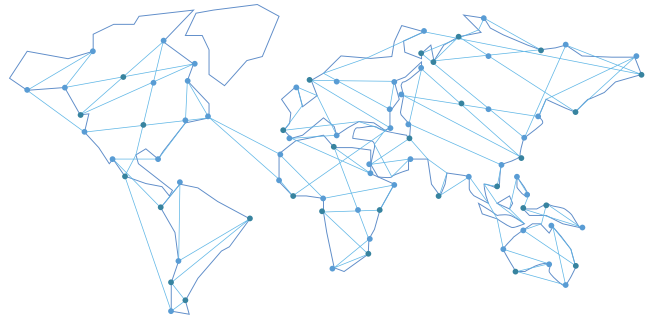
2016 KIEP Visiting Fellows Program



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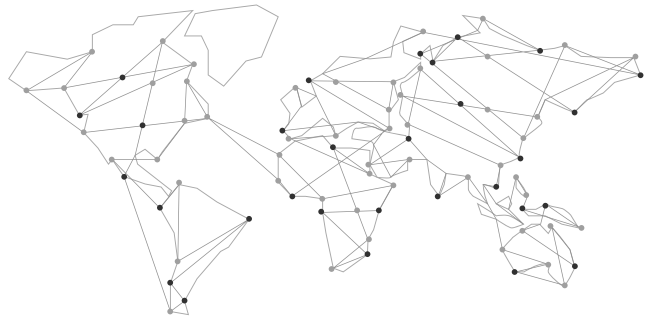

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The KIEP Visiting Fellows Program is published with the aim of promoting discussions among researchers, and to remember the outstanding achievements by the visiting fellows who came to KIEP.

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Since its inception, the VFP has demonstrated that sharing thoughts and ideas through face-to-face contacts and dialogue works as a catalyst for enhancing mutual understanding among scholars and professionals with diverse background.

By successfully implementing the VFP for the past 8 years, KIEP has been motivated to assume the role as a hub for international economic research in the region. As a host of the program, KIEP has many mandates. One of those tasks is to let more people know what has been accomplished through the program and how valuable it is.

In an effort to do so, KIEP has published series of research every year. This volume, the 8th of its series, contains eight research papers contributed by 2016 Visiting Fellows.

Publication owes many debts. Here I acknowledge just a few of them. First of all, I must express my deepest gratitude to the 2016 visiting fellows for their outstanding performances. My special thanks also goes to the Outreach Team and the staffs of the KIEP Publishing Team who worked very hard for the publication of this volume.

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Trade in Value Added and Sino-South Korean Collaboration on Global Value Chains

*Monan Zhang**

Abstract

In recent years, global value chains (GVCs) are accelerating restructuring and having a profound impact on global trade patterns. Trade in Value Added Accounting (TiVA) provides a new perspective for gaining insights into international trade, investment and industrial division under the background of globalization. Based on the data of the World Input-Output Database (WIOD), TiVA Method is adopted to measure the value added realization ability of China's manufacturing industry in global value chain division. According to findings, thanks to great development over years, China's manufacturing industry has strong ability to realize value added in the global value chain division. The share of domestic value added of China's manufacturing exports is higher than the world average and that of major emerging economies, but there is still a gap when compared with the United States and other developed countries. It is further shown that conclusions and implications

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of linking into GVCs can change drastically, especially for the issues related to measuring trade in GVCs and distribution of value-added gains between China and South Korea in GVCs. The bilateral trade structure is changing, from exports of primary products from China and imports of manufactured goods to China, to manufactured goods import and exports between both countries. This indicates that the decisive factor of bilateral trade between both countries is gradually changing from inter-industry trade determined by comparative advantage to intra-industry trade with emphasis on product quality and product diversification. Both countries are facing significant challenges in structural transition and GVCs upgrade. Thus, China and South Korea should formulate common development policies to vigorously support value-added trade and the collaborative upgrade of GVCs.

Keywords: Global Value Chains; Trade in Value Added; Backward Vertical Specialization; China-South Korea FTA

I. Introduction: GVCs and the Development of TiVA

At present, the growth of trade is sluggish, and the pulling effect of trade on world economic growth greatly weakens. Over the past three decades, global trade growth rat is twice global GDP growth rate. However, global trade growth falls into downturn stage due to weak demands, rising costs, increased trade frictions and other cyclical and structural factors. According to the global trade growth report issued by the WTO, global trade growth rate will decrease to 2.8% in 2016, far lower than the average annual growth rate of 6.7% as recorded 10 years prior to the 2008' financial crisis, which will also be eclipsed by forecast GDP growth. Weak trade performance dents both economic and job market prospects. From the perspective of revitalizing global trade development, enhancing global economies'

productivity, improving allocation efficiency of capital and technology, increasing infrastructure investment on innovation and deepening global value chains' distribution effectiveness and collaboration level will exert an essential influence on reversing the sustained slowdown or even recession of the world economy, which will imply profound significance for reinvigorated growth and prosperity.

In recent years, especially in the wake of the 2008' global financial crisis, "Global Value Chains (GVCs) and Trade in Value Added (TiVA)" have immediately emerged as research hotspots in the fields of international trade, investment, value chain and distribution. Multiple international organizations including the WTO (World Trade Organization), OECD (Organization for Economic Cooperation and Development) and UNCTAD (United Nations Conference on Trade and Development), along with research institutions and scholars of various countries, have conducted in-depth discussion and research on global value chains and the calculation of trade in value added (TiVA). As the key participant and promoter of global value chains, China was the first to incorporate reform of international trade statistics systems into the APEC cooperation agenda. The APEC Economic Leaders' Meeting, held in November 2014, endorsed such guiding documents as APEC Strategic Blueprint for Promoting Global Value Chain Development and Cooperation and Strategic Framework on Measurement of APEC TiVA under GVCs, which will lead further cooperation in the area of GVCs. The debate centers on the question of how to connect production through GVCs so as to reap the benefits of higher levels of specialization, revenue growth, technology transfer, FDI and employment.

As one of the key parts in global economic cycles and global production networks (GPNs), global value chains (GVCs) are spurred by global production networks and the new round of industrial and information technology revolutions is emerging as the pronounced feature of the world economy. The process of regional integration in East Asia and Asia Pacific is accelerating as ties among APEC member states strengthen, coupled with the progress in regional trade agreements including the ASEAN Economic Community, RCEP (Regional Comprehensive Economic Partnership), China-South Korea FTA, China-Japan-South Korea FTA and TPP (the

Trans-Pacific Partnership). Against the backdrop of deepening regional production and service networks, countries have unveiled wide-ranging reforms attempting to be incorporated into industrial value chains through enhancing regional collaboration. GVCs are embracing a period of in-depth integration.

The development of GVCs not only reshapes the world economic landscape, but also transforms inter-country trade, investment and production links. The new GVCs exhibits three remarkable traits as follows: 1) Final products go through two or more successive production phases; 2) Two or more countries participate in the production process while realizing value added at different stages; 3) At least one country applies imported intermediate products in the production process, resulting in massive trade in intermediate products and TiVA. The cross-border flow of intermediate products dominates global trade. Thanks to the development of GVCs, different production segments and phases are spread out in different countries and regions; as a result, the surging of cross-border flow of intermediate products becomes inevitable when these "intermediate segments and phases" need to cross national borders multiple times before delivering the final product and service. This differs drastically from the "content" of cross-border flow under traditional mode of international division of labor and trade. In other words, under the traditional division of labor and trade mode bounded by final products, final products make up the major content of cross-border flow, whereas under the mode of GVCs distribution and trade, the main content of cross-border flow is comprised of "intermediate products."

According to estimates on the basis of the statistics results of UN Comtrade, since 1995, global export of intermediate products represents a 50% share of total global exports, which soared up to 69.32% in 2013. This shows that trade in intermediate products have played a predominant role in global trade, which is an inexorable result from the advancement of GVCs. In the past decade, the emergence and development of GVCs have tremendously changed the organization form of global goods and services production. Statistics show that during 1913-1938, world export in goods grew by merely 0.7% annually. This rate crossed the threshold of 6% during 1948-1990, followed

by an average growth rate of 6.7% during 1990-1997. The share of exports in the world's GDP treaded on an upward trajectory from 5% in the early 1950s, 10% in the early 1970s, 15% in the early 1990s to 20% in 1995; global merchandise trade grew at an average of 7% between 1980 and 2011, as the total trade volume exceeded USD 38 trillion in 2014. The World Investment Report (2013), published by the UNCTAD, indicates that TiVA generates nearly 30% of GDP in developing countries and 18% of GDP in developed countries on average. Meanwhile, figures from OECD prove that value from international-investment-spurred cross-border connection has doubled over the past 20 years, as global FDI stock surged to 31% of world GDP in 2011 from less than 10% in the 1990s. This trend will continue.

Emerging economies and developing countries enjoy gradual annual increase in their shares in value-added trade, in line with a shifting in GVCs structure. This also reflects their growing participation in the value chain and efforts in transition and upgrade. The UN's World Investment Report (2013) points out that in developing countries, TiVA generates nearly 30% of GDP on average, as compared with 18% of GDP in developed countries. In the Asia-Pacific region, a pacesetter in GVCs distribution and development, intra-regional trade has grown twice as fast as the global trade since 1980s, eclipsing that of either NAFTA (the North American Free Trade Agreement) or EU. Asia-Pacific value chains, and in particular the East Asia Value Chain, emerge as one the most critical parts in global trade cycle and the primary driving force for world economic growth.

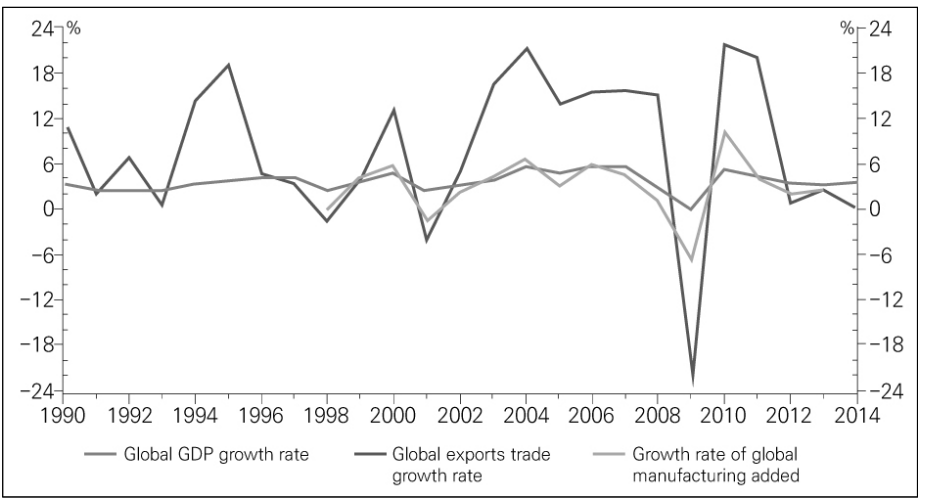
A joint study by the WTO and IDE-JETRO (2011) highlights a degree of complementarity among Asian industries, which is both cause and consequence of deepened economic interdependency between countries. The dependence on supply chain and production network by Asia dwarfs other regions, as trade in intermediate products grows at a much faster rate than that of final products. In terms of value added, intra-regional trade in Asia achieved annual growth rate of 10% during 1990-2012, doubling the rate outside Asia. Among Pan-Asian trade, intermediate products accounted for 60-65%. In the East Asia global industry chain, Japan and Korea made China the final link of the production chain. China imported semi-manufactured goods

and high-tech parts from developed East Asian economies and imported energy and mineral commodities from ASEAN countries before shipping final products to developed economies in Europe and North America, shaping up a complete GVC cycle.

Over the past decade, bilateral trade between China and South Korea skyrocketed. At the outset of the 21st Century, China became the top trade (merchandise goods) partner of South Korea, with a safe lead over other countries trading with Korea. In 2013, South Korea imported from and exports to China reached USD 83 billion and USD 146 billion respectively, as Sino-South Korean trade surpassed gross trade volume that South Korea had with the US and Japan. However, value chain collaboration between both parties remains low, as vertical intra-industry trade dominates Sino-South Korean commercial ties and horizontal intra-industry trade lags behind.

Therefore, TiVA not only provides a clear picture to genuine country origin, dependence and balance conditions of multilateral trade, but also mirrors profound impact of GVCs development on new global industry distribution and cross-border flow of trade pattern factors. Based on this, this paper employs data from the World Input-Output Database (WIOD), mainly from the perspectives of GVCs and TiVA, with the 1995-2011 input/output data of China's manufacturing sector from WIOTs, as well as KPWW Method (2014). In this way, this paper measures, compares and analyzes dynamic process and evolving rules embodied in TiVA between China and South Korea during 1995-2011. In addition, based on TiVA data calculations, this paper conducts an analysis on trade scale, industrial relevance and industries with comparative advantages, and proposes policy implications for China and South Korea to deepen partnership and industrial collaboration on GVCs.

Figure 1-1. Global Trade Growth Enters Period of Stagnation



Source: World Bank, WTO, IMF.

II. Policy Impacts and Challenges Posed by TiVA under the Framework of Conventional Trade

Against the backdrop of complex division of labor and production attributive to GVCs and division phases fragment and spread out to the world, boundary of division shrinks to process and production segment, and scale of trade in intermediate products outstrips that of final products. The series of changes have sparked significant changes i sources and main recipients of trade interest, statistics & measurement and distribution system, transforming the meaning of original trade interest. As a result, they are posing new challenges to trade policy concepts and contents under the conventional trade statistics framework, and raise new demands for global trade and investment rule framework.

Firstly, trade in intermediate products takes on a more prominent role for all economies, representing 70% of the global service trade and two-thirds of trade in goods. However, the current trade rules are still governing trade rules for final products. Trade rules and standards on intermediate products in regional and bilateral FTAs remain divergent and fragmented, which are in urgent need of integration.

Secondly, GVCs and global industrial chains objectively demand the reduction of tariffs and non-tariff barriers, especially those affecting intermediate products and services, and advance trade and investment facilitations. All these developments will inevitably proceed from the first generation of trade liberalization endeavors manifesting in curbing "on-the-border barriers" (tariff and non-tariff barriers on the border of trade entities) to the second generation of trade liberalization initiatives involved with domestic regulatory hurdles, while demanding cross-border interconnections. According to empirical research findings by the WEF (2013), reducing supply chain barriers can make global GDP and trade increase by 5% and 15%, respectively, whereas removing tariffs can produce 1% and 10% gains in GDP and trade, respectively. Likewise, a report by the OECD and WTO (2013) reveals that high transportation cost is the critical barrier for developing countries to improve their competitive position in GVCs.

Third, under the model of GVC, the interconnection of merchandise trade, investment and service trade improves. GVC encompasses regional production, geographic transfer of trade, trade investment, productive service and intellectual property rights in connection with trade and investment. The merge of production and trade means global trade is no longer a zero-sum game. GVC changes bilateral or multilateral trade relationships from sheer competition and exclusion into co-existence of collaboration in division of labor and production and competition, gravitating toward the policy choices for trade and investment liberalization and facilitation from conflict between surplus and deficit. The restriction or barrier imposed by one country on another country's products and trade in services can disrupt the operation of the entire value chain, resulting in spill-over effects on its own interest. All countries should adapt to such changes, alter the "obsession" about

surplus or deficit, and pursue coordination and integration of domestic regulations with global agreements. Meanwhile, trade competitiveness has shifted from industry or product in the traditional sense to task or segment, i.e. evolvement from "trade in goods" to "trade in tasks." Since a single country's industrial policy cannot cover the entire global value chain, the adoption of specified industrial policy becomes necessary, which must be aligned with its own comparative advantages and policies on participation strategy in order to be more effective.

Fourth, GVC-led policy stresses the import trade facilitation of intermediate products. Under GVCs, trade barriers over intermediate products cause accumulative and magnifying effect, considerably raising the cost of trade protection. As intermediate products go through multiple cross-border transactions, even if the level of tariffs and non-tariff barriers stays very low, protection can be built up incrementally, severely impacting the cost and price of final products. Significantly reducing tariffs and non-tariff barriers on intermediate products can effectively cut the production cost for downstream processing manufacturing sector, and enhance export competitiveness on the final product market. Because exports of many developing countries and emerging economies mainly gain from FDI and imported intermediate products, their exports contain relatively high foreign added value. Thus, it is necessary to further lower average tariff levels, curtail tariff peak value and maximum tariffs, encourage sectoral trade liberalization (zero tariffs), restrict tariff escalation, eliminate import and export quota and quantity limits, and revise cumulative rules of origin so as to encourage the development of regional value chain trade. According to estimates, if OECD countries implement trade facilitation measures, they can reduce potential trade cost by 10%; medium-income and low-income countries can even cut down potential trade cost by 15.5%.

Last but not the least GVC-led policy requirements propel the liberalization of service trade. Service trade plays the role of "adhesive" in the GVCs. "Servitization" of manufacturing enables services as an intermediate to get into the production chain, exerting a coordinating function and effectively enhancing the competitiveness of merchandise trade like data telecommunication and specialized services. At the

same time, service trade promotes flows of capital, human resources and information within the supply chain, and effectively coordinates the interconnection of different linkages on the value chain. The main policy measures for trade liberalization in services are taken through commitments on a negative list basis and methods of providing service trade, with a view to further expanding commitment coverage for the sectors and approaches and deepening liberalization of trade in services.

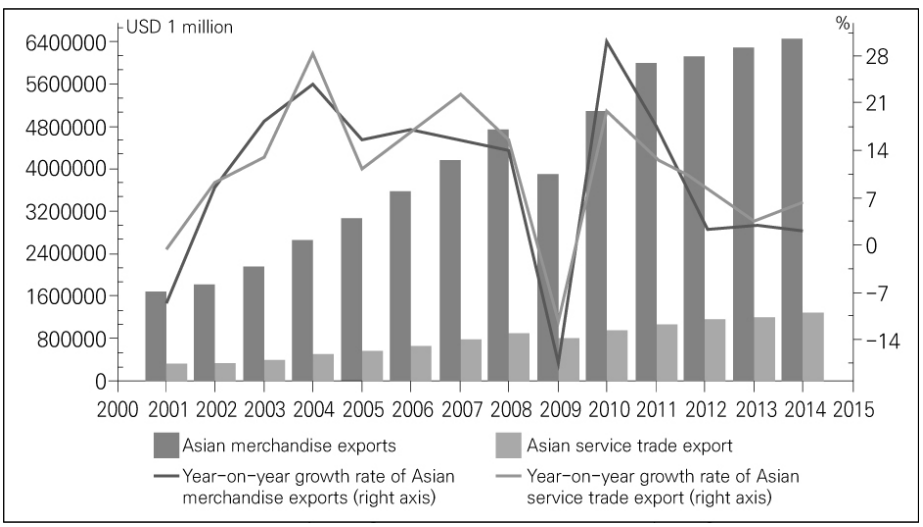
Table 2-1. The Role of Service Investment in GVCs

(Unit: %)

	Actual Export Share	Value Added Proportion in Total Export
Service Department	22%	46%
Manufacturing Department	71%	43%
Raw Material Department	7%	11%

Source: UNCTAD World Investment Report 2014, UNCTAD Database.

Figure 2-1. Asian Service Trade Develops Faster than Merchandise Trade



Source: WTO statistic database.

III. TiVA Statistics Methods and Main Databases in the World

3.1. The Drawbacks of Traditional Gross Trade Flow Estimate and the Emergence of New Methods

Against the backdrop of GVC-led trade patterns, traditional gross trade flow statistics based on the principle of country of origin have at least two obvious drawbacks: 1) Due to the presence of massive trade in intermediate products, cross-border trade estimates instead of net value added cause many double counting or multiple counting; 2) Due to failure to reflect the flow of products on the production chain, bilateral trade figures contain the value of intermediate products from other countries. For example, in "triangular trade," Chinese exports to the US contain a considerable amount of intermediate products from Japan, South Korea and. So a new statistical method for international trade is urgently needed.

Therefore, TiVA (TiVA), a new counting method, which genuinely reflects global trade operation and order, attracts ever-growing attention. The GVC-based statistical method of value added deducts the reverse value added of traditional customs statistics when calculating the value contribution of each country, thus avoiding double or multiple counting and truly reflecting the situations of each country in global trade. (The value added to a product by a country at a production phase is called as "domestic value added", while value added in its exports by upstream countries is called as "foreign value added".) As a result, the ratio of domestic valued against foreign value added in a country/region's exports is its yield on trade.

TiVA research is originated on the basis of the concept of "Vertical Trade" proposed by Hummels in 1998. In 2001, Hummels, Ishii and Yi ("HIY" for short) applied "Vertical Specialization (VS)" formula to measure direct or indirect value added exports. Thus, the name of HIY Method came into being. Later, Koopman, Powrs, Wang and Wei (2010) ("KPWW" for short) proposed the KPWW Mode

to combine the Value Added approach in the national account system with the traditional Gross Value Method. Through forging global multiple-sectoral I/O databases, it extends the domestic value added of a single country to a region and the whole world, and measures domestic value added and foreign value added to a country's trade in a comprehensive manner. In addition, KWW divides gross exports into final demand and intermediates. It further decomposes gross exports into domestic value-added embodied in exports of final goods and services absorbed by the direct importer, domestic value-added embodied in exports of intermediate products used by the direct importer to produce its domestically needed products, domestic value-added embodied in intermediate products used by the direct importer to produce goods for third countries, and domestic value-added embodied in intermediate products used by the direct importer to produce goods shipped back to source. This avoids double counting or multiple counting of TiVA, and effectively improves the trade statistics approach.

3.2. The main database and indices of global value chain (Existing data sources, classification systems and databases)

The development of GVCs and TiVA corresponds to the refining of world input/output databases. At present, six major multi-country I/O databases have been developed, including the WTO database on TiVA, the World Input-Output Database (WIOD) of EU, the World Input-Output Database of OECD, EORA multi-region IO database of UNCTAD, GTAP Database developed by Purdue University, and Asian Input And Output Tables (AIIOT) developed by Institute of Developing Economies in Japan.

World Input-Output Database (WIOD), the most popular one, is a project financed by the European Commission and jointly developed by various organizations. Unveiled in May 2012, WIOD consists of five sub-databases, and World Input-Output Tables (WIOTs) bearing the closest relationship with TiVA estimates. WIOD provides

a series of world input-output tables during 1995-2011, about the input-output situations of 59 product groups in 35 sectors, covering 27 EU countries, 13 other major countries (regions), and 41 economies in "other parts of the world." These countries and regions account for more than 85% of world GDP. So it favorable demonstrates global major economic activities. Unlike traditional input-output tables, WIOTs reflect the intercountry input-output relationship of continuous time series. In addition, WIOT decomposes intermediate products and final goods produced by each country into domestically produced supply and imported supply. Thus, WIOD database tremendously boosts the development of TiVA statistical approaches, providing great convenience in counting value-added trade and breaking down the value-added portion of a country's exports. It has emerged as the most effective tool in global GVCs and TiVA researches.

3.3. TiVA Measuring Method and Data Source of this Paper

Based on this, from the perspectives of GVCs and TiVA, this paper adopts data from WIOD and KWW Method to decompose the value added source of China's trade during 1995-2011, delve into the value flow, structural features and change regularity of China's TiVA. In particular, the paper places an emphasis on the analysis of South Korea's position and role in China's value chain and TiVA. In addition, in accordance with TiVA data calculated, this paper conducts analysis on industrial relevance, industry dependence and industries with comparative advantages, while proposing policy implications for China and South Korea to deepen partnership and industrial collaboration on global value chains.

KWW Method was first proposed by Zhi Wang and Shang Jinwei in 2010 and 2013. This measuring method decomposes a country's gross exports into domestic value added, foreign value added and double-counted value added to realize full decomposition of total exports. The approach decomposes trade in intermediate products and attains TiVA of countries on the production chain, thereby distinguishing

itself from other methods. TiVA Estimation Method (KWW, Koopman, 2013) decomposes a country's exports into domestic value added and foreign value added. Based on the balance nature of input/output table line equilibrium relationship, a country's gross output is used for intermediate demand and final consumption; intermediate demand can further be divided into domestic production demand and foreign production demand, while final consumption can be further divided into domestic final consumption and foreign final consumption. KWW states that a country's gross exports to the world is the sum of the following four broad terms: 1) Domestic value-added embodied in exports of final goods and services absorbed by the direct importer; 2) Domestic value-added embodied in exports of intermediate inputs used by the direct importer to produce its domestically needed products; 3) Domestic value added embodied in intermediate exports used by the direct importer to produce goods for third countries ("indirect value added exports"); 4) Domestic value-added embodied in intermediate exports used by the direct importer to produce goods shipped back to source ("reverse value added"). Therefore, KWW finally decomposes domestic value added and foreign value added of a country's export depending on the use of the exported goods, deducting multiple counting domestic value added and foreign value added, to get domestic value added and foreign value added required by the research topic. To study the weight of domestic value added and foreign value added to a country's exports, further decomposition is required with that of intermediate products being the key. In short, we decompose gross exports into nine sub-components:

1) Domestic value added of exports of final products to direct importing countries (DVA_FIN);
2) Domestic value added of intermediates that are absorbed by the direct importer, i.e. that are used by the direct importer to produce final goods and services to be consumed in the country itself (DVA_INT);
3) Domestic value-added embodied in intermediate exports used by the direct importer to produce goods for third countries (DVA_INTrex). According to KWW (Zhi Wang and Shang Jinwei, 2014), this component can be further

divided into sub-components according to product use: Value added to intermediates that the direct (initial) importer embodies into other goods and services (intermediate), which then are exported to third countries (DVA_INTrexI1); value added to intermediates that export to the direct importer to produce final products for re-export to the third country (DVA_INTrexF); value added to intermediates that export to the direct importer to produce intermediate products to export to the third country, before the final products produced by the third country are re-exported to the direct importer (DVA_INTrexI2);

4) Value added to intermediates that are ultimately absorbed at home, embodied in imports of final goods and services (RDV_FIN), as part of "reverse value added." According to KWW (Zhi Wang and Shang Jinwei, 2014), this component can be further decomposed into value added to intermediates that export to the direct importer for final production before returning to the source (RDV_FIN1) and value added to intermediates that export to the direct importer to produce intermediate products for re-export to the third country, before the final products produced by the third country are re-exported to the source (RDV_FIN2);
5) Valued added to intermediates that are ultimately absorbed at home, embodied in imports of intermediate products and services (used to produce final goods and services for domestic consumption (RDV_INT), also a part of "reverse value added";
6) The double counting portion of domestic value added (DDC), according to KWW (Zhi Wang and Shang Jinwei, 2014), can be further decomposed into double counting from final product exports (DDC_FIN) and double counting from intermediate products exports (DDC_INT);
7) Value-added from foreign countries embodied in gross exports ("foreign value added used in exports") (FVA_FIN), which can be further divided into value-added for the direct importer of final product exports (MVA_FIN) and value added to final product exports to other countries (OVA_FIN);

8) Foreign value added to intermediate products exports (FVA_INT) can be further decomposed into value added to direct importer of intermediate products exports (MVA_INT) and value added to other countries of intermediate products exports (OVA_INT);
9) The double (multiple) counting portion of foreign value added (FDC) includes double counting of direct importer's exports (MDC) and double counting of other countries' exports (ODC).

IV. Analysis of Chinese Value-added in GVCs

TiVA share of developed countries is higher than that of developing countries. In recent years, however, TiVA share of the US, Japan, the UK and other major developed economies has declined significantly. In contrast, emerging economies and developing countries (represented by China) witness ever-increasing TiVA share year by year. Moreover, China's TiVA share skyrockets in the most significant manner. Change in structure of TiVA is inseparable from change in the structure of global value chain, which not only results from the fact that developing countries are constantly deeply involved in transformation and upgrading of global value chain, but also leads to change in the structure of TiVA.

4.1. China's Status and Structural Change of TiVA

In 2013, the OECD published the latest global value chain research report Interconnected Economy, which holds that the success of China's foreign trade is mainly attributed to integration into global value chain by means of attracting foreign investment and developing processing trade. The success of China's export is achieved thanks to processing trade policy. China's economic development and

successful export are closely related to processing trade and Asian global value chains development. GVCs bring about vertical division of labor in Asia, and create comparative advantage for post-industrial China to develop manufacturing.

In the 1990s, characterized by embedded mode for division of labor, processing trade enjoyed rapid development, and trade in intermediate products accounted for a sharply rising proportion in China's foreign trade. In the decade following China's accession to the WTO, the average annual growth rate of trade in intermediate products was higher than that of trade in consumer goods or trade in capital goods. China's trade in intermediate products is manifested in two aspects: 1) Taking advantage of domestic cheap resources and labor endowments, producing low-level intermediate inputs, and exporting to foreign countries; 2) Importing intermediate inputs from abroad, taking advantage of domestic labor endowments for processing and assembly, manufacturing final products or intermediate products, and exporting to foreign countries (i.e., processing trade).

Processing trade gives rise to triangular trade in Asia so that China can develop into a manufacturing base with large scale and favorable depth within a relatively short period, and boasts strong production capacity in most sectors and production processes of manufacturing. In particular, these sectors, dominated by intra-production specialization (such as electronics, automotive and machinery), form relatively complete industrial chains and industrial clusters, and attract international industrial transfer in a growing number. According to the statistics of the UN Comtrade, since 2005, trade in intermediate products has occupied an important position in gross trade. China mainly imports a large number of parts from South Korea, the ASEAN, the EU and Japan, and then China mainly exports final products to the US, the EU and Hong Kong. China's parts import is relatively concentrated and mainly made up by top three economies. For example, electronic integrated circuits are imported from Taiwan, South Korea and Malaysia (accounting for over 70%). Likewise, the primary countries and regions with parts export to China are also essentially the same as those of final products. But intermediate products export to China is more concentrated and mainly made up by top three economies. For

example, telecommunications equipment and spare parts are exported to Hong Kong, the US and the EU (accounting for about 70%). China is becoming a hub of global trade in intermediate products.

China is engaged in large-scale imports of intermediate products, which has a significant role in promoting China's finished product export. This highlights that China plays the most important role of processer, assembler and producer in global value chains and international production networks. In other words, China imports intermediate products from Japan, South Korea and other emerging industrialized countries to process and assemble them into final products, and exports such final products to the US, the EU and other developed countries. Through further analysis of intermediate products, it is found that the difference of intermediate products exerts a significant impact on industrial specialization and technology upgrading. As for the structure of intermediate products, technical content of parts is generally higher than that of semi-manufactured goods. Especially precision parts of machinery, electronics and other industries are cutting-edge realms of modern manufacturing, the relevant core technologies are mostly controlled by the developed countries, and technology inputs and technology spillover effect of parts import are stronger. Accordingly, export has remarkable effect for upgrading the entire value chain. As a type of input with relatively low technology content, semi-manufactured goods are mainly final consumer goods at the low end in the food processing industry and textile industry. Excessive growth of semi-manufactured goods import is likely to be locked at the low end of intra-production specialization, which is not conducive to improvement on productivity.

On one hand, as China joins in the rank of "middle-income" countries, costs of labor force, land and other low-level technical factors continue to show an upward trend so that China's comparative advantage in the production of low-technology manufactured goods is undermined by intensive competition from neighboring developing countries and Latin America. On the other hand, in the wake of the international financial crisis in 2008, developed countries and industrial economies successively put forward "Return of Manufacturing." A new round of industrial

revolution and regional trade agreements is also reshaping the global value chain. Under this background, in recent years, China is actively pushing forward industrial upgrading, while the export structure of embedded specialization is also undergoing major change and may be phased out. According to the statistics of the General Administration of Customs of the PRC, the proportion of processing trade in export decreased from 50.7% in 2007 to 37.8% in 2014. During the same period, the proportion of processing trade in import decreased from 38.5% to 26.8%. This indicates that China's trade structure has continued to transform and upgrade.

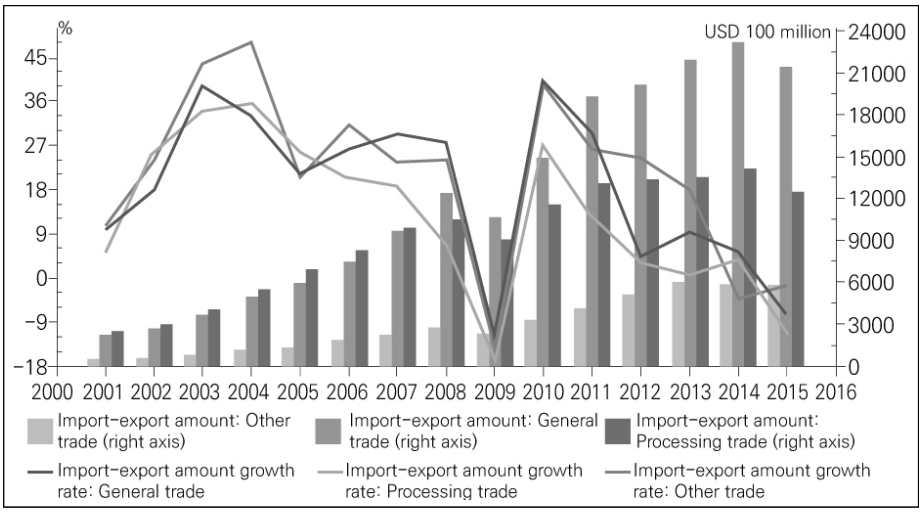
Table 4-1. China's Importand Export Trade Modes in 2007-2014

(Unit: USD 100million, %)

	Export			Import		
	Gross Value	Processing Trade		Gross Value	Processing Trade	
		Amount	Proportion		Amount	Proportion
2007	12,180	6,177	50.7	9,558	3,684	38.5
2008	14,285	6,752	47.3	11,331	3,784	33.4
2009	12,017	5,870	48.8	10,056	3,223	32.1
2010	15,779	7,403	46.9	13,948	4,174	29.9
2011	18,986	8,354	44.0	17,435	4,698	26.9
2012	20,489	8,627	42.1	18,178	4,811	26.5
2013	22,100	8,608	39.0	19,503	4,970	25.5
2014	23,427	8,844	37.8	19,603	5,244	26.8

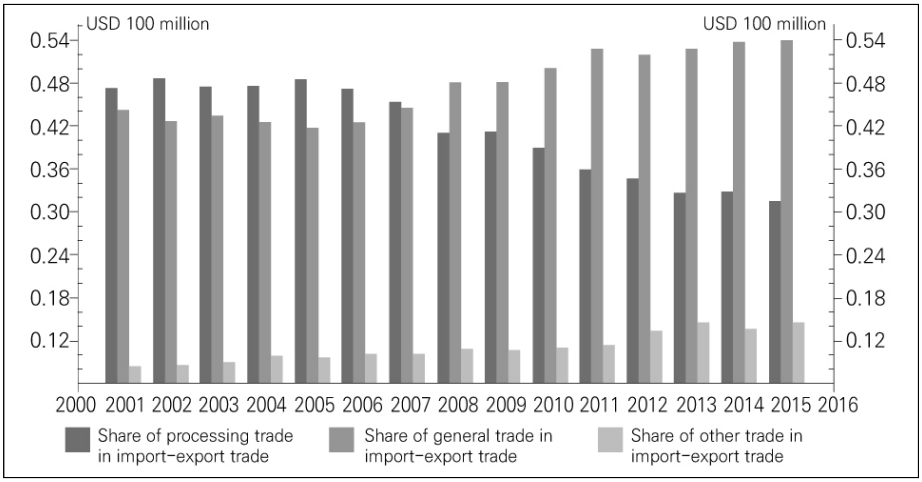
Source: General Administration of Customs of the PRC.

Figure 4-1. China's Growth and Change in Import and Export Trade Structure since Its Accession to the WTO



Source: General Administration of Customs of the PRC.

Figure 4-2. China's General Trade Becomes Dominating in Place of Processing Trade



Source: General Administration of Customs of the PRC.

China's equipment manufacturing is steering its export structure to upgrade from general consumer goods to capital goods. Since 2015, electromechanical products have accounted for about 50% of China's foreign trade export, with large-sized complete sets of equipment and stand-alone export holding the spotlight. In addition to high-speed rail and nuclear power, China's manufacturing demonstrates strong competitive advantage in other fields. Export growth maintains high rates in railway, shipping, aerospace and other sectors of transportation equipment manufacturing.

Table 4-2. China's Import and Export of Equipment Manufacturing Spare Parts and Proportions in Import and Export of the Whole Equipment Manufacturing

(Unit: %)

	Export amount of parts (USD 100 million)	Proportion of export of parts in export of equipment manufacturing	Import amount of parts (USD 100 million)	Proportion of import of parts in import of equipment manufacturing	Proportion of imported parts in output value of equipment manufacturing	Proportion of imported parts in export of equipment manufacturing
	(1)	(2)	(3)	(4)	(5)	(6)
2001	451	0.39	568	0.45	0.170	0.496
2002	593	0.43	635	0.43	0.155	0.461
2003	862	0.42	938	0.43	0.168	0.462
2004	1228	0.42	1281	0.44	0.180	0.441
2005	1552	0.41	1580	0.47	0.170	0.414
2006	1941	0.39	1925	0.47	0.158	0.391
2007	1755	0.28	1924	0.40	0.118	0.308
2008	2215	0.30	2142	0.41	0.098	0.294
2009	1705	0.27	1861	0.39	0.075	0.292
2010	2275	0.27	2399	0.38	0.075	0.284
2011	4380	0.45	4007	0.55	0.102	0.410
2012	2558	0.24	2551	0.34	0.061	0.241
2013	2616	0.23	2583	0.31	0.054	0.229

Source: UN Comtrade Database, General Administration of Customs of the PRC.

Through further analysis, it is asserted that in addition to these inherent advantages of the industry itself, the evolution of China's trade structure is consistent with international industrial transfer course. From the perspective of development process, international industrial transfer mainly evolves along "Consumer Goods—Consumer Electronics—Machinery and Equipment." Equipment manufacturing is mostly knowledge-intensive and technology-intensive. As a developing country, China still lags behind in terms of machinery, equipment and technology compared with foreign counterparts. China introduces machinery, equipment and technology in order to further promote China's industrial upgrading in the global value chain.

4.2. Measurement of China's Gains Distribution in GVCs and TiVA

Of course, China's transformation of trade structure and trade mode should not merely refer to the shares of general trade and processing trade. Meanwhile, as China is a manufacturing powerhouse, its trade surplus is not representative of all of its foreign trade interests, and a considerable part of trade surplus is created by countries importing resources and intermediate products. Therefore, the foreign trade imbalance, measured by TiVA, can better reflect China's comparative advantage in the international division of labor and production network.

China enjoys an increasingly higher position in the global TiVA. At present, China has gradually transcended Japan, the US and Germany and other developed economies to emerge as the biggest economy in terms of TiVA among major economies. In 1995, China's TiVA was only USD 140.43 billion, and ranked 9th among major economies. The US, Germany, Japan, France, the UK, Italy, Canada and the Netherlands saw TiVA of USD 632 billion, USD 458.61 billion, USD 444.48 billion, USD 263.24 billion, USD 239.55 billion, USD 211.97 billion, USD 157.04 billion and USD 147.22 billion in descending order. In 1997, China's TiVA reached USD 176.7 billion and exceeded that of Canada and the Netherlands, so China became the world's seventh largest country in terms of TiVA. In 2002,

China's TiVA rose to USD 295.12 billion and exceeded that of France and Italy, which ranked 5th among major economies. In 2007, China's TiVA maintained rapid growth trend and exceeded that of Japan and the UK, so China became the world's third largest country in terms of TiVA. In 2011, China's TiVA rapidly increased to USD 1.57442 trillion and exceeded that of Germany and the US, so China became the world's largest country in terms of TiVA among major economies. From the perspective of growth rate of TiVA, China's TiVA witnessed the highest average annual growth rate (16.3%) during 1995-2011, far higher than the global growth rate of 7.3%.

From the perspective of value added from per unit export, domestic value added from global export by every USD 1,000 showed a downward trend, recording USD 783, USD 781, USD 753, USD 711 and USD 724, respectively. Domestic value added from China's export by every USD 1,000 was slightly higher than the global average but still showed a downward trend, recording USD 836, USD 853, USD 808, USD 731 and USD 755, respectively. For resource-based economies, domestic value added from export by USD 1,000 was relatively high, and showed an increasing trend year by year. For example, domestic value added from Russia's export by every USD 1,000 was USD 918 in 1995 and increased to USD 928 in 2011, which was followed by Brazil (domestic value added of USD 876 from Brazil's export by every USD 1,000 in 2011) and Australia (domestic value added of USD 855 from Australia's export by every USD 1,000 in 2011).

Table 4-3. TiVA of Major Economies during 1995-2011

(Unit: USD million)

Economy	1995	1997	2002	2007	2011
China	140429	176699	295123	981027	1574422
The US	631998	739893	724546	1205849	1455191
Germany	458607	445740	527256	1054499	1112159
Japan	444479	419169	397477	639976	729821
The UK	239547	287825	311374	561322	538800

Table 4-3. Continued

Economy	1995	1997	2002	2007	2011
France	263242	261840	275723	455471	483151
Russia	75464	80347	94751	301264	450607
Italy	211973	222747	229829	423055	428825
Canada	157038	174918	216112	362095	406304
South Korea	111846	120385	132661	282878	362168
The Netherlands	147221	136915	150332	278890	319571
Australia	64647	74570	71599	164382	279366
Spain	86204	97210	118122	232798	268282
India	37709	42556	66122	190191	263342
Brazil	51345	54252	63932	160325	257857
Mexico	59343	80960	114488	191991	236528
Belgium	106831	97921	102238	181376	197946
Indonesia	45646	54224	53392	104955	185519
Taiwan	84566	94251	101025	148512	176671
Sweden	71325	74403	75406	153119	168592
Poland	26648	29916	40905	116412	147698
Austria	53060	52346	64381	128528	138303
Turkey	24405	36444	32425	83940	121377
Ireland	28981	36011	60959	119702	120089
Denmark	46571	43879	50791	92175	99059
Czech Republic	17650	18337	25983	71582	87184
Finland	35523	34860	39645	73282	68032
Hungary	11596	13415	20982	53047	61468
Portugal	19965	20348	22670	45182	41231
Romania	6906	7192	10696	35257	41025
Slovakia	7006	6858	8903	31818	36201
Luxembourg	10611	9353	11531	30588	34990
Greece	7687	8692	13621	35823	32158

Table 4-3. Continued

Economy	1995	1997	2002	2007	2011
Slovenia	6127	6192	7410	16869	16048
Bulgaria	3863	3887	4671	13121	15582
Lithuania	1866	2908	3884	11625	13388
Latvia	1429	1881	2613	6937	7913
Estonia	1344	1833	2537	7025	7652
Cyprus	1453	1427	1620	3304	3541
Malta	1073	1119	1509	2899	3327
Global	4315009	4554611	5318943	10799538	13324886

Source: Calculation Based on WIOD Database.

Table 4-4. Domestic Value Added of Major Economies from Export by Every USD 1,000 during 1995-2011

(Unit: USD)

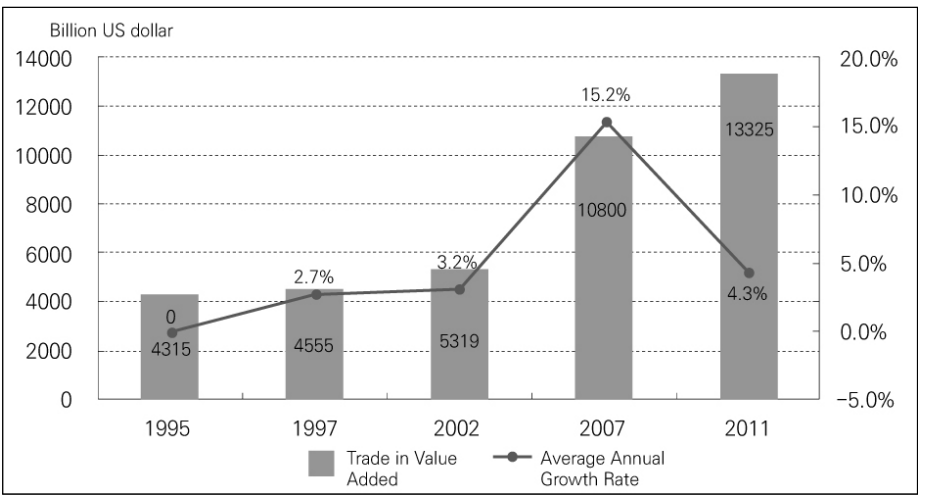
Economy	1995	1997	2002	2007	2011
Australia	874	871	869	841	855
Austria	756	735	711	660	652
Belgium	602	595	599	559	533
Bulgaria	675	627	661	554	652
Brazil	918	913	868	878	876
Canada	739	726	737	755	784
China	836	853	808	731	755
Cyprus	731	692	705	716	727
Czech Republic	692	680	602	535	529
Germany	794	783	758	698	694
Denmark	734	733	701	626	623
Spain	787	775	745	695	694
Estonia	620	598	560	617	666
Finland	762	750	747	670	652

Table 4-4. Continued

Economy	1995	1997	2002	2007	2011
France	787	774	752	716	699
The UK	791	794	805	798	768
Greece	808	773	697	715	756
Hungary	711	650	560	515	538
Indonesia	843	842	815	837	848
India	894	895	849	784	779
Ireland	613	613	581	592	553
Italy	803	814	793	736	719
Japan	918	903	891	829	815
South Korea	755	716	713	649	591
Lithuania	670	656	660	678	659
Luxembourg	547	481	419	387	387
Latvia	749	738	739	693	752
Mexico	735	714	694	696	688
Malta	491	547	554	545	603
The Netherlands	675	662	677	639	595
Poland	826	810	732	666	651
Portugal	722	719	710	682	717
Romania	766	740	715	721	758
Russia	918	922	905	922	928
Slovakia	677	622	543	521	576
Slovenia	661	661	636	577	634
Sweden	737	732	709	675	676
Turkey	860	825	765	702	773
Taiwan	666	666	645	536	522
The US	826	820	802	788	790
Global	783	781	753	711	724

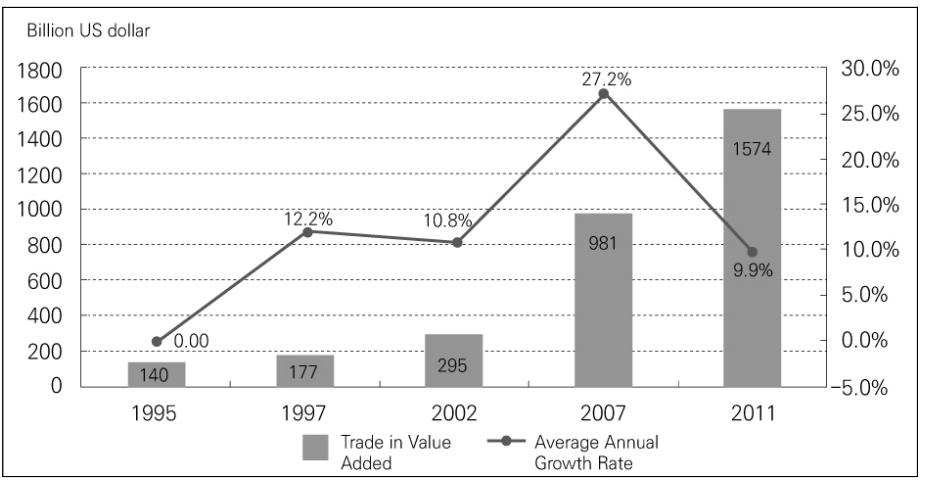
Source: Calculation Based on WIOD Database.

Figure 4-3. Global TiVA and Average Annual Growth Rate during 1995-2011



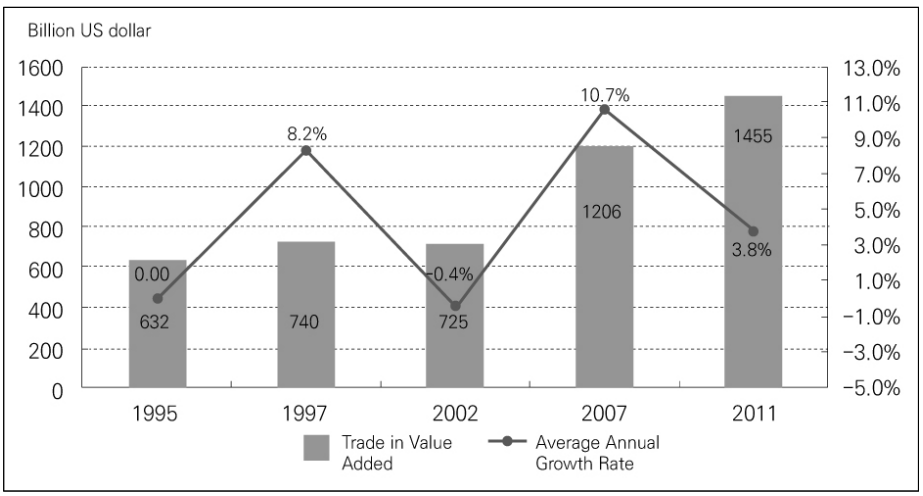
Source: Based on WIOD Database.

Figure 4-4. China's TiVA and Average Annual Growth Rate during 1995-2011



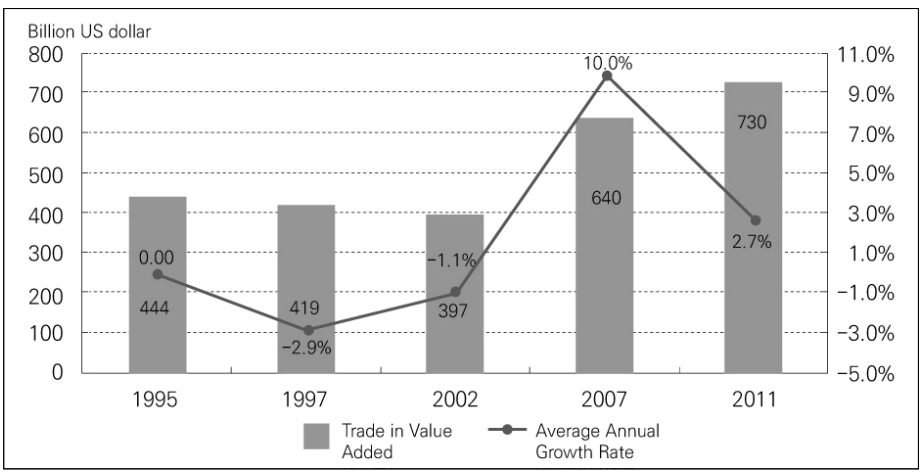
Source: Based on WIOD Database.

Figure 4-5. America's TiVA and Average Annual Growth Rate during 1995-2011



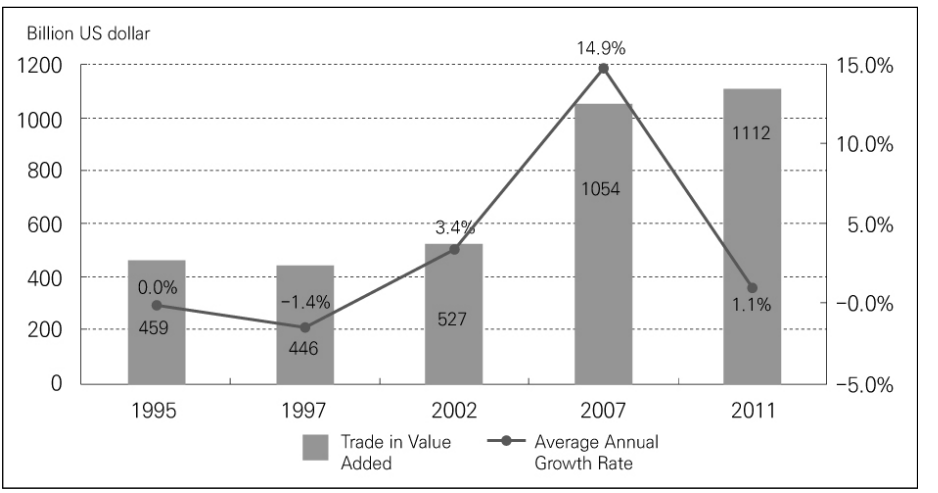
Source: Based on WIOD Database.

Figure 4-6. Japan's TiVA and Average Annual Growth Rate during 1995-2011



Source: C Based on WIOD Database.

Figure 4-7. Germany's TiVA and Average Annual Growth Rate during 1995-2011



Source: Based on WIOD Database.

4.3. China's Approaches to Participation in GVCs and Structure of TiVA

A country or region can either participate in global value chains at the low end of the production process (such as processing and assembly) or the high end of the production process (such as R&D and design). Therefore, the degree of participation in a global value chain can comprehensively reflect the degree of a country's participation in the international division of labor. The degree of participation in a value chain can further be classified into forward participation (output impact) and backward participation (demand impact), which are respectively measured by their forward vertical specialization rate (VS1) and backward vertical specialization rate (VS). Forward vertical specialization rate (VS1) refers to the share of intermediate products imported by other countries in a country's export, which demonstrates the contribution of such country's products to the supply chain of other countries. Backward vertical specialization rate

(VS) refers to the share of imported intermediate products in a country's export, which demonstrates the country's export dependence on import. On the whole, the forward vertical specialization rate and backward vertical specialization rate can comprehensively indicate a country's level of participation in division of labor in global value chain.

The specific formula is given as follows:

$$VSshare = \frac{u \bullet M \bullet (I-A)^{-1}}{u \bullet EX}$$

Wherein, u refers to row vector of $1 \times n$ with elem

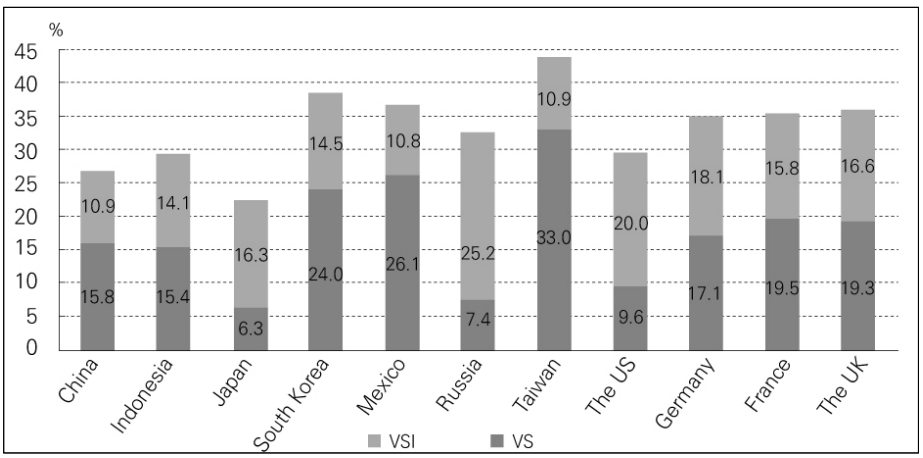
ent of 1; M refers to import coefficient matrix of $n \times n$ (the share of imported intermediate consumption in total inputs); A refers to domestic direct consumption coefficient matrix of $n \times n$; I refers to unit matrix of $n \times n$, $(I-A)^{-1}$ refers to domestic Leontief Inverse Matrix; EX refers to export column vector of $n \times 1$. This indicator manifests a country's import intermediate consumption directly or indirectly induced by a country's export demand, i.e., import intermediate consumption contained in a country's export. This indicator is widely used to indicate the degree of a country's participation in the global supply chain.

However, a high degree of participation in global value chain does not necessarily imply high gains distribution. As a representative of the newly industrialized economies, China mainly participates in global value chains in a backward manner, and its backward vertical specialization is higher than that of developed economies and resource-based economies, which presents a constantly deepening trend. Newly industrializing economies are in the middle and downstream of the global production chain, mainly devoted to processing and assembly or OEM, and they participate in the global value chain in a backward manner, show high dependence on imported intermediate products, and demonstrate high backward vertical specialization. China is showing a high and rapidly-growing backward vertical specialization rate. Especially during 2002-2007, China clearly participated in the global value chain to a more profound extent. China's backward vertical specialization rate rose by 7%, from

24.7% in 2007, and declined slightly in 2011. During the period of 1995-2011, China's backward vertical specialization rate was 15.8%, 14.1%, 17.9%, 24.7% and 21.8%, respectively. The backward vertical specialization of developed economies and resource-based economies is at a low level under upward trend and slow growth. As major economies in the Asian production network, South Korea and Taiwan always boast higher backward vertical specialization than that of other Asian economies. From 1995-2011, the backward vertical specialization rate of Taiwan was 33.0%, 33.0%, 34.9%, 45.8% and 47.3%, respectively, while the backward vertical specialization rate of South Korea was 24.0%, 27.8%, 28.2%, 34.3% and 40.3%, respectively.

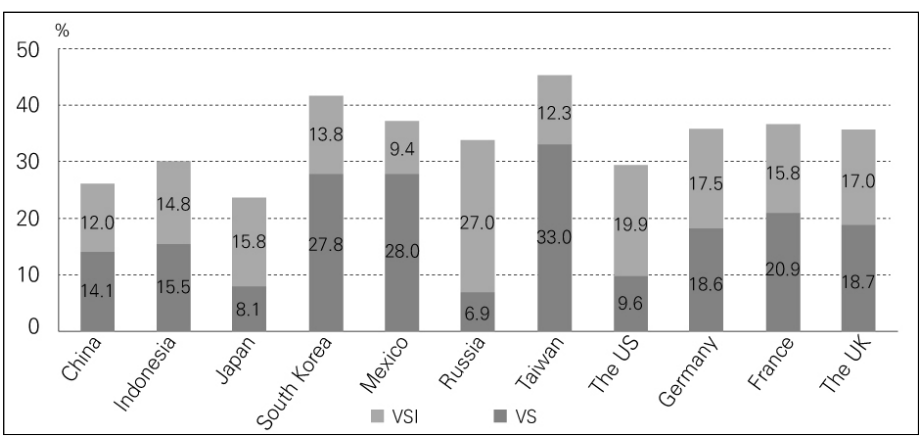
From the perspective of industrial structure, in addition to the traditional middle-tech and low-tech manufacturing, China's middle-tech and high-tech manufacturing also participates in global value chains in a backward manner, and the degree of participation continues to increase. During the period of 1995-2011, the traditional manufacturing industries (such as the paper-making and paper product industry, printing and recorded media reproduction industry, rubber and plastic product industry and metal products industry) are seeing a continuously higher level of backward vertical specialization. Backward vertical specialization of electrical machinery and equipment manufacturing, chemical material and chemical product manufacturing and chemical fiber manufacturing is lower than that of the traditional middle-tech and low-tech manufacturing, but showing an accelerating upward trend. From 1995-2011, the backward vertical specialization rate of electrical machinery and equipment manufacturing was 12.1%, 13.1%, 15.8%, 15.6% and 16.1%, respectively; while the backward vertical specialization rate of chemical material and chemical product manufacturing and chemical fiber manufacturing was 14.6%, 19.8%, 23.6%, 24.1% and 19.3%, respectively.

Figure 4-8. Participation of Some Economies in GVCs in 1995



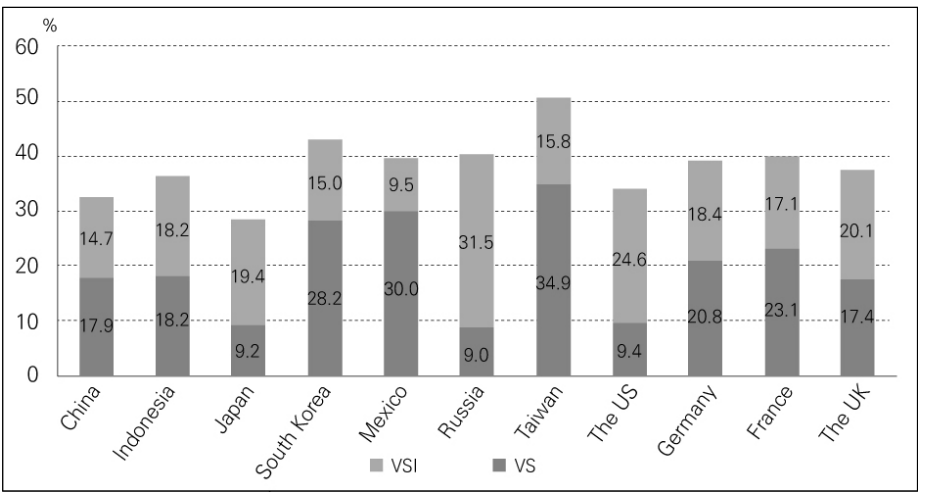
Source: Based on WIOD Database.

Figure 4-9. Participation of Some Economies in GVCs in 1997



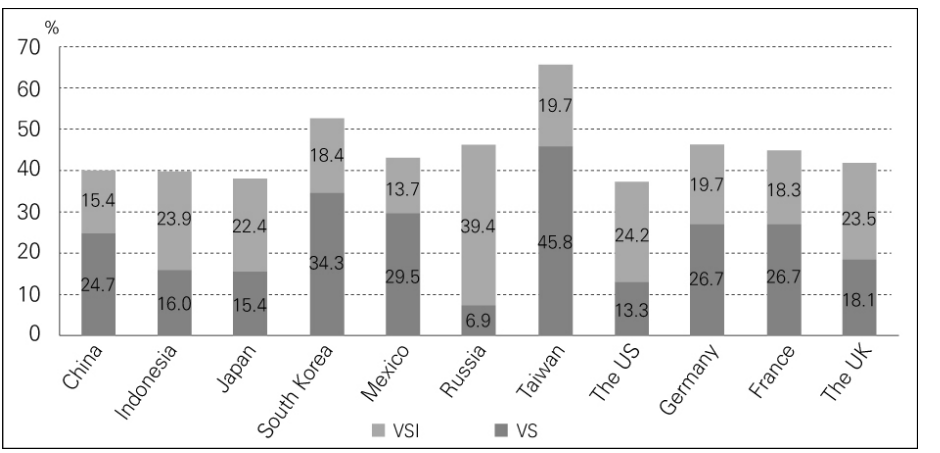
Source: Based on WIOD Database.

Figure 4-10. Participation of Some Economies in GVCs in 2002



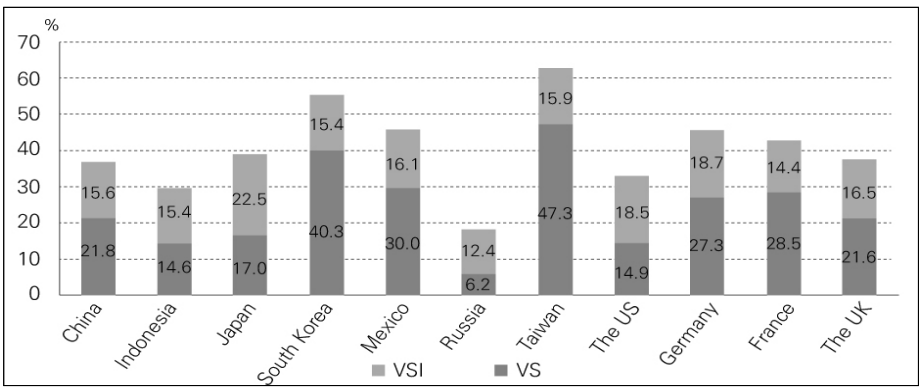
Source: Based on WIOD Database.

Figure 4-11. Participation of Some Economies in GVCs in 2007



Source: Based on WIOD Database.

Figure 4-12. Participation of Some Economies in GVCs in 2011



Source: Based on WIOD Database.

Table 4-5. Backward Vertical Specialization Rates (VS) of Major Economies from 1995-2011

(Unit: %)

Economy	1995	1997	2002	2007	2011
Australia	12.2	12.6	12.7	15.2	13.7
Austria	23.9	25.9	28.3	33.3	34.2
Belgium	38.7	39.5	39.3	43.4	46.0
Bulgaria	32.4	37.2	33.8	44.5	34.7
Brazil	7.9	8.4	13.0	11.9	11.9
Canada	25.1	26.2	25.3	23.3	20.2
China	15.8	14.1	17.9	24.7	21.8
Cyprus	26.9	30.8	29.5	28.3	27.2
Czech Republic	29.9	31.4	39.3	45.9	46.5
Germany	17.1	18.6	20.8	26.7	27.3
Denmark	26.3	26.4	29.4	36.7	37.1
Spain	20.6	21.7	24.5	29.2	29.7
Estonia	37.9	40.1	43.9	38.1	33.3
Finland	23.4	24.7	25.0	32.6	34.5

Table 4-5. Continued

Economy	1995	1997	2002	2007	2011
France	19.5	20.9	23.1	26.7	28.5
The UK	19.3	18.7	17.4	18.1	21.6
Greece	19.1	22.6	30.1	28.3	24.3
Hungary	28.8	34.8	43.8	48.2	46.0
Indonesia	15.4	15.5	18.2	16.0	14.6
India	10.5	10.4	14.8	21.1	21.7
Ireland	38.5	38.5	41.7	40.6	44.6
Italy	18.7	17.5	19.4	25.1	27.1
Japan	6.3	8.1	9.2	15.4	17.0
South Korea	24.0	27.8	28.2	34.3	40.3
Lithuania	32.9	34.3	33.9	32.0	33.9
Luxembourg	45.1	51.8	58.0	61.3	61.3
Latvia	25.1	26.2	26.0	30.4	24.6
Mexico	26.1	28.0	30.0	29.5	30.0
Malta	50.8	45.3	44.6	45.5	39.7
The Netherlands	31.4	32.8	31.4	35.0	39.2
Poland	17.2	18.7	26.4	32.8	34.3
Portugal	27.6	27.9	28.7	31.4	27.9
Romania	23.3	25.9	28.4	27.6	23.9
Russia	7.4	6.9	9.0	6.9	6.2
Slovakia	31.5	37.2	45.4	47.5	42.0
Slovenia	33.9	33.8	36.4	42.2	36.5
Sweden	25.7	26.3	28.5	31.9	31.9
Turkey	13.8	17.3	23.3	29.4	22.2
Taiwan	33.0	33.0	34.9	45.8	47.3
The US	9.6	9.6	9.4	13.3	14.9
Global	19.1	19.3	21.8	25.9	24.8

Source: Calculation Based on WIOD Database.

Table 4-6. Backward Vertical Specialization Rates (VS) of Major APEC Member Countries during 1995-2011

(Unit: %)

Economy	1995	1997	2002	2007	2011
Australia	16.8	15.8	19.2	25.0	24.8
Canada	10.2	10.0	9.6	13.3	18.0
China	10.9	12.0	14.7	15.4	15.6
Indonesia	14.1	14.8	18.2	23.9	15.4
Japan	16.3	15.8	19.4	22.4	22.5
South Korea	14.5	13.8	15.0	18.4	15.4
Mexico	10.8	9.4	9.5	13.7	16.1
Russia	25.2	27.0	31.5	39.4	12.4
Taiwan	10.9	12.3	15.8	19.7	15.9
the US	20.0	19.9	24.6	24.2	18.5
Austria	17.4	16.9	18.2	19.1	14.6
Belgium	15.1	15.7	15.1	16.6	16.3
Cyprus	7.5	7.3	10.5	15.5	17.7
Germany	18.1	17.5	18.4	19.7	18.7
Spain	14.0	14.7	16.0	18.3	16.7
Estonia	15.6	16.3	16.5	17.7	22.5
Finland	17.4	16.9	21.0	20.3	14.4
France	15.8	15.8	17.1	18.3	14.4
Greece	12.1	11.5	13.8	17.4	23.0
Ireland	9.4	10.4	10.4	11.9	14.2
Italy	13.4	14.3	16.3	18.0	10.0
Luxembourg	13.7	12.3	10.5	9.9	16.4
Malta	10.2	10.5	13.6	14.0	20.3
The Netherlands	14.4	14.5	15.8	18.3	14.8
Portugal	11.5	11.4	14.3	15.9	14.3
Slovakia	18.6	17.0	15.2	17.2	9.5

Table 4-6. Continued

Economy	1995	1997	2002	2007	2011
Slovenia	11.6	12.0	14.6	15.6	17.8
Bulgaria	10.0	10.0	13.5	15.3	13.4
Brazil	18.4	17.6	18.2	23.1	13.5
Czech Republic	16.5	16.2	16.9	16.6	17.3
Denmark	11.2	12.1	14.5	16.1	17.7
The UK	16.6	17.0	20.1	23.5	16.5
Hungary	13.4	13.6	13.5	14.5	18.9
India	11.8	13.2	15.5	16.2	22.2
Lithuania	12.4	11.4	15.4	16.8	37.9
Latvia	16.5	14.0	18.8	19.3	18.4
Poland	17.1	17.0	19.3	19.5	16.5
Romania	14.5	13.4	15.3	19.4	17.9
Sweden	16.3	15.6	17.0	18.5	16.7
Turkey	11.4	11.0	13.0	14.4	22.0
Global	15.8	15.9	17.6	19.7	24.6

Source: Calculation Based on WIOD Database.

In addition, according to the WIOD Database, manufacturing can be categorized as follows: 1) Middle- and High-Tech, 2) Middle- and Low-Tech; and 3) Low-Tech.[1] Vertical specialization rates of technology sectors at different levels are further measured. In most years, segments with a higher technical level in the manufacturing industry demonstrate higher vertical specialization rates. In mid- and high-tech

1) High-tech manufacturing includes chemical raw materials and products, machinery, electronics, optical instruments and transportation equipment manufacturing. Middle-tech manufacturing includes coal, oil refining, nuclear fuel, rubber and plastic products, other non-metallic minerals, basic metals and alloys. Low-tech manufacturing includes food and beverage manufacturing, tobacco processing industry, textile, textile products, leather, leather products, footwear, timber, timber products, pulp, paper products, printing, publishing, other manufacturing sectors and recycling.

fields, there is a large gap between China and the developed countries, meaning that China has to import large amounts of high-tech intermediate products. Especially the products exported to developed country markets are often subject to rigid technical and quality requirements, and even technical barriers are set for trade, thereby resulting in intermediate products import from developed countries so as to meet the requirements. In low-tech industries, China's domestic products generally meet international market requirements, which are less dependent on imported intermediate products, and vertical specialization rate is correspondingly low. As shown in the following Table 4-7, middle- and high-tech industries have the most volatile vertical specialization rate, which reached its highest point in 2005, declined and bottomed out until 2010. Mid- and low-tech industries show relatively small fluctuations of vertical specialization rate, which basically stabilized at the highest level during 2005-2008, declined slightly in 2009, and then rebounded. Low-tech industries have a relatively stable vertical specialization rate, which continuously declined after peaking in 2004, and then began to rise after 2009. The industries with a higher technical level show relatively greater dependence on foreign intermediate products, which are subject to greater shocks from the global economic slowdown and structural change, with a wide fluctuation range in their vertical specialization rate. Middle- and low-tech industries and low-tech industries show relatively stable vertical specialization rates, which are subject to few shocks from foreign economic change, with a narrow fluctuation range in their vertical specialization rate.

Table 4-7. Vertical Specialization Rates Classified according to Technical Level during 1995-2011

(Unit: %)

Year	Middle- and high-tech	Middle- and low-tech	Low-tech
1995	20.52	15.71	16.36
1996	18.61	14.52	14.16
1997	18.52	15.03	13.84
1998	17.13	13.27	12.82

Table 4-7. Continued

Year	Middle- and high-tech	Middle- and low-tech	Low-tech
1999	19.64	14.38	14.20
2000	23.11	16.95	15.82
2001	22.97	16.59	15.29
2002	25.61	17.72	15.78
2003	30.12	21.08	16.99
2004	35.14	24.76	18.93
2005	35.43	25.45	18.04
2006	34.51	25.23	17.13
2007	33.03	25.51	16.20
2008	29.58	25.47	15.15
2009	25.48	21.15	12.58
2010	24.16	24.14	14.14
2011	28.13	25.94	14.45

Source: Calculation Based on WIOD Database.

4.4. Flow and Distribution of China's Foreign TiVA in GVCs

In division of labor in the global value chain, regardless of which country/industry is participating, or in what manner, as long as domestic value added (DVA) realized from a value production process represents a high proportion, or foreign value added (FVA) represents a low proportion, such a country/industry is upstream of the value chain, or vice versa. Specifically, an economy in the upstream of the value chain is mainly engaged in high value-added activities, which is manifested by high DVA and reverse value added contained in per unit export and low FVA. On the other hand, an economy in the downstream of value chain will have low DVA and reverse value added contained in per unit export and high FVA.

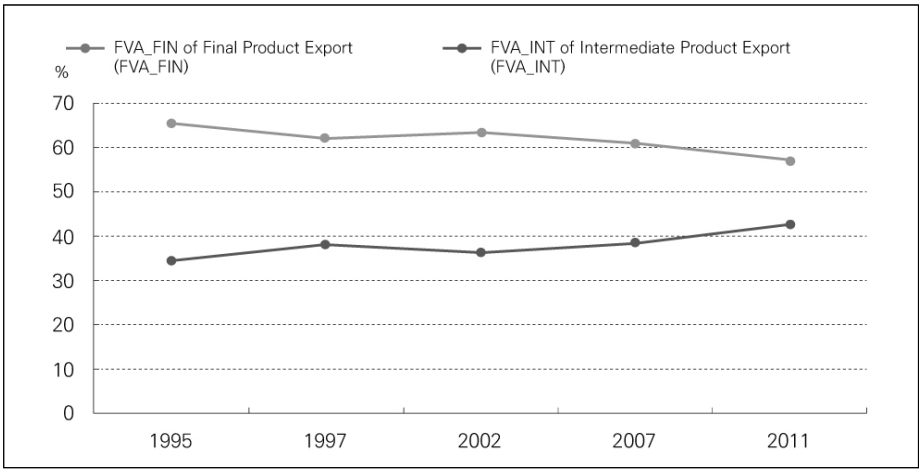
FVA is broken down into FVA of final product export and FVA of intermediate products export, which is measured by means of an input-output model. In the export sector, high FVA segments are concentrated in the manufacturing sector. As an emerging industrialized economy, China has lower DVA per unit export than that of developed economies and resource-based economies. For example, in 2011, for developed economies (such as the US, Japan and Germany), DVA accounted for 79.0%, 81.5% and 69.4% in per unit export, and FVA accounted for 11.4%, 12.6% and 20.2% in per unit export, respectively. For resource-based economies (such as Russia and Australia), DVA accounted for 92.8% and 85.5% in per unit export, and FVA accounted for only 3.7% and 9.7% in per unit export, respectively. For developed economies and resource-based economies, DVAs accounted for nearly the same proportion in per unit export. However, the proportion of FVA was significantly higher than that of resource-based economies because of the difference in the ways developed economies and resource-based economies participate in global value chains and length of their participation in the value chain. Developed economies are mainly engaged in high value-added activities that show a "smiling curve," or participate in global value chains through research and development, product design and marketing so as to obtain high DVA. Resource-based economies mainly rely on resource endowments and provide resources to other economies to achieve high value added in the production phase. For newly industrializing economies, the proportion of DVA in per unit export is far lower than that of developed economies and resource-based economies, and the proportion of FDA is much higher than that of developed economies and resource-based economies. Newly industrializing economies are in the downstream of global value chains. For Taiwan, Mexico and South Korea, in 2011, the proportions of DVA in per unit export were only 52.2 %%, 68.8% and 59.1%, respectively, whereas the proportions of FVA in per unit export were as high as 31.7%, 25.5% and 29.8%, respectively. For China, the proportions of DFA and FVA in per unit export fell between that of developed economies and other emerging economies, indicating its position midstream and downstream of the global value chain on the whole.

From the perspective of reverse value added, for developed economies, the proportion of reverse value added in per unit export is higher than that of other economies (the highest in the US), but this gap with other economies gradually narrows. From 1995-2011, the US saw the proportion of reverse value added in per unit export at 7.1%, 7.7%, 9.6%, 7.1% and 5.4%, respectively, which was followed by Germany. Under this downward trend, Germany saw the proportion of reverse value added in per unit export at 2.8%, 2.4%, 2.3%, 2.1% and 2.1% during 1995-2011, respectively. At the same time, China sees an ever-increasing reverse value added in per unit export, to an extent much higher than that of other economies. In 2011, the proportion of China's reverse value added in per unit export reached 2.0%, 0.8% higher than that of Japan. During 1995-2011, China's reverse value added accounted for 0.4%, 0.5%, 1.0%, 1.3% and 2.0% in per unit export, respectively. Russia and other resource-based economies show lower reverse value added. And the reverse value added of some resource-based economies in per unit export is even lower than that of newly industrializing economies. This further indicates that despite the value added of resource-based economies in per unit export being equal to that of developed countries, resource-based economies fail to deeply participate in global value chains, and merely rely on resource endowments to achieve high value added.

From the perspective of FVA content, China's share of FVA in its final product exports is much higher than that of developed economies and resource-based economies. China sees the highest FVA share of final product exports among major economies. However, China's share of FVA in its final product exports is higher than the share of FVA in its intermediate product exports, and declines year by year. During 1995-2011, China's FVA share of final product export (FVA_FIN) decreased year by year, recording 65.1%, 62.1%, 63.6%, 61.0% and 57.3%, respectively. China's FVA share of intermediate product export (FVA_INT) increased year after year, recording 34.9%, 37.9%, 36.4%, 39.0% and 42.7%, respectively. For China's exports during 2011, DVA and FVA were 75.5% and 17.1%, respectively. In such FVA, final product export and intermediate product export accounted for

57.3% and 42.7%, respectively. This also proves that although China's export TiVA is still at the low end of the global value chain on the whole, it continues to ascend towards the high end of the global value chain.

Figure 4-13. Proportions of China's FVA Measured by Final Product Export and Intermediate Product Export during 1995-2011



Source: Based on WIOD Database.

Table 4-8. VS and Industry Average of Proportion of VS Constituents in Total Exports

(Unit: %)

Year	1995	2000	2005	2007	2010	2011
VS	12.11	12.71	17.07	16.58	14.78	15.75
FVA	10.54	10.59	13.8	13.23	11.71	12.47
FDC	1.57	2.12	3.23	3.35	3.07	3.28
VS_Fin	6.22	6.04	7.94	7.21	6.46	6.76
VS_Int	5.90	6.67	9.13	9.37	8.32	8.99
FVA_Fin	5.60	5.21	6.79	6.06	5.38	5.63
FVA_Int	4.94	5.39	7.05	7.17	6.3	6.83

Table 4-8. Continued

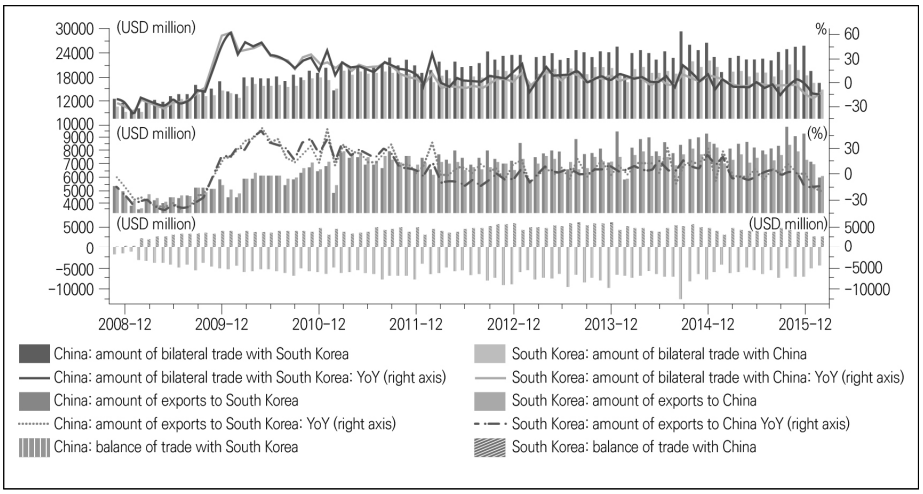
Year	1995	2000	2005	2007	2010	2011
FDC_Fin	0.62	0.83	1.15	1.15	1.08	1.12
FDC_Int	0.95	1.28	2.08	2.20	1.99	2.16

Note: VS, FVA and FDD respectively refer to vertical specialization, foreign value added and foreign double counting. VS_Fin, FVA_Fin and FDC_Fin respectively refer to VS, FVA and FDC in final product export. VS_Int, FVA_Int and FDC_Int respectively refer to VS, FVA and FDC in intermediate product export. Figures in the above table refer to VS and industry average of proportions of VS constituents in total exports.
Source: Calculation Based on WIOD Database.

V. Trade Competitiveness of China and South Korea in GVCs Analysis

China and South Korea are important economies in the Asia-Pacific region. The economic aggregate and trade in goods of both countries account for 25% and 29%, respectively, of those of all APEC members. In the past 20 years, the bilateral trade amount between China and South Korea increased by 60-fold, and accounts for more than one-fifth of South Korea's total foreign trade amount, exceeding the sum of the Korea-US trade amount and Korea-European trade amount. According to the statistics of the Ministry of Trade, Industry and Energy (South Korea), China's share of South Korean exports exceeded 25% for the first time in 2013. According to the statistics of South Korea Customs, South Korea and China realized a bilateral merchandise trade amount of USD 227.38 billion in 2015, including South Korean exports to China (USD 137.14 billion, 26.0% of South Korean total exports) and imports from China (USD 90.24 billion, 20.7% of South Korean total imports). By the end of 2015, China was still the largest trading partner, the largest export destination, the largest source of imports, the largest surplus origin country and the largest overseas investee of South Korea.

Figure 5-1. Growth Performance of China-South Korea Bilateral Trade in the Wake of the International Financial Crisis in 2008



Source: WTO statistic database.

5.1. China-South Korea Industry Relevance Analysis Based on TiVA

In recent years, trade between China and South Korea has mainly been intra-industry trade. Trades of spare parts and intermediate products account for nearly 35% of all China-South Korea trade. During 2009-2013, following the financial crisis, intermediate product trade between China and South Korea grew by 88%, far higher than the growth rate of 54% in final product trade. Both countries have forged a closer value chain partnership.

The Influence Coefficient and Response Coefficient methods are herein applied to reveal the industry relevance and impact between China and South Korea. Influence Coefficient refers to the impact that a product sector within the national economy has on production demands generated by other sectors within the national economy when per unit of final product increases. A higher Influence Coefficient implies that the sector has a greater pulling effect on other sectors. Response Coefficient

refers to the degree to which a certain sector reacts to demand when all sectors of the national economy increase per unit final demand, i.e., the production output required for the sector. A higher Response Coefficient indicates that demand in other sectors has a greater influence on the sector.

According to the row and line balance relations under the Model of Inter-Country Input-Output (ICIO) Tables, Complete Consumption Coefficient Matrix B and Complete Distribution Coefficient Matrix H are obtained, with which Influence Coefficient and Response Coefficient can be calculated:

$$BL^n = \frac{\sum_j \sum_i b_{ij}^{nn}}{\sum_m \sum_n \sum_i \sum_j b_{ij}^{mn} / (N \times S)}$$

$$FL^n = \frac{\sum_n \sum_j h_{ij}^{mm}}{\sum_m \sum_n \sum_i \sum_j h_{ij}^{mn} / (N \times S)}$$

Wherein, BL_j^n and FL_i^m respectively indicate the Influence Coefficient of country *n* and Response Coefficient of country *m*. N and S respectively indicate the number of economies and the number of industries.

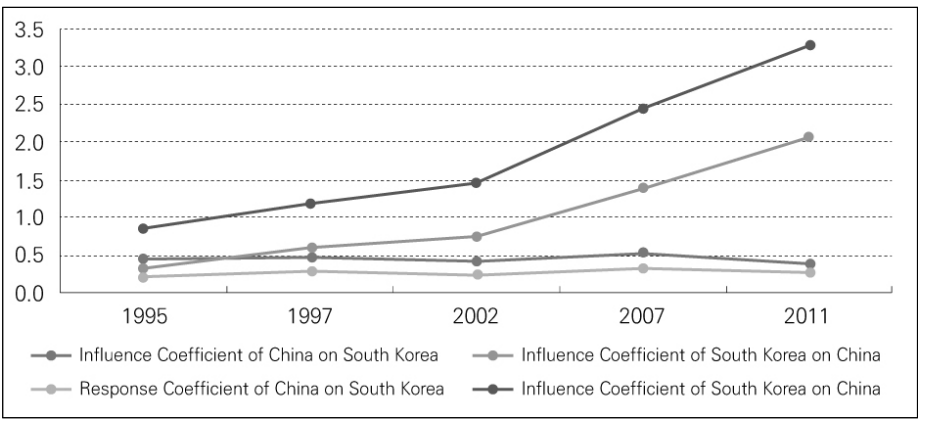
From the perspective of production, China and South Korea continue to strengthen their association, while China plays a continuously escalating role in pulling and promoting South Korea. In general, the magnitude of the pulling effect of an industry can be measured by the level of backward linkage. Backward linkage refers to the pulling effect that increases in the per unit final product of an industry have on downstream industries, which is commonly measured by the Influence Coefficient. A higher Influence Coefficient implies that the industry has a stronger pulling effect on downstream industries. The promoting role that China plays can be measured by the level of forward linkage. Forward linkage refers to the degree to which a sector reacts to demand when all sectors of the national economy increase per unit final demand. This is commonly measured by Response Coefficient. A higher Response Coefficient indicates the industry has a greater pushing effect on upstream

industries. WIOD 1995-2011 Inter-Country Input-Output (ICIO) tables are adopted to measure the Influence Coefficient and Response Coefficient of China and South Korea. According to the results, during 1995-2011, China's final demand played a limited pulling role for South Korea. On the other hand, South Korea's final demand played a great pulling role for China, and demonstrated a constantly growing trend. At the same time, China made weak response to South Korea's final demand. South Korea made strong response to China's final demand, which also presented a constantly growing trend.

From the perspective of industrial structure, China's sectors with a strong backward pulling effect on South Korea show a gradual shift from the previous low-tech manufacturing to high-tech manufacturing. China's sectors with a strong backward pulling effect on South Korea were mainly the textile industry and spinning, footwear, hat, leather and feather product industries during the period of 1995-2002, and then mainly the rubber and plastics industry, general equipment manufacturing, electrical machinery and equipment manufacturing and transportation equipment manufacturing sectors during 2007-2011.

South Korea's sectors with a strong backward pulling effect on China are characterized by the changing trend of "low-tech manufacturing — coexistence of low-tech, middle-tech and high-tech manufacturing — coexistence of the manufacturing and service sectors." South Korea's sectors with a strong backward pulling effect on China were mainly the textile industry and spinning, footwear, hat, leather and feather product industries and the metal product industry during the period of 1995-1997, and then general equipment manufacturing, electrical machinery and equipment manufacturing and transportation equipment manufacturing and other high-tech manufacturing during 2002-2007. High-tech manufacturing had a significantly higher pulling effect on China than low-tech manufacturing. By 2011, in addition to the above manufacturing sectors, the water transport industry had the strongest pulling effect on China.

Figure 5-2. Industry Relevance between China and South Korea



Source: Based on WIOD Database.

From the perspective of forward linkage, China's response to South Korea rose but the level remained low (Response Coefficient lower than 1). On the other hand, South Korea's response to China was much higher than that of China, also showed a growing trend and reached 3.3 in 2011. From the perspective of industrial structure, during 1995-2011, China's mining industry, textile industry, air transport, postal and communications industries showed a gradually weaker response to South Korea, while its high-tech manufacturing, electrical machinery and equipment manufacturing industry and water transportation industries showed an enhanced response to South Korea. In 2011, China's water transport industry, metal product industry, chemical raw material and chemical product manufacturing and chemical fiber manufacturing industries showed the highest level of response to South Korea. As for South Korea, during 1995-2011 South Korea's high-tech manufacturing showed an enhanced response to China, while low-tech manufacturing showed a diminishing response to China. South Korea's sectors with a high level of response to China shifted from low-tech manufacturing to high-tech manufacturing. In 1995, South Korea's textile industry showed the highest level of response to China, followed

by chemical raw materials and the chemical products and chemical fiber manufacturing industries. In 2011, South Korea's chemical raw material, chemical product manufacturing and chemical fiber manufacturing industries showed the highest level of response to China (with a Response Coefficient of 0.396), followed by air transport (with a Response Coefficient of 0.356) and electrical machinery and equipment manufacturing (with a Response Coefficient of 0.305). Other sectors with a high level of response to China included petroleum processing, the coking and nuclear fuel processing industries, rubber and plastic product industries, metal product industry and textile, spinning, footwear, hat and leather and feather product industries.

As major economies of the Asian production network, South Korea's backward vertical specialization is always higher than that of any other Asian economy. During 1995-2011, South Korea's backward vertical specialization was 47.3% and 24.0%, 27.8%, 28.2%, 34.3% and 40.3%, respectively. South Korea's low-tech manufacturing participated in global value chain deeper than high-tech manufacturing, but wide differences existed between different sectors. South Korea's sectors with deep participation in global value chains in a backward manner were mainly low-tech manufacturing sectors, such as the mining, paper making and paper products, printing and recorded media reproduction industries and the metal product industry. High-tech manufacturing such as the electrical machinery and equipment manufacturing industries showed diminishing participation in global value chains in a backward manner, which saw backward vertical specialization rates of 18.7%, 17.2%, 17.5%, 25.7% and 11.3% during 1995-2011, respectively.

According to the regional distribution of South Korea's value-added imports and exports, the Asia-Pacific region is the key region of its foreign trade. In 2011, the Asia-Pacific region accounted for 41.96% of its imports and 40.2% of its exports, respectively. Among them, China is a top priority. Since 2002, South Korea's low-tech manufacturing value-added exports to China exceeded imports year by year. In 2008 and 2011, South Korea's middle- and low-tech manufacturing value-added exports to China exceeded imports. In 2011, South Korea's middle-tech and high-tech and advanced value-added imports from China exceeded exports

to China. According to customs statistics, in 2013, the products imported from China to South Korea were mainly IC class high-end products in electronic spare parts, which indicated that the industrial structure complementariness of trade between China and South Korea trade had weakened, but alternativeness enhanced. With the continuous improvement of Chinese production technology, the China-South Korea intra-industry trade has gradually transformed from vertical intra-industry trade to horizontal intra-industry trade. Products of both countries have become more competitive.

In the global manufacturing specialization system, the advantages of Chinese manufacturing is mainly embodied by modular equipment (engineering machinery, household appliances, consumer electronics, etc.) and complex equipment (communications equipment, high-speed rail, nuclear power and hydropower equipment, etc.). However, China is less advantageous in integrated product industries (such as the auto CNC machine tool and other process integration industries), as well as industrial basic parts and other fields required for both integration characteristics and necessary core components.

Take electrical motors and electrical equipment as an example. China needs to import large quantities of parts from abroad to participate in the domestic processing and production process, and value added created by processing and production contributes significantly to the foreign value added of the countries supplying these parts. This means that South Korea not only realizes high direct value added from its exports to China, but also realizes high indirect value added through the transfer of industrial layout and participation in China's processing trade and other production patterns. In particular, from the perspective of structural changes during 2011-2012, inter-industry trade, which resulted from the industrial transfer and processing trade (such as electrical machinery, equipment, parts and other goods) saw a further rising share of exports. This proves that the commodity structure of China's imports from South Korea (i.e., South Korea's exports to China) gradually marches towards greater professionalization, which is also in the interests of South Korea's economic development.

As South Korea is a late-mover developed country, its technical capacity is mainly embodied by capital-intensive product industries, such as semiconductors, flat PCs and car lights. If this technical capacity is further structured into production capacity, innovation capacity and investment capacity, the uniqueness of South Korean manufacturing is mainly embodied by its high-intensity ability to acquire technology and the ability to invest on this basis. In particular, large South Korean multinationals are able to launch large-scale, sustainable research, development and investment in technology and equipment. For example, when global major semiconductor manufacturers cut capital expenditures in 2014-2015, Samsung Electronics carried out large-scale investments in memory chips, flash memory chips and application processors, with a total size of over USD 10 billion. This seemingly "irrational" KBC investment was almost impossible in the competitive realms of other countries. Clearly, the role of an investor in innovation infrastructure, played by South Korean conglomerates, is an important element for South Korean manufacturing to maintain high-intensity innovation.

5.2. Analysis for Competitive Advantages and China-South Korea Industrial Structure Based on TiVA Accounting

International competitiveness refers to the relative level of productivity among similar industries or similar enterprises of various countries. As for a specific industry of a country, when it participates in international market competition, the international competitiveness of such a specific industry is its level of productivity compared with foreign competitors. At present, international competitiveness is commonly measured according to international market share, trade competitiveness and revealed comparative advantage. This article is mainly focusing on the analysis for revealed comparative advantage of China-South Korea exports based on TiVA.

The Revealed Comparative Advantage (RCA) Index was proposed by the US economist Bela Balasa to measure the industries of an economy with greater export

competitiveness and further judge the comparative advantage of such an economy in international trade. This index refers to the ratio between proportion of total export amount of an economy for a type of commodity in total export amount of such an economy and proportion of export amount of such commodity in world's total amount of such commodity, which is expressed by the following formula:

$$RCA_1^k = (X_1^k / X_1) / (X_w^k / X_w)$$

Wherein, RCA_1^k indicates the revealed comparative advantage of economy I in ^{k}type commodity; X_1^k and X_1 respectively indicate economy I's export amount and total export amount of ^{k}type commodity; X_w^k and X_w respectively indicate total export amount of ^{k}type commodity and the global total export amount.

When the value of RCA_1^k is lower than 1, this indicates that ^{k}type commodity, exported by economy I, has no comparative advantage in the international market. When the value of RCA_1^k is higher than 1, ^{k}type commodity, exported by such an economy, has a comparative advantage in the international market and international competitiveness is relatively strong. When the value is close to 1, this indicates neutral relative comparative interest. Furthermore, if the value of RCA is lower than 0.8, such a product has weak international competitiveness. If the value of RCA ranges between 0.8 and 1.25, such a product has ordinary international competitiveness. If the value of RCA ranges between 1.25 and 2.5, the product has strong international competitiveness. If the value of RCA is greater than 2.5, the product has an extremely strong competitive advantage.

China's comparative advantage mainly relies on middle- and low-tech manufacturing, while the comparative advantage of China's high-tech manufacturing is also constantly growing. China's sectors with an export advantage are mainly in traditional middle- and low-tech manufacturing sectors, such as the textile industry, textile, leather, footwear, hat and feather product industries, rubber and plastic product industries and non-metallic mineral product industry, with this comparative advantage continuing to fade away. In exchange, the export advantage of China's middle- and high-tech manufacturing is gradually being highlighted, which is mainly embodied by electrical machinery and

equipment manufacturing (1.39, 1.29, 1.68, 2.58, 2.58).

South Korea's sectors with the strongest revealed comparative advantage of exports are mainly concentrated in high-tech manufacturing and some service sectors: electrical machinery and equipment manufacturing (1.92, 1.65, 1.98, 2.32, 2.28), transportation equipment manufacturing (1.12, 1.29, 1.54, 2.15, 2.66), water transport (3.66, 3.80, 3.97, 3.09, 2.85), as well as retail and household product maintenance (1.22,1.51,1.34,1.03, 1.02). And their comparative advantages are growing.

In addition, we should also analyze the comparative advantage index of China-South Korea trade in services. On the whole, the revealed comparative advantage of South Korea's trade in the service sector is greater than that of China. Both countries show a relatively stable RCA index over the past decade, the average of which is 0.77 in South Korea and only 0.47 in China. This indicates that the international competitiveness of South Korea's service sector is greater than that of China. Under the background of the trend toward service orientation in global value chains, information and communication technology, finance, transportation and other international services have become the key intermediate inputs in the coordination of transnational production networks. Blocking protected service markets can hinder the domestic enterprises to improve their status in the global value chain. As a latecomer industrialized country, South Korea has transformed and upgraded itself from an intermediate product absorber and importing country to an intermediate product provider and exporting country. These successful latecomer industrialized countries often take advantage of the expansion of service sector opening-up, make full use of a wider range of R & D design and other imported services to improve the export competitiveness of their own intermediate products, and promote the continuous optimization of the import and export structures of intermediate products. But compared against the European and American countries, and except for when South Korea's RCA index exceeded 0.8 in 2008, both countries saw an RCA index below 0.8 in all other years. This proved that the international competitiveness of South Korea's trade in services has not yet established an absolute competitive advantage.

Table 5-1. WIOD Sector Codes and Sector Names

Sector Code	Sector Name
1	Agriculture, forestry, animal husbandry and fishery
2	Mining
3	Food, beverage and tobacco manufacturing
4	Textile industry
5	Leather, fur, feather (woolen) and footwear product industry
6	Wood processing; wood, bamboo, rattan, palm fiber and grass manufacturing
7	Paper making and paper product industry; printing and recorded media reproduction industry
8	Petroleum processing, coking and nuclear fuel processing industry
9	Chemical raw material and chemical product manufacturing, chemical fiber manufacturing
10	Rubber and plastic product industry
11	Non-metallic mineralproductindustry
12	Metal product industry
13	General-purpose and dedicated equipment
14	Electrical and optical equipment manufacturing
15	Transportation equipment manufacturing
16	Other manufacturing industries, processing and recycling of waste resources and old materials
17	Electricity, gas and water production and supply industry
18	Construction industry
19	Automobile and motorcycle sale, maintenance and repair and fuel retail
20	Wholesale (excluding automobile and motorcycle)
21	Retail(excluding automobile and motorcycle)and maintenance of household products
22	Accommodation and catering industry
23	Inland transport
24	Water transport

Table 5-1. Continued

Sector Code	Sector Name
25	Air transport industry
26	Other supportive transport businesses and the travel agency business
27	Post and telecommunication
28	Finance
29	Real estate
30	Leasing and business services
31	Public administration, national defense and social security
32	Education
33	Health and social work
34	Other community, social and personal services
35	Domestic service under private employment

Source: Based on WIOD Database.

Table 5-2. China's RCA Based on TiVA during 1995-2011

Sector	1995	1997	2002	2007	2011
1	1.26	0.85	0.65	0.39	0.35
2	0.46	0.35	0.33	0.07	0.05
3	1.00	1.03	0.67	0.57	0.53
4	4.71	3.86	3.27	3.79	3.29
5	4.98	4.50	3.87	3.33	3.51
6	1.57	1.34	0.82	0.93	0.95
7	0.38	0.43	0.36	0.22	0.26
8	0.35	0.42	0.60	0.17	0.14
9	0.27	0.68	0.49	0.61	0.68
10	1.91	2.07	1.56	1.48	1.64
11	1.79	2.06	1.34	1.16	1.49
12	1.11	1.15	0.95	0.93	0.83

Table 5-2. Continued

Sector	1995	1997	2002	2007	2011
13	0.39	0.42	0.62	1.02	1.10
14	1.39	1.29	1.68	2.58	2.58
15	0.16	0.19	0.20	0.41	0.56
16	1.23	1.13	1.96	1.60	1.62
17	1.03	0.86	0.52	0.22	0.21
18	1.74	0.57	1.23	1.58	1.51
19	0.00	0.00	0.00	0.00	0.00
20	0.00	1.44	1.71	1.04	1.06
21	0.00	2.31	2.09	1.38	1.36
22	3.34	2.18	1.92	1.07	1.07
23	0.73	0.39	0.77	0.45	0.43
24	0.54	0.38	1.43	1.31	1.46
25	1.00	0.76	1.13	1.18	1.24
26	2.08	1.78	0.39	0.30	0.30
27	0.80	0.94	0.72	0.83	0.88
28	0.09	0.05	0.02	0.03	0.04
29	0.00	0.00	0.00	0.00	0.00
30	0.14	0.07	0.50	0.57	0.60
31	0.29	0.14	0.34	0.18	0.15
32	0.75	0.88	0.33	0.22	0.21
33	1.29	0.61	0.00	0.60	0.62
34	1.89	2.08	3.03	0.80	0.83
35	0.00	0.00	0.00	0.00	0.00

Source: Based on WIOD Database.

Table 5-3. South Korea's RCA Basedon TiVA during 1995-2011

Sector	1995	1997	2002	2007	2011
1	0.28	0.16	0.11	0.06	0.05
2	0.01	-0.01	0.00	0.00	0.00
3	0.29	0.36	0.31	0.22	0.24
4	2.61	2.34	1.87	0.80	0.56
5	1.69	1.43	0.89	0.37	0.26
6	0.07	0.06	0.03	0.02	0.02
7	0.31	0.41	0.43	0.35	0.36
8	0.63	1.08	1.24	0.89	0.80
9	0.84	0.93	0.85	1.04	1.03
10	0.93	0.98	1.02	0.91	0.93
11	0.34	0.28	0.42	0.38	0.34
12	0.90	1.09	0.94	1.01	1.17
13	0.65	0.72	0.94	1.11	1.19
14	1.92	1.65	1.98	2.32	2.28
15	1.12	1.29	1.54	2.15	2.66
16	0.76	0.67	0.47	0.26	0.20
17	0.10	0.10	0.06	0.04	0.03
18	0.21	0.29	0.29	0.18	0.16
19	0.03	0.02	0.05	0.52	0.51
20	1.27	1.04	0.99	1.06	1.08
21	1.22	1.51	1.34	1.03	1.02
22	0.66	0.91	1.07	0.56	0.52
23	0.66	0.77	0.38	0.10	0.09
24	3.66	3.80	3.97	3.09	2.85
25	1.26	1.28	1.38	1.59	1.54
26	0.47	0.66	0.54	0.26	0.25
27	0.71	0.56	0.37	0.42	0.43
28	0.16	0.16	0.29	0.32	0.34

Table 5-3. Continued

Sector	1995	1997	2002	2007	2011
29	0.23	0.27	0.42	0.70	0.56
30	0.85	0.57	0.30	0.46	0.47
31	1.90	3.66	2.77	2.22	1.86
32	0.10	0.15	0.18	0.14	0.14
33	0.05	0.11	0.33	0.22	0.22
34	0.53	0.62	0.48	0.48	0.48
35	0.00	0.00	0.00	0.00	0.00

Source: Based on WIOD Database.

5.3. Possible Effects and Impacts of China-South Korea FTA on GVCs

Regional trade agreement contributes to the expansion effect of global value chains. At present, China has signed 14 free trade agreements involving 22 countries and regions. For China, there are another 7 ongoing negotiations involving 22 countries. As the most important free trade agreement of the East Asian region and the largest free trade agreement signed by China in terms of trade amount, the China-South Korea FTA will have an important impact on China's free trade area strategy and trade pattern of East Asia.

As of 2015, 20 free trade zones were under way in China, covering 32 countries and regions. In terms of trade, China and South Korea are the world's largest and the ninth largest countries in terms of trade in goods. However, as the world's top-four goods trading countries, China, the US, the EU and Japan have yet to reach an FTA between each other. Therefore, the establishment of a China-South Korea free trade area is of great significance.

On December 20, 2015, the China-South Korea FTA entered into force and led to the first tariff reduction. On January 1, 2016, the second tariff reduction was made, which covered 1,679 items (under zero tariff within the upcoming five

years) and 2,518 items (under zero tariffs within the upcoming ten years). The implementation of the China-South Korea FTA will stimulate the trade and investment creation effect and transfer effect within the two economies by offering bilateral market access.

In addition, the 10th WTO Ministerial Conference reached consensus on negotiations regarding the expansion of the WTO Information Technology Agreement, agreeing that China should start to cut import tariffs on electrical equipment, medical equipment and measuring instruments beginning from July 2016, and lower tariff on them to zero within 3-5 years. 22 items (excluded from China's tariff reduction objects under South Korea-China free trade agreement) are specified in the Information Technology Agreement. Under the agreement, up to 30-35% of tariffs on television cameras and set-top boxes will be lifted, thus offering good opportunities for South Korean companies to tap into the Chinese market. In addition, the Asia-Pacific Trade Agreement (APTA) negotiations between China, South Korea and India concluded and reached agreement last month. Under the agreement, China's tariffs on 2,191 import items will enjoy tariff concessions, with an average reduction rate of 33.1%.

After the implementation of the China-South Korea FTA, trade and investment creation effect and transfer effect, stimulated by bilateral market access, will further promote the profound integration of industrial chains in both countries, strengthen bilateral value chain trade relations, and help both countries escalate status of global value chain and competitiveness of products in the global market.

VI. Conclusions and Policy Implications

This paper employs the TiVA Estimation Method and the Input/Output WIOD database, puts forward the framework for the economies to participate in GVCs

competition, and particularly conducts an analysis of industry interconnection and competitiveness between China and South Korea (the closest partnership on the value chain). The following conclusions and insights are hereby introduced:

Firstly, due to increasing global fragmentation on the manufacturing chain and the rapid development of trade in intermediate products, the weight of domestic value added to final products in all countries decreases. But such a decline in of domestic value added to final products does not equate to the decline in the manufacturing sector's global competitiveness. This changing trend is concrete expression and result that China steadily integrates into GVCs in essence.

Secondly, according to the research findings on value added to China contained in trading partners' exports, in many sectors, foreign value added in China's exports surpasses value added to China in foreign countries' exports. This fact indicates that other countries enjoy more benefits from exports via China than the benefits China enjoys from exports via these countries.

Thirdly, in the context of the global production network and TiVA development, a country's industry upgrade becomes more complex. It is impossible to study industry upgrade within a country's geographic border. The driving force, generated by rapid development of global specialization, leads to the forward or backward connection between a country's industrial economy and other countries to fuel the in-depth development of GVCs. This Global Production Sharing Model not only enables entities to make a contribution to value-added trade, but also advances regional economic integration.

Fourthly, the results of our calculations show that the structural complementarity of Sino-South Korean trade industries weakens despite growing substitutability. The bilateral trade structure is changing, from exports of primary products from China and imports of manufactured goods into China to both imports and exports of manufactured goods between both countries. Following advancements by China in production technology, Sino-South Korean industrial trade is gradually shifting from a vertical trading pattern to horizontal trading pattern, as products of two countries grow more competitive against each other. China and South Korea should

forge ahead towards a new competitive collaboration mechanism.

In general, the degree of economic integration between China and South Korea has not reached the level indicated by total bilateral trade volume, leaving much room for further in-depth collaboration in the China-Korea industrial chain. Both countries are facing significant challenges in structural transition and GVCs upgrade, which lend a sense of urgency to foster new competitive advantages relying on the global production chain, turning key-element cost competitiveness into value chain competitiveness built on merging production elements across national borders. Thus, China and South Korea should make it their common development policy to vigorously support TiVA and collaborative upgrade of GVCs.

1) Proactively forge a higher level of Sino-South Korean value chain partnership: After implementation of Sino-South Korean FTA, bilateral value chain trade will be further enhanced. In terms of technology, industry and operation model, South Korea boasts comparative advantage in the fields of new generation IT, new energy vehicles, etc., while China's edge lies in market size, human capital and policy environment. In these industries, China and South Korea can materialize "industry-government-academia" strategic cooperation, jointly formulate technical standards and develop new products. In new energy, environmental protection, bioenergy and new materials, in which both countries do not enjoy global comparative advantages, there is much room for joint research and development. At present, both countries' core parts production capacity and technical level lag behind those of the US, and remain at the mid-to-low end of the global specialization structure and industrial value chain. It is absolutely necessary for both countries to attract and absorb technology transfer from Europe and the US, and jointly participate in the formulation of technology license standards.
2) Break through by reducing trade cost and entry barrier and improve Sino-South Korean value chain collaboration: Reducing entry cost is essential and critical to enhance global value chain specialization and global industrial collaboration. In order to optimize Sino-South Korean global industrial cooperation, it is

high time to comprehensively take into account reducing production cost, trade cost and circulation cost, lift value chain barriers and raise benefits from trade.

3) Advance the partnership between public and private sectors in China and South Korea, with focus on China's national agenda of "building an innovation-driven economy" and the roadmap by South Korea for a creative economy: It is necessary to improve construction of innovation infrastructure, boost technology research and development, technological transformation and investment on human and knowledge capitals. It will be particularly imperative to give birth to integrated transnational production and industry clusters through investment on producer services, and considerably improve the global competitiveness of China and South Korea on the global value chain.
4) Accelerate the construction of Asian-European regional value chain network system: It is necessary to make full use of bilateral and multilateral cooperation mechanisms, promote the strategic alignment of the "Belt and Road" and "Eurasian Initiative," advancing regional economic cooperation. Expand bilateral collaboration in trade, investment, finance and comprehensive transportation networks, press forth with the liberalization process of trade and investment, and deepen cooperation in emerging industries like digital trade, service trade, smart manufacturing, green manufacturing and new-generation information technology, apply multilateral cooperation mechanisms, step up efforts in achieving uniform standards governing technology, industry and infrastructure and jointly exploring third-party markets. Hence, future high-quality and high-standard collaboration between China and South Korea will be expected to propel the implementation of the "Belt and Road" initiative and the advancement of economic integration between Europe and Asia.

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Appendix

This is a brief introduction to KWW Method and Modeling as mentioned in this paper.

1. Concepts

A country's exports contain not only domestic value added (DVA), but also foreign value-added (FV).

DVA refers to domestic value added in a country's exports, which is produced at home for exporting to other countries or is returned home.

FV refers to foreign value-added in a country's gross exports, which is produced by other countries as its export input. These two concepts are explained in detail in Modeling.

2. Brief Introduction to KWW Method

Based on the golden rule of input/output table in which two sides of the equation are equal, a country's gross output goes to intermediate demand and final consumption; the intermediate demand can be decomposed into domestic production demand and foreign production demand export, and the final consumption can be decomposed into domestic final consumption and foreign final consumption export, i.e. Gross Output = Intermediate Demand + Domestic Final Consumption = (Domestic Production Demand + Foreign Production Demand Export) + (Domestic Final Consumption + Foreign Final Consumption Export).

1) In a case involved with two countries, each country has N sectors, expressed in formula as follows:

$$X\_r = A\_rr\,X\_r + A\_rs\,X\_s + Y\_rr + Y\_rs, \quad r, s = 1, 2 \tag{1}$$

in matrix as

$$\begin{bmatrix} X_1 \\ X_2 \end{bmatrix} = \begin{bmatrix} A_{11}\,A_{12} \\ A_{21}\,A_{22} \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} Y_{11} + Y_{12} \\ Y_{21} + Y_{22} \end{bmatrix} \tag{2}$$

Rewritten as

$$\begin{bmatrix} X_1 \\ X_2 \end{bmatrix} = \begin{bmatrix} A_{11}\,A_{12} \\ A_{21}\,A_{22} \end{bmatrix}^{-1} \begin{bmatrix} Y_{11} + Y_{12} \\ Y_{21} + Y_{22} \end{bmatrix} = \begin{bmatrix} B_{11}\,B_{12} \\ B_{21}\,B_{22} \end{bmatrix} \begin{bmatrix} Y_{11} + Y_{12} \\ Y_{21} + Y_{22} \end{bmatrix} \tag{3}$$

Assume V_r is 1 x N direct added value coefficient vector of country r, we thus define the following as two-country added-value coefficient matrix:

Multiplying it with the Leontief inverse matrices produces the value-added share (VBS) matrix:

$$V = \begin{bmatrix} V_1 & 0 \\ 0 & V_2 \end{bmatrix}_{2 \times 2N} \tag{4}$$

Where V_1B_{11} denotes value-added share of products produced by country 1; V_2B_{21} denotes value-added share of products produced by country 2. Hence, the first column of VAS matrix includes all value added needed to produce one additional unit of domestic products in Country 1; the second column includes all value added needed to produce one additional unit of domestic products in Country 2. Following this rule, the equation can be drawn:

$V_1B_{11} + V_2B_{21} = V_1B_{12} + V_2B_{22} = u$, u is 1×N's unit vector

As a result, in the inter-country table, a country's exports include intermediate and final products, as expressed in formula:

$$E_r = \sum_{s \neq r} E_{rs} = \sum_{s} (A_{rs}X_s + Y_{rs}), \quad r, s = 1, 2$$

Two-country export's matrix:

$$E=\begin{bmatrix} E_1 & 0 \\ 0 & E_2 \end{bmatrix}_{2N\times 2}$$

$$\widehat{\mathrm{E}} = \begin{bmatrix} \widehat{\mathrm{E_1}} & 0 \\ 0 & \widehat{\mathrm{E_2}} \end{bmatrix}_{2\mathrm{N}\times 2\mathrm{N}}$$

Where, $\widehat{E_1}$ and $\widehat{E_2}$ are diagonal matrix of E_1 and E_2 respectively.

Thus, trade value-added of countries/sectors on the global value chain is expressed as follows:

$$\mathrm{VB}\widehat{\mathrm{E}} = \begin{bmatrix} \mathrm{V_1B_{11}} & \mathrm{V_1B_{12}} \\ \mathrm{V_2B_{21}} & \mathrm{V_2B_{22}} \end{bmatrix}_{2\times 2\mathrm{N}} \begin{bmatrix} \widehat{\mathrm{E_1}} & 0 \\ 0 & \widehat{\mathrm{E_2}} \end{bmatrix}_{2\mathrm{N}\times 2\mathrm{N}} = \begin{bmatrix} \mathrm{V_1B_{11}}\widehat{\mathrm{E_1}} & \mathrm{V_1B_{12}}\widehat{\mathrm{E_2}} \\ \mathrm{V_2B_{21}}\widehat{\mathrm{E_1}} & \mathrm{V_2B_{22}}\widehat{\mathrm{E_2}} \end{bmatrix}_{2\times 2\mathrm{N}} \quad (5)$$

In terms of country 1, its exports contains domestic value-added $\mathrm{V_1B_{11}}\widehat{E_1}$, foreign value added $\mathrm{V_2B_{21}}\widehat{E_1}$, with the sum of the two equaling its gross exports; likewise, it applies to country 2. In conclusion,

$$DV_r + FV_r = E_r$$

2) In a three-country or multi-country scenario

Based on prior analysis, value added produced by countries' exports is:

$$\mathrm{VB}\widehat{\mathrm{E}} = \begin{bmatrix} \mathrm{V_1B_{11}}\widehat{\mathrm{E_1}} & \mathrm{V_1B_{12}}\widehat{\mathrm{E_2}} & \mathrm{V_1B_{13}}\widehat{\mathrm{E_3}} \\ \mathrm{V_2B_{21}}\widehat{\mathrm{E_1}} & \mathrm{V_2B_{22}}\widehat{\mathrm{E_2}} & \mathrm{V_2B_{23}}\widehat{\mathrm{E_3}} \\ \mathrm{V_3B_{31}}\widehat{\mathrm{E_1}} & \mathrm{V_3B_{32}}\widehat{\mathrm{E_2}} & \mathrm{V_3B_{33}}\widehat{\mathrm{E_3}} \end{bmatrix}_{3\times 3\mathrm{N}}$$

Looking at non-diagonal column vectors, a country's exports include value added by other countries (foreign value added):

$$\mathrm{FV_r} = \sum_{s\neq r} \mathrm{V_sB_{sr}}\widehat{\mathrm{E_r}}$$

Looking at non-diagonal vectors, other countries' exports to a third country include domestic value added (value added in indirect export) (domestic products as other countries' intermediate products):

$$IV_r = \sum_{s \neq t} V_r B_{rs} \widehat{E_{st}}$$

The diagonal portion denotes domestic value added in countries' exports:

$$DV_r = V_r B_{rr} \widehat{E_r}$$

Likewise, for the exporting country, value added from exports includes domestic value added and foreign value added, with the sum of these two equaling the country's gross exports.

3) Trade value added

Product export is a sum of two parts, i.e., export for final consumption and export for production in exogenous countries. According to Wang Zhi (2010), a country's gross export to the world is the sum of the following four broad terms:

1) Domestic value-added embodied in exports of final goods and services absorbed by the direct importer;
2) Domestic value-added embodied in exports of intermediate inputs used by the direct importer to produce its domestically needed products;
3) Domestic value-added embodied in intermediate exports used by the direct importer to produce goods for third countries ("indirect value added exports")
4) Domestic value-added embodied in intermediate exports used by the direct importer to produce goods shipped back to source ("reverse value added").

$$= \underbrace{Y_{rs}}_{\text{fianl goods exprote to s}} + \underbrace{A_{rs}X_{ss}}_{\text{Inrerme diates finished and consumed in s}} + \underbrace{\sum_{t \neq r,s}^{m} A_{rs}X_{st}}_{\text{Processed and exproted to thired endogenous countries}} + \underbrace{A_{rs}X_{sr}}_{\text{Processed and exproted back to r}} + \underbrace{\sum_{l=m+1}^{M} A_{rs}E_{sl}}_{\text{Processed and exported to exogenous countries}}$$

Therefore, as mentioned above, a country's gross export is decomposed into nine sub-components under the following formula:

$$E_r = DV_r + FV_r$$

$$uE^{ss*} = \underbrace{V^s B^{ss} \sum_{r \neq s}^{G} Y^{sr}}_{(1)} + \underbrace{V^s B^{sr} \sum_{r \neq s}^{G} Y^{rr}}_{(2)} + \underbrace{V^s \sum_{r \neq s}^{G} B^{sr} \sum_{k \neq s,r}^{G} Y^{rk}}_{(3)}$$

$$+ \underbrace{V^s \sum_{r \neq s}^{G} B^{sr} Y^{rs}}_{(4)} + \underbrace{V^s \sum_{r \neq s}^{G} B^{sr} A^{rs} (I - A^{ss})^{-1} Y^{ss}}_{(5)} + \underbrace{V^s \sum_{r \neq s}^{G} B^{sr} A^{rs} (I - A^{ss})^{-1} E^{s*}}_{(6)}$$

$$+ \underbrace{\sum_{u \neq s}^{G} V^u B^{us} \sum_{r \neq s}^{G} Y^{sr}}_{(7)} + \underbrace{\sum_{u \neq s}^{G} V^u B^{us} \sum_{r \neq s}^{G} A^{sr} (I - A^{rr})^{-1} Y^{rr}}_{(8)} + \underbrace{\sum_{u \neq s}^{G} V^u B^{us} \sum_{r \neq s}^{G} A^{sr} (I - A^{rr})^{-1} E^{r*}}_{(9)}$$

1) Domestic value added of exports of final products to direct importing countries (DVA_FIN);
2) Domestic value added of intermediates that are absorbed by the direct importer, i.e. that are used by the direct importer to produce final goods and services to be consumed in the country itself (DVA_INT);
3) Domestic value-added embodied in intermediate exports used by the direct importer to produce goods for third countries (DVA_INTrex). According to KWW (Zhi Wang and Shang Jinwei, 2014), this component can be further divided into sub-components according to product use: Value added to intermediates that the direct (initial) importer embodies into other goods and services (intermediate), which then are exported to third countries (DVA_INTrexI1); value added to intermediates that export to the direct importer to produce final products for re-export to the third country (DVA_INTrexF); value added to intermediates that export to the direct importer to make intermediate products to export to the third country, before the final products produced by the third country are re-exported to the direct importer (DVA_INTrexI2);
4) Value added to intermediates that are ultimately absorbed at home, embodied in imports of final goods and services (RDV_FIN), as part of "reverse value added." According to KWW (Zhi Wang and Shang Jinwei, 2014),

this component can be further decomposed into value added to intermediates that export to the direct importer for final production before returning to the source (RDV_FIN1) and value added to intermediates that export to the direct importer to produce intermediate products for re-export to the third country, before the final products produced by the third country are re-exported to the source (RDV_FIN2);

5) Valued added to intermediates that are ultimately absorbed at home, embodied in imports of intermediate products and services (used to produce final goods and services for domestic consumption (RDV_INT), also a part of "reverse value added";
6) The double counting portion of domestic value added (DDC), according to KWW (Zhi Wang and Shang Jinwei, 2014) can be further decomposed into double counting from final product exports (DDC_FIN) and double counting from intermediate products exports (DDC_INT);
7) Value-added from foreign countries embodied in gross exports ("foreign value added used in exports") (FVA_FIN), which can be further divided into value-added for the direct importer of final product exports (MVA_FIN) and value added to final product exports to other countries (OVA_FIN);
8) Foreign value added to intermediate products exports (FVA_INT) can be further decomposed into value added to direct importer of intermediate products exports (MVA_INT) and value added to other countries of intermediate products exports (OVA_INT) ;
9) Double (multiple) counting portion of foreign value added (FDC) includes double counting of direct importer's exports (MDC) and double counting of other countries' exports (ODC).

In export trade, only domestic value added exported to and absorbed by other countries is called value added export; value added of intermediate imports is treated as domestic value added of other countries instead of value added to the importing country.

The portion of refunded domestic value added should be isolated from the export value added. Import intermediate products by a country/sector perhaps are produced into another kind or multiple kinds of intermediate products by other sectors in the importing countries before exporting to other countries. In other words, the value added to import intermediates of a country can move around its different sectors before the processed products are exported to other countries. Hence, the above formula only reflects direct movement and first round of indirect movement of value added; it can be further drawn that the above formula (direct movement and first round of indirect movement of value added) reaches the approximate value for total movement of value added.

Supplementary Tables

Table Major Sources of Korean Trade Balance in 2015

(Unit: Millions of $)

Country & Region	2015	Same period a year earlier	Year-on-year (%)
Total	90,353	47,150	91.6
Major sources of surplus			
China	46,904	55,205	-15.0
Hong Kong	28,921	25,507	13.4
United States	25,815	25,002	3.3
Vietnam	17,971	14,361	25.1
India	7,791	7,508	3.8
Marshall Islands	7,467	7,991	-6.6
Mexico	7,420	7,578	-2.1
Singapore	7,079	12,447	-43.1
Turkey	5,459	6,010	-9.2
Philippines	5,081	6,701	-24.2
Major sources of deficit			
Japan	-20,258	-21,585	-6.2
Qatar	-15,802	-24,819	-36.3
Germany	-14,730	-13,728	7.3
Saudi Arabia	-10,091	-28,407	-64.5
Kuwait	-8,039	-14,916	-46.1

Source: Ministry of Commerce, PRC.

Table 2015 Korean Top-5 Categories of Export Destination Country/Region

(Unit: Millions of $)

HS84-85: Machinery and Electrical Products

Country/Region	Amount	Year-on-year (%)	Share of the total (%)
China	67,794	2.8	33.8
United States	24,601	-1.0	12.3
Hong Kong	20,856	16.3	10.4
Vietnam	15,196	43.5	7.6
Japan	7,826	-12.5	3.9

Source: Ministry of Commerce, PRC.

HS86-89: Transport Equipment

Country/Region	Amount	Year-on-year (%)	Share of the total (%)
United States	25,414	9.7	23.1
Marshall Islands	7,491	-7.0	6.8
China	6,864	-13.4	6.2
Norway	4,674	204.4	4.2
UK	4,450	106.1	4.0

Source: Ministry of Commerce, PRC.

HS72-83: Manufactured Base Metal Products

Country/Region	Amount	Year-on-year (%)	Share of the total (%)
China	7,384	-9.5	16.7
United States	5,517	-25.8	12.5
Japan	3,877	-23.6	8.8
Vietnam	2,891	4.9	6.6
India	2,583	-0.7	5.9

Source: Ministry of Commerce, PRC.

HS39-40: Plastics and Rubber

Country/Region	Amount	Year-on-year (%)	Share of the total (%)
China	9,846	-12.1	28.3
United States	3,747	0.5	10.8
Vietnam	2,010	7.5	5.8
Japan	1,591	-18.4	4.6
Hong Kong	1,583	-5.4	4.6

Source: Ministry of Commerce, PRC.

HS28-38: Chemical Products

Country/Region	Amount	Year-on-year (%)	Share of the total (%)
China	15,207	-14.3	44.4
Japan	2,269	-10.4	6.6
United States	2,202	-13.0	6.4
Taiwan (Province)	2,106	-25.9	6.2
Vietnam	1,084	5.0	3.2

Source: Ministry of Commerce, PRC.

Table 2015 Korean Top-5 Categories of Import Source Country/Region

(Unit: Millions of $)

HS84-85: Machinery and Electrical Products

Country/Region	Amount	Year-on-year (%)	Share of the total (%)
China	41,874	7.6	33.7
Japan	16,051	-7.5	12.9
United States	14,457	-1.9	11.6
Taiwan (Province)	13,060	12.6	10.5
Germany	6,157	-16.5	5.0

Source: Ministry of Commerce, PRC.

HS25-27: Mineral Products

Country/Region	Amount	Year-on-year (%)	Share of the total (%)
Saudi Arabia	18,485	-47.5	15.9
Qatar	16,167	-36.2	13.9
Australia	11,600	-27.0	10.0
Kuwait	8,939	-46.8	7.7
Russia	8,771	-30.4	7.5

Source: Ministry of Commerce, PRC.

HS72-83: Manufactured Base Metal Products

Country/Region	Amount	Year-on-year (%)	Share of the total (%)
China	12,802	-12.8	32.9
Japan	7,197	-26.8	18.5
United States	2,666	-20.2	6.8
Chile	1,516	-18.5	3.9
Australia	1,069	-0.3	2.7

Source: Ministry of Commerce, PRC.

HS28-38: Chemical Products

Country/Region	Amount	Year-on-year (%)	Share of the total (%)
Japan	7,990	-17.8	22.1
China	6,668	-4.9	18.4
United States	5,771	-2.6	16.0
Germany	2,942	-2.0	8.1
Singapore	1,019	-12.5	2.8

Source: Ministry of Commerce, PRC.

HS86-89: Transport Equipment

Country/Region	Amount	Year-on-year (%)	Share of the total (%)
Germany	6,885	17.5	32.3
United States	4,098	54.5	19.2
China	2,052	7.1	9.6
Japan	2,025	-2.5	9.5
France	1,368	-23.0	6.4

Source: Ministry of Commerce, PRC.

Table Commodities that Korea Exports to China in 2015

(Unit: Millions of $)

HS Code	Item category	2015	Same period a year earlier	Year-on-year (%)	Share of the total (%)
	Total	137,140	145,288	-5.6	100.0
85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers and parts thereof	52,666	51,182	2.9	38.4
90	Optical, photographic and medical equipment and parts	19,258	20,351	-5.4	14.0
84	Nuclear reactor, boiler, machinery and mechanical appliances and parts	15,128	14,758	2.5	11.0
29	Organic chemicals	10,079	13,440	-25.0	7.4
39	Plastics and articles thereof	9,064	10,314	-12.1	6.6
87	Vehicles other than railway or tramway rolling-stock, and parts thereof	6,353	7,435	-14.6	4.6
27	Mineral fuels, mineral oils and products of their distillation; bituminous substances	4,893	7,799	-37.3	3.6
72	Iron and steel	3,078	3,907	-21.2	2.2
74	Copper and articles thereof	1,577	1,619	-2.6	1.2
28	Inorganic chemicals; compounds of precious metals	1,315	1,120	17.4	1.0

HS Code	Item category	2015	Same period a year earlier	Year-on-year (%)	Share of the total (%)
33	Essential oils, balm, perfumery products, cosmetic or toilet preparations	1,191	598	99.2	0.9
73	Article of iron or steel	1,077	1,055	2.1	0.8
38	Miscellaneous chemical products	900	982	-8.4	0.7
32	Tanning or dyeing extracts; dyes, paints, pigments, ink and other coloring matter	824	801	2.9	0.6
40	Rubber and articles thereof	782	889	-12.1	0.6
76	Aluminum and articles thereof	589	614	-4.1	0.4
54	Sewing thread of man-made filaments	474	549	-13.6	0.4
89	Ships, boats and floating structures	451	440	2.7	0.3
94	Furniture; bedding; lamps; prefabricated house	447	514	-12.9	0.3
82	Tools, implements, cutlery, spoons and forks, of base metal; parts thereof of base metal	433	432	0.3	0.3
37	Photographic or cinematographic goods	379	317	19.4	0.3
60	Knitted or crocheted fabrics	373	459	-18.7	0.3
70	Glass and glassware	354	359	-1.5	0.3
83	Miscellaneous articles of base metal	296	321	-7.8	0.2
55	Man-made staple fibers	274	355	-22.8	0.2
41	Raw hides and skins (other than fur skins) and leather	271	291	-7.0	0.2
19	Products of cereals, flour, starch or milk; pastry	266	235	13.0	0.2
62	Articles of apparel and clothing accessories, not knitted or crocheted	249	266	-6.5	0.2
34	Washing preparations, lubricating preparations, artificial waxes; styling cream	236	227	3.9	0.2

HS Code	Item category	2015	Same period a year earlier	Year-on-year (%)	Share of the total (%)
59	Impregnated, coated, covered or laminated textile fabrics; textile articles of a kind suitable for industrial use	235	268	-12.5	0.2
	Sum	133,511	141,896	-5.9	97.4

Source: Ministry of Commerce, PRC.

Table Commodities that Korea Imports from China in 2015

(Unit: Millions of $)

HS Code	Item category	2015	Same period a year earlier	Year-on-year (%)	Share of the total (%)
	Total	90,237	90,082	0.2	100.0
85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers	31,672	28,444	11.4	35.1
84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	10,202	10,461	-2.5	11.3
72	Iron and steel	6,884	8,903	-22.7	7.6
90	Optical, photographic, and medical equipment and parts	4,324	4,089	5.7	4.8
73	Articles of iron or steel	3,654	3,531	3.5	4.1
29	Organic chemicals	2,441	2,647	-7.8	2.7
62	Articles of apparel and clothing accessories, not knitted or crocheted	2,199	2,306	-4.7	2.4
39	Plastics and articles thereof	2,198	2,068	6.3	2.4
28	Inorganic chemicals; compounds of precious metals	2,020	2,007	0.7	2.2
94	Furniture; bedding; lamps; prefabricated house	1,871	1,703	9.8	2.1

HS Code	Item category	2015	Same period a year earlier	Year-on-year (%)	Share of the total (%)
87	Vehicles other than railway or tramway rolling-stock, and parts thereof	1,463	1,450	0.9	1.6
61	Articles of apparel and clothing accessories, knitted or crocheted	1,192	1,180	1.0	1.3
64	Footwear, gaiters and the like; parts of such articles	1,132	1,198	-5.5	1.3
38	Miscellaneous chemical products	1,048	1,177	-11.0	1.2
03	Fish and other aquatic invertebrates	1,006	1,014	-0.8	1.1
70	Glass and glassware	1,003	1,115	-10.1	1.1
95	Toys, games, sporting goods and parts thereof	888	846	5.0	1.0
76	Aluminum and articles thereof	887	749	18.3	1.0
68	Articles of mineral materials	869	843	3.2	1.0
42	Articles of leather; travel bags and suitcases; articles of animal gut	824	890	-7.5	0.9
69	Ceramic products	782	789	-0.9	0.9
44	Wood and articles of wood; wood charcoal	657	717	-8.5	0.7
54	Sewing thread of man-made filaments	566	617	-8.3	0.6
07	Edible vegetables and certain roots and tubers	543	475	14.3	0.6
89	Ships, boats and floating structures	539	410	31.5	0.6
27	Mineral fuels, mineral oils and products of their distillation; bituminous substances	506	906	-44.1	0.6
81	Other base metals; metal ceramic; articles thereof	444	452	-1.8	0.5
74	Copper and articles thereof	437	558	-21.6	0.5
48	Paper and paperboard; articles of paper pulp, of paper or of paperboard	435	451	-3.4	0.5

HS Code	Item category	2015	Same period a year earlier	Year-on-year (%)	Share of the total (%)
32	Tanning or dyeing extracts; dyes, paints, pigments, ink and other coloring matter	432	459	-5.9	0.5
	Sum	83,119	82,456	0.8	92.1

Source: Ministry of Commerce, PRC.

Table Major Industry of Korean Investment in China

(Unit: %)

Industry		1992	2000	2005	2011
Manufacturing		1.2	5.8	23.0	27.7
Service		0.01	0.7	0.4	4.6
Specialized, science and technology service		0.0	0.01	0.1	3.2
Wholesale & retail		0.0	0.6	1.7	2.1

Source: Export-Import Bank of Korea (www.koreaexim.go.kr).

Table Changes of Top-10 Products in Korean Exports to China

(Unit: %)

Ranking	1992		2000		2011	
	Item	Ratio	Item	Ratio	Item	Ratio
1	Reinforced steel plate	15.8	Petroleum products	9.1	Flat TV screen	15.1
2	Synthetic resin	11.3	Synthetic resin	8.5	Semiconductor	11.8
3	Steel bar	8.9	Electronic valves and tubes	6.7	Petroleum products	8.2
4	Leather	5.3	Reinforced steel plate	6.	Synthetic resin	5.5

Ranking	1992		2000		2011	
	Item	Ratio	Item	Ratio	Item	Ratio
5	Synthetic fiber	4.9	Leather	4.1	Synthetic fiber and synthetic rubber materials	3.4
6	Synthetic fiber textiles	3.7	Computer	4.0	Auto parts	3.3
7	Paper products	3.4	Other textiles	3.3	Wireless telecommunication equipment	3.2
8	Petrochemicals machine	2.9	Semiconductor	3.1	Petrochemical intermediate materials	2.8
9	Petroleum products	2.8	Synthetic fiber and synthetic rubber materials	3.1	Distillate	2.7
10	Other petrochemicals	2.6	Petrochemical raw materials	2.8		2.4

Source: Korea International Trade Association (www.kita.net).

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How do the Renminbi and other East Asian Currencies Co-move? New Evidence from Non-linear Analysis[1)]

Benjamin Keddad*

Abstract

This paper investigates the degree and the nature of exchange rate co-movements between the Renminbi and a set of seven East Asian currencies, estimating Markov-switching models with regime-dependent correlations and time-varying transition probabilities. These models have several advantages: First, exchange rate co-movements can differ across regimes of depreciation and appreciation. Second, the Renminbi can act as a transition variable informative with regard to detecting how exchange rates evolve through time. After controlling for global effects, the results bring robust evidence of the rising Renminbi's role in East Asia as a significant

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1) The latest version of the paper has been uploaded on SSRN in December 2016 and is available at: https://ssrn.com/abstract=2850421. The author is also grateful to the participants of EAEA 2016 convention in Bandung and the INFINITI 2016 conference at the University of Ho Chi Minh City.

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factor of currency fluctuations. A key result is that regional currencies tend to overreact when the Renminbi depreciates while the inverse is true when it appreciates, suggesting that East Asian economies are not willing to allow their currencies appreciate too much against the Chinese currency. Finally, trade transactions and competition as well as financial flows significantly explain currency movements against the Renminbi, especially during episodes of smaller exchange rate fluctuations.

Keywords: Exchange Rates, East Asia, Renminbi Impact, Markov-Switching Models, Asymmetric Co-movements, Time-Varying Transition Probabilities

JEL: F31, F41, F42

I. Introduction

Over the last three decades, China has registered a spectacular period of rapid expansion and become a key driver of world economic growth. In the aftermath of the 2007-08 financial crisis, China has continued to offer economic development opportunities for the rest of the world. More recently, China's economic slowdown has produced important spillovers on world markets. This increasing influence places China at the center of global economic issues including, among others, the resolution of global imbalances and the reform of the International Monetary System-IMS (Dooley *et al.*, 2014; Benassy-Quéré *et al.*, 2013; Mazier *et al.*, 2008). In the aftermath of the 2007-08 financial crisis, the IMS configuration has been seriously criticized for having exacerbated asymmetric capital flows in favor of developed countries, global excess liquidity and then global current account imbalance (Gourinchas and Rey, 2007; Dooley *et al.*, 2003). The economic rise of China, coupled with the negative externalities produced by the US Dollar's fluctuations (USD), has raised

the prospect of a multi-polar monetary system in which the Chinese Renminbi (RMB hereafter) and the Euro would have an increasing role (Fratzscher and Mehl, 2014; Yeh, 2012; Eichengreen, 2011; Wu *et al.*, 2010; Dobson and Masson, 2009). This mutation is viewed favorably in many countries which call for a more stable and diversified IMS, making them less vulnerable to external fluctuations.

If the RMB's potential to become a global currency remains questionable in many respects, it is clear that it will inevitably play an important role in East Asia.[2] Eichengreen and Lombardi (2015) stress that the RMB has special advantages in East Asia as a result of an increasing regional trade integration. For instance, the RMB acts already as an important vehicle for trade settlements in Asia, where it has become the most active currency for payments with China and Hong Kong.[3] Furthermore, the development of the Asian trade network has been accompanied in recent years by greater competition on both regional and international markets. In light of this, some studies have emphasized that during the 1990s, the increasing capacity of China to export has crowded-out those of lower-developed countries (see, e.g., Eichengreen *et al.*, 2007). However, the rapid development of China's manufacturing sector during the last years has occurred largely at the expense of its high-wage neighbors, as a result of production lines becoming highly capital- and technology- intensive (Caporale *et al.*, 2015; Athukorala, 2009).

Trade relationships in East Asia are multifaceted, implying that exchange rate fluctuations can generate regional spillovers through many channels. This points out important concerns in terms of export competitiveness for countries engaged in regional and international trade. A first strand of the literature has studied the

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2) When compared with the currencies of the other world largest economies, the RMB's influence remains limited. However, Chinese authorities have recently taken different measures to promote the RMB as a global currency. Among them, the development in the RMB cross-border trade settlement, the issuance of RMB-denominated bonds, the set-up of currency swaps agreements with foreign central banks and the promotion of the RMB as a reserve currency. See, among others, Ryan (2015), Yeh (2012) and Wu *et al.* (2010) on the RMB's internationalization issues.

3) See https://www.swift.com/insights/press-releases/rmb-ranks-1-in-asia-pacific-for-payments-with-greater-china.

relationship between intraregional trade and exchange rate volatility, with evidence supporting the significant negative effects of intra-Asia exchange rate volatility on exports (Tang, 2014; Chit *et al.*, 2010). Likewise, Mattoo *et al.* (2012) address a different side of this issue and show that China's real appreciation significantly boosts Asian exports in third markets.

A new strand of the literature has focused on the RMB co-movements with other regional currencies since China's exchange rate policy reforms of July 2005 (see, e.g., Shu *et al.* , 2015; Kawai and Pontines, 2015; Fratzscher and Mehl, 2014; Chow, 2014; Keddad, 2013; Ma and McCauley, 2011; Henning, 2012; Shu *et al.*, 2007). Overall, these studies agree with the view that the incentive to track more closely RMB's fluctuations has become stronger as a result of deeper trade and financial integration between China and its neighbors. For instance, Subramanian *et al.* (2012) find that co-movements between many East Asian currencies and the RMB are stronger than with the US dollar, arguing that a stable exchange rate with the RMB could promote trade integration and maintain export competitiveness within the region. Several papers stress also the growing role of the RMB as a possible regional anchor, although the Great and the European debt crises have seriously dampened the case for regional monetary cooperation (see, e.g., Chinn, 2015; Ryan, 2015; Park and Song, 2011; Park, 2010).

If the relationship between the RMB and other currencies in East Asia has strengthened over the last decade, the exact nature of their co-movements needs to be further investigated. There are many channels through which co-movements can emerge. For instance, if the RMB appreciates against the USD, this would make East Asian exports more competitive than Chinese exports (other things being equal) causing inflation pressures as a result of a rising aggregate demand. Under inflation targeting regimes, central banks in East Asia thus should be more inclined to let their currency appreciate against the USD to reach price stability.[4] Conversely,

4) Another argument refers to the fact that the collective realignment of East Asian currencies is necessary to resolve global imbalances. According to Ito (2008), East Asian countries, including China, would be more willing to allow appreciation of their own currencies if the

one might argue that the relevant authorities may be reluctant to let their currencies appreciate too much against the RMB for enhancing domestic firm exports in a highly competitive environment. In this view, Pontines and Siregar (2012) provide some elements of answer by showing that the exchange rate policy of many East Asian countries are well-characterized by asymmetric behavior with a significant degree of aversion to appreciation against the RMB. While the RMB has appreciated almost continuously since 2005, the People's Bank of China (PBC) has let the RMB depreciate on several occasions since 2012 to cope with China's economic slowdown and negative macroeconomic news flow, which generated important spillovers within the region. The events of the summer of 2015 are illustrative: many Asian currencies have depreciated sharply against the USD, under the pressure of capital outflows caused by market anticipations of depreciation as a potential response to RMB's devaluations.

In the aftermath of the 1997-98 crisis, there is evidence that many East Asian countries have returned to a soft USD pegging because of an inherent fear of floating, forcing them to intervene heavily in the foreign exchange market to avoid the disrupting effects of sudden and large deprecations (McKinnon and Schnabl, 2004a; McKinnon and Schnabl, 2004b; Calvo and Reinhart, 2002). Subsequently, it has been argued that the central banks of many emerging countries intervened for limiting appreciations rather than depreciations (see, e.g., Levy-Yeyati *et al.*, 2013). This asymmetric behavior of exchange rates is rational when considering that the relative competitiveness of domestic firms is an essential component of the export-led growth prevailing in many East Asian emerging countries. Rajan (2012) and Pontines and Rajan (2011) provide such evidence through the estimates of the intervention reaction function and policy preference of central banks in East

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appreciation of the neighbor's currencies accelerates. The episodes of RMB's gradual appreciation from July 2005 to the summer of 2008, and after June 2010 may have been characterized by greater exchange rate co-movements in East Asia. As such, Ma and McCauley (2011) show that East Asian countries have shared a policy of gradual appreciation during 2006-2008, leading to greater intra-regional exchange rate stability.

Asia. In the same way, Coudert *et al.* (2013) find that many emerging countries are more likely to loosen their peg in face of an appreciating USD, reflecting greater real exchange rate co-movements with the USD in times of depreciation. Given the regional growing role of China in trade and financial areas, Pontines and Siregar (2012) go further by claiming that such asymmetric exchange rate policies are aimed mainly at limiting the exchange rate appreciation against RMB.

With the introduction of greater RMB's flexibility since July 2005 and the gradual progress toward the RMB's internationalization, the roles have been partially redistributed within the region. Overall, previous studies generally find that the RMB exerts a significant and growing influence at the regional level, but some go further by stating that an effective RMB bloc has emerged in East Asia (e.g. Subramanian *et al.*, 2012, Henning, 2012). Most of these studies rely on the method introduced by Frankel and Wei (1994) (FW) or a modified version of it, augmented with regional or global factors (Kawai and Pontines, 2015; Fratzscher and Mehl, 2014). The main purpose of the FW model is to estimate the relative weights of major currencies (i.e., USD, Yen, Euro, RMB) in the country's implicit basket peg. All exchange rates are generally defined in terms of a numeraire currency (i.e. the Swiss Franc, Special Drawing Rights, Australian, Canadian or New Zealand dollars) whose fluctuations are supposed to be independent from those of the currencies included in the model. Since the RMB's variations are closely linked to the USD, the FW standard model is unable to disentangle between the weights of the RMB and the USD. Previous studies have dealt with this issue through different methods such as auxiliary regressions (Kawai and Pontines, 2015; Shu *et al.*, 2007) or SVAR models (Chow, 2014; Keddad, 2013). Finally, other studies have simply overcome this simultaneity bias by using the USD as the numeraire currency by focusing mainly on the role of the RMB rather than the basket peg's composition (e.g. Shu *et al.*, 2015).

Shu *et al.* (2007) run an auxiliary regression to orthogonalize the changes in the RMB and the USD, and use the residuals to represent the RMB in the FW model between 1999 and 2007, for a set of nine Asian currencies. Their findings

show that the USD continues to dominate in the implicit currency basket tracked by Asian countries, although its weight has declined since 2005 after the RMB's exchange rate reform. According to the authors, this result is explained by the rising RMB's influence even if fluctuations independent from the USD have been limited. These findings are supported by Subramanian *et al.* (2012) who claim that the RMB has become the dominant reference currency in East Asia where more currencies co-move with the RMB than with the USD, especially after 2010. The same conclusion is reached by Henning (2012) who finds an ascending trend for the RMB weights at the expense of the USD weights. Ma and McCauley (2011) conclude that, from mid-2006 to mid-2008, the RMB seems to have been managed to appreciate gradually against a trade-weighted basket of currencies, leading to greater intra-regional exchange rate stability. Kawai and Pontines (2015) propose an FW empirical model that yields to more robust results and thus, provide contradictory evidence on the existence of a RMB bloc in East Asia.

Referring to the German mark's dominant role in Europe before the introduction of the Euro, Fratzscher and Mehl (2014) find evidence supporting what they called the "China's dominance hypothesis." The authors use a regional factor (including the RMB) as an explanatory variable in the FW model, and test whether its influence has changed after 2005. At the last stage, they propose an extended version of the FW model by including an indicator variable for Chinese statements on the exchange rate regime or reserves, and find robust evidence that the RMB has become a key regional driver of currency movements since the mid-2000s.

Exploiting the SVAR methodology and the associated computational tools, Chow (2014) shows that the USD continued to exert a significant regional influence before 2008, but there is clear evidence supporting an increasing co-movement with the RMB after the global financial crisis. Using a slightly different approach, Keddad (2013) finds that the RMB shocks explain in average 19% of East Asian exchange rate fluctuations after 2006, which is significantly higher compared with the period preceding the RMB exchange rate reform.

With the development of its offshore markets, there is an additional channel through which the RMB's influence can spread within the region. As the external use of the offshore RMB increases, the central banks will be pushed to monitor its fluctuations with greater attention. In this view, Shu *et al.* (2015) use a modified version of the FW regression model to control for Chinese exchange policy, and find that both the onshore and offshore RMB affect the movements of East Asian currencies.

In light of the recent empirical literature dealing with exchange rate regimes, Pontines and Siregar (2012) ask whether the exchange rate behavior of East Asian currencies are characterized by a fear of appreciation against the RMB and the USD. The authors estimate a univariate MS model and show that the probability of remaining in the appreciation regime is greater than the probability of remaining in the depreciation regime.

This paper aims at providing additional empirical evidence on the nature of exchange rate co-movements, from July 2005 to February 2015, between the RMB and the currencies of seven East Asian economies, namely the Indonesian Rupiah, the Malaysian Ringgit, the Singapore Dollar, the Thai Baht, the Philippines Peso, the Taiwanese Dollar and the Korean Won. As explained above, the need to further investigate how the RMB and the other regional currencies co-move is rooted in the fact that co-movements should depend on the state of exchange rates. This paper is among the first to address this issue for East Asian countries. This study more precisely attempts to answer the following main questions: Do the exchange rate co-movements differ significantly between periods of depreciation and appreciation? Does the RMB drive the transitional dynamics of other East Asian currencies? What are the economic factors that may explain the incentive for East Asian economies to keep a stable relationship with the RMB? These issues have not yet been investigated in previous studies, because most of them resort to linear measures that are unable to capture non-linear co-movements.[5] This contribution

5) Among others, asymmetric exchange rate co-movements have already been studied between

sought to remedy these limits by relying on the Markov-switching (MS) class of models (Hamilton, 1989; Filardo, 1994; Kim *et al.*, 2008). The MS models have several advantages. First, the regimes of appreciation and deprecation are endogenously detected by the data. Second, the MS model allows to compute regime-dependent correlations, that is, correlations that can differ among depreciation and appreciation episodes. Third, transition probabilities between regimes can depend on variables that help predicting turning points of exchange rates. Here, this suggests that the RMB can act as an indicator informative on how East Asian currencies evolve through time. Fourth, the parametric structure of the MS model allows to infer the states of exchange rate volatility, allowing to assess the economic factors that might explain episodes of limited flexibility against the RMB.

The main results are as follows. First, there is evidence of the MS model's ability to capture in a convenient way asymmetric exchange rate fluctuations for all countries, including China, as it identifies clearly two distinct regimes of appreciation and depreciation. Second, exchange rate co-movements appear to be asymmetric since the sign, the significance and the magnitude of correlation coefficients differ widely across regimes. More precisely, the Singapore Dollar, the Malaysian Ringgit, the Indonesian Rupiah and the Korean Won tend to overreact when the RMB depreciates, while the inverse is true when it appreciates. Third, the RMB has become a key regional currency in East Asia as it drives significantly the regime transition probabilities of all currencies, with the exception of the Korean Won, and to some extent the Philippine Peso and the Indonesian Rupiah. However, the Malaysian Ringgit and the Singapore Dollar seem to be highly sensitive to the RMB's fluctuations. Finally, bilateral trade and Foreign Indirect Investment (FDI) flows with China, as well as trade competition, are found to explain significantly the incentive to track the RMB more closely.

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the Deutschmark and the Yen through models of conditional dependence structure (Patton, 2006), and between Australia, Canada, New Zealand, Sweden and United Kingdom, with asymmetric dynamic conditional correlation models (Li, 2011).

In the follow sections, some recent results on the regional influence of the RMB are first reviewed. Next, the different stages of the proposed methodology are explained in details. I subsequently present the estimations and the discussion of the results, followed by concluding remarks.

II. Data and Empirical Methodology

I use monthly data over the period of July 2005 to March 2015, for a sample of eight exchange rates against the US dollar (nominal rate of the domestic currency per US Dollar): the Indonesian Rupiah (IDR), the Malaysian Ringgit (MYR), the Singapore Dollar (SGD), the Thai Baht (THB), the Philippines Peso (PHP), the Taiwanese Dollar (TWD), the Korean Won (KRW) plus the RMB. The data are collected from International Financial Statistics (IFS) published by the International Monetary Fund (IMF). The investigation is conducted in three steps. First, an MS model with regime-dependent correlations is estimated to shed new light on the asymmetric co-movements between the RMB and the other regional currencies. To this end, I estimate the following MS model:

$$\begin{aligned}\Delta e_t^{EA^i_{USD}} &= \mu_1 + \sum_{m=1}^{M} \phi_1^m \Delta e_{t-m}^{EA^i_{USD}} + \beta_1^1 \Delta e_t^{RMB_{USD}} + \beta^2 \Delta e_t^{EURO_{USD}} + \beta^3 \Delta e_t^{YEN_{USD}} + \sigma\varepsilon_t \ \text{in regime 1} \\ &= \mu_2 + \sum_{m=1}^{M} \phi_2^m \Delta e_{t-m}^{EA^i_{USD}} + \beta_2^1 \Delta e_t^{RMB_{USD}} + \beta^2 \Delta e_t^{EURO_{USD}} + \beta^3 \Delta e_t^{YEN_{USD}} + \sigma\varepsilon_t \ \text{in regime 2} \quad (1)\end{aligned}$$

with Δe_t^{EAi}, the (log) returns of the East Asian exchange rate i and Δe_t^{RMB}, Δe_t^{EURO} and Δe_t^{YEN}, the (log) returns of the Chinese, Euro and Japanese exchange rate. I use the USD as the numeraire because it remains the main reserve and intervention currency within the region. Likewise, the East Asian currencies remain fairly managed against a currency basket in which the US dollar continues to keep an important

weight (see, e.g., Kawai and Pontines, 2015). Moreover, an independent numeraire (such as the Swiss-Franc) is not appropriate in the MS model because exchange rate series would be too volatile, which would make more difficult, if not impossible, the inference of regime probabilities.[6] This parametric form is very similar to the standard FW model or extended versions proposed in the literature, but it differs in one main aspect. Indeed, the model in Eq. (1) allows the exchange rates to evolve across different regimes (here two) characterized by their own dynamics. The endogenous variable Δe_t^{EA} is assumed to visit the two states of a hidden variable $S_t \in \{1, 2\}$ that follows a first-order Markov-chain. However, the states are unobservable so that the inference of S_t takes the form of a probability given observations on Δe_t^{EA}. The regime-generating process is an ergodic two-regime Markov-chain of order 1 with the following transition probabilities:

$$P_{ij} = P_r(s_t = i | s_{i-1} = j), \quad \sum_{i=1}^{2} P_{ij} = 1, \text{ for } all\ i, j \in \{1, 2\} \tag{2}$$

This framework refers to the seminal Hamilton (1989)'s Fixed Transition Probability MS model (FTP-MS hereafter) where transition probabilities between each regime are constant over time. This assumption will be relaxed later.

This non-linear specification is entirely appropriate for capturing continued episodes of exchange rates appreciation and depreciation, because it is based on the assumption of a regime-dependent mean μ_{st} whose value depends on the state of the exchange rate. Suppose that in the first regime μ_1 is positive. This indicates a depreciation regime where the exchange rate fluctuates positively. Obviously, the second regime should correspond to the appreciation regime with a negative μ_2 (i.e negative variations). The model also incorporates auto-regressive lags to account for different dynamics in each regimes.[7] The asymmetric behavior of exchange rates is simply tested through

6) The USD has been used recently as a numeraire by Shu *et al.* (2015). Note also that the aim of this empirical exercise is to identify exchange rate co-movements, not to infer the exhaustive composition of basket pegs.

a log-likelihood ratio (LR) test between the MS and linear specifications. The results presented in Table 4 confirm without exception the assumption that two distinct regimes of depreciation and appreciation characterize the East Asian exchange rates.

The most important advantage here is that the model allows to capture regime-dependent correlation through the coefficients β_{st}^{RMB}. These correlations can be of opposite sign, different magnitude but also statistically significant in one regime and insignificant in the second. A second LR test is performed to confirm this asymmetric relationship. The log-likelihood of the unconstrained model (i.e. model with a non-linear β_{st}^{RMB} coefficient) is compared with that of the constraint model (i.e. model with a linear β^{RMB} coefficient). The LR statistic displayed in Table 4 allows to reject the constrained model, thus confirming the existence of a regime-dependent relationship between the Chinese currency and those of the other East Asian countries. The Euro and the Yen are also included to control for their respective influences.[8)]

The same exercise is repeated using a synthetic Asian Monetary Unit (AMU) in the left-hand side of Eq. (1). The goal is twofold. First, it allows to assess whether there exists a regional factor that is responsive to RMB fluctuations. Second, the AMU can serve as a benchmark for comparing the estimates on a regional basis. The currencies included in the AMU are those of the original sample, excluding the RMB. Their weights are calculated as the arithmetic average of respective countries' share in the GDP (measured at purchasing power parity) and intra-regional trade,

$$W_i^{trade} = \frac{X_i + M_i}{\Sigma(X_i + M_i)}, \quad W_i^{GDP} = \frac{Y_i}{Y_{REG}}$$

7) The number of lags is optimally chosen according to conventional criteria such as the Akaike Information Criterion (AIC), the Schwarz Information Criterion (SBC) and the LR statistic.

8) For purposes of simplicity and parsimony, the correlation coefficients are restricted to be common across regimes. The study of the exhaustive non-linear FW weights constitutes a promising avenue of research that goes beyond the scope of this paper.

that is with X_i (resp. M_i) the exports from (resp. imports to) country i to (resp. from) other countries, Y_i the GDP of the country i and Y_{REG}, the regional aggregated GDP.[9] These weights are time-varying according to the evolution of the countries' respective share in GDP and intra-regional trade. The weights are presented in Table 1.

Table 1. Weights of East Asian currencies in the AMU

(Unit: %)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Indonesia	0,112	0,118	0,123	0,146	0,155	0,165	0,178	0,175	0,166	0,158
Malaysia	0,113	0,113	0,112	0,113	0,109	0,110	0,108	0,108	0,110	0,109
Philippines	0,049	0,050	0,051	0,052	0,053	0,055	0,053	0,053	0,054	0,054
Thailand	0,092	0,092	0,094	0,097	0,098	0,098	0,097	0,097	0,097	0,094
Singapore	0,174	0,177	0,177	0,177	0,176	0,170	0,169	0,169	0,165	0,158
Korea	0,275	0,273	0,268	0,242	0,235	0,234	0,229	0,229	0,234	0,238
Vietnam	0,035	0,037	0,041	0,046	0,048	0,044	0,051	0,051	0,056	0,062
Taiwan	0,150	0,141	0,133	0,133	0,125	0,123	0,118	0,118	0,118	0,125
Total	1	1	1	1	1	1	1	1	1	1

Notes: This table shows the weight of each country in the regional currency basket. These weights are calculated as the arithmetic average of respective share in the total GDP and intra-regional trade of these countries.
Source: Own calculation with data from IMF's DOTS and World Bank databases.

Second, the FTP hypothesis is relaxed by assuming that transition probabilities between regimes depend on a "transition" variable. In other words, the RMB that was entering as an explanatory variable in Eq. (1) is now considered as a leading indicator potentially informative with regard to detecting the turning points of the East Asian exchange rates. The most closely related models refer to Filardo (1994) and Kim *et al.* (2008) that assume Time-Varying Transition Probability (TVTP-MS thereafter) features in MS models. The aim here is to go beyond the correlation

9) Imports and Exports Data are extracted from the IMF's DOTS database and GDP data are extracted from the World Bank database.

analysis by evaluating whether the RMB provides relevant information regarding the probabilities that the East Asian currencies stay in, or switch from a given regime. To this end, the transition matrix is now defined as follows

$$P_{ijt} = Pr(s_t = i | s_{t-1} = j, Z_t) = \begin{pmatrix} P_{11}(Z_t) & 1-P_{22}(Z_t) \\ 1-P_{11}(Z_t) & P_{22}(Z_t) \end{pmatrix} \quad (3)$$

with $1-P_{11t} = P_{21t}$ and $1-P_{22t} = P_{12t}$. In this framework, the transition probabilities P_{ijt} are driven by a set of transition variables Z_t with a possible lag. This set includes the log variation of the RMB exchange rate against the USD at lag $k \in \{1, \cdots, 4\}$, but also two common factors that are the stance of the US monetary policy and energy prices.

The US monetary policy as well as energy prices are likely to affect exchange rates through many channels, which could lead to misleading inference on the RMB's real effect. Indeed, changes in US monetary policy induce important macroeconomic fluctuations, especially exchange rates, through massive capital inflows, carry trades, portfolio adjustments and terms of trade (see, e.g., Mackowiak, 2007). Moreover, many energy commodities are traded in USD implying that fluctuations of energy prices are supposed to affect widely the exchange rates of energy importers and exporters in East Asia (see, e.g., Basher *et al.*, 2012). As a proxy for the US monetary policy, I choose the first difference of the Krippner (2013)'s US Shadow Rate (*ssr*) to account for the stance of the US monetary policy beyond the zero lower bound.[10] This choice follows the findings from recent papers that document the sizeable effects of the US unconventional monetary policy on the exchange rates of emerging economies (see, e.g., Chen *et al.*, 2015). For energy prices, I use the log variations of the Energy Index (*en*) computed by the World Bank Commodity Price Data.

The transition probabilities are assumed to be a function of these three factors.

10) For robustness checks, I used also the Wu-Xia shadow rate (Wu and Xia, 2015).

The following logistic specification is retained:

$$P_{11}(Z_t) = \frac{\exp(\alpha_1 + \lambda_1 \Delta s_{t-k}^{RMB} + \gamma_1 \Delta ssr_t + \omega_1 \Delta en_t)}{1 - \exp(\alpha_1 + \lambda_1 \Delta s_{t-k}^{RMB} + \gamma_1 \Delta ssr_t + \omega_1 \Delta en_t)},$$
$$P_{22}(Z_t) = \frac{\exp(\alpha_2 + \lambda_2 \Delta s_{t-k}^{RMB} + \gamma_2 \Delta ssr_t + \omega_2 \Delta en_t)}{1 - \exp(\alpha_2 + \lambda_2 \Delta s_{t-k}^{RMB} + \gamma_2 \Delta ssr_t + \omega_2 \Delta en_t)} \quad (4)$$

Consequently, the two regimes are associated with opposite values of the transition variables. The TVTP-MS assumes a notion of causality in the sense that the RMB's variations cause those of the other currencies when the information in the former helps predicting the latter. For purpose of illustration, assume that regime 1 and 2 are respectively the depreciation and appreciation regimes. A positive and significant coefficient λ_1 would indicate that the probability to see a given currency remaining in the depreciation regime is positively linked with the observed RMB's variations k periods before.[11] Put differently, it means that when the RMB depreciates (resp. appreciates), the probability to observe e_t^{EA} depreciates is higher (resp. lower), suggesting that the former drives the latter.

Two TVTP-MS-based indicators are computed to enrich the analysis. The first indicator MP measures the variation of P_{11t} associated with an RMB depreciation of 1%.[12] The second indicator ZM gives the value of Δe_t^{RMB} for which the probability that Δe_t^{EA} stays into the depreciation regime is 0.5. For values of Δe_t^{RMB} above this threshold, it becomes more likely to observe Δe_t^{EA} in the depreciation regime.

For robustness checks, I perform a Granger causality test to check whether the probability of being in the depreciation regime are caused by those associated to the RMB. For this purpose, a basic univariate FTP-MS model is applied to Δe_t^{RMB} and Δe_t^{EAi} in order to collect the regime filtered probabilities (including the AMU also).

Third, I explore the economics determinants that may explain the decision

11) The lag is selected according to conventional criteria.

12) The reader may refer to Aloy *et al.* (2014) regarding the computation of regime-dependent indicators derived from TVTP-MS models.

of East Asian countries to stabilize their currencies against the RMB. These economics factors are chosen in order to reflect the increasing trend in capital and current account transactions between East Asia and China. Following Kim *et al.* (2012), I take the first difference of the following variables: the Export Similarity Index (*esi)* between China and each country, the Exports (*X*) and Imports (*M*) to and from China, Portfolio Investments outflows in China (*pf*) and FDI outflows (*fdix*) and inflows (*fdim*) to and from China.[13] This set of economic variables is included in the following model

$$\begin{aligned}\Delta e_t^{EA^i_{RMB}} &= \beta_1^1 \Delta esi_t + \beta_1^2 \Delta X_t + \beta_1^3 \Delta M_t + \beta_1^4 \Delta Pf_t + \beta_1^5 \Delta fdix_t + \beta_1^6 \Delta fdim_t + \sigma_1 \varepsilon_1 \ \text{in regime 1} \\ &= \beta_2^1 \Delta esi_t + \beta_2^2 \Delta X_t + \beta_2^3 \Delta M_t + \beta_2^4 \Delta Pf_t + \beta_2^5 \Delta fdix_t + \beta_2^6 \Delta fdim_t + \sigma_1 \varepsilon_1 \ \text{in regime 1} \quad (5)\end{aligned}$$

where e_t^{EAi} is the bilateral exchange rate between the RMB and the East Asian currency i (expressed as the domestic currency price of the RMB). This parametric form has several interesting features. First, the error variances are regime-dependent (i.e $\sigma_{s_t}\epsilon_t$ with $s_t \in \{1, 2\}$) which means that the empirical model is able to discriminate between two separate regimes of high and low exchange rate fluctuations, respectively defined as the regime 1 and 2, with $\sigma_1\epsilon_t > \sigma_2\epsilon_t$. Accordingly, the second regime is assimilated to the regime where the East Asian countries are expected to track more closely the RMB's fluctuations. Second, the influence of economic factors are regime-dependent, thus allowing to infer which economic factors explain episodes of smaller exchange rate flexibility against the RMB. In this view, we look at the variables that are statistically significant in the second regime.

13) The data sources are the Coordinated Portfolio Investment Survey (CIPS), the UN Comtrade, the IMF's DOTS and the UNCTAD databases. The esi is developed using the STIC two digits sectoral level (64 commodities). A higher esi means that the competition between two countries is stronger in the world market. The data related to the variable pf are not available for Taiwan while the data related to fdim are not available for Taiwan and Indonesia.

III. Empirical Results

3.1. Preliminary assessment

This section describes some stylized facts on the exchange rate dynamics of East Asian currencies based upon Figures 1-7 and the estimated regime-dependent means (i.e. μ_{st}) presented in Table 3. For each currency, the top graph correspond to the USD exchange rate in level, the second to the log-returns and the third, to the filtered regime probabilities. When the filtered probability of state 1 is superior to 0,5, then the exchange rate is considered as being in the depreciation regime. This corresponds to the red part of the plot lines.[14)]

At first glance, we can note from Figures 1-7 the MS model's ability to capture in a convenient way asymmetric exchange rate fluctuations, as the computed regime probabilities overlap periods of sustained depreciation and appreciation. For instance, we can easily see that the currencies have depreciated sharply in 2008 before appreciating again, until 2012. Since then, many currencies seem to depreciate gradually, a result confirmed by the movements in the AMU (Figure 8). Likewise, the estimates of the regime-dependent means differ significantly by their signs and their magnitudes. For each currency, the first and second regimes are characterized by positive and negative means respectively. For regime 1, the mean value ranges from 0.495 (SGD) to 3.51 (KRW), suggesting that the KRW shows averaged fluctuations of 3.51% (per month) in times of depreciation. More generally, positive fluctuations are of larger magnitude than negative fluctuations.

Concerning the RMB (Figure 9), there are also two alternative regimes of appreciation and depreciation with monthly averaged fluctuations of -0.46% and 0.22%, respectively. The evolution of China's exchange rate policy is fairly well described by the model. The first period of gradual appreciation started on July 21, 2005 (regime 2) until the summer of 2008 when China decided to peg the

14) The regime probabilities are those estimated from Eq.1.

RMB to a quasi-fixed rate of 6.83 RMB/USD (regime 1). After the first semester of 2010, the RMB appreciated almost continuously until 2014, except between May and July 2012 following the China's decision to widen the RMB's trading band from 0.5% to 1%. Since then, the RMB has depreciated gradually from 6.05 to 6.57 RMB/USD between January 2014 and 2016.

Figure 1. Regime probabilities of the Philippine Peso

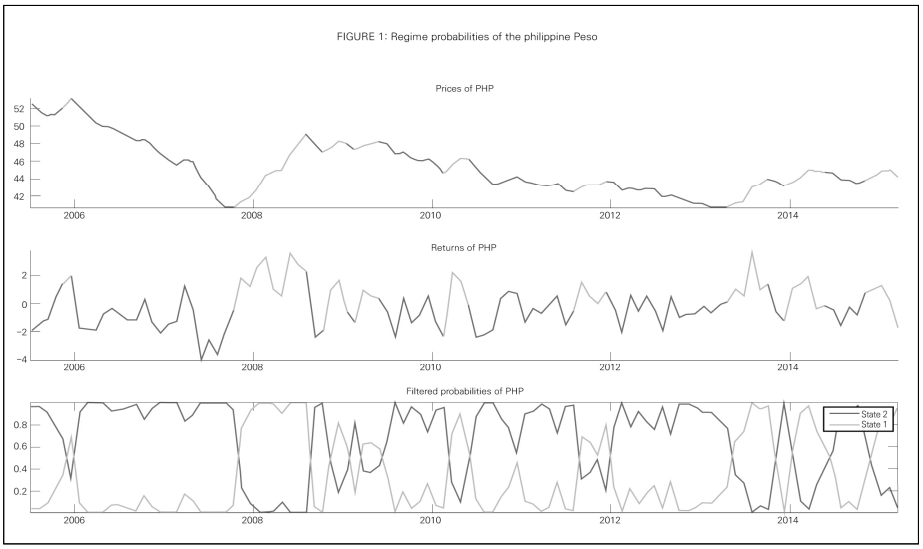


Figure 2. Regime probabilities of the Malaysian Ringgit

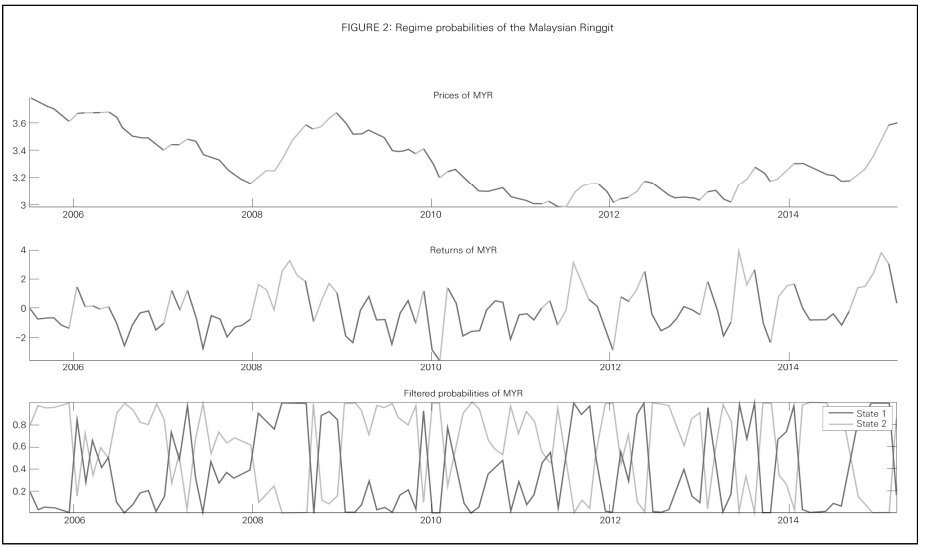


Figure 3. Regime probabilities of the Singapore Dollar

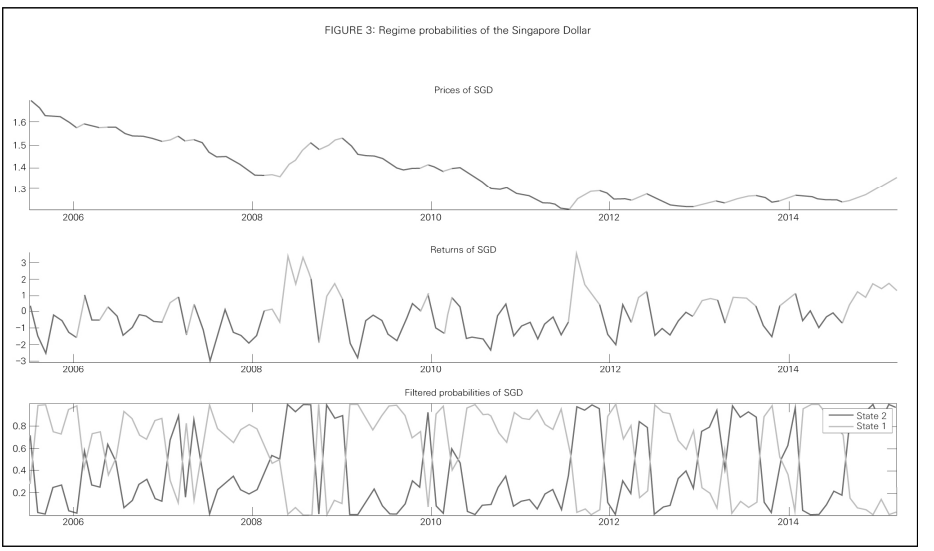


Figure 4. Regime probabilities of the Taiwanese Dollar

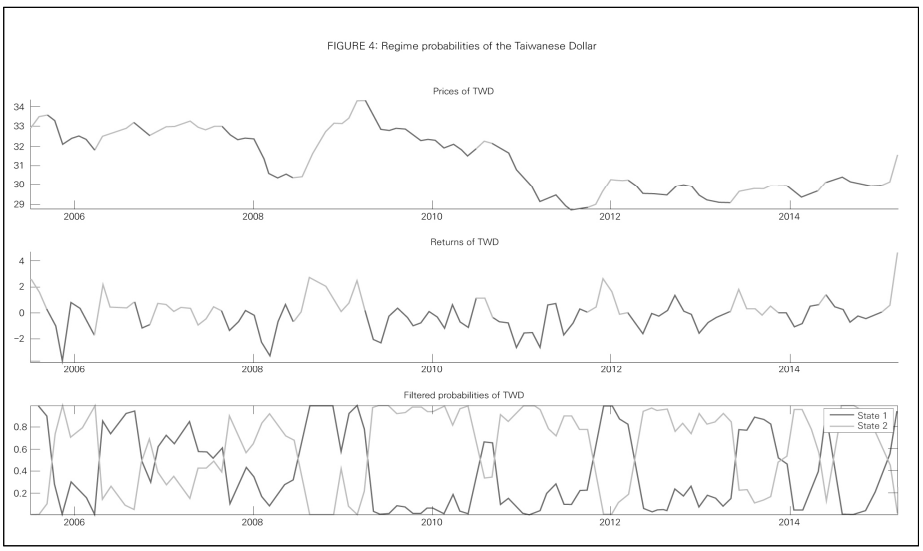


Figure 5. Regime probabilities of the Thai Bath

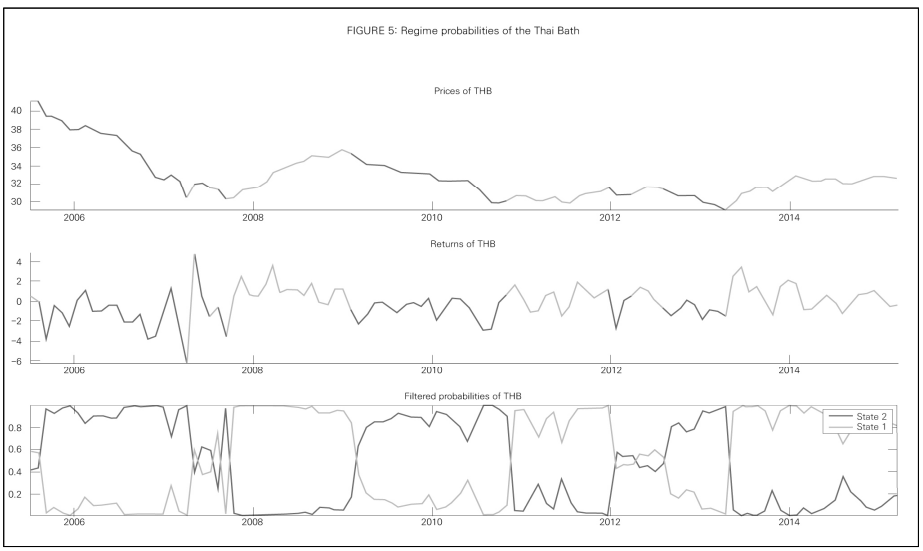


Figure 6. Regime probabilities of the Korean Won

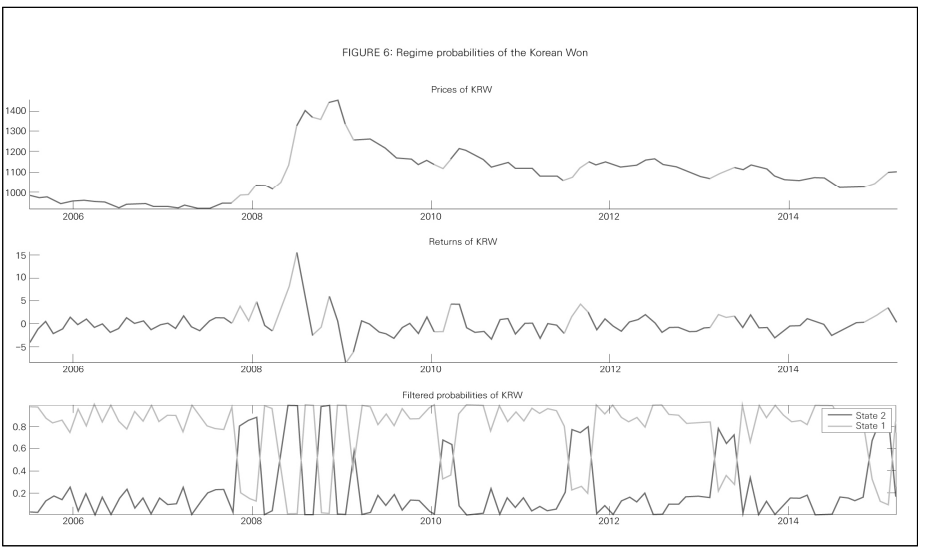


Figure 7. Regime probabilities of the Indonesian Rupiah

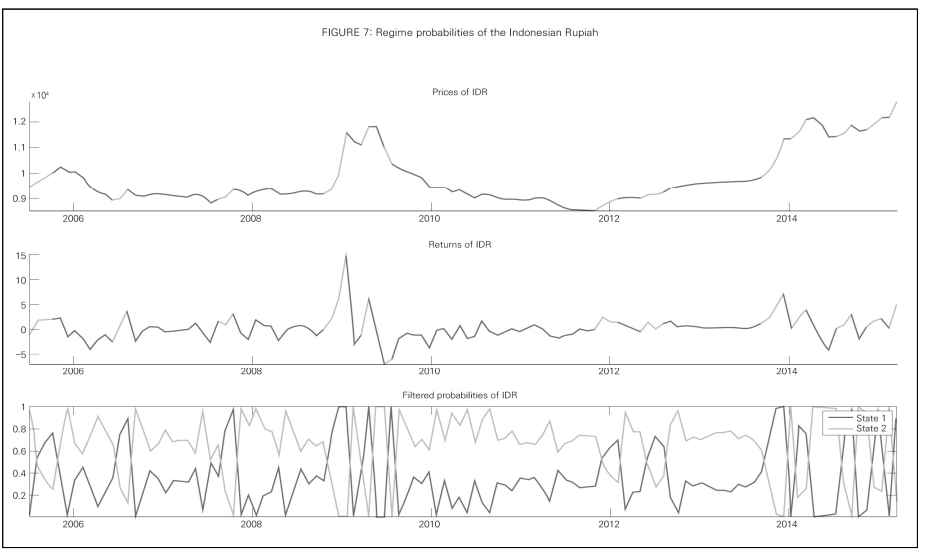


Figure 8. Regime probabilities of the AMU

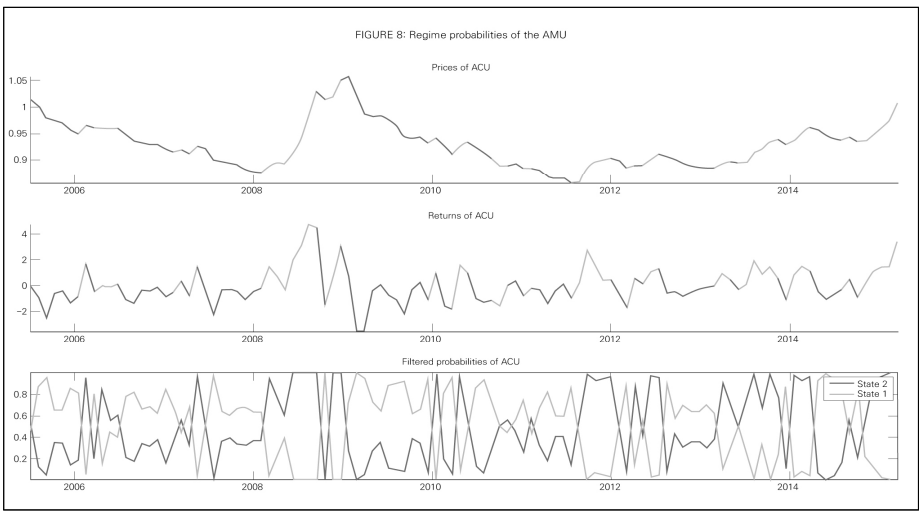
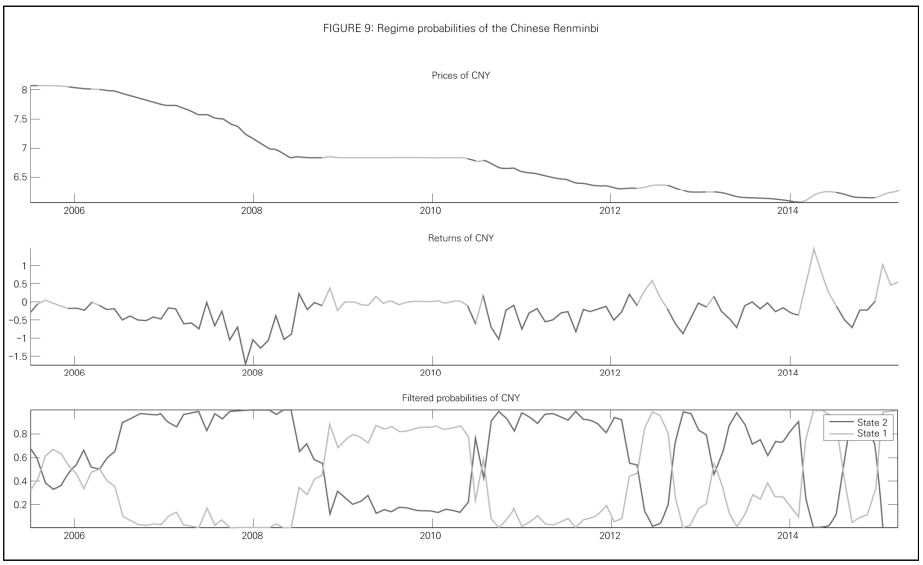


Figure 9. Regime probabilities of the Chinese Renminbi



As a first measurement, I assess whether the regime probabilities evolve together by computing Pearson cross-correlation coefficients. The estimation results are presented in Table 2. A careful observation reveals different patterns depending on the currency pair. For instance, it appears that the regime probabilities associated to the IDR are weakly correlated (i.e. < 0.5) with those of the other currencies. Indeed, the average correlation does not exceed 0.2 and is almost always insignificant.

Table 2. Correlations between regimes probabilities

	IDR	MYR	PHP	SGD	TWD	THB	KRW	Average
AMU	0,377* [1,779]	0,886*** [6,305]	0,526*** [2,627]	0,842*** [5,511]	0,530*** [2,653]	0,382* [1,807]	0,454** [2,198]	0,571
IDR	-	0,338 [1,581]	0,155 [0,703]	0,280 [1,290]	0,051 [0,230]	0,221 [1,008]	0,169 [0,766]	0,202
MYR		-	0,589*** [3,040]	0,593*** [3,064]	0,471** [2,298]	0,557*** [2,826]	0,492** [2,417]	0,364
PHP			-	0,724*** [4,118]	0,362* [1,705]	0,860*** [5,808]	0,563*** [2,861]	0,465
SGD				-	0,458** [2,220]	0,613** [3,208]	0,525*** [2,622]	0,456
TWD					-	0,401* [1,908]	0,360* [1,696]	0,300
THB						-	0,286 [1,324]	0,420
KRW							-	0,399

Notes: This table shows the Pearson cross-correlations between the regime probabilities of the East Asian currencies. The Anderson's(1958) Z-test is used to assess whether correlations are significant. The critical values at 1%, 5% and 10% significance level are 2.575, 1.960 and 1.645, respectively. The last column corresponds to the average correlation between a given currency and the six remaining currencies plus the AMU. For each currency. the regime probabilities are those estimated through the FTP-MS model. The probabilities of being in regime I have been used for computing the correlations. *,**,*** denote significance at 10, 5 and 1% respectively.

We can note also that the other pairwise correlations are statistically different from zero and particularly strong across the PHP, SGD, THB and MYR, suggesting for these currencies that deprecation and appreciation episodes are intimately linked to each other. Interestingly, the pairwise correlation with the AMU is always stronger than the averaged correlation. These correlations may be biased since the movements in the AMU partly reflects those of each currency. However, this argument does not hold for the SGD and the MYR whose correlation coefficients reach 0.89 and 0.84, respectively, while their share in the AMU does not exceed 16%. This is not surprising, but rather intuitive when acknowledging that both currencies are actually managed against a trade-weighted basket.

3.2. Regime-dependent correlations

We now turn to the analysis of regime-dependent correlations. The estimation results are presented in Table 3. It is remarkably clear that exchange rate co-movements are non-linear since the sign, the significance and the magnitude of the correlation coefficients differ widely across regimes. For all currencies except the THB, I find positive and statistically significant correlations in the depreciation regime, and these correlations are higher than unity for the IDR, MYR, SGD and KRW. When comparing with the correlations in the second regime, the co-movements appear to be stronger during times of depreciation than appreciation (i.e. $\beta_1^{RMB} > \beta_2^{RMB}$). The correlations in the second regime are either negative (IDR), insignificant (KRW), or of lower magnitude (MYR, SGD).

Table 3. Estimates of regime-dependent correlations between the RMB and East Asian currencies

	IDR	MYR	PHP	SGD	TWD	THB	KRW	ACU
Regime1:								
μ_1	1,111* (0,583)	1,837*** (0,300)	1,483*** (0,168)	0,496** (0,241)	0,512*** (0,095)	0,161 (0,195)	3,51*** (0,500)	1,051*** (0,241)
β_1^{RMB}	1,391* (0,795)	1,03*** (0,399)	0,394** (0,165)	1,139*** (0,325)	0,433** (0,172)	-0,355 (0,306)	1,3** (0,595)	1,474*** (0,294)
$\varnothing_{1.1}$	1,718*** (0,190)	1,369*** (0,423)	1,306*** (0,,108)	0,299* (0,164)	0,006 (0,143)	-0,16 (0,114)	-0,311* (0,178)	0,736*** (0,146)
$\varnothing_{2.1}$	-0,093 (0,145)	-0,849** (0,377)	-1,162*** (0,189)	0,272* (0,143)	-0,023 (0,129)		-1,113*** (0,288)	-0,01 (0,132)
$\varnothing_{3.1}$	0,326 (0,207)		1,379*** (0,178)		-0,48*** (0,100)			
$\varnothing_{4.1}$			-0,621*** (0,093)					
Regime2:								
μ_2	-0,421* (0,242)	-0,214* (0,157)	-0,655*** (0,167)	-0,423** (0,203)	-1,415*** (0,166)	-0,665*** (0,241)	-0,368*** (0,142)	-0,879*** (0,186)
β_2^{RMB}	-1,284*** (0,284)	0,606** (0,271)	0,349*** (0,122)	0,761** (0,305)	616*** (0,129)	1,645** (0,723)	-0,418 (0,390)	-0,102 (0,245)
$\varnothing_{1.2}$	0,107 (0,083)	0,771*** (0,112)	1,161*** (0,107)	0,721*** (0,230)	0,285 (0,191)	-0,569*** (0,213)	-0,312*** (0,100)	0,364** (0,176)
$\varnothing_{2.2}$	-0,314** (0,124)	-0,397*** (0105,)	-0,813*** (0,129)	-0,703*** (0,221)	0,651*** (0,198)		-0,101 (0,088)	-0,55*** (0,148)
$\varnothing_{3.2}$	0,344*** (0,080)		0,224** (0,104)		0,2 (0,187)			
$\varnothing_{4.2}$			-0,061 (0,095)					

Table 3. Continued

	IDR	MYR	PHP	SGD	TWD	THB	KRW	ACU
Common:								
β_{eur0}	0,191***	-0,14**	-0,141***	0,019	0,048	-0,04	0,487***	0,053
	(0,062)	(0,034)	(0,016)	(0,048)	(0,030)	(0,053)	(0,079)	(0,038)
β_{yen}	-0,018	0,347***	0,516***	0,009**	0,326***	0,186***	-0,111*	-0,017
	(0,052)	(0,045)	(0,018)	(0,039)	(0,029)	(0,060)	(0,065)	(0,034)
σ	0,372***	-0,226***	-0,458***	-0,214**	-0,509***	0,234***	0,526***	-0,243***
	(0,084)	(0,085)	(0,073)	(0,102)	(0,079)	(0,075)	(0,067)	(0,091)
LL	-22,74	-175,366	-179,349	-164,681	-143,723	-200,435	-237,985	-168,534

Notes: *, **, *** denote significance at 10, 5 and 1% respectively, Standard errors of parameters are reported in parentheses (.). Regime 1 and Regime 2 correspond to the depreciation and appreciation regimes repectively. The choice of the lag length is made on the basis of information criteria (AC and BIC). The parameters α, β^{EUR} and β^{YEN} are common across regimes.

These results suggest that these currencies tend to overreact when the RMB depreciated while the inverse is true when it appreciated. When the Chinese authorities allow the RMB to appreciate very gradually, the East Asian countries may be more willing to tolerate the appreciation of their own currencies to contain inflationary pressures, which could explain why positive co-movements are found in the second regime. However, the fact that these correlations are lower than unity suggests also that they are not inclined to let their currencies appreciate too much against the RMB.[15] This is confirmed by the findings of higher correlations in regime 1. Indeed, when the RMB is pegged to the US dollar or depreciates against it, this results in an appreciation of the East Asian currencies against the RMB, which makes domestic exporters less competitive against Chinese firms. Consequently, the East Asian countries may be pressured to foster the depreciation of their own currency against the USD in order

15) Since then, the Malaysian example is illustrative: on July 21, 2005 Malaysia removed the MYR peg to the USD in favor of a managed float, almost immediately after China announced its RMB's exchange rate reform. The exchange rate of the MRY is monitored against a currency basket with its value determined by economic fundamentals.

to stabilize the RMB exchange rate. However, an appreciating RMB has no impact on East Asian competitiveness, lowering the incentive to track the RMB movements.

Table 4. Specification and robustness tests

	IDR	MYR	PHP	SGD	TWD	THB	KRW	AMU
FTP-MS *vs* Linear	83,475 [0,000]	20,893 [0,004]	34,199 [0,000]	20,631 [0,002]	27,556 [0,000]	20,584 [0,001]	50,959 [0,000]	30,7158 [0,000]
$\beta_{s_t}^{RMB}$ *vs* β^{RMB}	8,288 [0,004]	11,745 [0,001]	7,603 [0,006]	21,550 [0,000]	5,654 [0,017]	11,120 [0,001]	7,103 [0,008]	5,218 [0,022]
Ljung Box Q	0,683 [0,408]	0,058 [0,809]	5,453 [0,142]	0,637 [0,425]	1,3207 [0,8213]	0,227 [0,634]	1,275 [0,259]	0,022 [0,881]

Notes: This table presents two specification tests based on the log-likelihood ratio statistic (LR) and the Ljung Box Q-test statistic. The values represent the statistics of each test while p-values are displayed in brackets [.]. The first LR test aims to test whether the dynamics of exchange rates is non-linear. The tets statistic is computed as following : $LR = 2 \times [L_{FTP-MS}(\Theta) - L_{Linear}(\Theta)]$ with Θ, the parameters of the model. The null hypothesis is that the FTP-MS model does not fit significantly better than the linear model. The second LR test aims to test whether the influence of the Chinese RMB is regime-dependent. The test statistic is computed as following : $LR = 2 \times [L_{MS}(\beta_{s_t^{RMB}}) - L_{MS}(\beta^{RMB})]$. The null hypothesis is that the untocorrelation in the residuals of the underlying model. Under the null hypothesis, the residuals are not serially correlated. the results indicate the absence of autocorrelations in the residuals.

These findings are in line with those of Pontines and Siregar (2012) who give evidence that the East Asian exchange rate policies are shaped by a fear of appreciation against the RMB.

The story seems different for the THB as positive and significant correlations are found in the second regime only. One potential explanation is related to the increase in short-term capital inflows during 2003-2008, which caused the Thai Baht to rise significantly against the USD, while the RMB began its revaluation from July 2005. A similar trend is observed between 2009 and 2013, a period during which Thailand's central bank announced new measures to curb the THB's appreciation. Mixed results are found for the PHP since correlations coefficients are almost similar in both regimes.

As a robustness check, the same empirical exercise is repeated with the AMU as the dependent variable. Although the sensitivity of each currency may differ, the use of a regional benchmark has the advantage of looking at the collective responsiveness to RMB's fluctuations. The results clearly corroborated the previous findings as the correlation coefficient is positive and significant in the first regime, while insignificant in the second.

3.3. Transitional dynamics of East Asian currencies

The FTP-MS model presented in Eq. (1) is informative about exchange rate co-movements. However, the fact that two currencies co-move does not automatically imply causality. I therefore go one step further by conducting a complementary approach based on the TVTP-MS model estimations. The goal of such analysis is to ask whether the RMB already acts as a leading currency within East Asia. The estimations results are displayed in Table 5. In order to keep the analysis tractable, the interpretation of the results is based on P_{11t}, that is the probability to stay in the depreciation regime.

First of all, the control variables are found to be significant with the expected sign in many cases. We can notice that estimates of *ssr* are found to be significant and positive for MYR, SGD, TWD and KRW, implying that tighter US monetary conditions lead to greater probability of staying in the depreciation regime. This is in line with the common view that the US monetary policy spills over to emerging markets, notably through the exchange rate channel. Furthermore, the estimates of *en* are significant for the IDR, MYR, SGD and TWD.

Table 5. Estimates of the transition matrix parameters

	IDR	MYR	PHP	SGD	TWD	THB	KRW	AMU
α_1	-3,516***	-2,864*	-1,588*	-0,569	-1,287*	-3,901***	0,799	-0,315
	(1,204)	(1,533)	(0,802)	(0,606)	(0,749)	(1,460)	(1,730)	(0,416)
λ_1^{RMB}	4,5**	8,792***	5,517***	4,414***	2,909*	11,544***	1,682	4,273**
	(2,109)	(3,144)	(2,045)	(1,607)	(1,719)	(7,860)	(2,475)	(1,758)
γ_1^{ssr}	-1,614	22,193***	-6,129	3,246**	5,357*	-4,263	8,293*	3,217
	(1,962)	(35,102)	(3,823)	(1,268)	(2,899)	(4,398)	(4,896)	(2,371)
ω_1^{en}	-37,636**	132,035***	20,521	-18,74*	-29,656***	-18,256	-7,637	-9,379
	(16,271)	(35,102)	(15,089)	(10,570)	(8,367)	(12,516)	(9,802)	(7,396)
α_2	0,886	2,557***	2,863	-0,937	-0,902	-6,497***	-4,568**	2,804
	(0,639)	(0,665)	(2,256)	(0,625)	(1,622)	(2,631)	(2,293)	(2,806)
λ_2^{RMB}	1,191	-0,762	1,746	-2,089*	4,051	-6,834	-5,302	3,298
	(1,138)	(1,999)	(2,330)	(1,203)	(2,762)	(3,696)	(3,997)	(4,951)
γ_2^{ssr}	-0,059	-0,064	-18,841**	2,961*	-1,77	-9,349***	-0,654	17,764*
	(1,426)	(6,615)	(8,820)	(1,713)	(2,879)	(4,296)	(1,785)	(10,244)
ω_2^{en}	6,827	16,632	-3,788	-40,217**	-44,325***	-7,284	-16,019*	-116,373
	(4,830)	(10,240)	(11,495)	(15,489)	(13,739)	(12,816)	(8,326)	(90,380)
MP	0,126	0,449	0,777	1,019	0,493	0,481	-	1,042
ZM	0,781	0,326	0,288	0,129	0,442	0,268	-	0,074

Notes: This table presents the estimated transition matrix parameters of the TVTP-MS models. Here, the parameters of Eqs. (1) and (2) have been estimated simultaneously. The parameters of Eq. (1) are not to conserve but are available on request).

Now, I look at the effect of the RMB's fluctuations. Except for the KRW, the coefficient λ_1 is positive and statistically significant at conventional levels. This means that when the RMB depreciates (resp. appreciates), the probability that a given currency depreciates is higher (resp. lower). We can conclude from this that when China allows its currency to depreciate, the East Asian currencies are more likely to react in the same way. This can be illustrated through the shape of the estimated transition probability functions. Figure 10 displays the transitional

probabilities P_{11t} for each currency according to the degree of RMB's fluctuations. Visually, these probabilities seem to share the same features, but the regime-switching indicators MP and ZM point out some differences across currencies. Recall that the MP indicator measures the impact of an RMB depreciation of 1% in the variation of P_{11t}. The results with the AMU as a benchmark indicate that the variation of P_{11t} is around 1.042, implying that on average East Asian currencies are undoubtedly expected to stay in the first regime following a RMB's positive variation of 1%. Looking at each currency separately, the same conclusion is reached for the SGD and PHP, which are the most responsive currencies, while the IDR is the least responsive. Likewise, the SGD, THB and TWD display marginal variations near from 0.5, suggesting that the probability to observe these three currencies in the first regime is fairly high. The ZM indicator gives the values of Δe_t^{RMB} for which the probability to stay in the depreciation regime is 0.5. For values above that threshold, it becomes more likely to observe a given currency in the depreciation regime. Note also that the lower the threshold, the higher the currency responsive to the RMB depreciates. For instance, we see that the SGD is more likely to depreciate when the RMB's variations exceed 0,129%, but this threshold is further lower for the AMU (0.07%). Again, the IDR seems to be least responsive as the threshold is 0.78%, which is higher than other currencies.

Figure 11 shows how these transition probabilities evolve through time. For all currencies, it can be seen that the depreciation's probabilities coincide mainly with episodes where the RMB has weakened, that is after 2012, suggesting that China's exchange rate policy clearly has shaped currency movements in East Asia over recent years. This observation is less evident for the rest of the sample, which suppose in turn that factors other than the RMB (such as *ssr* or *en*) may have explained the positive currency variations observed before 2012.

Figure 10. Probabilities to stay in the depreciation regime (P_{lk}) according to RMB's variations

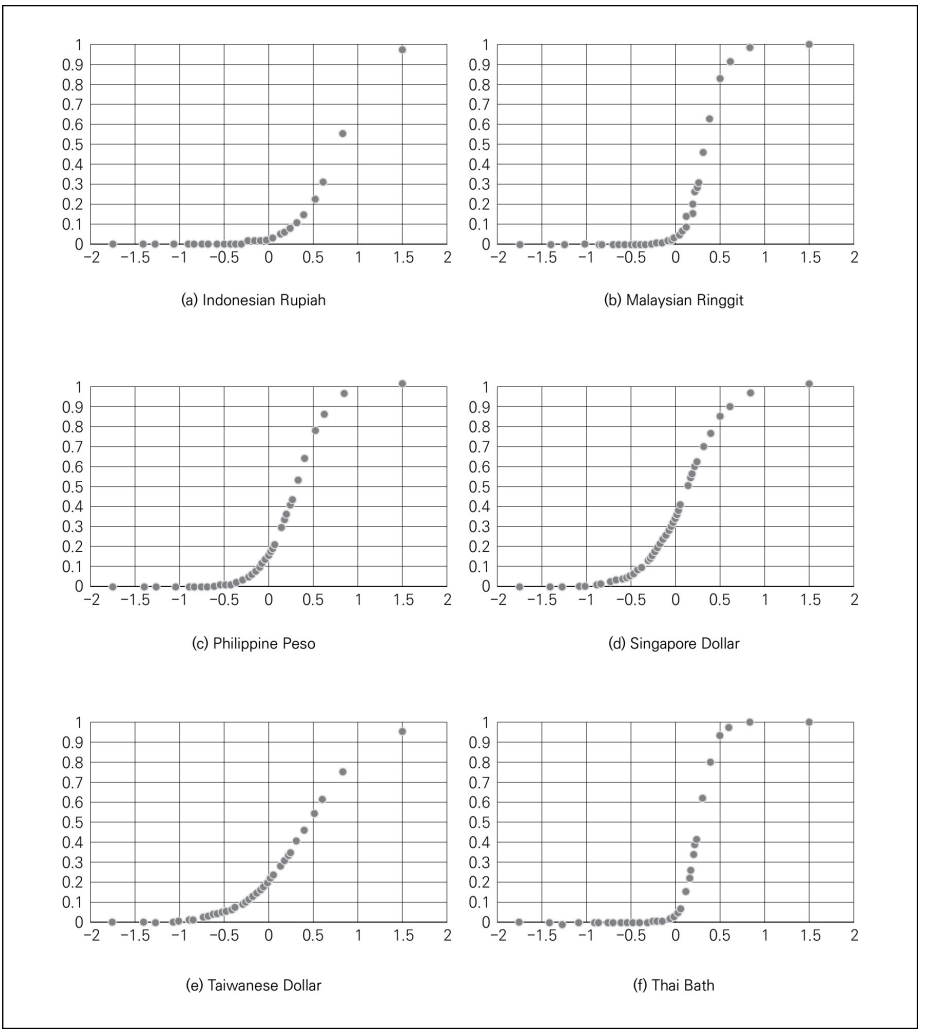
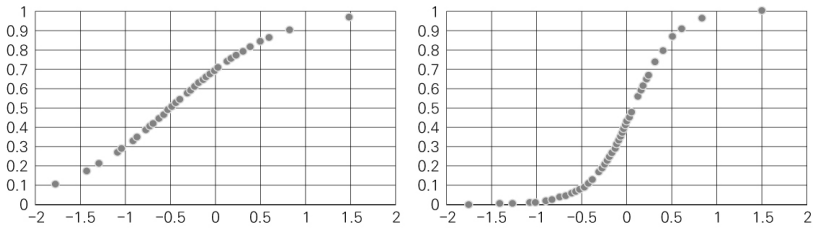


Figure 10. Continued



(g) Korean Won

(h) Asian Monetary Unit

Table 6. Granger causality tests

Null Hypothesis:	F-Statistic	Prob.	Lags
Prob. of RMB does not Granger Cause Prob. of AMU	3,689	0,058	1
Prob. of RMB does not Granger Cause Prob. of MYR	5,671	0,019	1
Prob. of RMB does not Granger Cause Prob. of PHP	1,542	0,217	1
Prob. of RMB does not Granger Cause Prob. of SGD	2,882	0,093	1
Prob. of RMB does not Granger Cause Prob. of KRW	2,097	0,088	4
Prob. of RMB does not Granger Cause Prob. of THB	4,549	0,035	1
Prob. of RMB does not Granger Cause Prob. of TWD	2,523	0,046	4
Prob. of RMB does not Granger Cause Prob. of IDR	1,206	0,275	1

Notes: This table presents Granger causality test results. The F-statistic shows the results of testing null that regime probabilities of the RMB does not Granger Cause those of the other East Asian currencies. A rejection of the null hypothesis at conventional statistical levels implies causality. The procedure for choosing the lag length was to test between one and four-order lag. For each currency, the regime probabilities used for the test are those estimated through the FTP-MS model. The probabilities of being in regime 1 have been used for performing the tests.

Figure 11. Time-varying transition Probabilities (P_{lk})

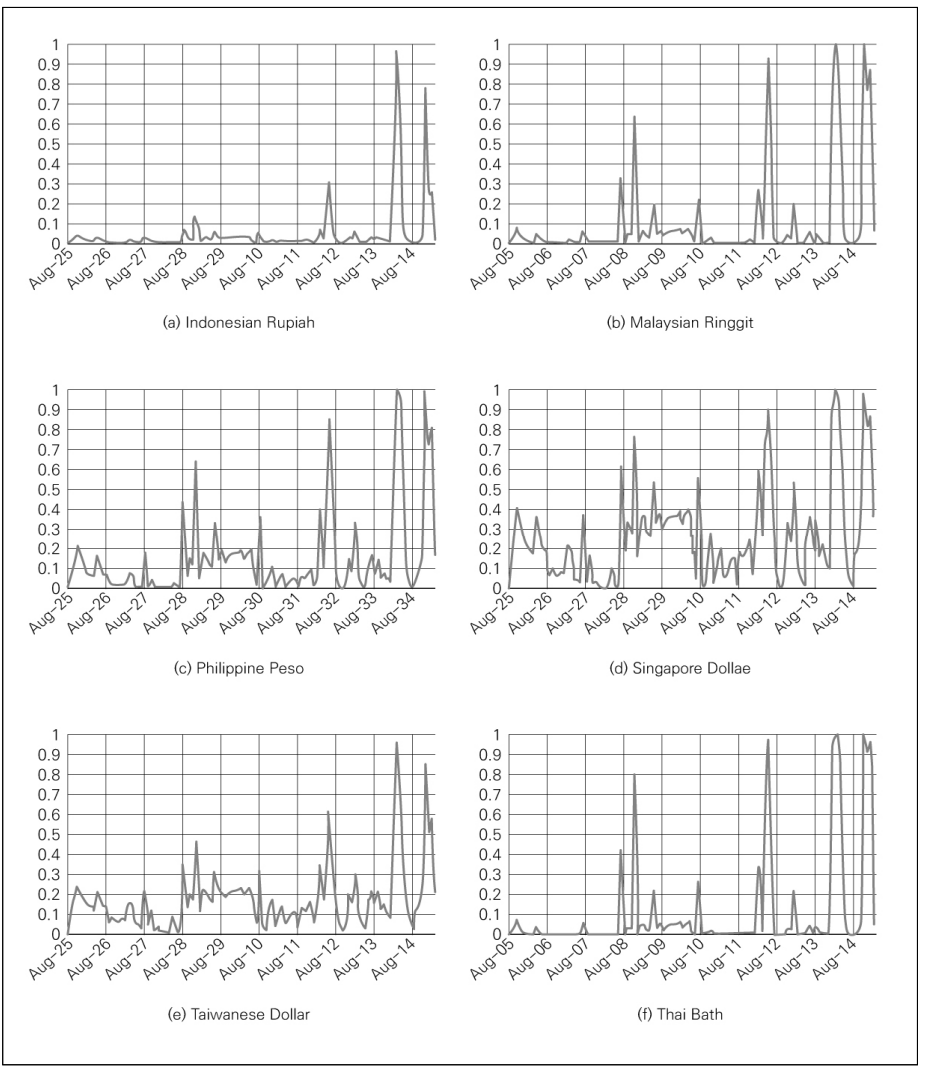
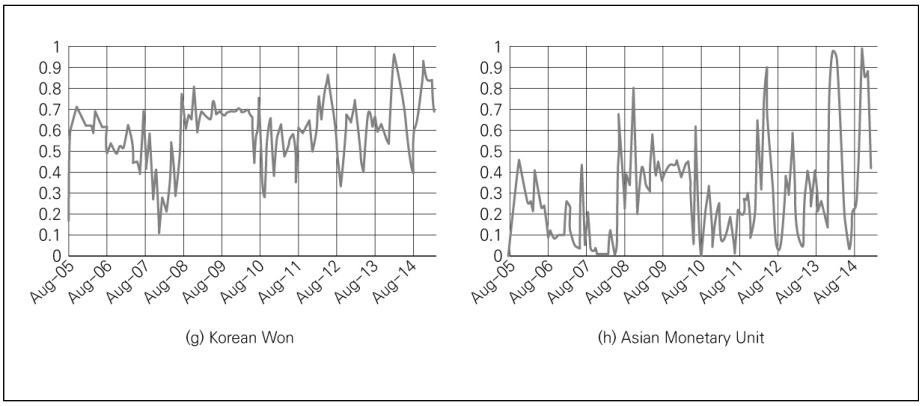


Figure 11. Continued



3.4. Economic determinants behind the growing role of the RMB

In this section, I empirically assess the economic determinants that could explain the growing role of the RMB in East Asia. There are at least four reasons why East Asian countries would be inclined to track more closely the RMB. First, trade flows between China and its main regional partners have grown in an impressive way which led China to overtake Japan and the US as the largest trading partner within the region. This increasing role is mainly explained by the Chinese position in the Asian production network as a major trading hub for intra-regional and global trade, but also by China's increasingly strong demand for consumer goods. Second, China's exports have shifted from labor-intensive manufactured goods to more capital- and technology- intensive production over the last years, bringing further export competition not only to low-income economies but also to newly industrialized economies. Third, and related to the preceding arguments, the influence of China's monetary policy shocks on East Asian firms, and then stock markets, is likely to become more important as business cycles synchronization continues to strengthen. In this view, Johansson (2012) and Kozluk and Mehrotra (2009)

find that expansions in China's money supply positively affect several stock markets in Southeast Asia as well as real output. Fourth, regional financial integration is deepened as a result of the greater cooperation in regional economic surveillance, the increasing share of intraregional FDI and the development of local currency bond markets. As the financial ties are tightening, exchange rate stability can be viewed as an implicit guarantee for regional investors who seek to promote their financial activities across the region through the export of short- and long-term capital flows.

I estimate an MS model augmented with a set of economic indicators and where the East Asian exchange rates against the RMB enter now as the dependent variables. Each regime is characterized by its proper variance of errors as described in Eq. (7). The first regime is defined as the regime where the degree of flexibility against the RMB is high and the second as the regime where this degree is low. Accordingly, the second regime can be assimilated to periods where the East Asian countries grant a higher weight to the RMB in their exchange rate policy. The Export Similarity Index (*esi*) is chosen in order to capture the increasing trade competition between China and its neighboring countries. The inclusion of Exports (*X*) and Imports (*M*) aim at considering the importance of trade flows between China and other countries. The portfolio (*pf*) and FDI (*fdix*, *fdim*) flows are included to account for capital account transactions.

Table 7. Estimates of economic determinants

	IDR	MYR	PHP	SGD	TWD	THB	KRW
regime-switching variances							
Regime1							
σ_1	0,041*** (0,151)	0,014*** (0,081)	0,015*** (0,086)	0,013*** (0,070)	0,012*** (0,079)	0,015*** (0,069)	0,027*** (0,073)
Regime2							
σ_2	0,013*** (0,095)	0,002*** (0,207)	0,002*** (0,194)	0,001*** (0,269)	0,004*** (0,246)	0,002*** (0,261)	0,001*** (0,240)

Table 7. Continued

	IDR	MYR	PHP	SGD	TWD	THB	KRW
Regime-dependent factors							
Regime1							
esi	-6,7 (6,848)	0,133 (0,402)	-0,398 (0,417)	0,325* (0,188)	0,958 (0,696)	1,089*** (0,271)	0,938 (0,713)
X	-0,047 (0,044)	-0,002 (0,007)	-0,002 (0,008)	-0,007 (0,007)	0,013 (0,008)	-0,018* (0,009)	-0,043** (0,018)
M	0,053 (0,046)	0,004 (0,008)	0,035*** (0,009)	0,007 (0,007)	-0,008 (0,008)	0,019** (0,007)	0,076*** (0,016)
pf		-0,011 (0,016)	0,007 (0,027)	-0,007 (0,078)		0,014 (0,014)	-0,013 (0,011)
$fdix$	0,781* (0,447)	-0,103* (0,057)	-0,394*** (0,092)	0,074 (0,083)	0,021 (0,076)	0,01 (0,012)	-0,427* (0,242)
$fdim$	-0,035 (0,122)	-0,014 (0,028)	-0,01 (0,013)	-0,021 (0,016)		0,001 (0,009)	0,017 (0,017)
Regime2							
esi	1,901* (0,842)	0,232*** (0,012)	-0,771*** (0,142)	0,628*** (0,005)	-1,717** (0,680)	-6,415*** (0,043)	1,283*** (0,008)
X	-0,006 (0,005)	-0,03*** (0,0002)	-0,005** (0,002)	0,005*** (0,0003)	-0,041*** (0,005)	-0,114*** (0,001)	-0,065*** (0,0001)
M	0,019*** (0,005)	0,019*** (0,0002)	0,017*** (0,004)	0,02*** (0,0002)	0,06*** (0,008)	-0,006*** (0,0005)	0,044*** (0,0001)
pf		-0,005*** (0,0004)	0,251*** (0,011)	0,124*** (0,002)		0,033*** (0,0004)	-0,029*** (0,001)
$fdix$	0,055 (0,047)	0,048*** (0,004)	-0,157*** (0,036)	0,049*** (0,002)	-0,175*** (0,049)	0,002*** (0,0005)	1,004*** (0,057***)
$fdim$	(0,036) 0,033	(-0,041***) 0,001	(-0,04***) 0,004	(-0,031***) 0,0004		(-0,117***) 0,001	(0,057***) 0,0001

Table 7. Continued

	IDR	MYR	PHP	SGD	TWD	THB	KRW
LL	283,373	280,672	281,262	354,416	362,729	331,496	263,653

Notes: This table shows the influence of economic factors on the RMB exchange rates. Here, each regime is characterized by its proper variance. The estimates esi, X, M, pf, $fdix$ and $fdim$ correspond respectively to correlations associated to the export similarity index between China and the other East Asian countries to China, imports China, portfolio investment outflows to China, FDI outflows to China and FDI inflows from Chi. *, **, *** denote significance at 10, 5 and 1% respectively.

The estimation results are displayed in Table 7. With no exception, *esi* is significant in Regime 2 while it is mostly insignificant in Regime 1 (except for SGD and THB). Put together, this leads to the conclusion that trade competition is a significant factor explaining why the East Asian countries decide to strengthen exchange rate stability against the RMB. Moreover, X turns out to be significant in Regime 1 in all cases, while the other explanatory variables are always significant expect for Indonesia. Consequently, these results provide evidence supporting also that as the weights of China in trade and capital transactions increase, the incentive for keeping a stable exchange rate against the RMB is stronger.

IV. Concluding Remarks

In this paper, several empirical tools derived from non-linear models have been used to assess the size and the nature of the co-movements between the RMB and a set of seven East Asian currencies plus an AMU. Estimates have been carried out over the period of July 2005-February 2015. In line with many recent studies, this paper has presented empirical evidence that stressed the influential role of the RMB in East Asia. First, it has been found that exchange rate fluctuations show asymmetric relationships with greater co-movements during times of RMB's

depreciation and when the RMB has been fixed to the USD. This echoes recent findings that stress the aversion of many East Asian economies towards a greater appreciation of their currencies against the RMB (e.g. Pontines and Siregar, 2012; Pontines and Rajan, 2011). Second, there is clear evidence supporting that the RMB has driven currency movements in East Asia over the last decades, a clear illustration being the recent episodes of 2012 and 2014, when the RMB has weakened in face of the USD. Finally, the last stage of the empirical investigation has demonstrated that deeper economic integration and trade competition with China could explain the need for East Asian countries to track more closely the RMB's variations.

In the medium-term, the RMB's role will depend on the pace of the RMB's internationalization (or regionalization). The exchange rate management will become increasingly dependent on China's exchange rate policy, as the use of the Chinese currency will spread within the region. The most recent example is the RMB's inclusion in the SDR basket, a decision welcomed by many East Asian policymakers, that will promote the holding of RMB-denominated assets by private investors and East Asian central banks particularly inclined to diversify the currency composition of their foreign reserves.

However, if the RMB may foster monetary stability within the region, it may be also the source of important vulnerabilities. The recent movements in the RMB have shown how East Asian economies' exposure was important. During the year 2015, many East Asian currencies have been seriously affected by the surge of capital outflows triggered in a large extent by RMB's devaluations. These recent events has demonstrated the need to promote a deeper regional monetary cooperation, a project however distant that has been undermined in recent years by the lack of regional leadership.

The RMB is expected to become more flexible as China rebalances its economic growth, which raises several challenges for regional policymakers. One crucial issue in the coming years will be the conjunction between the growing role of the RMB and the potential need for regional exchange rate coordination. Indeed, intra-regional exchange rate stability has been viewed for a long time as an important

goal on the road to financial and trade integration. This stability could be achieved in the future through an increasing RMB's weight in the managed currency basket of East Asian economies. Such a shared policy would have several advantages such as increasing the stability of the nominal effective exchange rate at the regional level. This could also create favorable conditions for a joint appreciation, including the RMB. Indeed, a deeper regional cooperation would foster their realignment by rendering their gradual appreciation less costly, which could in turn foster the transition of East Asian emerging economies toward a more sustainable growth model. This however assumes that China sets up in the future favorable economic conditions for reducing its excessive dependency on exports and investments but also implements macroeconomic policies aiming at maintaining price stability and ensuring the smooth development of its financial market.

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3

Study on the G20's Transition from the Perspective of China's Strategy in Global Economic Governance

*Sun Wei**

I. Introduction

As is well known, the international financial crisis of 2008 gave birth to the G20 Summit, whose main function was to enhance the coordination among major economies on macroeconomic policy so as to overcome the crisis through joint efforts. In terms of real effect, during the battle with the most serious financial crisis since the Great Depression, the G20 has played a key role as a "fire fighter" who urges major economies to launch stimulus packages, enhance coordination on international currency policy, and stop trade protectionism in order to delay the decline of the global economy and prevent the international financial system from collapse. Until now, the G20 summit has been successfully held for 10 times, and the 11th session will be hosted by China in Hangzhou from September 4–5, 2016.

With the recovery of the world economy, the G20 seems not that important

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and necessary for global economic governance, and some defects have started to emerge, attributable to hasty update measures at the beginning. People have started to doubt the G20's representativeness, authoritativeness and implementation capacity etc., and the potential risk for the G20 to be ignored has emerged. So some scholars suggest that the transition of the G20 should be put into consideration. But due to some obstacles, there are still some disputes about the G20's transition. Therefore, what the potential directions of the G20's transition should be still remains a question.

China is the major power to promote the transition of global economic governance. At the first G20 summit in Washington, China entered the global economic governance system with the identities of both a building state and core player. If taking back the office in UN in 1971 was the symbol of international acceptance from a political stance for China, its participation in the G20 could be taken as a sign of acceptance from an economic perspective as an indispensable actor in global economic governance. To a great extent, China's expectations are of great significance to the future transition of the G20. Therefore, it is necessary to study the G20's transition from the perspective of China, especially China's strategy in global economic governance.

South Korea is the representative of the medium powers group in the G20 and also a crucial strategic partner of China, so how to strengthen the cooperation between China and South Korea in the G20 is also an important question.

II. Literature Review

2.1. Views about the Prospects of the G20's Transition

Transition or not, it is still a question. Zhang Haibing from Shanghai Institutes for International Studies believes that the G20 summit has entered a transition period with two characteristics: first, the transition from a crisis response forum to a permanent institution; second, the transition from economic issues oriented

to a more comprehensive coordination institution of global governance oriented, and the addition of agendas about security, society and development issues strengthen this trend.[1] Tu Xinquan from the University of International Business and Economics believes that the original function of the G20 is to overcome the financial crisis under the precondition that the U.S. could not handle it on its own, and that the U.S. had no alternative but to share responsibility as well as hegemony power. But following the hardest time, the G20 has to transit to be a long-term global economic governance institution.[2] Some more keen voices from American think-tankers like C. Fred Bergsten, Director of the Peterson Institute for International Economics, states that the G20 has become "an effective steering committee for the world economy."[3] Andrew F. Cooper recommends that rather than expending all of its diplomatic capital in working out the details on this side of its dual personality, the G20 must now concentrate on accelerating concerted action on a much bigger set of issues. It is time for the G20 to tilt more explicitly away from its concentration on a detailed but technical agenda and towards taking itself far more seriously as the hub of economic global governance, with a greater and more sustained sense of propose.[4] As stated by Colin I. Bradford, for the G20 to become an enduring global steering committee, it will have to succeed in its role as crisis committee to have credibility, develop the capacity to move beyond economics to other types of issues, and create new modalities of global leadership derived from the cultural diversity of its members and the world.[5] Zhu Jiejin

1) Zhang Haibin, "G20's Transition and Prospects of 2016 Hangzhou Summit," Journal of International Relations, No. 3, 2016, pp. 26-38.

2) Zhang Yuanhang, Gao Yanrui, "G20's Transition Directions and Paths," China Development Observation, No. 8, 2016. p. 5.

3) Quoted in Richard Wolf, "Obama G-20 unite on recovery package" USA Today, April 3, 2009, http://wwww.usatoday.com/news/world/2009-04-02-g20-summit_htm. Accessed March 1, 2010.

4) Andrew F. Cooper, "The G20 as an improvised crisis committee and/or a contested 'steering committee' for the world," International Affairs, Vol. 86, No. 3 Global Economic governance in transition (May 2010), p. 757.

5) Colin I. Bradford, Global leadership in transition: making the G20 more effective and responsive, Korea Development Institute and Brookings Institution Press, 2011.

believes, in the crisis-response stage, the G20 focused on economic stimulus packages and macroeconomic policy coordination, enhancing financial regulation and supporting developing countries in coping with the crisis. With the gradual recovery of the global economy, the G20 key agendas have shifted towards facilitating strong, sustainable and balanced economic growth, promoting reforms of international financial institutions, making and implementing international financial regulatory standards, promoting infrastructure investment.[6)]

Nevertheless, some scholars are negative to the transition. Ding Yifan from the Development Research Center of the State Council believes it will be very hard for the G20 to become a permanent international organization, and the G20 will become an informal forum like the G7 in the future. Wang Honggang from China Institutes of Contemporary International Relations believes that there are three main obstacles for the G20's transition: first, the U.S. seems to have no desire to promote the G20 to become a long-term formal organization, nor build a secretariat; second, some other organizations like the IMF and OECD are concerned that a formal G20 could further weaken their influences; third, some countries propose that the main function of the G20 is to share practical experiences, so any binding commitments or institutionalization are not necessary.[7)]

2.2. Views about Paths of the G20's Transition

From the experiences of other international organizations, the establishment of a secretariat is an important symbol of permanent organization. Joseph E. Stiglitz, professor of Columbia University and a Nobel Prize of Economics winner, believes that the inclusiveness of G20 is insufficient as there are no representatives from

6) Zhu Jiejin, "G20 Institutional Transition and Global Tax Governance," The Pacific Review, VOL. 29, No. 3, p. 466.

7) Zhang Yuanhang, Gao Yanrui, "G20's Transition Directions and Paths," China Development Observation, No. 8, 2016. p. 6.

African and Latin American countries, so the establishment of a small secretariat should be taken into consideration, through which the national interests of these countries can be reflected under effective regulation. Some of the decisions of the G20 were not implemented effectively because there is no binding power or pressure from a decision or declaration.[8] Wang Honggang believes that the establishment of a secretariat can help G20 members communicate in a manner more formal, effective and stable, which is in the interest of G20 members from the long-term perspective.[9] The lack of a permanent secretariat to provide for institutional memory and continuity is a clear deficiency of the G20's preparatory and follow-up process.[10]

Not everybody agrees to the idea of a secretariat. Proposals to set up a formal secretariat have been opposed by most members, who insist that the G20 remain an informal group controlled by leaders.[11] Secretary-General of the OECD Angel Gurria opposes the proposal, stating he believes that the G20 has already made the OECD, IMF and ILO play a similar role to a secretariat and reach unprecedented coordination and mutual help under the framework of the G20. Although there is no binding power from any institution, it remains more effective.[12] Tu Xinquan believes that now is not a good time to establish the G20 secretariat since main countries have not reached agreement yet and even if they do, the internal legislature of member countries has to approve and agree to transfer more sovereignty to the G20.[13]

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8) Zhang Yuanhang, Gao Yanrui, "G20's Transition Directions and Paths," China Development Observation, No. 8, 2016. p. 5.

9) Zhang Yuanhang, Gao Yanrui, "G20's Transition Directions and Paths," China Development Observation, No. 8, 2016. p. 6.

10) Barry Carin, China and the G20, Shanghai People's Publishing House, April 2015. p. 13.

11) Barry Carin, China and the G20, Shanghai People's Publishing House, April 2015. p. 13.

12) Zhang Yuanhang, Gao Yanrui, "G20's Transition Directions and Paths," China Development Observation, No. 8, 2016. p. 5.

13) Zhang Yuanhang, Gao Yanrui, "G20's Transition Directions and Paths," China Development Observation, No. 8, 2016. p. 6.

2.3. Alternative Solutions Before the Transition of the G20

Ding Gong, from the National Institute of International Strategy of Chinese Academy of Social Sciences, gives some alternative solutions to consider before the transition of the G20. First, launch a dialogue partnership institution among regions, where selected representatives of some regional organizations can attend the G20 summit. Second, continue deepening the cooperation with global multilateral organizations, especially the UN and its affiliated organizations. Third, improve the function of council chairpersons and special committees. Special committees are under the supervision of and provide policy consultation and reference to their related council, while a council chairperson takes the responsibility to implement measures after gaining approval at the summit. Fourth, push forward the meeting mechanism of speakers. This could help to transfer the coordinated agreements into binding law which can improve the governance effect of the G20. In terms of the Hangzhou summit, Ding Gong suggests that China should expand the functions of coordinators which can temporarily make up for the lack of a secretariat.[14)]

Zhu Jiejin emphasizes the role of international organizations during the G20's transition. He believes the relation between the G20 and other international organizations is getting more important during its transition from crisis institution to steering institution.[15)] So this relation can be strengthened as the alternative solution at this stage.

Barry Cline suggests making it the norm to establish a G20 "non-secretariat" organization to carry out preparations for summits. These organizations would be resident in the G20 host country, rotating with the presidency. The secretariat could be managed by the Troika countries' Sherpas.[16)]

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14) Ding Gong, "G20's Reform meets opportunity on Hangzhou Summit," South Review, No. 15, 2016. p. 71.

15) Zhu Jiejin, "G20 institutional transition and global tax governance," The Pacific Review, VOL. 29, No. 3, p. 470.

16) Barry Carin, China and the G20, Shanghai People's Publishing House, April 2015. p. 13.

III. The G20 and its Transition

The direct reason for the establishment of the G20 summit was the outbreak of the international financial crisis of 2008, but the deeper reason is that global economic governance itself is in transition, and at least partly because the U.S. is no longer providing leadership for the multilateral system. With the rising up of emerging economies as a group, the U.S. and the G7 cannot overcome the crisis independently, and emerging economies have been authorized to enter the authoritative party of global economic governance. Certainly, the latter has been the major driver promoting the G20's transition.

3.1. From G7 to G20 and G20 Summit

The 1970s energy crisis gave birth to the G7, which took over the authority of global economic governance from U.S. The oil crisis that broke out in 1973 had a heavy impact on western European countries. In order to avoid another disaster like the Great Depression, some Western European countries hoped to cope with the crisis through coordination of internal and foreign economic policies, which would enable the economic departments of these countries to cooperate effectively to overcome the crisis. In November 1975, the first G6 summit was held in Paris, with the leaders of France, the United States, Great Britain, West Germany and Italy participating. With the joining of Canada in 1976 the G7 became a permanent coordination platform. And from 1977, the Chairman of the European Communities was invited in. Several decades later, the leaders from the seven top western industrialized countries continue to exchange their viewpoints regularly about world economic situations and problems, and reach agreements about rules of finance, fiscal measures, currency and trade, according to which the IMF, World Bank and WTO act as executive organizations. In this manner the post-World War II economic order was safeguarded through joint efforts, and the G7 was

called the "steering committee of the global economy."[17] The establishment of the G7 was an important milestone for global economic governance, through which the seven top capitalism countries have enhanced their coordination on the world economy, and started a period of "Group Governance" that ended the superpower role of the U.S. in global economic governance. After the end of the Cold War, with the rising up of Neoliberalism and agreement on the Washington Consensus, the G7 became the top authority to govern the global economy, through which G7 members exchanged their policies on economy, trade and finance instead of the U.S. making sole decisions as before. The G7 has helped to maintain the stability of the U.S. dollar and hedge risks within the international monetary system, and to some extent, it has delegated some of the control and influence of the U.S. to the IMF, World Bank and WTO. Under the leadership of the G7, global economic governance dominated by western countries peaked, and Neoliberalism has spread to the non-western world, with emerging economies also obtaining benefits from the rapid economic growth period.

The Asian financial crisis of 1997 led to the establishment of the G20. The outbreak of the Asian financial crisis and its conduction effects woke up the G7 to the fact that there is no firewall among economies. The international society requested for the G7 to take the responsibility to cope with the crisis that had started from several Asian countries, and to take effective measures to maintain the stability of the international financial market through coordination. Accordingly, the G7 started to allow the access of emerging economies into the global economic governance. The first step was to let Russia in and establish the G8. After 1998, Russia was allowed to join in most but not all of the agendas of the G8.The purpose of this expansion to G8 was not to bring Russia into the global economic governance, but to consolidate the achievements of the Cold War, and push forward the reform of Russia within the multilateral framework, and Russia can make the

17) Jin Zhongxia, China and G20-Highend Gaming in Global Economic Governance, Beijing: Economic Press China, April 2014, p. 4.

G7 more legitimate and representative in the process of global economic governance, even on political issues. However, when considering the self-contradictory nature of this purpose, the first expansion was bound to fail. So in 1999, in order to reconsider the cause of the Asian financial crisis and enhance global economic governance, the G8 meeting of finance ministers in Washington initiated an informal forum attended by the finance ministers and central bank governors from 20 economies to discuss issues on global financial stability, leading to the establishment of the G20 in Berlin later the same year. Since then, the G20 ministerial meetings have played a supplementary role to the G8 but rarely exercised any real effect. The G7 was still the main governor of global economic governance. In order to make itself more effective, the G8 established a dialogue mechanism between G8 and BRICS economies, which gave way to the emergence of the G20 summit.

In 2008, an international financial crisis unprecedented since the Great Depression broke out in the U.S., and quickly spread to all over the world, on a scale that the G7 and U.S. found impossible to deal with on their own. Just as Barry Bosworth from the Brookings Institution stated, the G7 cannot reach any agreements on solutions of economic issues, since every member takes their national interests as the priority. The GDP share of the G7 has declined from 68% in 1992 to 47% in 2015. The G7 is more like an "Old Boys" party.[18] In order to stop the expansion of crisis, in 2008, the U.S. initiatively organized the first G20 summit in Washington to discuss how to combat the crisis. The Washington Summit declared to "enhance mutual cooperation, strive for global economic growth recovery and implement the necessary reform of financial system."[19] The establishment of the G20 marks a departure from the old logic of "beggar thy neighbor." In the face of the international financial crisis, G20 members coordinated on monetary and fiscal policies, pushed ahead reforms of international financial institutions, and brought the world economy

18) Barry P. Bosworth, Not-so-great expectations: The G-7's waning role in global economic governance, http://www.brookings.edu/blogs/order-from-chaos/posts/2016/05/24-g7-economic-governance-bosworth.

19) Declaration of the Summit on Financial Markets and the World Economy, Washington DC, November 15, 2008.

back from the brink of precipice. This spirit of partnership and solidarity in times of difficulty is the most valued asset of the G20.[20] After 2008, the G20 summit became a regular informal forum between leaders of major economies, and also consists of various meetings between coordinators, ministers and special workshops.

Compared with the G7, the G20 has some advantages in terms of representativeness, authority, effectiveness, equality and integration, so it has already been fixed as the "the premier forum for international economic co-operation." First, the G20 consists of 10 OECD members, the European Union and nine emerging economies, and also can be divided into four countries groups like the G7, EU, BRICS and MITKA nations. The G20 accounts for 2/3 of the world population, 60% of land territory, and 88% of the world GDP share (Figure 1). Hence, it is fair to say that the performance of G20 economies has a direct bearing on the well-being of the world economy and that cooperation among G20 members decides the future of international economic cooperation. The series of agreements reached at the G20 summit can be taken as most representative. Second, G20 is an integration of multilevel coordination dialogues between national leaders, finance ministers, central bank governors and various professionals. This diversity can impart authority. Third, members of the G20 are also the members of the WTO, IMF, World Bank and FSF, meaning the G20 has fairly good cooperation with these international organizations, which can implement resolutions by the G20 more efficiently. This is also why the G20 can play an essential role in the resolution of crisis. Finally, the G20 is different from previous cooperation mechanisms. Here, developed countries and developing countries sit at the same table as equal partners to discuss and decide on international economic matters on an equal footing. This reflects a major change in the world economic pattern and the historical progress in keeping with the trend of our times, which can better guarantee the equality of decisions.

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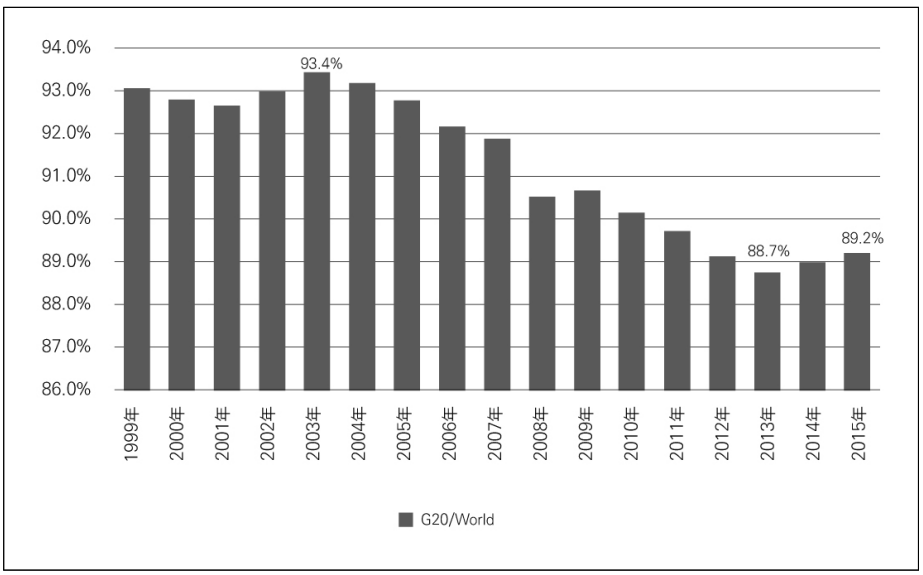
20) Remarks by Foreign Minister Wang Yi at the Media Briefing on the G20 Hangzhou Summit, May 26, 2016. www.fmprc.gov.cn.

Figure 1. G20 members' share of world GDP (current price, U.S. dollars)



Source: World Bank.

3.2. Hidden Challenges of the G20

Just as the G20 ministerial talks were mostly ignored for nearly 10 years after establishment, the G20 Summit is also facing the danger of losing attention again. Mr. Long Yongtu, the Vice Minister and Chief Representative for Trade Negotiations of Ministry of Foreign Trade and Economic Cooperation, expressed regret for the ignorance of the G20 after the financial crisis, and stated he thought the mechanism is very necessary.[21] There are some hidden challenges for the G20.

First, difficulties in the cooperation between members of the G20 are rising up. A sense of pressure and crisis at the beginning of the financial crisis was

21) Long Yongtu, G20 was forgotten after Financial Crisis, http://finance.sina.com.cn/roll/20130406/155615059024.shtml.

the main drive for the cooperation between developed and emerging economies. However, after several years' recovery, the economic situation of developed economies looks better than that of emerging economies, who are generally experiencing a declining period. The unbalance of recovery brings out the divergence on policy and interests concerns. For instance, developed economies focus on coordination of macroeconomic policy, multilateral trade system, energy security and climate change, but emerging countries focus more on reforms of international financial institutions, monetary policy and poverty elimination, development aid, liquidity surplus and price fluctuation of bulk commodities. And such a divergence is also visible between developed economies.[22] Compared with the "simple" agreement of launching stimulus packages at the beginning, coordination and cooperation measures have been proven more difficult.

Second, lack of effectiveness is another weak point of the G20. Just like many other international organizations, it is very hard to reach a proper balance between the equality and efficiency of the G20. The G20 is an informal international forum and insists on the principle of reaching unanimity through consultation, which both increases the difficulty of resolution and implementation. And resolutions of the G20 lack binding power on members, who can voluntarily choose whether to implement them or not, which provides a good excuse for some members to choose "slack working." The result of this negative response results in a decline of authority from both inside and outside; in that case other countries will seek help from some regional organizations for more pragmatic solutions. The lack of authority will greatly limit the future development of the G20.

Third, the representativeness of the G20 also comes into question if its authority declines. Although G20 members account for a dominative share of the world economy, the number of G20 members is small compared to the total number, and the representativeness among different continents is not balanced, resulting

22) Liu Hongsong, "Expansion of G20's Agenda and the Influence on its Effectiveness," International Forum, No. 3, 2015, p. 8.

in the non-G20 countries expressing doubt about the "be-governed" situation. Such queries will become fiercer if the G20 cannot properly solve internal problems which will harm its authority and also provide an excuse for some G20 members to ignore the G20.

In the short run, the G20 will not be ignored, because the world economy has not recovered completely, and both developed and emerging economies cannot take on the responsibility of losing the G20, but the fact that both are starting to strengthen regional cooperation is not a good signal for the G20.

3.3. Potential Directions of the G20's Future Transition

In the face of the international financial crisis, the G20 implemented its first transition from ministry level to a leaders' summit. With the gradual easing of crisis, the G20's role as the "fire fighter" of crisis has declined and it will have to find a path to transition for its long-term existence. As the main operation mode of the G20 is to conduct discussions among members on specific agenda items and reach agreements, the potential directions of G20's future transition can be predicted accordingly. Generally speaking, in order to solve its hidden troubles, the G20 is potentially moving forward from being oriented on short-term issues to focusing on mid-to-long-term issues, from an informal forum to an institution with certain binding powers, and from an economic-oriented to a comprehensive global governance institution.

3.3.1. "The Premier Consultation and Coordination Institution for Global Economic Governance"

The G20 was announced as "the premier forum for international economic co-operation" at the Pittsburgh summit in 2009. Looking through the main agendas of past summits, "push the global economic resilience" has been always at the core, but since there is a time gap for the crisis-causing effect to impact developed

economies and emerging economies, there is a divergence on issues of concern. At the beginning, developed economies focused more on economic recovery, while emerging economies were concerned about the reform of the international financial and monetary system. In recent years, with the recovery of developed economies and the growth rate declining in emerging economies, both pay attention to the target of sustaining economic growth. Due to differences in their situations, there are some divergences on specific policies, so it is very necessary for the G20 to coordinate macroeconomic policies among members and push forward structural reform from the mid- to long-term perspective through the G20, in order to fundamentally solve problems of global economy. Therefore, at the Antalya summit in 2015, leaders of G20 members agreed on a transition from a crisis response institution to a long-term governance institution, and planned to expand the inclusiveness of the G20, establish a regular mechanism for trade ministers' meetings, and emphasize the implementation of commitments and so on.

In addition, the G20 is also on its way to becoming a more formal institutional platform rather than only an informal forum. First, in order to improve the implementation capacity of the G20, "mutual assessment" has been emphasized as the core of "strong, sustained and balanced growth framework" for times, which is a "soft binding" to member states. And, the G20 is dedicated to enhancing its cooperation with major international financial and economic organizations that get support from the G20 and are also in charge of implementing the consensus of the G20. To a certain extent, this could help to improve the implementation capacity of the G20. Second, in order to improve its authority, the G20 is dedicated to optimizing its organization pattern into one which can make it more institutional. Taking China's presidency in 2016 as an example, various meetings have run through the whole year and will culminate in the Hangzhou summit. Throughout the year, 66 events will be held in 20 Chinese cities. Among them, there are 23 ministerial-level meetings, including four G20 ministers meetings, five Sherpa meetings, four finance ministers and central bank governors meetings, four finance and central bank deputies meetings and six large-scale side events. Forty-three working group meetings in

various fields will be held. Altogether nearly tens of thousands of people will get involved. These meetings will lay the ground for the Hangzhou summit from different areas and perspectives and help to translate consensus into action.[23] Various meetings can bring about the most inclusive coordination as well as the more authoritative consensus. Third, in order to improve the representativeness of the G20, China plans to invite more developing countries to participate at the Hangzhou summit in 2016.

The above measures will gradually promote the G20's transition from an informal international cooperation forum to the premier consultation and coordination institution for global economic governance with a certain level of binding, implementation capacity and more representativeness.

3.3.2. "The Consultation and Coordination Institution for Global Development"

On the G20 Toronto Summit Declaration, based on the purpose of narrowing down the development gap and reducing poverty, all members agreed to establish a Working Group on Development and mandate it to elaborate, consistent with the G20's focus on measures to promote economic growth and resilience, a development agenda and multi-year action plans to be adopted at the Seoul summit. At the Seoul summit in 2011, development became a regular issue. At the Antalya summit in 2015, G20 members agreed to cooperate on the 2030 Agenda for Sustainable Development. At the upcoming Hangzhou summit, G20 members are ready to develop national plans for the implementation of the 2030 Agenda. The focus on development agenda will strongly promote the sustained growth of the global economy, and provide a solid foundation for the implementation of development goals, and propel the G20's transition toward long-term governance with more legitimacy on political aspects. What is more important is that cooperation with the UN and its affiliated institutions will improve the executive force of the G20 on various

23) Remarks by Foreign Minister Wang Yi at the Media Briefing on the G20 Hangzhou Summit, May 26, 2016. www.fmprc.gov.cn.

issues. Therefore, cooperation between the G20 and the UN on development issues will promote the G20 to be "the consultation and coordination forum for global development."

3.3.3. "The Consultation and Coordination Institution for Political, Security and Social Issues"

The G20's agenda items have been extending. The G20 members are not only major economies, but also all permanent members of the Security Council of the UN and some regional powers, so leaders have to take the chance to discuss how to deal with political, security-related and social puzzles at the summit every year. From Pittsburgh in 2009, the G20 has been focusing on anti-corruption, and an Anti-corruption Workshop was established at the Seoul summit. At the St. Petersburg summit in 2013, G20 members discussed the Syria issue, but because of divergence on resolution, this was not put into the declaration. At the Antalya summit of 2015, the G20 had a discussion on the refugee issue, and turned to the issue of anti-terrorism because of the sudden occurrence of a terrorist attack in Paris. On this account, the G20 could transition to "the comprehensive consultation and coordination platform on political, security and social issues," so as to enhance the international cooperation on problems above.

IV. China's Expectations on the G20's Transition and Sino-Korean Cooperation under the Framework of the G20

The G20, as a new premier forum of global economic governance, provides an equal opportunity for China to discuss crucial economic issues with other great powers. As economic power is the core competitiveness of China, the G20 is of great significance to China's strategy on global economic governance. Given the

current global situation, China expects the G20 to be the hub of "stock reform" and "incremental updating" strategies, and will take the opportunity of the 2016 Hangzhou summit to promote the G20's transition. And this will also provide opportunities for South Korea to cooperate with China under the framework of the G20.

4.1. The G20 as the hub of "stock reform" and "incremental updating" of China

From the international financial crisis in 2008, the dominant power of the world order has declined, and a great concern for the challenging power has risen up. Since the "Pivot to Asia," the U.S. has adopted a policy of "containment" instead of "recruitment" to China, and China is facing the risk of being "kicked out" from the new world order. Therefore, China has chosen to implement the strategy of "stock reform" and "incremental updating." The G20 can serve as the very potential hub for this strategy.

4.1.1. The G20 and "Stock Reform" of China

International financial organizations are the main executive parties of global economic governance. China has tried to enter various international organizations since its founding in 1949. At the very beginning of its "Reform and Opening-up" stage, China, with the identity of an apprentice, tried to enter several major international organizations like the IMF, World Bank and WTO. China's difficult entrance into the WTO over 15 years still remains impressive. Since getting back its lawful seat in the UN in 1971, China has become a member of more than 100 international organizations and over 400 international multilateral institutions, and this is a symbol that China has deeply merged into global governance.

As a major developing country, China has spared no effort when it comes to pushing for global economic governance reform, especially in international financial organizations like the IMF, in order to build a fairer power and speaking structure.

The dialogue regime between developed and emerging economies provides such a good opportunity. During the London G20 summit in 2009, voices from China, EU and Russia called for the reform of the international monetary system dominated by the U.S. dollar. Members emphasize "enhancing reform and regulation of international financial system" at every summit. Take the IMF reform as an example. IMF, as the main international financial organization of the Bretton Woods System after World War II, has been exposed to have defects like an inflexible decision-making process, limitations on credit according to the subscription quota, additional conditions on aid systems, lack of financial regulation and cooperation with regional financial institutions, etc. Given the defects above, China has pushed forward effective discussion about the reform of IMF distribution on quota and voting rights between developed and emerging countries under the framework of the G20. At the Pittsburgh summit in 2009, all members agreed to increase the voting power of developing and transition economies by at least 3% in the World Bank. At the Toronto summit in 2010, all members appealed for the speeding up the implementation. And in the same year, at a conference between financial ministers and central bank governors of the G20 members, a historical agreement was reached to double the total quota and adjust share distribution. According to the reform plan, the total quota of IMF will reach 476.8 billion SDR, while contribution from developing members will increase to 6%. There will be no change in the total seats of the board but two of them originally taken by European countries will be delivered to developing countries. Contribution and quota after reform can improve in accord with the quota change of IMF members in the global economy. China's quota and voting rights will climb to 6.39% and 6.608%, which means China will surpass Germany, France and Great Britain, and second only to the U.S. and Japan. Developed members promised to complete the reform before October 2012, and reconfirmed this at the Seoul summit in 2010. At the Los Cabos Summit in 2012, China declared to support and participate in the IMF's capital increase plan, with an amount of US$ 43 billion. However, as is well-known, because of delay at the congress of the U.S., the reform plan was officially taken into effect in late 2015. This can

be called a partial success for China to promote its "stock reform" strategy, in which G20 has already played a crucial role, and it could also be a starting point for the G20 to be the major platform of China's "stock reforming" strategy.

4.1.2. The G20 and China's "Incremental Updating" strategy

The "Belt and Road" initiative is a regional development initiative proposed by China in 2013, and taken as a symbolic measure of China promoting its "incremental updating" strategy. The "Belt and Road" initiative, through policy coordination, facilities connectivity, unimpeded trade, financial integration and people-to-people bonds, and plans to promote unhindered policy communication, push infrastructure connectivity, improve trade and investment facilitation, enhance exchanges between people, and build a huge economic belt with mutual benefit and prosperity. Given the following common objectives, the cooperation between the "Belt and Road" initiative and the G20 will be well beneficial to the G20's implementation of global governance objectives.

Goal of Economic Growth: The main function of the G20 is to promote global economic growth. At the Brisbane summit of 2014, G20 members set an ambitious goal to lift the G20's GDP by at least an additional 2% by 2018, which means to add more than US$ 2 trillion to the global economy. This is a challenging goal given the downbeat global economic situation. Plenty of projects under the "Belt and Road" initiative will bring huge investment opportunities for G20 members so as to reach the goal above.

Goal of Development: The G20 summit has put long and consistent efforts on development issues, and has already confirmed to coordinate on the implementation of the 2030 Agenda of Sustainable Development. According to the Human Development Index report published in 2014 by the UNDP, of the countries along the "Belt and Road," only 1/4 ranked in the highest development level list, with the other 3/4 being classified on the high, medium and low development level. And although China is included in the high ranking list, it still has a poverty

population of 50 million. So at least 74% of countries along the "Belt and Road" need to focus on the development issue. One main objective of the "Belt and Road" initiative is to promote mutually beneficial cooperation to a new high, which is in accord with the G20's development goal of "speeding up development and reducing poverty." The cooperation between "Belt and Road" nations and the G20 could not only bring necessary aid to undeveloped countries but also improve their development capability, and thus, both can contribute to the implementation of the 2030 Agenda of Sustainable Development.

Goal of Promoting Trade and Investment Growth: One of the themes of the Toronto summit in 2009 was to "promote trade growth." The Saint Petersburg summit in 2013 promised to "extend until the end of 2016 the standstill commitment: being fully committed to further progress in removing barriers an impediments to global trade and investment,"[24] and also proposed a new subject on promoting investment. Both reflect the G20's approach to promoting economic growth by improving trade and investment, and this is fully the same with the "unimpeded trade" goal of the "Belt and Road" initiative. Up to now, China has signed 11 FTA agreements, 56 BIT agreements and 53 tax agreements with "Belt and Road" countries, and has established 53 economic and trade cooperation zones in 18 countries with a total investment of over US$ 14 billion.[25] In addition, China has formulated a dozen of financing platforms for "Belt and Road" projects. All of the above measures aim to promote trade and investment convenience, remove barriers for investments and trade, strengthen industrial cooperation, improve the division of labor and distribution of industrial chains, so as to implement the goal of trade and investment growth.

Goal of International Monetary System Reform: From its establishment, the G20 has started the process of international financial and monetary reform pushed by emerging countries, and every summit has emphasized the reform, but the results

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24) G20 LEADERS DECLARATION, Saint Petersburg Summit, Sep. 5-6, 2013, p. 44.

25) Zhao Jing, "Ministry of Commercial: China has signed the BIT with 56 countries along 'Belt and Road' Initiative," www.finance.com.cn/stock/t/2016-05-31/doc-ifxsqtya6596462.shtml.

have not been as much as hoped. The "Belt and Road" initiative advocates financial integration which can not only provide more capital support, but is also beneficial to the stability of regional monetary systems by the progress of RMB internationalization. Thus, it could be helpful to the international monetary system reform goal proposed by the G20.

Goal of Infrastructure Construction: As a main fundamental measure to promote the economic development of developing countries, the G20 has paid much attention to infrastructure construction. The Toronto G20 summit's declaration required emerging economies to "enhance infrastructure spending."[26] The Seoul summit also reminded members to focus on infrastructure construction in developing countries. At the Brisbane summit in 2014, G20 members agreed to establish the Global Infrastructure Hub with a four-year mandate, which will contribute to developing a knowledge-sharing platform and network between governments, the private sector, development banks and other international organizations, and also foster collaboration among these groups to improve the functioning and financing of infrastructure markets. The Brisbane summit also welcomed the launch of the World Bank Group's Global Infrastructure Facility.[27] Facilities connectivity is a priority area for implementing the "Belt and Road" initiative. In the recent three years, some demonstration projects have been completed or are under construction, like the High-speed Railway from Djakarta to Bandung, High-speed Railway from Hungary to Serbia, East gas tube from Russia to China, the construction of Gwadar port in Pakistan, the logistics cooperation base built by China and Kazakhstan, etc. The G20 should cooperate with "Belt and Road" nations in the infrastructure area in order to promote development objectives.

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26) The G20 Toronto Summit Declaration, June 27, 2010.

27) G20 Leaders' Communiqué, Brisbane Summit, November 15-16, 2014.A.

4.1.3. The G20 is an Important Hub for China's "Stock Reform" and "Incremental Updating" Strategies

The emergence of the G20 Summit makes the global governance deserve its name, for it brings a new stable balance of power and rules. China, as the second largest economy and the biggest of all developing countries, requires global stability, power sharing and rule of law. Not only does it take on the responsibility of great power, but to also speak for other developing countries. So during the gaming with Western great powers, China has to maintain balance between power and rules by the use of the G20, which should be taken as the important hub between China's "stock reform" and "incremental updating" strategies.

First, power sharing. As the decision-making process of the G20 is to reach unanimity through consultation, this means, at least apparently, power is shared by all members, and decisions can be reached only through consensus. On the implementation of consensus, the G20 has described the "mutual assessment" process proposed during the Seoul summit in 2010 as a "soft binding power," by which members can supervise each other based on voluntary implementation.

Second, respecting rules. Open trade and market are the core rules of global governance which have been respected by the G20. At the G20 Washington summit, all members agreed that "our work will be guided by a shared belief that market principles, open trade and investment regimes, and effectively regulated financial markets foster the dynamism, innovation and entrepreneurship that are essential for economic growth, employment and poverty reduction."[28] The principles above have also been emphasized in every summit afterwards. At the Saint Petersburg summit in 2009, rules-based governance was written into the declaration that "as leaders of the world's largest economies, we share responsibility for reinforcing the open and rules-based global economic system. Free and rules-based trade fosters economic opportunities." The G20 members agree to operate based on rules which

28) Declaration summit of financial markets and the world economy, Washington DC, November 15, 2008.

are also the core principle of global economic governance.

Third, insisting on cooperation. "The premier forum for international economic co-operation" provides the G20 with legitimate evidence after crisis. The slow-growth of the global economy makes the G20 more useful in the short term, but the cooperation on long-term issues endows the G20 with stronger vitality. Therefore, the G20 is currently the best platform for both developed and emerging economies to cooperate on promoting economic growth, regulating international finance, enhancing trade and investment, and development. Now, especially with the emergence of more political, security-related, and social issues, this cooperation should be more cherished.

4.2. China's Expectation on the G20's Transition: From Hangzhou Summit

From September 4–5, 2016, China will be the host country of the 11th G20 Summit. In 2015, China contributed more than 25% of the world economic growth, and just like the situation after crisis, China is still the major driver for global economic growth, so China deserves to have more say in the global economic governance. The G20 Hangzhou summit provides China with such an opportunity to propose China's general resolutions. At the time of global economic declining, trade protectionism rising, reconstruction of financial and monetary order, the 2016 China summit will be a good opportunity for the G20 to push forward further transition.

4.2.1. Two Directions

In March 2016, Mr. Wang Yi, the Foreign Minister of China, addressed the BOAO Forum for Asia, saying that he expected the Hangzhou summit will become a new start for G20's transition. The G20 has to keep pace with the times, and gradually transition from a crisis-response mechanism to a long-term governance institution, as well as from short-term policy oriented to mid-to-long term policy oriented.[29] On May 26, Minister Wang delivered remarks at the media briefing on the G20 Hangzhou

summit, saying, at the Hangzhou summit China would like to focus on the core challenges and outstanding issues confronting the world economy and work with all parties to seek common solutions and contribute China's wisdom. China aims to keeping steady growth in the near term by addressing the symptoms and adding momentum to the long term by treating the root causes. We want to facilitate G20's transition from a crisis-response mechanism to one focusing on long-term governance so as to better lead world economic growth and international economic cooperation.[30] His statements stand for China's expectations for the G20's future transition.

4.2.2. Three Principles

From the perspective of China as a new great power in the G20, and a developing country, and an important player in the transition of global economic governance, China is inclined to insist on the three following principles in the G20's transition.

First, economic issues are priority. Economic issues have been at the core since the establishment of the G20, especially during the time of recovery. The global economy has been experiencing a slow-down period after the international crisis (Figure 2). Christine Lagarde, President of the IMF, believes that the global economy can be described by "weak recovery, slow growth, deflation, high unemployment and debt rate." As predicted by the IMF World Economy Outlook published in July 2016, the world economy grew at a rate of 3.1% in 2015, and the growth rate in 2016 and 2017 would be 3.4% and 3.6%, respectively down-graded by 0.3% and 0.2% compared with that in January. And except for the positive prediction in regard to China and India, the growth rate of other main economies all down-graded (Table 1). By comparison, the prediction from the World Bank is more negative. According to its predictions made in June, the World Bank down-graded the growth rate of the global economy from 2.9% in January to 2.4% for 2016, and from 3.1%

29) Zhang Yuanhang, Gao Yanrui, "G20's Transition Directions and Paths," China Development Observation, No. 8, 2016, p. 5.

30) Remarks by Foreign Minister Wang Yi at the Media Briefing on the G20 Hangzhou Summit, May 26, 2016. www.fmprc.gov.cn.

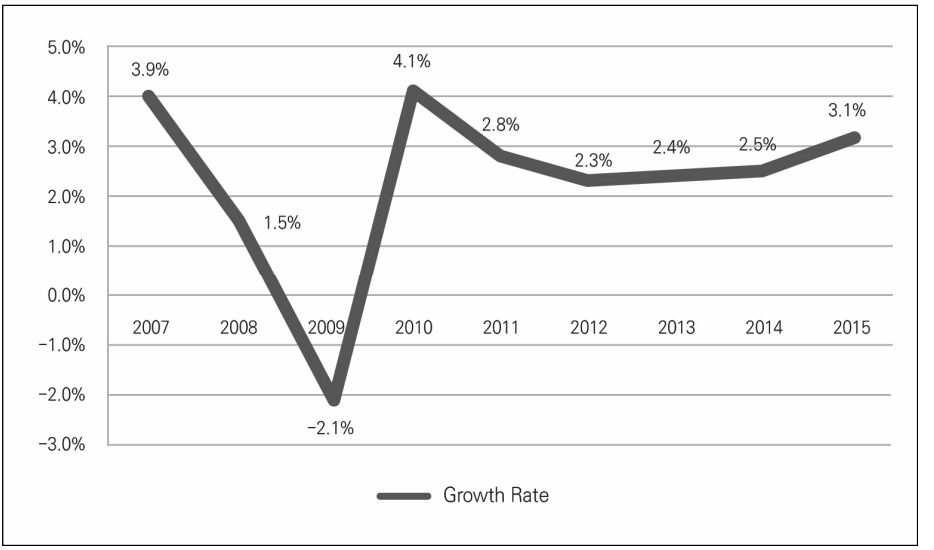
in January to 2.8% for 2017. The World Bank explained the reason for these adjustments was that developed economies are undergoing stagnant growth, bulk commodity prices remain low, and global trade stays weak while capital liquidity declines (Table 2). The predictions above show that the global economy is still at risk of slipping into crisis. Although major economies have paid much effort, even adopting negative interest rates, the global economy will remain in a slow growth period for a time until a new "stable anchor" can be found.

Right now, the world economy is in a crucial transition period that offers both opportunities and challenges. First, the old approach of stimulating growth merely through fiscal and monetary policies has become less and less effective. Second, the policies of the world's major economies have clearly diverged, making it harder to form synergy. Third, trade and investment protectionism is rearing its head, and the building of an open economy remains a long and daunting task. And fourth, the world economy, though recovered somewhat from the crisis, is still weak in growth and under constant downward pressure.[31)]

Of the ten expected outcomes of the Hangzhou summit, all but two are economic-related issues, with the remaining two being about development and anti-corruption. This proves that China has placed economic issues as the first priority of the G20, and is being very cautious about the expansion of political, security-related and social issues.

31) Remarks by Foreign Minister Wang Yi at the Media Briefing on the G20 Hangzhou Summit, May 26, 2016. www.fmprc.gov.cn.

Figure 2. Growth Rate of the Global Economy (2007-2015)



Source: World Economic Outlook, IMF (April 2016).

Table 1. Comparison of IMF's Prediction on Global Economic Growth Rate between January and June

Economies	Growth Rate in 2016-2017		Comparison with Prediction in January	
	2016	2017	2016	2017
US	2.2%	2.5%	↓0.4%	↓0.1%
Euro Zone	1.5%	1.4%	↓0.2%	↓0.3%
Japan	0.5%	-0.1%	↓0.5%	↓0.4%
China	6.5%	6.2%	↑0.2%	↑0.2%
India	7.5%	7.5%	Even	Even
Russia	-1.8%	1.0%	↓0.8%	Even
World	3.1%	3.4%	↓0.3%	↓0.2%

Source: World Economic Outlook, IMF (July 2016).

Table 2. World Bank's Prediction on Growth Rate of Major Economies

(Unit: %)

Economies	2013y	2014y	2015y (estimated)	2016y (predicted)	2017y (predicted)	2018y (predicted)
World	2.4	2.6	2.4	2.4	2.8	3.0
Developed Economies	1.1	1.7	1.8	1.7	1.9	1.9
U.S.	1.5	2.4	2.4	1.9	2.2	2.1
Euro Zone	-0.3	0.9	1.6	1.6	1.6	1.5
Japan	1.4	-0.1	1.6	0.5	0.5	0.7
Emerging Economies	4.7	4.2	3.4	3.5	4.4	4.7
China	7.7	7.3	6.9	6.7	6.5	6.3

Source: Global Economic Prospects, World Bank (June 2016).

Table 3. Ten Major Expected Outcomes of G20 Hangzhou Summit

1. Work out a blueprint for innovation-driven growth.
2. Adopt an action plan for the implementation of the 2030 Agenda for Sustainable Development.
3. Identify priority areas and set up guiding principles as well as an indicator system for structural reforms (9 priority areas, 48 guiding principles, 12 indicators).
4. Adopt a global trade growth strategy.
5. Lay out the guiding principles for global investment policies.
6. Deepen reform of the international financial architecture.
7. Launch three-pronged anti-corruption cooperation.
8. Initiate cooperation to support industrialization of Africa and least developed countries (LDCs) in the world.
9. Formulate an entrepreneurship action plan.
10. Push for early entry-into-force of the Paris Agreement on climate change.

Source: "100 days countdown to the G20 Hangzhou Summit: Ten Expected Outcomes", http://news.xinhuanet.com/world/2016-05/27/c_129019748.htm.

Second, insist on development issues. Two of the ten major outcomes of the Hangzhou summit are to "adopt an action plan for the implementation of the 2030 Agenda for Sustainable Development" and "initiate cooperation to support industrialization of Africa and least developed countries (LDCs) in the world" (Table 3). Out of 21 Key Agenda Items, nine are related to such development issues (Table 4). This is the first time that development issues are being given a prominent position in the global macroeconomic policy framework, and also the first time to make a special action plan for implementation of the 2030 Agenda of Sustainable Development.

Economic growth is the first problem to be dealt with for developing countries. Most of the developing countries are suffering the decline of economic growth after 2008. Taking countries along the "Belt and Road" for example, 65% of these nations suffered a decline in 2013 compared against 2008 levels, and 73% suffered more decline in 2015 compared with 2008.

With the deepening of economic globalization, developing countries are faced not only with the challenge of promoting economic growth, but also having to cope with problems caused by development, including climate change, environmental deterioration, social differentiation, increasing traditional and nontraditional changelings. All of these problems require the resolution of global governance.

The elimination of poverty and inequality, protecting the environment and creating inclusive economic growth are all reliable agendas. G20, as the group of largest economies, has the obligation and responsibility to push forward the accomplishment of the 2030 Agenda for Sustainable Development from economic, social and environmental aspects.

The focus on development issues at the Hangzhou summit proves that China, as the rotating presidency of the G20, hopes that the G20 can play a leading role in development issues. In addition, China also focuses on the industrialization of African countries, connectivity of global infrastructures, inclusive commercial etc., so as to share these development achievements with developing countries for them to accomplish poverty elimination and sustainable development through international cooperation.

Third, put more emphasis on long-term issues. Actually, short-term solutions can only have effect for a while, and problems can only be solved fundamentally from a long-term perspective. Just as Wang Yi said, "we aim to steady growth in the near term by addressing the symptoms and add momentum to the long term by treating the root causes."[32] China has put "Breaking a New Path for Growth" as the first theme, and this is the first time the G20 has focused on the long-term drive for global growth (Table 4). It can be found that most of the expected outcomes of Hangzhou Summit are about medium and long-term economic growth plans and structural reform (Table 3). After the stimulus policy process at the beginning, G20 members need to put more emphasis on long-term structural reform, and make innovation the key driver of economic growth in order to provide fundamental resolution to the world economy.

Table 4. Theme and Key Agenda Items of Hangzhou Summit in 2016

No.	Theme	No.	Key Agenda Items
I	Breaking a New Path for Growth	1	Maintaining the Momentum of World Economic Recovery
		2	Lifting Mid-to-Long term Growth Potential
II	More Effective and Efficient Global Economic and Financial Governance	3	Improving International Financial Architecture to Meet Future Challenges
		4	Continuing Financial Sector Reforms
		5	Developing Green Finance
		6	Improving International Tax Regime
		7	Implement Consensus on Anti-corruption
III	Robust International Trade and Investment	8	Reinforcing Trade and Investment Cooperation Mechanism
		9	Supporting the Multilateral Trade System
		10	Promoting Global Trade Growth
		11	Promoting Inclusive and Integrated Global Value Chains

32) Remarks by Foreign Minister Wang Yi at the Media Briefing on the G20 Hangzhou Summit, www.fmprc.gov.cn May 26, 2016.

Table 4. Continued

No.	Theme	No.	Key Agenda Items
III	Robust International Trade and Investment	12	Enhancing Cooperation and Coordination on Global Investment Policy
IV	Inclusive and Interconnected Development	13	Implementing the 2030 Agenda for Sustainable Development
		14	Optimizing G20's Development Cooperation agenda
		15	Building Infrastructure and Connectivity
		16	Promoting Accessible, Affordable and Sustainable Energy Supply
		17	Increasing Employment
		18	Improving Food Security and Nutrition
		19	Mobilizing Climate Finance
		20	Eradicating Poverty
		21	Supporting Industrialization in African and other Developing Countries

Resource: Theme and Key Agenda Items of the G20 Summit in 2016. www.g20.org.

4.2.3. Three Orientations

As stated in the "Theme and Key Agenda Items of the G20 Summit in 2016" declared by the Chinese government, China proposed three main orientations for the summit, and it also indicated its requests and expectations for the future G20.

First, Action-Oriented. A series of commitments by the G20 at every summit have played an important role in the crisis response, but not all of them have been implemented, casting doubt on the executive ability of the G20. Therefore, the Hangzhou summit puts an emphasis on this executive ability, hopes to strengthen cooperation with international organizations, and turns consensus into actions as well as accountability and "mutual assessment."

Second, Out-Reaching. Governance itself signifies multilateral participation. Therefore, as the premier forum of global economic governance, the G20 should

strengthen dialogues with representatives from business, labor, think-tanks, women, youth and other social groups, and listen to their voices, so as to better respond to people's needs and demands.

Third, World-Embracing. On July 22, 2016, China held the "1+6" round table meeting with six big international financial and economic organizations. Premier Li Keqiang has discussed with the presidents of the IMF and World Bank, Director-General of the WTO, Secretary-General of the OECD and International Labor Organization (ILO), Chairman of the Financial Stability Board (FSB) about rising anti-globalization thoughts symbolized by trade protectionism, isolationism and how to enhance coordination on macroeconomic coordination, as well as promoting global economic recovery, etc. This is a very good beginning for the coordination between a G20 organizing nation and main international institutions. China also expects to strengthen the cooperation between the G20 and other international organizations like the UN, the Group of 77 and APEC. These active moves by China show its conviction in open trade and multilateral cooperation, prove China's willingness to safeguard current world order, and also indicate China wants to build a high-level coordination regime between the G20 and other international organizations.

4.2.4. Theme and Key Agenda Items: "Stock Reform" and "Incremental Updating"

Recently, a lack of innovative drive, reform momentum, international cooperation, and inclusive growth are the main problems encountered by the global economy, so China's vision, combined with some domestic economic problems and undertaking reform measures, embodies long-term, strategic considerations and demonstrates a broad perspective and ambitious goals, which show China's expectations for the G20.

At the Hangzhou summit, the G20 will discuss four themes and 21 key items (Table 4). From China's perspective, these items can be divided into its two agendas of "stock reform" and "incremental updating" (Table 5). From the "stock reform"

side, China insists on decisions made by previous G20 Summits, and will keep pushing for them at the Hangzhou summit. And China agrees to take measures to maintain the recovery momentum of the global economy in order to solve short-term issues. From the "incremental updating" side, China has put much focus on mid- to long-term issues and has proposed some new measures. Innovation and reform are the main keywords of the "incremental updating" agenda. First, innovation is the resolution of China to the global economic growth. Just as structural reform on the supply side is being implemented in China, China believes that demand management can hardly be the ultimate solution to the deep-rooted structural issues undermining economic growth, and that it is necessary for the G20 to take a different approach, assess the growth prospects of the world economy from a new perspective, innovate the growth pattern, further deepen structural reforms and lift the total-factor productivity and potential growth rate, thus facilitating strong, sustainable and balanced growth in the mid- to long-term.[33] Second, China has proposed some reform measures on structural reforms, global economic and financial governance, trade and investments and development issues, which proves that China is not only the "stable anchor" of the world economy, but also the main player in global governance reform. China also wants to invite a bigger number of developing countries[34] to participate in the process, which can improve the representativeness of the G20.

33) Theme and Key Agenda Items of G20 Summit in 2016. http://www.g20.org.

34) Laos (rotating presidency of ASEAN), Chad (rotating presidency of Africa Union), Senegal (rotating presidency of African New Partnership Senegal), Kazakhstan, Egypt, Thailand (rotating presidency of the Group of 77).

Table 5. Key Agenda Items on "Stock Reform" and "Incremental Updating"

Sectors	Stock Reform.	Incremental Updating.
Economic Growth	- Pushing for greater macro-economic policy coordination to avoid negative spill-over effect, and so as to main the momentum of world economy recovery	- Champion reform and innovation to unleash new impetus and achieve strong, sustainable and balanced growth. It is the first time for the G20 to focus on the medium-to-long term driving. - Newly establish special working groups on innovation, new industrial revolution and digital economy.
Reform of Global Economic and Financial Governance	- Encouraging the IMF to complete its 15th General Review of Quotas, expanding the role of the SDR of IMF, and continue to push forward work related to World Bank voting share review. - Supporting reforms promoted by previous G20 summits, such as IMF, World Bank, FSB, Global Forum on Transparency and Automatic Exchange of Information for Tax Purpose, G20 Principles on Energy Cooperation - Some reforms are still in progress, G20 should keep the momentum of reform.	- Confirm nine priority areas for G20 structural reforms, and work out a host of guiding principles and an indicator system to monitor the progress and real effect. That will in fact be the first time in the G20's history. - Reactivate the International Financial Architecture Working Group - Enhance macro-prudential regulation and its international cooperation in this area. - Inclusive finance. - Explore further development of taxation - Anti-corruption should be prioritized in the G20's future work
Trade And Investment	- Stressing multilateral trading system's centrality and primacy in promoting trade and investment liberalization and facilitation - Addressing sluggish trade and investment and resurging protectionism, we will reinvigorate the two engines of growth and build an open world economy.	- Develop a comprehensive action-based initiative to promote global trade growth. - Build a rules-based GVCs system that is both consistent and inclusive - Explore the development of non-binding global investment guiding principles or framework on a voluntary basis

Table 5. Continued

Sectors	Stock Reform.	Incremental Updating.
Development	- Pushing the G20 to take the lead and play an exemplary role in global cooperation on sustainable development. - Supporting 2030 Agenda for sustainable development - Increasing employment - Pushing for early entry-into- force of the Paris Agreement on climate change	- Invite a bigger number of developing countries to take part in the Hangzhou summit so as to make the summit more representative of developing countries in the world. - Suggest the G20 members develop national plans for the implementation of the 2030 Agenda
Development		- AIIB and NDB and other new institutions should also play a role in complementing the existing multilateral development system in order to deal with the lack of finance in infrastructure. - Formulate an entrepreneurship action plan

Source: Remarks by Foreign Minister Wang Yi at the Media Briefing on the G20 Hangzhou Summit, May 26, 2016, www.fmprc.gov.cn; Theme and Key Agenda Items of G20 Summit in 2016. http://www.g20.org.

4.3. Advices on Cooperation between China and South Korea in the G20

Both China and South Korea are founding member states of the G20, and respectively the representatives of BRICS and MIKTA. Therefore, China and South Korea should properly handle temporary security conflicts, and integrate regional development plans initiated by both into the G20 framework, and promote the cooperation and policy coordination between BRICS and MIKTA, in order to accomplish global economic governance goals through a joint effort.

4.3.1. Properly handle strategic and security conflicts, maintain the good momentum of bilateral economic relations

The past two decades have witnessed a rapid development of the bilateral relationship between China and South Korea. China and South Korea established a diplomatic relationship in 1992 and a Comprehensive Cooperative Partnership in 2003, and moved to a closer Strategic Cooperative Partnership in 2008 which was further expanded in 2014 as partners of "achieving common development, safeguarding regional peace, prospering Asia together, and promoting prosperity of the world." And in recent years, China has been the most important trade partner, largest exporting market, largest importing country, largest investment destination for South Korea, while South Korea is China's third-largest trade partner, exporting market and importing country. In 2015, China and South Korea successfully reached an agreement to establish an FTA. South Korea joined the AIIB as a founding state. The momentum of cooperation is exciting.

However, South Korea and U.S. announced on July 8, 2016, that they have decided to deploy an advanced American missile defense system (MDS) in South Korea. As is evident from the series of tough protests from the Chinese government both in advance and afterwards, if the MDS is finally deployed in South Korea, the bilateral relations between China and South Korea will be heavily damaged, with incalculable losses sustained in political, economic and security-related terms. Therefore, China and South Korea must handle this issue from a long strategic perspective and mindful of the overall situation, in order to prevent stopping the good momentum of their bilateral relations.

4.3.2. Integrating the "Belt and Road" Initiative and "Eurasia Initiative" into the G20 Framework

On October 31, 2015, China and South Korea signed an MOU on the integration of the "Belt and Road" initiative and "Eurasia Initiative," which started their official cooperation in regional development. Both initiatives are regional cooperative plans

focusing on the Eurasia continent, originated and promoted by presidents. Now, both have entered the implementation stage which needs more bilateral cooperation. Therefore, China and South Korea should consider integration of the two initiatives with the G20 framework, by which the goals of economic growth, development, promoting trade and investment growth, reform of the international financial and monetary system and especially infrastructure can be better implemented. Such integration would also be beneficial to expanding cooperation with third parties. The integration will not only strengthen the practical cooperation of the G20, but also break a new path for the cooperation pattern between members' regional development plan and the G20 framework.

4.3.3. Leading the Cooperation and Coordination between BRICS and MIKTA

BRICS, since its establishment in 2009, has become an important cooperation platform for emerging economies and developing countries on economic, financial and development issues. MIKTA is an association formed under South Korea's leadership in 2013 and is an acronym of the names of five major middle powers: Mexico, Indonesia, South Korea, Turkey and Australia. The establishment of MIKTA is aimed at strengthening the cooperation and coordination between medium powers, and providing new drive for global governance. As for the G20, MIKTA breaks up the borderline between developed countries and developing countries, and will improve the diversity of the G20.

China and South Korea, as the founding states of BRICS and MIKTA, should play the leading role in enhancing the cooperation and coordination between the two groups. China and South Korea can jointly initiate the dialogue mechanism between the two groups, so that MIKTA can play the role of a bridge between developed and emerging members, and implement practical cooperation with both on development aid, mutual investment etc., in order to safeguard the unity of the G20.

V. Conclusion

Transition or not, that is not a question for the G20 anymore. While the 2008 international financial crisis led to the G20's transition from ministry- to summit-level, the crisis-response approach taken by the G20 can no longer satisfy the demand for global economic governance or promote the G20's development in the future. The G20 has to resolve problems like its lack of effectiveness and authority because of the difficulty of the cooperation between members rising up.

According to the trend, there are three potential directions for the G20's transition. First, from "the premier forum for international economic co-operation" to "the premier consultation and coordination institution for global economic governance," which means transition from an informal forum to an institution with a certain binding power through diversified meetings, and from a focus on short-term response to mid- to long-term structural reform, which is what global economic governance means.

Second, the G20 should extend itself to become a "consultation and coordination forum for global development." The G20's representativeness and legitimacy need support from numbers of developing economies and the G20 has the responsibility and obligation to help the development of developing countries.

Third, the G20 should extend itself to become a "consultation and coordination institution for political, security and social issues." Traditional and non-traditional political, security-related and social issues rise in the agenda of the G20, because it is the summit among great powers that are in charge of the global governance from any aspect.

From China's perspective, the first two directions above can be fully accepted because they are in accord with the "gradual transit from a crisis-response mechanism to a long-term global economic governance institution, and also from short-term policy oriented to medium and long-term policy oriented," and given the success of its transition, the G20 can become the hub of the "stock reform" and "incremental updating" strategies implemented by China in the area of global economic governance. Therefore, China is not only the defender of the current global economic governance

with the nature of sharing power, respecting rules and insisting on cooperation, but also a reformer standing in the shoes of emerging and developing countries. However, China has to be cautious when it comes to making the G20 become a comprehensive global governance institution which also puts much focus on political, security-related and social issues, because doing so will not only disperse the G20's energy on coping with the depressed global economic situation, but also may bring China into dispute over other sensitive issues which are not good for China, in order to realize its huge advantage in the economic issues.

There is no doubt that South Korea is a crucial strategic partner of China from the long-term perspective of global economic governance, especially in the G20. Therefore, both governments should handle well the accidental security problem to prevent potential damage to the bilateral relationship and emotional ties between their people. And under the framework of the G20, China and South Korea should promote the coordination and cooperation between BRICS and MIKTA, and try to integrate the "Belt and Road" initiative and "Eurasia Initiative" into the G20 framework, which can make the G20 and the two initiatives more practical and effective.

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4

Comparative Research on Economic Transformation and Economic Reform between China and South Korea

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I. Introduction

For many East Asian countries, economic transformation contains two meanings: first, the transformation of the mode of economic development, including the transformation of economic demand structure, industrial structure, and the driving force of development; and second, the system transformation which mainly refers to changing the way of allocating resources from the government-led to market-determined, or economic restructuring and economic reform interrelated and mutually reinforcing.

After decades of continuous reform and development, South Korea successfully joined the ranks of moderately developed countries from a low-income country, and maintains a 3%-5% rate of sustained growth after almost 30 years of rapid growth. Meanwhile, the economic system has changed along with the economic

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development. In the 1980s-1990s, Korea gradually changed the government-led mode of economic development, maintaining sustainable economic growth by promoting innovation and developing the service economy in the beginning of this century, starting a new round of restructuring and development. South Korea has long been seen as an example of the East Asian model, and a large number of documents and materials have analyzed the reasons leading to the South Korean economic development miracle from the perspective of institutional reform. As such, economics-oriented institutionalist accounts attribute Korea's economic performance to the effectiveness of the state in overcoming market failure. Institutionalists attribute this performance to market-centric reform. American economist Chalmers Johnson defined the South Korea's economic system as a "soft despotism high-growth system" in his book Political System and Economic Operation. Tat Yan Kong (2000) thought that the economic reform in South Korea is a fragile miracle, with "fragility" meaning the economy's vulnerability to externally induced shocks. It is an undeniable fact that economic reform is an important force to promote economic transformation.

China's economic development is in a transition from a period of rapid growth to slow growth, in which the driver of development is changing from increasing investment to innovation. In this context, the reform has been given an important task to promote the transformation and development. This paper analyzes the characteristics of the different stages of economic development in China and Korea, the different tasks and focus in different transformation stages, and finds that China's current economic structure is similar to South Korea during the transition period of 1992-1997, and the purpose of economic transformation of China will complete the task of the three economic transformations of South Korea, including not only changing the pattern of a government-led economic model, but also transforming economic development momentum driven by resource investments to innovation driven. In many aspects, China's comprehensive deepening reform is similar to South Korea's economic reform, such as to establish a fair competitive market environment, to promote the reform of the public sector, and create institutional

mechanisms beneficial to innovative development.

However, there are many differences between China and South Korea. Korea seized the economic crisis as an opportunity to promote economic reform and structural adjustment, which improved the market economic system and provided new impetus for economic growth in the long term, thus transforming a calamity into a blessing. However, there is a long conduction chain of economic transformation and economic reforms in China, due to the big domestic potential market providing enough economic room for maneuver, and the fact that external economic crisis has very little impact on China's economic development. As such, any external economic crisis provides but limited incentive to reform, and as a result China is more likely to miss the opportunity to reform. China needs to be more proactive in promoting reform.

It is the social consensus that China's current necessary and urgent task is to promote economic transformation through implementing economic reforms. However, there is still much controversy over how to promote market-oriented reforms, and some reforms may have deviated from market direction in practice. This paper also analyzes the experience and lessons of reform in state-owned enterprises in South Korea, putting forward these experiences and lessons for reference based on an analysis of the main problems facing China's new round of SOE reform and the current focus of debate.

This paper is organized as follows. Chapter 2 looks at the characteristics of economic restructuring and economic reform during the different periods of China and South Korea. This chapter is a historical review and emphasizes the key transition task in different periods. Chapter 3 analyzes the role of reform in promoting economic transformation and maintaining long-term economic development. This chapter shows the long-term and short-term relationship between reform and economic growth, and also presents the path of reform impacting economic growth in the long term. Chapter 4 is a comparative analysis which presents the similarities and differences between China and South Korea through a comparison of four aspects: economic structural characteristics, tasks and goals in transition, key areas of reform and

problems in economic development. Chapter 5 is a comparison analysis on SOEs reform in China and South Korea. The aim of this chapter is to highlight the importance of market-orient reform. There is room for public enterprise reform under continued state control, and there are prerequisites for the privatization. The conclusion and discussion is provided in Chapter 6.

II. Characteristics of Economic Restructuring and Economic Reform in China and South Korea

2.1. Historical review on the reform and opening up process of China's economic transformation

China's economic transformation can be roughly divided into the following four stages based on the important reforms and different tasks of economic transformation.

2.1.1. The first stage was from 1981-1998, with the establishment of the socialist market economic target model

The main task at this stage was to promote the transition from a planned economy to a market economy and change the primary means of resource allocation from planned instruction to market mechanisms. Shortage is the major challenge at this stage. China had to stir up the enthusiasm of enterprises and employees to liberate and develop productive forces in order to solve the shortage problem. So, the goal of economic development was to increase the total economic output, which relied on the relatively cheap labor force, a large amount of natural resources input, low costs and low level of imitation costs, etc. China embraced a government-led, investment-led and export-led economic model at this stage.

2.1.2. The second stage was from 1998-2008, with an opening policy particularly to join the WTO promoting market-oriented reform

In 2003, "The decision of the Central Committee of the Communist Party of China on improving the socialist market economic system" called for "greater play to the fundamental role of market in the allocation of resources," and market mechanisms played a basic role in further widening of fields. The rules of domestic market competition began to merge with the international competition rules following China's joining the WTO. Although the market played an increasing role in allocating resources, the government still played an important role in promoting economic development, which was most conspicuous in its measures to lead investment and allocate resources, etc.

2.1.3. The third stage was from 2008-2013, with the drawback of the government-led model being increasingly exposed

The world financial crisis in 2008 challenged the traditional export-led economic model and induced more and more enterprises to turn toward the domestic market. The policy also focused on domestic demand and the government issued a series of policies to promote economic growth. The Chinese government implemented a four trillion yuan stimulus package and carried out a positive financial policy and moderate loose monetary policy which stimulated short-term economic growth, further strengthening the government-led economic development model. In subsequent years, with the deterioration of the environment, the efficiency of capital investment decreasing and labor costs increasing, the original model of economic development is no longer sustainable. It has become a more urgent task to promote economic restructuring and economic reform.

2.1.4. The fourth stage is from 2013 up to now, with China's economic development entering a "new normal" and starting comprehensively deepening reforms

In 2013, China had to deal simultaneously with the slowdown in economic growth, making difficult structural adjustments, and absorbing the effects of previous economic stimulus policies. In 2014, China's economic development entered a new normal, which means a transition from a high growth rate to a moderate growth rate, a strategic adjustment of economic structure, and a shift of energetic mechanism of the economic growth. Economic growth will mainly rely on technological and institutional innovation rather than the input of resource elements. This requires the release of new power through reform. China implemented the comprehensively deepening reform and the focus is on economic reform in which the core is to deal with the relationship between the market and government. Since 2015, the Chinese government has proposed the implementation of supply-side structural reforms in order to resolve the major contradictions and problems and improve the quality and efficiency of economic development based on comprehensively deepening reform.

Table 1. Course of China's economic transformation and economic reform

Period	Background	The main emphases	The main economic reform (Four major top-level system design)	
1981-1998	In the early stage of reform and opening up, the market economy status was gradually established.	Establishment of the socialist market economy target model: promote the transition from a planned economy to a market economy and change the primary means of resource allocation from planned instruction to market mechanisms	The Third Plenary Session of the 12th Central Committee of Communist Party of China (CPC) in 1984 adopted the "Decision on Reform of the Economic System," and decided to develop the socialist commodity economy.	1. Reform of the rural economic system and the establishment of the household contract responsibility system. 2. Start of urban reform in 1984, SOEs reform of decentralization, profit sharing, and distribution according to work. 3. Price Marketization. 4. Develop various economic forms, including township enterprises and foreign companies. 5. Develop export-oriented economy, establish the Special Economic Zone.
			The Third Plenary Session of the 14th Central Committee of CPC in 1993 adopted the "Decision on establishing a socialist market economy system," and decided to develop the social market economy.	1. Adhere to the public ownership as the main body, the common development of various economic components, establish a modern enterprise system. 2. Establish a unified and open market system 3. Change the function of the government to manage the economy and setting up the macro control system. 4. Establish an efficiency priority and give consideration to the equitable income distribution system. 5. Establish a multi-level social security system.

Table 1. Continued

Period	Background	The main emphases	The main economic reform (Four major top-level system design)	
1998-2008	Opening policy, especially to join the WTO, promoted market-oriented reform	Market mechanism plays a basic role in more widening fields. Merge with the international competition rules	The Third Plenary Session of the 16th Central Committee of CPC in 2003 adopted "The decision of the Central Committee of the Communist Party of China on improving the socialist market economic system," points out "greater play to the basic role of market in allocating resources"	1. Improve the basic economic system with public ownership as the main body, and common development of a variety of ownership. 2. Establish the system conducive to the gradual change in the economic structure of urban and rural areas. 3. Promote regional coordinated development. 4. Construct a unified and open market system with orderly competition. 5. Perfect the system of macroeconomic regulation and management, administrative system and economic law system. 6. Perfect employment, income distribution and social security system.
2008-2013	The world financial crisis in 2008	Four billion yuan stimulus package, positive financial policy, moderate monetary policy which stimulated short-term economic growth. With the deterioration of the environment, the efficiency of capital investment decreasing and labor costs increasing, the original model of economic development cannot be sustained.	Further strengthen the government-led economic development model. Market oriented reform lagging behind in this period.	1. Strategic layout adjustment of state-owned enterprises. 2. Financial regulation: "one bank and three commissions". 3. Government's super ministry system.

Table 1. Continued

Period	Background	The main emphases	The main economic reform (Four major top-level system design)	
2013 to date	China's economic development entering a new normal and implementing supply-side reform.	Transition from a high growth rate to a moderate growth rate, a strategic adjustment of economic structure, and a shift of energetic mechanism of the economic growth. Improvements in the quality and efficiency of economic development based on comprehensive deepen reform.	The Third Plenary Session of the 18th Central Committee of CPC in 2013 adopts the "Decision on major issues concerning comprehensively deepening reforms"	1. Improve the basic economic system 2. Perfect modern market system 3. Deepen the reform of fiscal and taxation system 4. Speeds up the transformation government function 5. Integrate urban and rural development system 6. Constructing the new system of open economy

2.2. Historical review of the reform and economic transformation in South Korea

2.2.1. Establishing a government-led economic development model

During the 1960s and 1970s, the main goal was to develop the economy. The government played a leading role to formulate a government-led economic development model which is characterized by a fixed asset investment-led and export-oriented model. The model promoted rapid economic growth and created the "miracle of the Han River." The government played the role of an enterpriser and supported large enterprises, implemented large-scale investment to construct infrastructure and developed light and heavy industries, also promoting the "New Community Movement" to increase farmers' income and providing a basis for smoothly crossing the Lewis turning point.

South Korea's GDP average annual growth rate was 9.5% from 1961-1979, during which the nation rapidly grew from a low-income country to a high-income country. Economic growth in this period was mainly driven by investment and exports, and the problem of overcapacity gradually appeared, especially during the oil crisis of the 1970s. The government took the initiative to promote enterprises to outward investment and to develop new markets in the Middle East in order to solve this excessive production capacity. However, the long-term overcapacity was still severe, and the government-to-business credit guarantee also created a moral hazard resulting in excessive bank lending and excessive corporate debt which obscured the hidden dangers of a future financial crisis.

2.2.2. The first transformation stage was from the 1980s to 1997, with a focus on changing the government-led model of economic development and promoting economic liberalization

The Korean economy entered into a stage of "stagflation" affected by unfavorable domestic and international economic factors in the early 1980s. The growth rate

slowed down abruptly, in particular falling to -1.9% in 1980, while on the contrary prices soared (the average annual inflation rate was 22.8% during 1979-1981). In order to solve these problems, the Korean government implemented a restructuring strategy.

Firstly, the Korean government implemented comprehensive economic stabilization measures in 1979, including the reduction of investment in the heavy chemical industry, improvement in its monetary policy, implementation of a tight fiscal policy, inhibition of real estate speculation, supplying of more necessities and price stabilizing measures, etc. However, these measures were discontinued due to the "high growth and low inflation" economic development situation after 1983, when the world economy started a sustained recovery, and was affected by favorable factors such as the low oil prices—lower US currency—low interest rates in the 1980s, and the 1986 Seoul Asian Games, the 1988 Seoul Olympics, etc. The good situation of economic development reduced the need for transformation. South Korea's main sectors—such as the heavy chemical industry, including petrochemicals, steel, oil refining, automobiles, tires and semiconductors—launched 28 major equipment investment plans from 1988. These devices were put into use successively in the early 1990s, resulting in a surplus.

Secondly, the Korean economy exposed signs of slowdown since 1991, with its GDP average annual growth rate slowing down from 9% to 7%. The government implemented financial, monetary and administrative system reform by improving fair competition, increasing autonomic safeguards of enterprise and improving economic justice, in order to strengthen its economic growth potential, expand the international market and improve people's living standard.

Thirdly, the Korean government promoted economic liberalization and opened up its domestic market to join the OECD in 1996. However, the outbreak of the financial crisis in 1997-1998, and especially the weakness in the global high-tech market, depreciation of the yen and turbulence in other Asia-Pacific markets dragged down the Korean economy and destroyed the financial situation of Korean enterprises and banks.

To be sure, Korea made certain achievements in this period, such as its canceling price controls and differentiation of policies between foreign trade and domestic trade, and its privatization of state-owned banks, interest rate liberalization, etc.

2.2.3. The second transformation stage was from 1997-2008, with a focus on continuing to change the government-led model of economic development and privatizing SOEs and increasing domestic consumption

The financial crisis led to a forced market clearing, and many companies fell into debt crisis. The Korean government accepted the IMF's reform measures in order to obtain its loan assistance. In 1998, Korea implemented the "4+1" economic reforms which included enterprise reform, financial reform, public sector reform and labor reform, and a commitment to reduce government intervention to speed up market opening.

1. Financial reform

The establishment of professional regulatory bodies (Financial Supervisory Commission, Korea Deposit Insurance Corporation, the Korea Asset Management Corporation) and restructuring of financial institutions took place. The government set up public funds to promote financial restructuring, in which the number of banks (including commercial banks and specialized banks) was reduced from 33 to 19, integrated financial companies reduced from 30 to 3 and non-banking financial institutions reduced from 2009 to 1462. Meanwhile, stronger financial regulation gradually opened up the bond market, money market, stock market, and encouraged foreign direct investment to promote the deepening marketization. The financial situation of these institutions has improved significantly through restructuring reform.

2. Enterprise reform

Starting from the second half of 1998, the South Korean government promoted enterprise reform with the IMF and formulated five basic principles of enterprise reform, which included: prohibit corporate cross-shareholdings and mutual loan guarantee systems; require large enterprise groups to adopt international accounting

systems to increase business transparency; reduce the corporate debt ratio and improve self-owned capital; require large companies to focus on their core business, reduce diversification and cooperate with SMEs; strengthen the oversight responsibilities of major shareholders and operators. The main enterprise reform initiatives were to sail and clear unvalued enterprises, introduce foreign capital to merge with Korean enterprise, develop leading enterprises, and combine or exchange company's assets or conduct business swaps led by the Federation of Korean Industries. These reforms gradually improved the financial structure of Korean companies and stimulated the power of companies. A total of 16 large Korean enterprise groups declared bankruptcy during 1997-2002. The number of companies affiliated to four consortia (Hyundai, Samsung, LG, SK) were reduced by half through sailing, emerging or business swap by the end of 2002, and their debt ratios were reduced from 463% in 1997 to 200% in 1999.

3. Labor market reform

The Labor Standards Law was amended to abolish lifetime employment, while the Trilateral Commission was founded by the employees, employers and government representatives to deal with employment issues and maintain stable development in the labor market, strengthen employment training and refine the unemployment social security.

4. Public sector reform

Reform measures in the public sector included the streamlining of government organizations, reduction in the number of government officers, promotion of tax reform to cut tax and implement a simple taxation system, decentralize the central government authority to local government, simplify administrative procedures, as well as to promote the privatization of state-owned enterprises. The number of South Korean central government employees fell to 136 thousand by the end of 2002, from 162 thousand by the end of 1997, a decrease of 16%, and local governments also cut staff by 16%.

The structure of the Korean economy improved significantly after these four reforms, and market mechanisms came to play an increasingly stronger role, while

administrative efficiency improved. South Korea's economy achieved a "V" shaped recovery since 2000, and re-entered the ranks of high-income countries in 2001. In 2003, the South Korean film, music, mobile phones and electronic games exports exceeded steel exports for the first time, and Samsung, LG became world-renowned brands in the electronics industry. Driven by knowledge-intensive industries, South Korea continues to maintain a higher pace of economic growth.

2.2.4. The third transformation stage was from 2008 to date, with a focus on further relaxing market access, developing an innovative economy and strengthening livelihood investment

South Korea's economic growth was weakly affected by the financial crisis, and economic and social development were under pressures from slowly growing consumption, an aging population, low birth rate and higher unemployment rate. In 2013, South Korean President Park Geun-hye proposed the "Trinity" statecraft that included economic revitalization, cultural prosperity and national happiness. South Korea issued a "three-year plan of economic reform" in 2014 and emphasized three core strategies to promote solid economic fundamentals, create a dynamic and innovative economy and balance domestic demand and exports in the economy. The goal is to upgrade the Korean economy's potential growth rate to 4%, the employment rate to 70%, increase national income to $40,000, and constantly promote the optimization of the economic structure, thus opening up a "national happiness economic times." In 2015, South Korea proposed to promote the "four reforms" including public sector reform, labor reform, education reform and financial reform to create employment, reduce public sector spending, cultivate high-quality talent to meet social needs, and promote integrated development of science and finance.

Table 2. Course of South Korea's economic transformation and economic reform

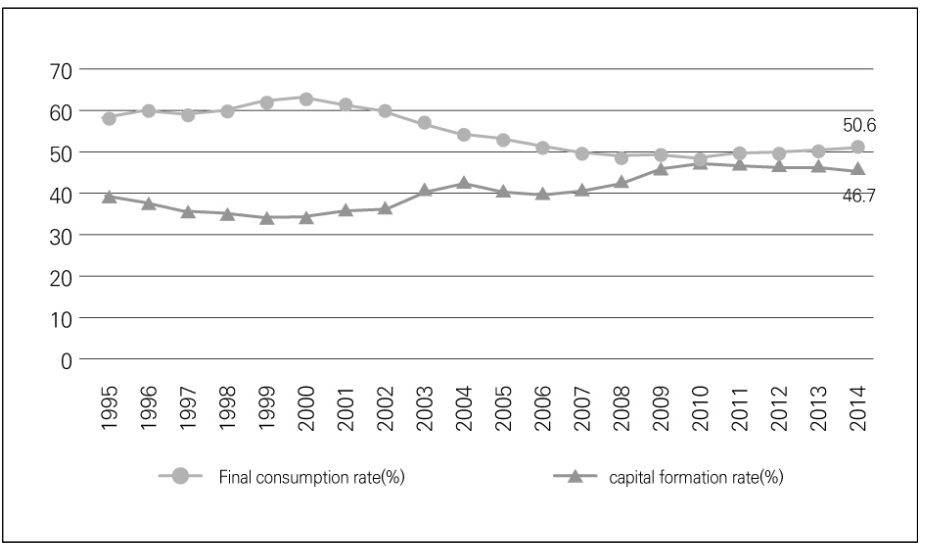
Period	Background	The main emphases	The main economic reform
1960-1980	revive economy	Formulate a government-led economic development model characterized by fixed asset investment-led and export-oriented model which promoted rapid economic growth	-
1980-1997	"stagflation" in the early 1980s; "High growth and low inflation" economic development situation after 1983.	Changing government-led model of economic development and promoting economic liberalization	1979: comprehensive economic stabilization measures Early 1990s: financial, monetary and administrative system reform through improving fair competition, increasing autonomic safeguard of enterprise and improving economic justice 1996: join OECD
1997-2008	financial crisis of 1997-1998	Continuing to change government-led model of economic development and privatizing SOEs and increasing domestic consumption	"4+1" economic reforms: Enterprise reform, financial reform, public sector reform and labor reform, and a commitment to reduce government intervention to speed up market opening.
2008 to date	economic growth was weak affected by financial crisis 2013: "Trinity" statecraft 2014: "three-year plan of economic reform" 2015: "four reforms"	Further relaxing market access, developing innovative economy and strengthening livelihood investments	2013: "Trinity" statecraft 2014: "three-year plan of economic reform 2015: "four reforms" including public sector reform, labor reform, education reform and financial reform

III. Comparison between China and South Korea in Economic Transformation and Economic Reform

3.1. China's current economic structure is similar to South Korea during the transition period of 1992-1997

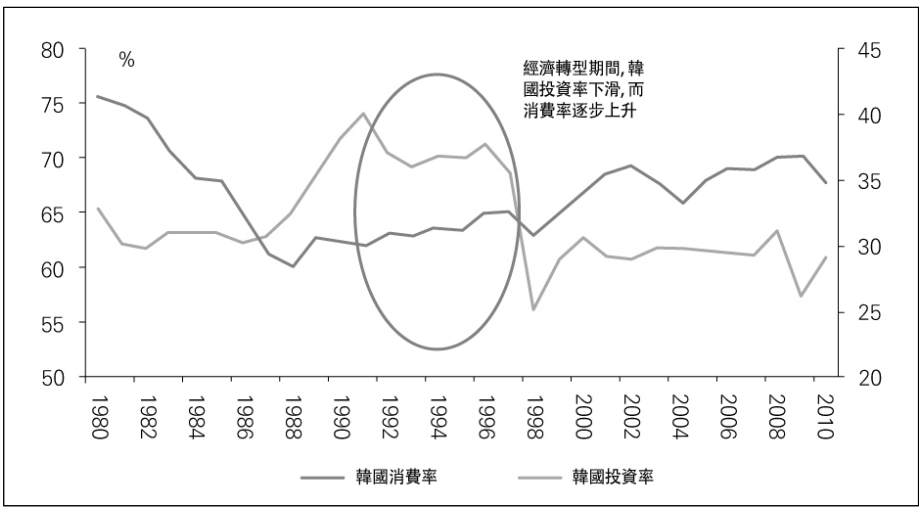
From the perspective of GDP by expenditure composition, China's investment rate grew from 34% in 2000 to 48% in 2011, then declined to 46.7% in 2015. Korea's investment rate is also high, almost reaching 40% during 1992-1997, and then declining since the government-led model changed. China's consumption rate is increasing, and its consumption on economic growth rate also increasing after 2010. Consumption to GDP growth rate was 66.4% in 2015, and this increased to 73.4% in the first half of 2016.

Figure 1. Consumption rate and investment rate during 1995-2014 in China



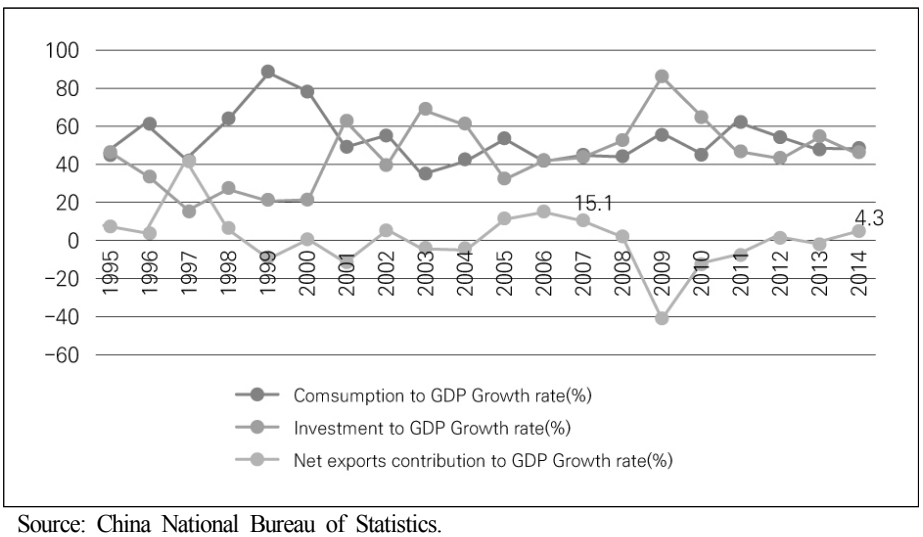
Source: China National Bureau of Statistics.

Figure 2. Consumption rate and investment rate during 1980-2010 in South Korea



Source: China Economic Database.

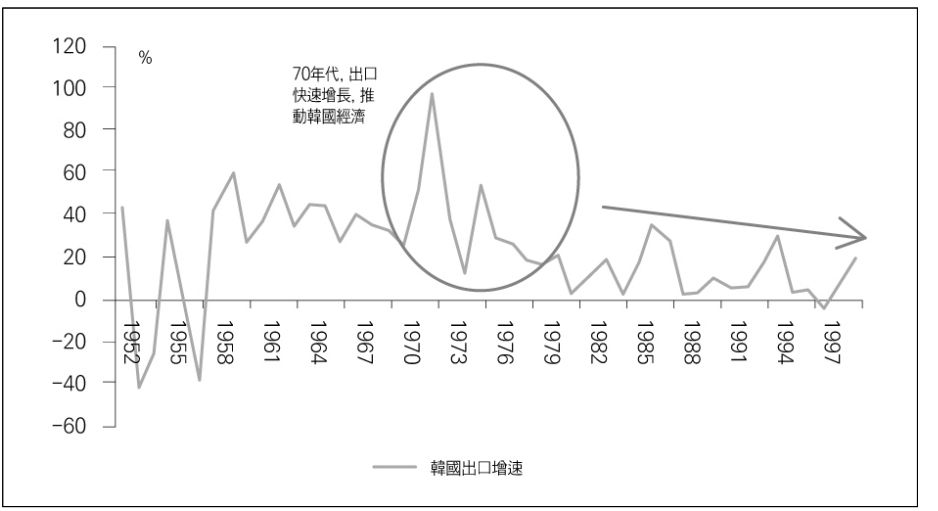
Figure 3. GDP by expenditure composition of China



Source: China National Bureau of Statistics.

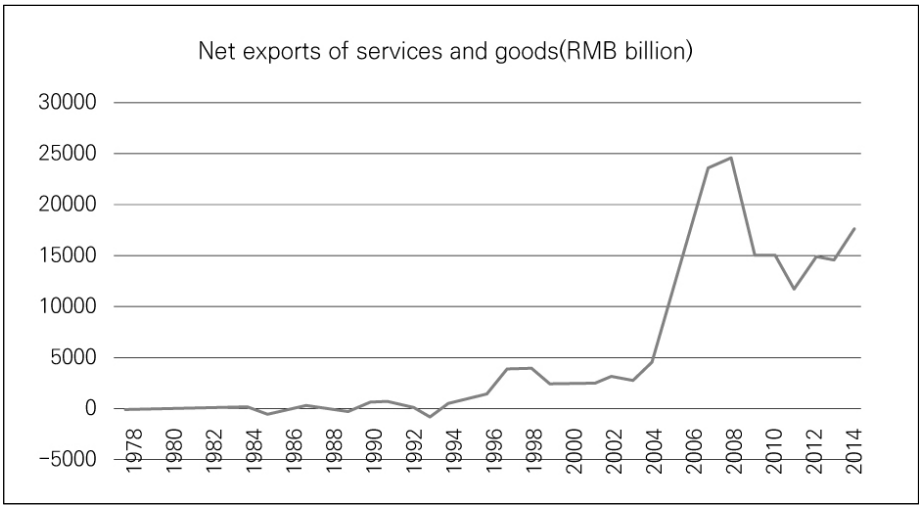
Exports also experienced a turning point in this period. The net exports contribution to GDP declined from 15.1% in 2006 to 4.3% in 2014. Studies have shown that when a country's exports accounted for 10% of the world's total exports, such a turning point will appear, and the growth rate will begin to decline. The US' export share peaked at 12.8% when this happened in 1999, Germany's at 11.8% in 1990, and Japan's at 9.8% in 1993. China's export share increased from 1% to 12.13% in 2014, so, it is almost impossible to maintain such high growth in exports.

Figure 4. Export growth rate in 1952-1997 of South Korea.



Source: China Economic Database.

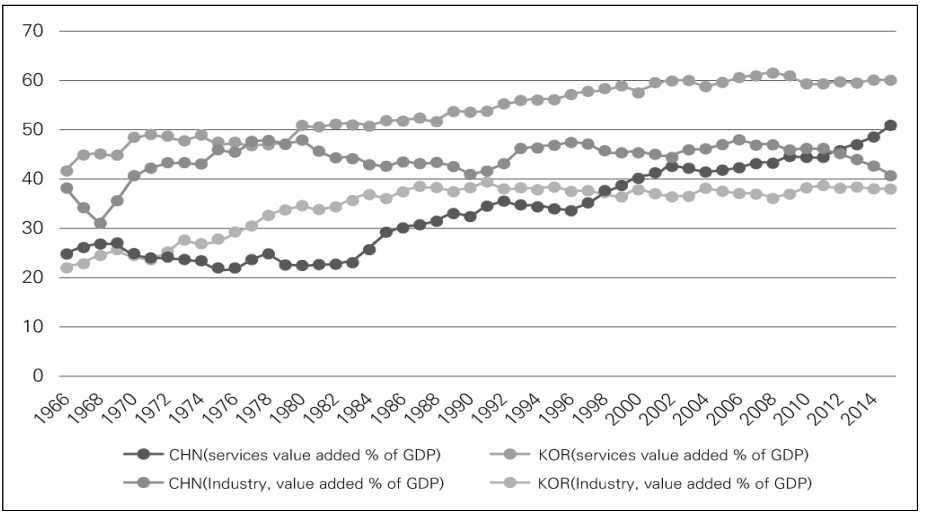
Figure 5. Net export of services and goods of China



Source: China National Bureau of Statistics.

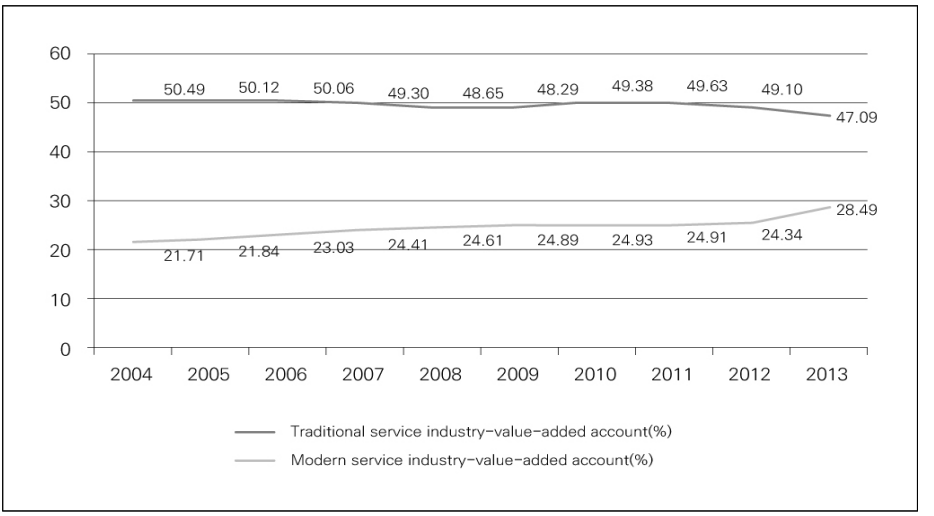
From the perspective of industrial structure, the tertiary industry accounted for more than 50% in the late 1980s in South Korea. The proportion of the tertiary industry in China has increased continuously, first exceeding the secondary industry in 2013, when it reached 46.2%. The proportion of the tertiary industry increased to 54.1% in the first half of 2016. From the view of the inner tertiary industry, the proportion of modern service industries such as information transmission, computer services and the software industry, financial services, leasing and business services, scientific and technological research services, etc. is increasing. The proportion of traditional service industries, such as transport, storage and the postal industry, wholesale and retail trade, accommodation and catering industry, etc. is decreasing correspondingly. Because the TFP rate of the service sector often reacts slower than in the industrial sector, and prices in the service sector increase quicker than those of industrial sectors which induce more labor to the service sector, this means the economic growth rate of China is decreasing.

Figure 6. Industrial structure of GDP in China and South Korea



Source: China National Bureau of Statistics.

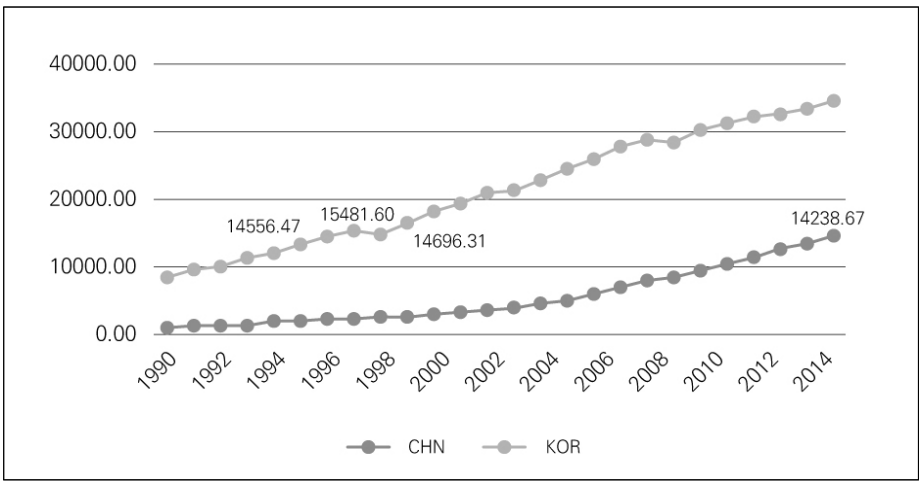
Figure 7. Traditional and modern service industry value added account in China



Source: China National Bureau of Statistics.

China has lagged behind South Korea for about 20 years in terms of per capita GDP. South Korea's rapid growth period lasted about three decades, from the early 1960s to the early 1990s. Simply comparing that to China's high-speed growth period, which has lasted almost 3 decades from the beginning of the early 1990s, this may indicate that the comparable period of rapid catch-up for both China and South Korea has been completed.

Figure 8. Changes in China and South Korea's per capita GDP (PPP, current international $)



Source: The World Bank database.

3.2. China will complete the tasks of three economic transformations as with South Korea

At present, the purpose of economic transformation in China is not only to change the pattern of a government-led economic model, but also to transform economic development power driven by resource investment to an innovation-driven model. The previous two economic transformations in South Korea established

a decisive role for market mechanisms in the allocation of resources. China is reducing the government's direct configuration of resources significantly, and promoting the allocation of resources according to market rules, market prices, market competition, to achieve maximum efficiency and efficiency optimization, further promoting the breadth and depth of the market.

At present, the main focus of economic transformation in South Korea is relaxing market access, strengthening economic democracy and developing an innovative economy, which are also the tasks of economic transformation in China. As such, China implemented the future of manufacturing "Made in China 2025" plan in order to promote its innovative economy, which holds many similarities with "South Korean manufacturing innovation 3.0 strategy." The strategic objectives all reflect a deep integration of information technology and manufacturing technology of digital, networked, intelligent manufacturing. They all stress out transformation and upgrading of enterprises as the backbone of the manufacturing sector, and highlight long-term investment in R&D to improve quality, design, brand and other non-price competitiveness. Compared with the South Korean "manufacturing innovation 3.0 strategy," "Made in China 2025" plan should pay more attention to the leading role of large enterprises, the soft power of accumulation of human resources and innovations to serve the people's livelihood.

3.3. The economic reform of China and South Korea focus on the similar areas

The twice "four reforms" in South Korea are all reflected in China's comprehensive deepening reform, with public service reform, labor market reform, financial reform, promote solid economic foundation reform all being the focus in China. As such, the current government is implementing a "decentralization, regulation, service" reform, that is streamlining government processes and delegating authorities, strengthening supervision, and optimizing service, which is similar to the public

service reform in South Korea. From now on, the central government will cancel or delegate over a third of the items requiring administrative review and approval, combined with some administrative examination and approval authorities to provide a "one stop" approval service, thus reducing institutional transaction costs.

Another similar example is the promotion of solid economic foundation reform in South Korea, which corresponds to the "perfect modern market system" of "Decision on major issues is concerning comprehensively deepening reforms" in China. One of the important tasks is to establish fair, open, transparent market rules. In 2014, China's State Council issued "Opinions on Promoting Fair Competition in the Market and Maintaining the Normal Order of the Market" to implement the task. The Chinese government has begun to relax market access, strong market regulation, solid regulatory credit basis, and improve credit supervision and law enforcement. In July 2016, China's State Council issued its "Opinions on Establishing Fair Competition Censorship System in the Market System Construction," which requires the cleanup and abolishment of various provisions and practices which have hindered fair competition, and requires the policymaking authorities to censor policy according to standards before introduction. These standards include 18 behaviors that hinder market access and exit, free flow of goods and factors, and fair production and operation.

3.4. China and South Korea's economic development face many similar issues

The main risks facing the economic development of South Korea currently are the decline of potential growth rate, reducing of working-age population, weakness of entrepreneurship, unbalanced development of big businesses and SMEs and a bottleneck in the service industry. These problems have also been raised in China.

Firstly, China and South Korea are facing the same problem of a declining potential economic growth rate, with TFP decreasing stage by stage. Korea's potential economic growth rate was 3.2% during 2011-2015, according to the South Korean

bank statistics, and will decline from 2.7% to 2% during 2016-2020, based on forecasted data. Now, it is an urgent task for South Korea to promote its potential economic growth rate through increasing the economic activity participation rate, capital investment, and productive innovation, etc. It will need to take measures to increase the birth rate, promote women's participation in economic activities, delay retirement, and implement a positive immigration policy. Secondly, the investment environment must be improved to attract FDI. Thirdly, investment in human resources must increase, together with efforts to to enhance the standard of health care. Fourthly, intensive growth must be achieved by increasing R&D investment and improving the efficiency of R&D. The same goes for China as well. A study by the AMR (Academy of Macroeconomic Research, NDRC) in 2013 forecasted that the potential economic growth rate would decline to 6.7% in 2016, 5.8% in 2018, and 5.3% in 2020. The increase of the volume factors of production is limited and the productivity is declining. In this situation, it will be necessary to rely on technical innovation, industrial innovation, and institutional innovation to increase the TFP.

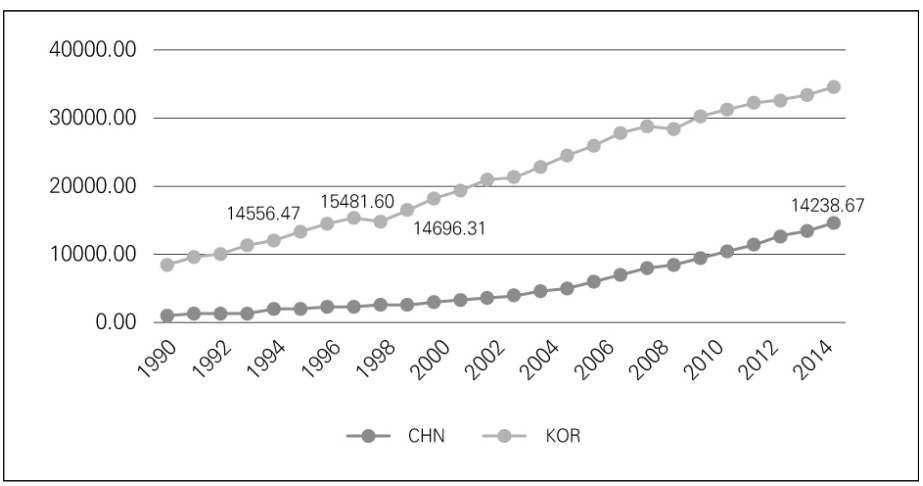
Secondly, the proportion of China's service industry accounts for GDP is increasing, but the quality of service and the degree of diversification cannot meet the domestic market demand, which leads to an outflow of consumption. Amazon's shopping amount from Chinese people in 2015 exceeded the total amount of the previous 20 years. The number of outbound tourists reached 120 million in 2015, who expensed 1 trillion and 500 billion RMB, of which shopping consumption accounted for 50%. The development of education, health care and other living services are also subject to the access restrictions and regulatory restrictions, and there is an urgent need to promote the quality of the service industry and carry out institutional reform.

Thirdly, China is experiencing a squeeze in its working-age population. China's working age population has shown a declining trend from the beginning of 2012. The working-age population was reduced by 3 million 450 thousand in 2012, 2 million 440 thousand in 2013, 3 million 710 thousand in 2014, and 4 million 870 thousand

in 2015. The working-age population (16 years of age to 60 years of age, excluding 60 years of age) was 911 million in China at the end of 2015, accounting for 66.3% of the total population, which declined by 0.7 percentage points over the previous year. It is a curse of aging that leads to negative economic growth, and many developed countries, such as Japan, Germany, etc., have not been able to avoid this curse.

Fourthly, the spirit of entrepreneurship has weakened. This phenomena is reflected in the decline in private capital investment growth rate, which was 10% in 2015, but declined to 3.9% in January to May 2016. Meanwhile, the national fixed asset investment growth rate was 10.1% in 2015, and 9.6% in January to May 2016. The weakness of entrepreneurship manifested mainly as follows: some entrepreneurs face the transition pressure of traditional industries, due to lack of ability, confidence, upgrading direction, they feel helpless and depressed. Some entrepreneurs do not want their children to adventure and bear hardships with their increasing wealth accumulation. Some entrepreneurs feel very embarrassed and disrespected because their work or value is not respected by the society, especially when they experience operating difficulties.

Figure 9. Private fixed asset investment growth rate in China



Source: China National Bureau of Statistics.

3.5. What is the difference between China and South Korea? What is the significance of comparative analysis?

There are many differences between China and South Korea. Korea seized the economic crisis as an opportunity to promote economic reform and structural adjustment which improved the market economic system and provided new impetus for economic growth in the long term, thus transferring the calamity into a blessing. However, there is a long conduction chain of economic transformation and economic reforms in China due to a big domestic potential market providing enough economic room for maneuver, and the fact that external economic crisis has very limited impact on China's economic development. As such any external economic crisis provides but limited incentive to reform. Resistance to reform, including a dependence on existing development paths, vested interests, etc. has continued in the face of crisis. As a result, China is more likely to miss the opportunity to reform and will need to be more proactive in promoting reform.

South Korea's experiences and lessons are worth studying and learning for China in its period of transformation and changing of the government-led model to a market-oriented system. China and South Korea should strengthen cooperation and communication in terms of development of the innovative economy and service economy, while promoting entrepreneurship and other issues. The significance of comparative analysis for China may include the following aspects.

Firstly, China must be more conscious about the importance of economic restructuring and development. While China has no need to pursue economic growth to an overly extent, and does not verbally say farewell to such high growth, it actually feels great apprehension over a decline in economic growth. China should adhere to implementing the comprehensive deepen reform, especially the supply-side reform to establish the foundation for fair competition, improve its investment environment, cultivate qualified market players, etc., be more careful to use incentives to promote economic growth, and cannot continue to allow the state sector to remain in a state of inefficient and excessive growth of investment. According to data

by the Bank for International Settlements, the debt of Chinese companies is rapidly expanding in recent years, with the ratio of corporate debt to GDP increasing from 99% in 2008 to 166% in 2015, with half of this owned by SOEs. So, it is very important to reform SOEs by cutting excessive industrial capacity and deleveraging.

Secondly, China must be clearer about its advantages as the global economy suffers from the challenge of insufficient demand. China's huge potential consumer market and the increasing trend of consumption makes the supply and demand mismatch problem prominent, which is the exact bonding point of challenges and opportunities. China needs to take the initiative to promote economic restructuring, and promote technological innovation to industrial innovation, open up channels from the laboratory to the market through combining R (Research, rely on scientists) & D (development, rely on entrepreneurs). At the same time, it must make cuts to give "blood and milk" to excess backward production capacity, let the market mechanism fully play a role in the survival of the fittest, meanwhile strengthening the protection of property rights and intellectual property, so that the quality of products and enterprises can stand out.

Thirdly, China should pay attention to increasing element supply including increasing labor force, the flexibility of labor market and the accumulation of human capital, increasing the enthusiasm of private capital investment by establishing a fair and transparent market, inspiring entrepreneurs and scientific and technological personnel to innovate. All of these rely on reform to promote institutional innovation.

IV. What is the Role of Reform in Promoting Economic Transformation and Maintaining Long-term Economic Development?

There are many reasons to explain the "Korea miracle," and a large number

of studies have tried to answer the question of "why some Latin American countries, also accepting IMF aid, fell into the middle-income trap, while South Korea did not." The main reasons can be grouped into several categories. Firstly, Korea timely adjusted its industrial structure from labor-intensive light industry to capital-intensive heavy industry, and the government supported large enterprises in steel, shipbuilding, automobiles, heavy machinery industry. Secondly, Korea promoted the "New Community Movement" and urbanization to increase household income, which supports an increasing consumption rate in Korea. Thirdly, Korea promoted the democratization of its government and economy, and in this process, the role of reform cannot be ignored.

Similarly, there are many researchers who have studied the relationship between China's economic transformation and reform, such as Cai Fang and Liu Shijin (2012) who analyzed economic reform and economic growth. The results show that reforms can increase China's potential growth rate by about 2 percentage points. Some researchers think that the Chinese government's active role and competition between local governments are the main cause of economy development, and they call these characteristics the "China model."

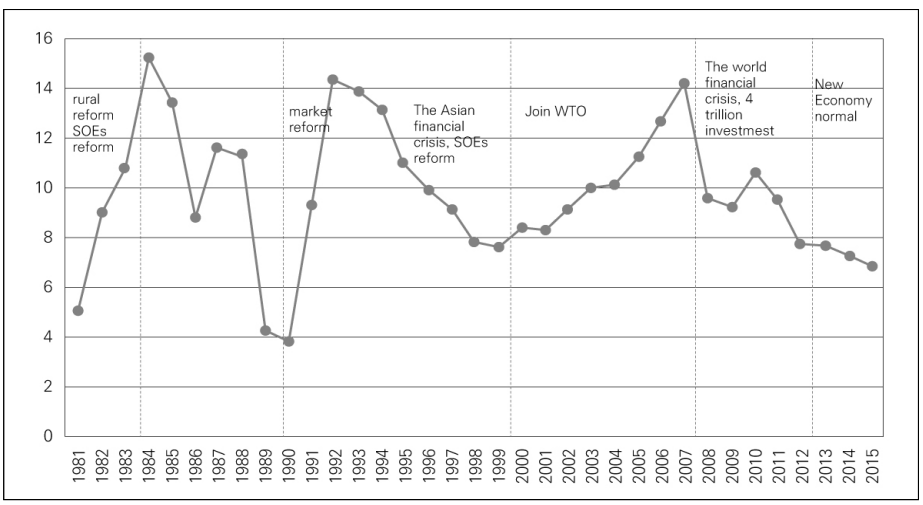
It is undeniable that reform is an important factor in promoting economic restructuring. However, it is not easy to measure the role of reform, even if it can be simplified to measure the relationship between reform and GDP growth rate. Reform is an important but unstable factor on economic growth—there are certainties and uncertainties, continuities and discontinuities, quantifiable and non-quantifiable parts of the reform—and its impact on economic growth is difficult to obtain from the historical trend. This chapter attempts to analyze the impact path of reform on economic growth in China, which also can be used in the analysis of South Korea.

4.1. China's economic reform and economic growth

In the early period of reform and opening, China implemented the rural household

contract responsibility system, which fully stimulated farmers' enthusiasm and initiative to produce. As a result, agricultural productivity and efficiency were rapid promoted in a relatively short period. With the continuous improvement of the market economic system, China opened market access in communication, electric power electron, and energy resource and traffic industries step by step. The current government vigorously promoted the reform and decentralization boosted efforts to streamline administration and delegate more power to lower-level governments, which invigorated the market and stimulated development and social creativity. The number of new companies registered is rising rapidly, about 13,000 per day since 2015. China's economic growth has experienced three big rises, and all are related to reform.

Figure 10. Changes in real GDP growth in China



Source: China National Bureau of Statistics.

This figure presents the relationship between potential economic growth and economic reform in China. The economic reform can impact the K (capital), L (Labor) and TFP.

4.1.1. Increase labor supply reforms

The number of labor resources decreasing in China from 2010, and the labor force participation rate will definitely reduce the post-2017 peak. Reforms that China have implemented, to increase labor supply in the short term and increase the labor force participation rate, include the household registration system reform, delay retirement reform, administrative examination and approval reform and commercial registration reform. The household registration system reform can increase the stability of labor supply. Delay retirement policy will increase the labor supply in the short term, while the beginning of a two-child policy can only improve the long-term supply of labor. Administrative examination and approval reform and commercial registration reform can improve the business environment and increase the number of new enterprises, which will lead to an increase in labor supply.

4.1.2. Increase capital formation reforms

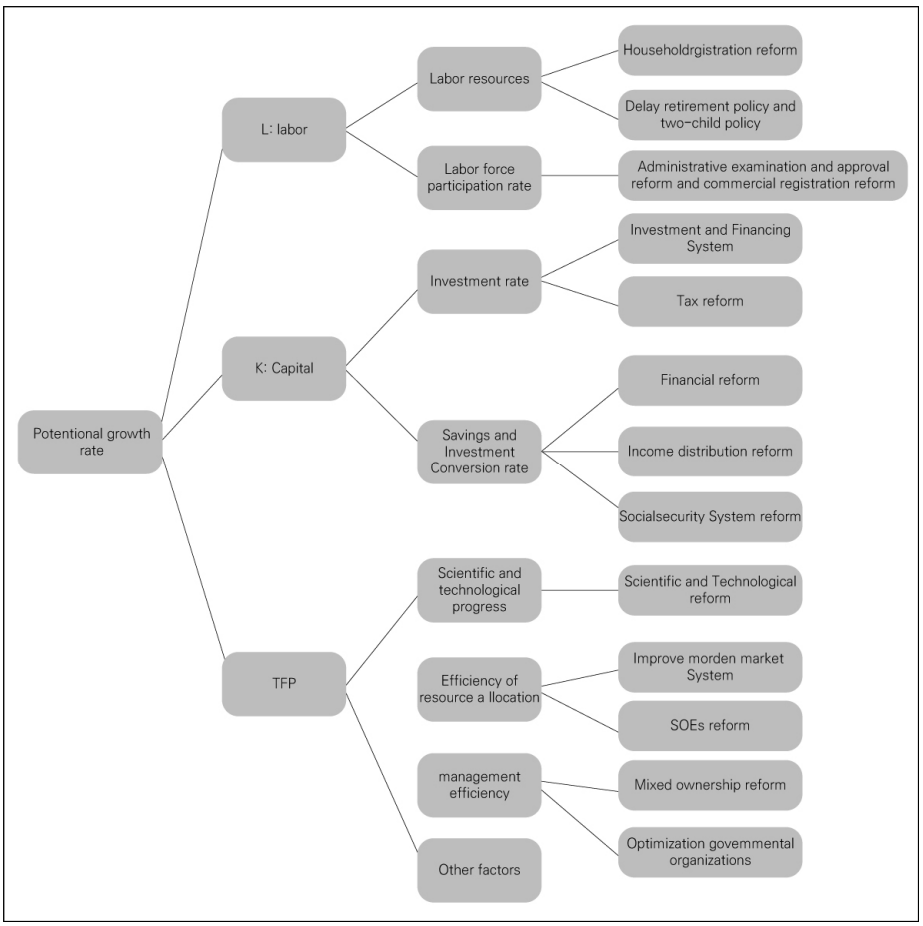
The capital stock in China, per capita or labor, is far less than that of major developed economies. There is still great space to increase capital formation and investment to increase potential growth considering its savings rate remains higher. However, the main problem faced by the increase in investment is the coexistence of capital adequacy and the high cost of financing, so it should increase its efficiency of investment and promote financial reform.

4.1.3. Increase TFP reforms

At present, the challenges facing China increasing its TFP lies in how the efficiency of labor reallocation is disappearing gradually, but innovation cannot form an effective capacity. It is the focus that the reform impact potential growth. Firstly, science and technology reform will promote technological innovation. Secondly, improvement of the modern market system, establishment of a unified national market and fair competition environment, unified market access and market supervision, will promote

corporate survival of the fittest and optimize the use of factors of production. Thirdly, SOEs reform and mixed ownership reform will eliminate administrative barriers, redistribute interests and restructure the business model.

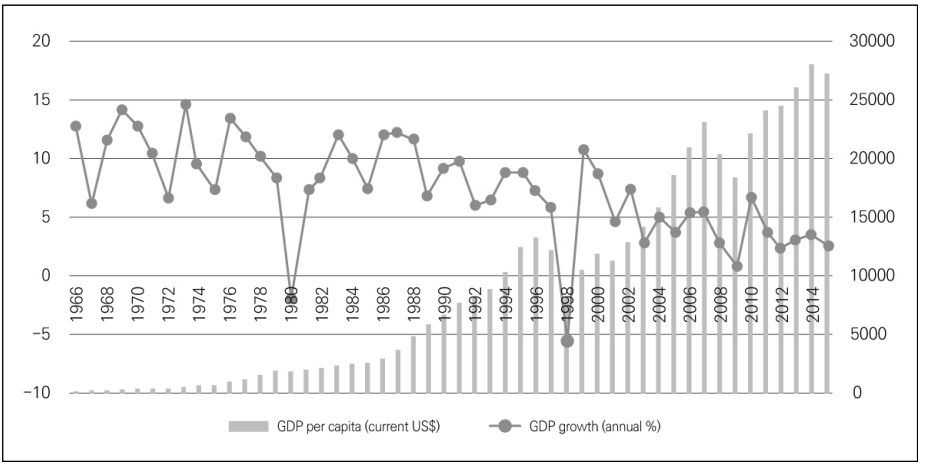
Figure 11. The relationship between potential economic growth and reform in China.



4.2. South Korea's economic reform and economic growth

The Asian financial crisis in 1997 was the cutoff point of South Korea's economy. Its GDP average annual growth rate fell from 7.9% during the 37 years of 1961-1997, to 3.9% during the 15 years of 1998-2012. While the GDP growth rate declined 51% after Asian financial crisis, the per capita GDP grew even faster. This was the result of economic transformation.

Figure 12. Changes in real GDP growth in South Korea



Source: The World Bank database.

When further investigating the decline in economic growth in Korea from the perspective of Factor Contribution decomposition, it is found that the GDP annual growth rate declined 3.3 percentage point compared with 1971-1995. Among them, the contribution rates of capital and labor all declined, and the contribution rate of TFP reached to 34.6%. This shows economic reform measures did improve economic efficiency, and improved the efficiency of the institutional system and the quality of development.

Table 3. Course of South Korea's economic transformation and economic reform

	1971-2008	1971-1995	1996-2008
Growth rate (%)			
GDP	6.5	7.6	4.3
K	10.0	12.4	6.2
L	1.0	2.8	0.1
TFP	1.8	1.6	2.2
Contribution rate (%)			
K	52.5	66.0	43.9
L	19.3	32.3	21.5
TFP	28.1	1.7	34.6

Source: KIET (2009).

4.3. The relationship between reform and economic growth in China: short term and long term effects

The goal of economic restructuring or economic reform is to promote long-term sustainable economic growth. Many studies believe that the reform is only to promote long-term economic growth, and the short-term effect is not clear yet. Indeed, the effect of reform on economic growth is a "double-edged sword" in the short term. For example, the negative impact of strengthening the control of local finance and investment on economic growth may soon become evident. However, some reforms can promote short-term economic growth. For example, administrative examination and approval reform and commercial registration reform can improve business environments and increase the efficiency of the economy. Reform is usually a slow factor to influence economy growth when compared with stimulus policy.

From the view of policy implementation, it is necessary to classify and distinguish different reform measures to balance reform and economic growth, and accelerate those reforms in favor of economic growth. Reforms favorable to long-term economic

development should identify opportunities to firmly promote the reform, even if it will have a negative impact on economic growth.

When it comes to better promoting these market-oriented reforms, are there any experiences and lessons we can learn from Korea? The next chapter takes the SOEs for example, to explore the specific path of market-oriented reform.

V. Comparative analysis on SOEs between China and South Korea

Korea's SOEs reform has progressed from the government directly exercising control to improve the internal governance structure and external supervision system, to a course of privatization reform. Its experiences and lessons not only suggest that there is room for public enterprise reform under continued state control, but also indicate what the prerequisites for privatization reforms are. With China carrying out a new round of SOE reform, the comparative analysis has important implications for further promoting the reform of state-owned enterprises.

5.1. Historical review on state-owned enterprise reform in South Korea

5.1.1. Types of state-owned enterprises

There are mainly three types of SOEs in South Korean:

1. Government Invested Enterprise (GIE). GIE are public corporations or joint-stock companies in which the government has a direct majority ownership stake. The GIE Budget and Accounting Act of 1962 first established their legal basis. They are now governed by the GIE Administration Basic Act of 1983, a comprehensive law that defines the corporate governance structure of GIEs and imposes a rigorous system of performance evaluation. There

had been as many as 26 GIEs in the late 1980s, which then declined to 13 GIEs with the privatization of SOEs. The government is responsible for the appointment of the chairman of the company, and management of the company was awarded a relatively large operational autonomy.

2. Government Backed Enterprise (GBE). GBEs were originally defined as public corporations or joint-stock companies in which the government directly had less than a majority stake. With the change in the definition of GIEs, however, GBEs have in effect become public enterprises with a direct government ownership stake exempted from the GIE Administration Basic Act. In other words, rather than the extent of government ownership it is the applicability of the GIE Administration Basic Act that is the decisive criterion that distinguishes GBEs from GIEs. There are now about 17 GBEs in Korea.
3. Indirectly Invested Enterprise (IIE). IIEs have no direct government ownership stake. They are also exempted from the GIE Administration Basic Act. Most of them are small companies carrying out specialized functions for their parents. IIEs are controlled by the parent company, and the parent administrates its performance evaluation.

According to one estimate, the value-added contributed by Korea's public enterprises, including financial institutions, accounted for 8.3 percent of its GDP in 1975 and 9.4 percent in 1990. Meanwhile, the share of public enterprises in fixed capital formation declined from 27.6 percent in 1980 to 8.9 percent in 1990.

5.1.2. The Evolution of Korea's public enterprise policy

The evolution of public enterprise policy in Korea has closely paralleled the evolution of general economic policy. This may be divided into four periods as follows:

1. **The first period (1960~1979): Public enterprises played an important role in the Korean economy and SOE policy was marked by strong government intervention**

The Korean government established a number of new SOEs in this period, especially

in heavy and chemical industries as well as the banking and infrastructure-related sectors. A majority of them were products of Korea's state-led economic development strategy.

In 1962, the GIE Budget and Accounting Act was enacted, imposing centralized control on government invested enterprises by the Economic Planning Board (EPB). EPB was a super-ministry that took over the budgetary function from the Ministry of Finance and the collection and evaluation of national statistics from the Ministry of Internal Affairs, and it was in charge of formulating and implementing five-year economic development plans. The EPB prepared a common set of budget planning guidelines for GIEs and required them to submit their budget plans to their supervisory ministries, which in turn had to consult with the EPB before a cabinet review. In 1973, the Ministry of Finance (MOF) took the initiative in introducing the GIE Administration Act of 1973. The Act included a provision for the Government Investment Administration Committee at MOF and provided a legal basis for MOF to conduct an annual performance evaluation of GIEs.

Korea's SOE policy in this period was marked by strong government intervention. Even procurement and contracting decisions were centralized and handled by the Office of Supply (later renamed the Public Procurement Service). Although a performance evaluation mechanism had been first introduced in 1968 and strengthened in 1973, it was largely ineffective in this period due to the lack of pre-requisite managerial autonomy on the part of SOEs. Last but not least, retired military officers and bureaucrats were frequently "parachuted" into public enterprises based on political reasons.

2. The second period (1980~1997): Incentives were introduced based on a rigorous system of performance evaluation

The landmark reform during this period was the 1983 GIE Administration Basic Act, which sharply reduced political appointments at public enterprises, gave managers greater autonomy, and introduced incentives based on a rigorous system of performance evaluation.

(1) Changing the board structure and reducing "parachute appointments." The 1983 Basic Act prohibited outsiders from "parachuting" into GIEs as executive officers below the CEO level. Considering the interests of veterans

and bureaucrats, the 1983 Act adopted a compromise solution by introducing significant changes in the board structure. The 1983 Act built a duel-board structure, a management board and a policy supervisory board. The supervisory board consisted entirely of non-standing directors (except the CEO), including representatives from the supervisory ministry and the Economic Planning Board. The CEO formed a virtual management board with internally promoted executive officers.

(2) Streamlining the budget planning, procurement, and audit procedure. The 1983 Basic Act entrusted GIEs with the authority to finalize their budget plans, subject only to common budget guidelines, and allowed the CEO of a GIE to exercise discretion in purchasing goods. The 1983 Act designated the Board of Audit and Inspection as the sole authorized audit agency. If necessary, the supervisory minister was allowed to conduct an audit but only after consultation with the head of the Board of Audit and Inspection.

(3) Clarifying managerial objectives and linking incentives to performance. The 1983 Basic Act established the GIE Management Evaluation Council (MEC), replacing the Government Investment Administration Committee, which was a ministerial-level council empowered to coordinate major issues, such as guidelines for managerial objectives, budget preparation, performance evaluation, and other matters. Headed by the Deputy Prime Minister, it had representatives from supervisory ministries and civilian experts. This new umbrella organization significantly strengthened the GIE performance evaluation system.

3. The third period (1997): Introduction of the 1997 Privatization Act

Although the 1983 Basic Act represented substantial progress over its predecessors, the corporate governance structure it imposed on GIEs became subject to increasing criticism. Influenced by other countries privatizing their SOEs since the 1980s, some began to call for privatization as the ultimate reform program for Korea's SOEs. In 1987, South Korea launched a privatization program of state-owned enterprises, planning to privatize 40% of its central government

enterprises. However, this reform moved slowly and ended with no definite results.

The 1997 Privatization Act, aimed at improving managerial efficiency and pushing ahead with privatization, sought to transform more business-oriented public enterprises into ready-for privatization companies operating on commercial principles. The Privatization Act imposed an ownership ceiling of 7 percent to prevent the chaebol from acquiring controlling interests in the public enterprises. However, this Act was accompanied neither by a credible program to sell government shares nor by a comprehensive plan to separate regulatory and industrial policy objectives from the business objectives of public enterprises. In fact, the privatization of KOGAS and Hanjung was not to begin until 2003 according to the Act.

4. The fourth period (1999-present): Privatization of SOEs after economic crisis

The outbreak of the economic crisis at the end of 1997 added a new sense of urgency to privatization policy, as the sale of highly regarded public enterprises was viewed as a way of generating hard currency to service foreign debt. The new government headed by Kim Dae-jung drafted a comprehensive privatization plan in 1998. This plan determined to transfer the control of public enterprises to the private sector, instead of stopping at a partial sale of government shares.

While the government generally sold off smaller public enterprises to private companies in a trade sale, it took various approaches in disposing of government shares in larger ones. For POSCO, the government imposed an ownership ceiling of 3 percent for some time and sold government shares in several tranches, so as to produce a corporate governance structure dominated by institutional investors and strategic partners. The cap on shareholdings was subsequently lifted. Privatization will risk a serious backlash if it leads to the destruction of firm value or gives rise to monopoly rent due to the lack of competition or the capture of regulatory bodies. In particular, the sale of co-generation facilities in Anyang and Bucheon without an appropriate transformation of regulatory policy led to significant hikes in heating bills and subsequent consumer complaints.

In 1999, the Korean government amended the GIE Administration Basic Act which changed the structure of GIE boards. The board of a GIE is to consist

of standing and non-standing directors, with a majority of non-standing directors. Provisions for automatic government representation on the board were eliminated, and it became possible to recruit standing directors from the outside.

Of the eleven public enterprises targeted for privatization in 1998, only three remain public enterprises, in the electric power, gas, and district heating sectors—all network industries where competitive market design and regulation are of crucial importance.

5.1.3. Assessment of the effect of the reform

Although it is difficult to isolate the impact of institutional changes and control for all other factors, comparative studies and regression tests suggest that the 1983 reform had a positive effect on the performance of GIEs. A study proved that in 1986, for example, costs were 67.7 percent of revenues for all the GIEs, well below an expected ratio of 73.1 percent based on past performance.

Compared with privately owned business groups of comparable size, SOEs tended to have a lower number of subsidiaries (more business focus), a lower debt-equity ratio (better financial stability), and a comparable level of profitability in 2002. In 2001, when the Korean economy was affected by a global slowdown, the business performance of SOEs was actually better than privately owned business groups. For the 2001 cohort, the weighted average ROA and ROE for SOEs were 2.65 percent and 5.15 percent, respectively, while the comparable figures for their privately owned counterparts were 1.69 percent and 4.12 percent. Presumably, SOEs, concentrated as they are in infrastructure industries, are less vulnerable to cyclical factors.

5.2. Historical review on state-owned enterprise reform in China

5.2.1. Chinese state-owned enterprise status

In 2014, the total assets of Chinese state-owned enterprises (excluding financial SOEs) were 102.1 trillion yuan, 35.6 trillion yuan of net assets, 2.5 trillion yuan

of total profit, 3.8 trillion yuan of taxes paid. At the same time, the non-public economy has been developing rapidly, and its share of the GDP was more than 60%, tax revenue was over 50%, and provided more than 90% new jobs. The non-public economy is playing an increasingly important role in supporting growth, increasing tax revenue and employment and promoting innovation.

From the perspective of the management system, Chinese non-financial state-owned enterprises are managed and supervised by the State-owned Assets Supervision and Administration Commission of the State Council (SASAC) and decentralized supervision by the regional SASAC. SASAC performs investors' responsibilities, supervises and manages the state-owned assets of the enterprises under the supervision of the central government (excluding financial enterprises), and enhances the management of state-owned assets. SASAC shoulders the responsibility of supervising the preservation and increment of the value of the state-owned assets of the supervised enterprises; establishes and improves the index system of the preservation and increment of the value of the state-owned assets, and works out assessment criteria; supervises and administers the preservation and increment of the value of the state-owned assets of the supervised enterprises through statistics and auditing; and is responsible for the management work of wages and remuneration of the supervised enterprises and formulates policies regulating the income distribution of the top executives of the supervised enterprises and organizes implementation of the policies.

Financial state-owned enterprises are managed by the Ministry of Finance and Central Huijin Investment Ltd., a state-owned investment company. Central Huijin was established in December 2003 and mandated to exercise the rights and the obligations as an investor in major state-owned financial enterprises, on behalf of the State.

5.2.2. The reform of state owned enterprises in China

The evolution of SOEs reform in China can be divided into four periods as follows:

The first period was 1983-1992, which focused on the decentralization reform of SOEs in China as it relinquished part of the power and profits to enterprises. Gradually separating the relationship between the enterprise and the government, the enterprise has the right to employ workers according to the enterprise's own needs. SOEs became self-financing market participants.

The second period was 1992-2003, which focused on corporate governance and strategic adjustment. Due to the fact that state-owned enterprises still followed the development of ideas and mode of operation under the planned economy system, after a few years in the development of high input, the state-owned enterprises entered a difficult period during the early nineties. Among all of SOEs, these difficulties extended to 1997, with almost one-third SOEs showing loss, one-third profitable, and one-third showing a balance. In 1997, the Chinese government made the three-year goal for the reform and difficulty relief of SOEs, then started to implement strategic adjustment to "grasp the big and give up the small." The specific measures were to: close and reconstruct enterprises in difficulty, reduce the number of employees, open market access to private capital in competitive field, guide SOEs to establish a modern enterprise system which consists of the shareholder conference, board of directors and supervision committee and managers. The number of state-owned enterprises decreased from 362 thousand in 1997 to 150 thousand in 2003, while the percentage of loss making enterprises decreased from 64% in 1997 to 20% in 2003.

The third period was 2003-2013, which focused on the establishment of the State-owned Assets Supervision and Administration Commission of the State Council (SASAC) and reform of the management system for state-owned assets. SASAC unified management of all non-financial state-owned enterprises, improved the agent relationship, and strengthened the assessment and evaluation of state-owned enterprises. However, the relationship between the government and the state-owned enterprises has not been straightened out, with the state-owned enterprises still performing a large number of government functions. The internal management system of state-owned enterprises still needs to be improved, and the board of directors and the board of supervisors are yet to play their role.

The fourth period is from 2013 and up to date, during which the focus has been on continuing market-orient reform, pushing forward the transition from assets management to capital management. Presently the Chinese government has induced a "1+N" reform plan. "1" is "the guiding opinions on deepening the reform of state owned enterprises," while "N" is the attached supporting documents to implement the reform. Ten pilot reforms are being carried out, which are as follow:

(1) Implement the functions of the board of director, who has the power to make decisions, the right of selection, appointment and distribution; in particular, ensure that no government departments and agencies are authorized to interfere with the board of director.

(2) Market-oriented recruitment and management of managers. The compensation of managers will relate to the way of recruitment, that is, government appointed managers adhere to government compensation levels while compensation for market-oriented managers is based on market pricing.

(3) Establish professional manager systems. According to the SASAC, the difference between a professional manager and market-oriented manager can be explained in two aspects: the first is assessment, for professional managers, focusing on assessing business performance, and for market-oriented recruitment managers, focusing on all-round assessment including political responsibility, economic responsibility and social responsibility. The second is the different situation after the expiration of the labor contract. Market-oriented recruitment managers may be rationally used and the professional managers must go to the market to find a new job.

(4) Differentiating salary distribution. Explore to perfect medium and long term incentive mechanisms, establish a scientific and reasonable performance evaluation system.

(5) Reconstruct and establish state-owned capital investment or operating companies ("the two companies"), which are representative of capital holder, in order to manage the transformation from "assets management" to "capital management." The investment companies are more required to reflect the

national strategy and the operating companies are more required to maintain and increase the value of capital.

(6) Merge and reorganization of central SOEs in order to solve the problems of state-owned capital structure being irrational, resource allocation not efficient, homogeneous development, etc.

(7) Mix ownership reform in key areas including electricity, oil, natural gas, railways, civil aviation, telecommunications, etc.

(8) Employee stock ownership in mixed ownership enterprise in order to establish the benefit risk sharing long-term mechanism to provide incentive and restraint.

(9) Disclosure of information related to SOEs, including information of board of director, financial information, etc. in a unified information disclosure platform.

(10) Break away from social obligation and solve the historical problems of SOEs.

5.2.3. Current focus of controversy in the reform of state-owned enterprises in China

1. The relationship between state-owned capital investment or operating companies and SASAC: Since the two companies can represent the investor, whether or not should the SASAC assume this function? Currently, experiments and pilots have taken place in some provinces, however, the two types of companies are still managed by the SASAC. So, the reform of "the two companies" has merely added another chain of management for SOEs. Whether the function of the SASAC should be defined as a state-owned assets investor or the supervision and management of state-owned assets is not clear.
2. The relationship between making bigger and stronger and making more fit and healthy: Some think that SOEs reform is to make the assets or capital of SOEs bigger and stronger through restructuring, that there is no need for state-owned enterprises to withdraw from the competitive field. Others think SOEs reform is to let the market play a decisive role in the

allocation of resources, and it is necessary to withdraw them from the competitive field.

3. Internal relationship in corporate governance: For example, the relationship between the Party committee and the board of directors. The SASAC points out major decisions shall be made by the Party committee to discuss after the decision of the board of directors. Another example would be the salary design of the market-oriented recruitment manager, government appointment manager and professional manager. It is likely to appear a problem when superior leadership is paid less than a lower level manager.
4. How to promote mix ownership reform? The government cannot force the private capital to invest in SOEs, while private capital usually requires an absolute share of shares once invest SOEs.

5.3. Experience enlightenment

5.3.1. The reform of state owned enterprises has great significance to the economic transformation of China

State-owned enterprise reform is not only related to "cutting excessive capacity," reducing the distortion of resource allocation and improving the efficiency usage of resource, but also related to the market share of healthy enterprises and cultivation of qualified market players to expand effective supply. Research by Zhao Xu Yuan, Zhang Wenkui (2015) found that if every 5% of the SOEs are reformed year by year in the next 10 years, the economic growth rate can on average rise by 0.33 percentage points every year; and the yearly average increase of economic growth would be 0.47 or 0.50 percent points if 10% and 20% of the SOEs are reformed . So, it is important for China to deepen SOE reform in its current stage, and it is more important to find the right path.

5.3.2. Enlightenment of SOEs reform in South Korea

1. The essential difference between state-owned enterprises and private enterprises is the property rights. The unclear subject of use rights of SOEs lead to unclear and unstable objectives. Supposing the rights or goal of state-owned enterprises and private enterprises are determined, then, the internal corporate governance of many state-owned enterprises can be the same as for private enterprises. If the basic nature of the corporate governance problem in both private and public firms is identical, any difference in performance between public and private firms must arise either from differences in objectives or differences in incentives schemes.
2. The goal of clearing property rights is to clarify the firm's objectives. But how to clarify property rights—only through privatization? South Korea's experiences tell us that there is a prerequisite for the privatization of state-owned enterprise reform, that not all reforms will automatically bring efficiency. If privatization is to lead to increased efficiency, it must be part of a comprehensive reform program designed to remove various entry and exit barriers and enhance the operation of market forces. Privatization should be accompanied by substantive competition or regulation if it is to lead to improved consumer welfare. For large-scale firms, institutional requirements for efficiency improvement through privatization are much more complex.
3. Private enterprise incentive and restraint mechanisms are given by the market, not privatization. The incentive and restraint mechanisms from the market include: (1) threat of shareholder exit, (2) threat of takeover or replacement of incumbent management, (3) threat of bankruptcy, and (4) performance-related pay. So, there is room for public enterprise reform under continued state control, and privatization is not the only way to solve the problem of state-owned enterprises.
4. If the field does not have the conditions for privatization, how to reform SOEs? The essence of public enterprise reform is to establish this type of effective incentive mechanisms by implementing the following set of

actions: (1) Minimize political interference, especially in personnel and pricing decisions; (2) Clarify the firm's objectives, using performance indicators whenever possible; (3) Increase managerial autonomy to meet these objectives; (4) Evaluate managerial performance; and (5) Link reward to performance.

VI. Conclusion and Discussion

China's current economic structure is similar to South Korea during the transition period of 1992-1997, and the goal of economic transformation within China will be to complete the task of the three economic transformations of South Korea, including not only changing the pattern of a government-led economic model, but also transforming economic development power driven by resource investment to innovation driven. In many aspects, China's comprehensive deepening reform is similar to South Korea's economic reform, such as to establish a fair competitive market environment, to promote the reform of the public sector, and to create institutional mechanisms beneficial to innovative development.

However, there are many differences between China and South Korea as well. Korea seized the economic crisis as an opportunity to promote economic reform and structural adjustment, which improved the market economic system and provided new impetus for economic growth in the long term, thus transferring the calamity into a blessing. However, there is a long conduction chain of economic transformation and economic reforms in China due to the big domestic potential market providing enough economic room for maneuver, and external economic crisis having a limited impact on China's economic development. With the external economic crisis providing but a limited incentive to reform, China is more likely to miss the opportunity to reform and needs to be more proactive in promoting reform. China has no need to focus overly on economic growth, and does not verbally say farewell to the

high growth, but actually feels fear over a decline in economic growth. China should pay attention to increasing the supply of elements such as its labor force, the flexibility of the labor market and the accumulation of human capital, increasing the enthusiasm of private capital investment by establishing a fair and transparent market, inspiring entrepreneurs and scientific and technological personnel to innovate. All of these measures rely on reform to promote institutional innovation. Reform played an important role in promoting economic growth in China and South Korea, and it will play an even more important role by influencing the factor inputs and TFP.

It is a social consensus that China's current necessary and urgent task is to promote economic transformation through implementing economic reforms. However, there is still much controversy over how to promote market-oriented reforms, and some reforms may have deviated from market direction in practice. In the reform of SOEs, China should adhere to market-oriented reform, minimize political interference, especially in personnel decisions, clarify the firm's objectives, using performance indicators whenever possible, increase managerial autonomy to meet these objectives, evaluate managerial performance, and link reward to performance. At the same time, it must remove various entry and exit barriers, and enhance and promote fair competition.

China and South Korea should strengthen cooperation and mutual learning in the field of economic reform. The importance of convergence management systems has become increasingly prominent, and the coordination of international rules and cooperation agreements reached between China and South Korea are all measures required to promote appropriate domestic reforms.

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5

Growth, Structural Change and Spatial Inequality in India: Some Dimensions of Regional Disparity[1)]

*Krishnarajapet V. RAMASWAMY**

I. Introduction

1.1. The Context K.

Rising inequality in incomes and standards of living between and within countries in the global economy is at the centre of development issues debate in recent years. The focus of discussion has been the growing inter-personal income inequalities in the globalized world (Milanovic 2013 and 2016). The analysis of income inequality between all individuals in the global economy is important from the perspective of the problem of international transfer of resources. Understanding factors affecting income inequality between individuals within countries (vertical inequality) is equally important for two reasons. First, inequality within countries is a significant component

1) This paper borrows much from earlier published research work. In particular, I would like to mention Ramaswamy (2007), Ramaswamy (2011), Ramaswamy and Tushar (2013) and Ramaswamy (2015).

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of overall global inequality. Second, domestic economic policies have been and continue to be important as factors driving income inequality within countries. Spatial inequality in average incomes between regions (horizontal inequality) represents another dimension of the inequality problem in developing countries undergoing economic transformation like India and China (Gajwani, Kanbur and Zhang 2007). Spatial inequality in India is the focus of the present paper. Why should one study spatial inequality in developing countries in recent years of globalization? Two reasons can be advanced. First, spatial inequality is a component of overall inequality of incomes. High horizontal inequality between the regions of a country might lead to high vertical inequality between all individuals (Stewart 2002). The policy of economic integration through trade and investment liberalization could have an uneven spatial impact. It has been argued to have contributed to regional income inequalities in developing countries (Kanbur and Venables 2005, Rodriguez-Pose 2013). Second, spatial inequalities might be the source of conflicting political differences between regions with respect to national economic policies in a federation.

In India the problem of regional inequality has received much policy and academic attention in the context of allocation and sharing of tax revenues (GOI 2013). States within India differ greatly in terms of income and development indicators. Several studies of regional income inequality in India have found that spatial income inequality has increased in the post-reform period (Ahluwalia 2000, Nayyar 2008, Ramaswamy 2007). Some States like Gujarat and Haryana have forged ahead significantly, leaving behind others like Uttar Pradesh. The growth rate of per capita State Domestic Product (SDP) of Gujarat (8.1%) stands in sharp contrast with that of Uttar Pradesh (2.1%) during 2000-05. In more recent years Bihar has experienced faster growth (9% since 2006), while Uttar Pradesh and Odisha have continued to lag behind others. If one looks at the differences in levels of income then one finds that the per capita SDP of Gujarat and that of Maharashtra is more than four times that of Bihar in 2013-14 and the per capita income of Goa is twice that of West Bengal in the same year.

1.2. Economic Reforms and Industrial Location Policy[2)]

Economic reforms relaxed the entry restrictions on domestic and foreign firms. It liberalized access to intermediate inputs, capital goods and technology. The location restrictions on industries were removed. It is useful to summarize the policy reform to put the discussion in perspective. The foremost instrument of industrial policy was the industrial licensing for private entrepreneurs based on the Industrial Regulation Act of 1956. The new industrial policy of 1991 abolished industrial licensing except in 18 industries. The major areas of trade reform included reduction of average tariff rates, the removal of licensing and other non-tariff barriers on all imports of intermediate and capital goods, the elimination of trade monopolies of the state trading agencies and the simplification of trading regime. The mean tariff was reduced from 128% before July 1991 to 35% by 1997-8 and further reduced to 30% in 2001. Ninety five percent of the tariff lines were freed from non-tariff barriers (NTBs) in 2001. Restrictions on foreign direct investment (FDI) were relaxed in 1991. In the years prior to 1991, FDI was permitted only up to 40% in certain industries, known as “Appendix I Industries” subject to the discretionary approval by the government. In 1991, FDI was allowed up to 51% equity in these industries under the “automatic route.” This was later liberalized to enable setting up of 100 percent subsidiaries in the manufacturing sector in 1997. The list of products reserved for exclusive manufacture by small-scale industries have been progressively removed from the reservation list enabling large domestic and foreign firms to enter those product lines.

2) This section is based on Ramaswamy (2011). It is primarily addressed to readers in South Korea unfamiliar with policy changes in India. Others can skip this section.

Industrial Location Policy

The concern for regional disparity was expressed very early in India in the Industrial Policy Statement of 1956. Multiple instruments were brought into use during the 1970s and 1980s in order to achieve the desired objective of industrial dispersal.[3] They can be seen as falling broadly into two types[4]: (i) policies that influenced inter-regional distribution of industry, and (ii) policies that impacted intra-regional distribution of industries. Use of industrial licensing policy to direct investment into backward or "no industry" districts, prohibiting heavy industry from metropolitan areas, the location of public sector plants in backward states (Bihar, Madhya Pradesh and Orissa), pricing and distribution policy for intermediate inputs were important ways. All these fall under the first category. Applications for setting up units in backward areas were favoured and this showed up in the higher share of letters of intent and total licenses. The most powerful was the control of distribution and pricing of intermediate inputs like coal, cement and steel. This policy was implemented through the operation of freight equalization policy. This policy equalized across states the prices of coal, steel and cement. As a consequence, states in the Eastern region rich in these resources lost their natural competitive advantages. Other states in the Northern and Western regions that were not producers of these commodities were the beneficiaries. Later this policy was discontinued beginning with the decontrol of the cement industry in 1989.

Within (or Intra) state distribution of industries were influenced by another set of policies that included the central government capital subsidy schemes, transport subsidy for industries in hilly backward areas, income tax concessions for new industrial units in backward districts that permitted 20% deduction of profits in the computation of taxable income, and financial assistance at below normal lending rates by financial institutions. The latter is reported to be quite successful as the share of backward areas in the financial assistance sanctioned and disbursed by the All India Financial

3) This section is based on Sekhar (1983) and Mohan (1993).

4) See Sekhar (1983) for an early detailed discussion of these policies.

Institutions is found to be between 40 to 50% since the mid-1970s. Further the industrial licensing system was used to restrict the location of new industrial units within certain limits of large metropolitan cities. The Industrial Policy Statement of 1977 prohibited the location of new industrial units above a certain size on all cities with a population of more than 500,000. All these policy rules clearly suggest a serious intention on the part of the government's industrial policy to induce industries to locate away from existing locations with high degree of industrial concentration.

The industrial policy statement of 1991 that liberalized industrial regulatory rules by delicensing of industries removed all restrictions regarding location of industries. It retained the licensing requirement for setting up an industry within 25 kilometers of cities with population more than 1 million in 1991. Environmental, pollution and other local use restrictions have been continued. All other incentives except income tax concessions for backward districts were withdrawn. Later in 2001, the Parthasarathy Shome committee on tax policy for the tenth plan advised the abolition of income tax concessions for regional industrial development. The approach of the central government during the era of economic reforms is that provision of infrastructure is more important than income tax concessions for encouraging economic activity in backward regions. The state governments on their part have continued many fiscal incentives like sales tax exemption etc. to attract domestic and foreign investment to their states.

1.3. Analytical Background and Broad Questions

In the mainstream thinking the relationship between spatial inequality and economic growth is represented as an inverted U-curve, following the idea of the Kuznets curve in development economics that represents the relationship between personal income inequality measures like Gini coefficient and the level of per capita income. The standard Kuznets curve shows that income inequality first increases, reaches a maximum and then declines with the per capita income. Structural change

that takes place with people moving from the agricultural sector (low productivity activity) to non-agriculture sectors (high productivity activity) is the factor that increases inequality in the initial stages of economic development. Development that begins with increasing physical capital formation tends to benefit some segments of population disproportionately relative to others. As compensatory changes started to take root with the high productivity sectors absorbing a greater proportion of people, income inequality declines with economic development. In this sense, economic development defined as growth with structural change is said to result in societies with low income inequality. Empirical support for the original Kuznets curve is found to be weak with income inequality often found to persist with higher levels of per capita income and structural transformation. In short the Kuznets curve cannot be used to infer the long run relationship between inequality and economic development. Following the idea of a Kuznets curve, Williamson (1965) suggested a similar inverted-U relationship between spatial inequality and economic development in the long run. This is regarded as a spatial Kuznets curve. In early stages of development there takes place spatial concentration of resources in leading or industrialized regions due to agglomeration economies. This causes regional income inequalities to go up. In later stages of development, with increasing factor mobility, due to falling transportation costs, resources move into lagging regions bringing about spatial equality. A recent study using panel data in 56 countries covering the period 1980-2009 has found empirical support for the inverted-U curve hypothesis of spatial inequality (Lessmann 2014). Other studies using individual country data have reported a U-shaped relationship between spatial inequality and economic development (Terrasi 1999). This suggests that it is hard to consider spatial inequalities as a temporary or transitory phenomenon expected to decline over time with economic development. The point worth noting is that changing characteristics of structural change in the process of development could influence the pattern of spatial inequalities in a country of continental size like India.

What are the forces behind this trend of increasing regional disparities in manufacturing and services activity? Structural changes within states have been

broadly similar with the income share of agriculture falling (20%), moderate rise in the share of industry (27%) and substantial rise in the share of services (50%) in the years 2005-06.[5] Studies have observed large inter-state disparities in growth and labour productivity in individual sectors like agriculture, manufacturing and services (Ramaswamy 2007). The key questions have been the following. What are the sources of this disparate growth? Is there a tendency for geographic concentration of economic activity leading to greater disparities? What are the factors that help or hinder such tendencies? Is there a role for regional policy in an environment of market-driven industrialization? These are the substantive questions with no easy answers.

In this preliminary paper I have examined the problem of spatial disparities in income in recent years of growth and structural change in India. I have highlighted certain features of interstate differences output and employment shares and regional concentration of economic activity in terms of services and manufacturing. I have also drawn attention to unbalanced growth of formal or registered manufacturing. Formal manufacturing has been the sector most subjected to economic policy reform and at the forefront of India's industrial licensing, trade and foreign investment liberalization since 1991. Recent policy initiatives like "Make in India" have emphasized the role of the manufacturing sector in growth and employment creation.

II. Growth, Structural Change and Spatial Inequality

2.1. Growth and Structural Change

The Gross Domestic Product (GDP) per capita grew annually by an average of 1.2% in the 1960s and 1970s but this growth rate changed to an average of

5) EPWRF (2009)

3.5% in the 1980s, to 3.7% in the 1990s and to 5.5% in the 2000s. India has transformed itself to be counted among the fastest growing economies in the world with an average GDP per capita growth rate of 3.7% in the years 1980 to 2004. In terms of GDP growth performance alone one finds that the Indian economy's average annual growth rate was 3.5% during 1951-82, which increased to 5.4% in the next two decades (1983-1999), followed by a growth rate of above 7% in the 2000s. The causes and outcomes of this economic transformation have been the subject of research and analysis in recent years. A perceptive analytical assessment of the evidence and factors driving change is available in Kotwal, Ramaswami and Wadhwa (2011). The economic policy reform of 1991 has played an important role in driving this growth but other pre-existing factors have also influenced the pattern of development (Kochhar *et al*. 2008). First and perhaps the foremost feature of India's recent growth experience is that it is led by the services sector, unlike in other countries of East Asia and China. In the broader context of economic development and structural change the observed sequence was that manufacturing followed agriculture while the service sector became prominent only at a later stage. India's experience appeared to be different, with the share of the services sector in GDP sharply going up in the 1990s, beginning with a share of 43% in 1990-1, to reach a high share of 57% in 2009-10. In Figure 1 the changes in GDP shares of Agriculture, Manufacturing and Services over the period of 1950-51 to 2012-13 is shown.[6] This rapid rise in the share of services has taken place at lower levels of per capita income when compared to presently advanced countries and other Asian economies.

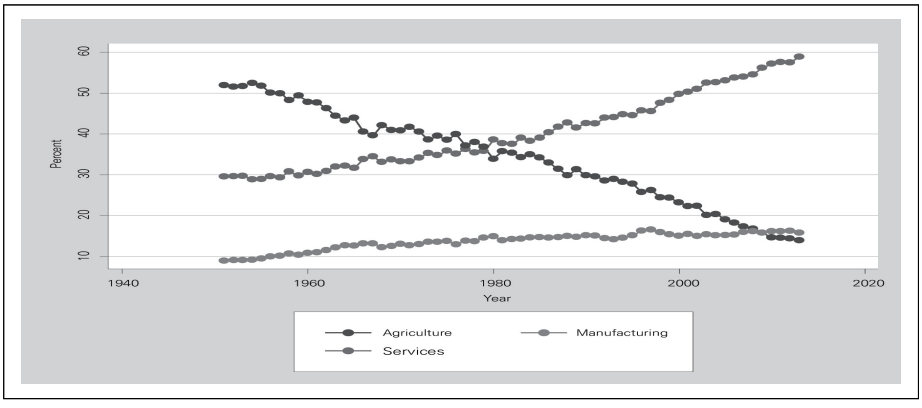
In 1895, the share of services in the UK was about 53%, comparable to India in 2004 but the level of GDP per capita was 4,100 international dollars (at 1990 prices)[7] compared to 2,278 dollars in India in 2004. Similarly, in Germany the

6) This is based on National Income Accounts Statistics taken from the Handbook of Statistics on Indian Economy 2015-16 published by the Reserve Bank of India.

7) These figures are taken from Verma (2011) and measured in terms of 1990 Geary-Khemis (GK) dollars. Refer to the original for more comparisons with other countries.

share of services was 53% during 1890-1899 with an average per capita GDP of 6,000 dollars and came down to 38% by the end of the period. In the case of Japan, services accounted for 48% during 1933-37 and declined to 42% by 1942. The GDP per capita of Japan increased to 2,700 dollars in 1942 from 2,200 dollars in 1937. The upshot is that at similar stages of development India had a larger share of services in GDP. If we take another fast-growing comparable developing country like Malaysia we find that the share of services was 49% in 2005 with a per capita GDP level of 9,000 dollars. By 2005 India's per capita GDP was about 2,400 dollars but with a services share of 54%. The flip side of this structural development is that of premature deindustrialization (to borrow the term used by Dani Rodrik). In presently developed countries like the U.S. (in 1953), Britain (in 1961), Germany (1970) and Sweden (in 1961), the share of employment by the manufacturing sector peaked (more than 30%) when their per capita GDP levels were $9,000-$11,000 dollars and then deindustrialization began with the decline of the manufacturing sector. The developing countries like Brazil, China and India seem to exhibit a contrasting experience. Their employment shares have been observed to shrink while per capita GDP levels have been in the range of $2,000-$5,000 (at 1990 prices, Rodrik, 2013).

Figure 1. Sectoral Share in GDP: INDIA 1950-51 to 2012-13



It is useful to begin first by noting the output or GDP growth rates in various sub-sectors of the Indian economy and the associated change in the structure of GDP during the reference period of our study, that is, from 1999-2000 to 2012-13 (Table 1). The service sector output has grown rapidly since 1990 and by 2005 the share of services in GDP had reached well above the international norm that corresponds to the average share of services in countries with similar per capita GDP (Eichengreen & Gupta 2011). My estimates based on National Accounts Statistics (NAS) data indicate that the service sector has clocked an average annual compound growth rate of 8.7% annum between 1999-2000 and 2009-10 as against 7.7% achieved by manufacturing during the same period. Within the service sector the areas of group transport, storage and communications have grown the fastest at 11.8%. This is followed by trade and hotels at 8.5% and other business services at 7.9%. The distribution of total employment for two selected years by industry is presented in Table 2. The growth rate of employment between 2004-05 and 2011-12 is presented. The stagnancy of manufacturing sector in terms of employment is evident (1.3%). The services sector contributes about 28% of total employment in the Indian economy.

Both demand side and supply side factors have been shown to have played important roles in this "services revolution" (Rakshit 2007). Two types of demand for services are final demand from consumers (both domestic and exports) and intermediate demand services from the other two sectors of the economy, namely, industry and agriculture. Faster growth of final demand for service-sector output is indicated by the growth in private household consumption expenditure and a rapid growth of export of services.[8] During the time period 1995-2005 private consumption of services grew at an average of 8.6% and export of services grew at 19.1%, which is much higher than the growth rate of services GDP (8%). The household income elasticity demand for services averaged 1.5% for the ten year period (Rakshit 2007). A supply factor of importance has been technological change

8) See Rakshit (2007) for an excellent analytical discussion and the supporting empirical evidence on demand and supply factors. This paragraph borrows much including the statistics cited from this paper.

or total factor productivity growth (TFPG) in the services sector. Indirect evidence in support of this factor is the declining incremental capital-output ratio and increasing labour productivity growth in the service-sector since 1995.

Table 1. Distribution of GDP at Factor Cost by industry of Origin (2004-05 prices)

Industry/Sector	GDP Share 1999-2000	GDP Share 2012-13
1. Agriculture	23.2	13.95
2. Mining & Quarrying	3.00	1.98
3. Manufacturing	15.01	15.76
4. Electricity, water, etc.	2.50	1.88
5. Construction	6.50	7.66
6. Trade (Retail+ Wholesale),		
Hotel and Restaurant, Transport, Storage and Communications	21.10	26.86
7. Other Services like Financial, Business, Public Administration, Education etc	28.55	31.91
Services (6+7)	49.65	58.77
All Sectors	100.00	100.00

Source: Handbook of Statistics on Indian *Economy* 2015-16 (Reserve Bank of India 2016).

Table 2. Growth of Employment by Sector: 2004-05 to 2011-12

Sector	2004-05	2011-12	Growth Rate	Share in Total Employment	
	Million	Million	%	2004-05	2011-12
Agriculture and allied activities	258.8	224.5	-2.0	56.5	47.5
Mining and quarrying	2.5	2.6	0.2	0.6	0.5
Manufacturing	55.9	61.3	1.3	12.2	13.0
Electricity, gas and water supply	1.2	2.5	10.9	0.3	0.5
Construction	26.0	49.9	9.8	5.7	10.6

Table 2. Continued

Sector	2004-05	2011-12	Growth Rate	Share in Total Employment	
Services	113.6	131.8	2.1	24.8	27.9
of which,					
Trade, Hotels and restaurants	49.6	53.7	1.1	10.8	11.4
Transport, storage and communication	18.6	21.4	2.0	4.1	4.5
Finance, real estate and business services including IT services	45.4	56.7	3.2	9.9	12.0
Total	458.0	472.5	0.4	100.0	100.0

Source: Estimates based on NSSO Employment-Unemployment Surveys of Corresponding years.

2.1.1. Inter-State Differences in Income

Income differences between citizens in a country consisting of different spatial units, like states, could be decomposed into two parts. First is the within inequality that refers to income differences within the state, and the second is the between component that is due to average income differences between states. If all the citizens within a given state could be assumed to have the same mean income of that state, then one could ask how much of observed inequality could be attributed to differences in mean income between states. One must note SDP data do not capture the value of remittances received by residents of different states. Consequently, the use of SDP data results in the underestimation of average income of residents in a state. This is particularly serious in the case of Kerala with income from remittances. One could use per capita consumption expenditure to overcome this limitation. We have not estimated the mean per capita consumption of different states in India. Available data indicates that per capita consumption by state is correlated with per capita income. Other studies using per capita consumption have reported that inequality has increased in recent years.

Data on the per capita SDP of 22 selected states in India for two selected

years (2004-05 and 2013-14) is presented in Table 3. In Table 3 we have also presented the ratio of each state's income to the poorest Indian state, which is Bihar. The relative difference of each state's income to the poorest state has marginally declined over the last ten years. However the absolute difference in per capita income between the richest state (Goa) and the poorest State (Bihar) has increased by more than 80% in the last decade. If people perceive the welfare differences in terms of absolute income differences then wellbeing of the poorest state would have worsened. It could be argued that absolute differences do matter for evaluation of people's wellbeing. This is a larger issue not pursued in this paper.

It is important to note that in recent years some states like Bihar and Chattisgarh have grown at faster rates. It is possible that on average high income (low) states grow slower (faster) but the variance in income across states does not narrow over time (See the discussion in Ramaswamy 2011). We will now turn our attention to the trends in spatial inequality since 2004-05.

2.1.2. Estimates of Spatial Inequality

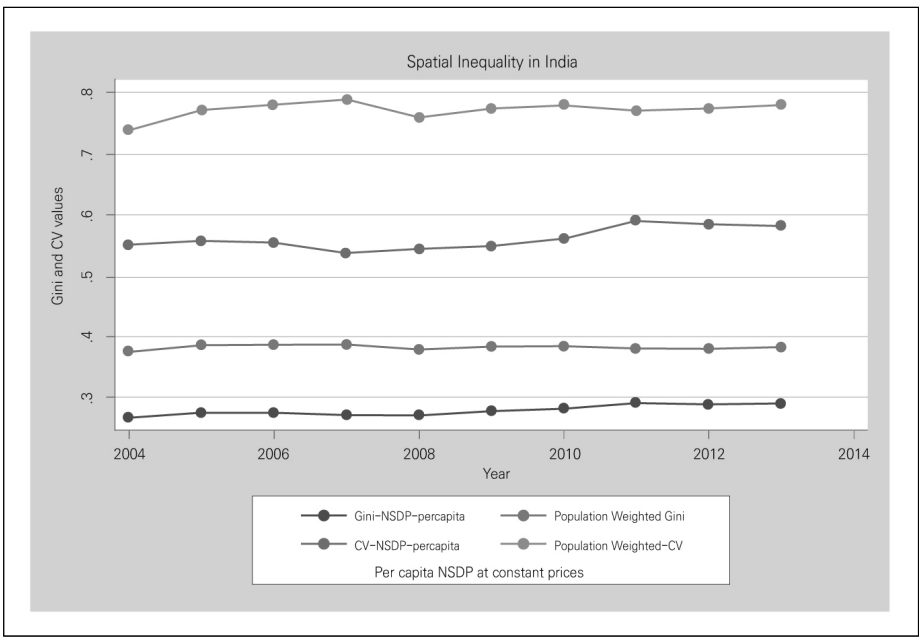
Two widely used measures of dispersion are the Gini Coefficient and the Coefficient of Variation (CV) with and without population weights. Population-weighted CV is my preferred measure as India is a country with large differences in population size between states. I have estimated both these measures of inequality for the period of 2004-05 to 2012-13, using per capita NSDP data for the 22 states of India. These two measures are shown in Figure 2. One could clearly see that spatial inequality has not declined in the last nine years. My estimates are consistent with those reported by Lessmann (2014), which covered the period 1980 to 2005. To quote Lessmann, "The case of India shows that the strong growth period, which started at the beginning of the 1990s, has increased spatial inequality significantly and no turning point has been reached yet" (Lessmann 2014, p.48).

Table 3. Disparities in Per Capita Income between States in India

	2004-05	2013-14	Ratio of State's income to poorest State:2005	Ratio of State's income to poorest State: 2014
Andhra Pradesh	25959	42170	328.0	272.0
Bihar	7914	15506	100.0	100.0
Chhattisgarh	18559	28373	234.5	183.0
Goa	76968	137401	972.6	886.1
Gujarat	32021	63168	404.6	407.4
Haryana	37972	67260	479.8	433.8
Himachal Pradesh	33348	54494	421.4	351.4
Jharkhand	18510	28882	233.9	186.3
Karnataka	26882	46012	339.7	296.7
Kerala	32351	58961	408.8	380.2
Madhya Pradesh	15442	26853	195.1	173.2
Maharashtra	36077	69097	455.9	445.6
Odisha	17650	24929	223.0	160.8
Punjab	33103	49529	418.3	319.4
Rajasthan	18565	31836	234.6	205.3
Tamil Nadu	30062	62361	379.9	402.2
Telangana	24409	48881	308.4	315.2
Uttar Pradesh	12950	19233	163.6	124.0
Uttarakhand	24726	59161	312.4	381.5
West Bengal	22649	36293	286.2	234.1
Delhi	63877	118411	807.1	763.6
Puducherry	48302	94787	610.3	611.3
India	24143	39904	305.1	257.3
Mean for 22 States	15,804.5	30144.7	199.7	194.4

Source: EPWRF On line data base available at www.epwrfits.in.

Figure 2. Indices of Spatial Inequality in India: 2004-14



2.1.3. Proximate Causal Factors of Regional Disparity:

2.1.3.1. Spatial Concentration of Manufacturing in India

The flip side of industrial growth in India is the spatial concentration of industries. In the beginning of the 1980s the top three states in terms of their share in GSDP were Maharashtra, West Bengal and Tamil Nadu (Table 4). These three states had received 56% of the industrial licenses issued between 1953 and 1961. In 1970-1 their combined share of value added in registered manufacturing was 48%. Between 1970 and 1980 there was little redistribution of value added except for the fall in the share of West Bengal (Mohan 1993). The share of these three states in total registered manufacturing was higher than their share in total NSDP in the 1970s. In other words, the spatial inequality of registered manufacturing was

probably increasing in the 1970s. It started declining in the 1980s. In 2011-12, we find that the shares of Maharashtra, Gujarat and Tamil Nadu together accounted for 47.8% of the GSDP of the major 14 states. A useful way to understand the problem of regional concentration of registered manufacturing is examine the trends in the HH index of spatial concentration.

Our measure of regional inequality is the spatial Herfindhal-Hirschman index (HH index) of concentration defined as follows:

$$HH\ Index = \sum (s_i - x_i)^2$$

Where, s_i is the output share of the i_{th} state in manufacturing and x_i is the state's share in total GDP of the country. The HH index is a relative index that measures the extent to which an individual sector (manufacturing in our case) is spatially concentrated within a country. It compares a given state's share in manufacturing output relative to its share in total economy output. The estimates of HH index for the period 1980-1 to 2011-12 are shown in Figure 3.

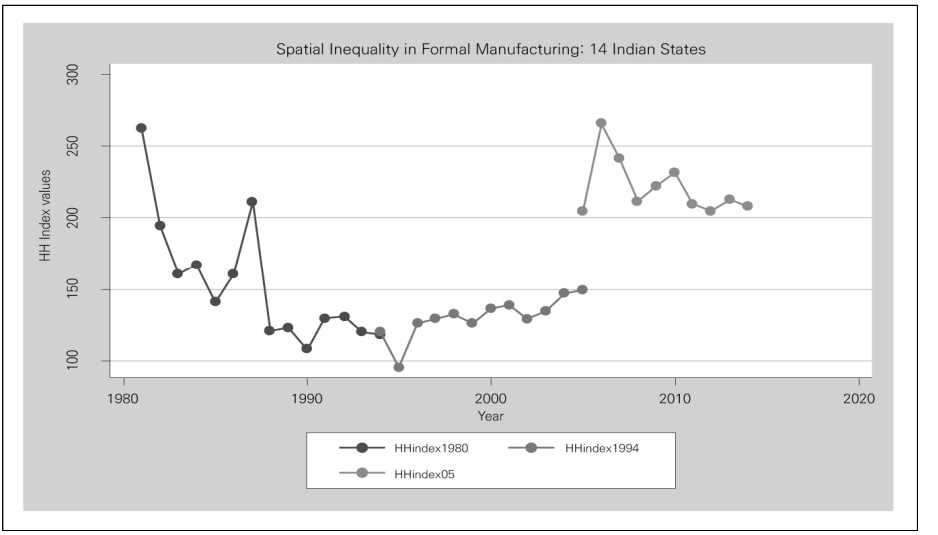
It is evident that spatial concentration of manufacturing was declining in the 1980s. The years after 1990 do not show this kind of steep falls except in the year 1994-5. Spatial concentration in Indian manufacturing clearly shows an increasing trend particularly after 1995-6. The HH index has peak value in the year 2005-06, incidentally the best year in terms of export performance. In the years after 2010, concentration index shows some decline but still remains above the levels of HH-index observed in the 1990s and in the first half of the 2000s. On this basis we might argue that spatial concentration is increasing in the post-reform years. The decline in the 1980s is an outcome of industrial decline of West Bengal in particular and stagnation of the eastern states of Bihar and Orissa. The rise in concentration may be attributed to the superior industrial performance of Gujarat, Karnataka and Haryana and the continuing dominance of Maharashtra.

Table 4. Distribution of Manufacturing GSDP by State

State*	1980-81	1993-94	2004-05	2012-13
Punjab	2.9	3.9	2.8	4.1
Maharashtra	27.7	24.0	22.5	22.1
Haryana	3.1	3.5	6.2	4.4
Gujarat	10.4	11.7	15.2	14.3
Tamil Nadu	10.5	12.1	9.3	11.4
Kerala	3.0	2.0	2.0	2.1
Karnataka	5.3	5.6	7.5	6.4
Andhra Pradesh	4.7	7.0	7.0	7.1
West Bengal	11.4	5.8	4.2	4.5
Madhya Pradesh	5.5	6.0	5.7	3.1
Rajasthan	2.3	2.6	3.2	5.2
Uttar Pradesh	6.2	8.8	7.6	9.6
Orissa	1.9	1.9	2.3	2.3
Bihar	5.1	5.1	4.6	3.2
Above 14 States	100	100	100	100

Note: States in descending order of per capita GSDP in 1993-94.
Source: Estimates Based on EPWRF (2009) and EPWRF on line data base available at http://www.epwrfits.in/.

Figure 3. Index of Spatial Inequality in Formal Manufacturing in India, 1980-2012



2.1.3.2. Employment Dimension

I have estimated the spatial concentration index mentioned above for employment distribution for selected states (Table 5). The HH index is a relative index that measures the extent to which employment in a sector is spatially concentrated within a country. It compares a given state's share in employment relative to its share in India's total employment. My estimates suggest that employment in both manufacturing and skilled labour services like business services are getting spatially concentrated. This is consistent with the estimates reported in Ramaswamy (2011).

Table 5. Employment Spatial HH index by Sector: India 2005-12

Sector	2004-05	2011-12
Manufacturing	73	128
Business services, transport and Communication	35	100

Source: NSS Employment Surveys.

2.1.3.3. Export Activity by State

Another dimension of regional economic activity would be the state-wise distribution of merchandize exports and manufacturing exports. Data presented in Table 6 and Table 7 provide evidence that manufacturing exports and merchandize exports are originating from high income states of Maharashtra, Gujarat, Tamil Nadu and Karnataka. This might be an important factor to increasing regional income inequalities in India. In short, relatively higher productivity activities seem to get located in high income states raising spatial inequality.

Table 6. Distribution of Merchandize Exports by State in India

	State	2014-15	2004-05
1	Maharashtra	23.5	32.9
2	Gujarat	19.2	15.0
3	Tamil Nadu	8.9	10.4
4	Karnataka	7.6	11.5
5	Andhra Pradesh	5.8	3.9
6	Uttar Pradesh	4.5	3.4
7	Haryana	3.6	3.2
8	Delhi	3.2	5.2
9	Wst Bengal	2.9	3.5
10	Punjab	2.2	2.4
11	Rajasthan	2.0	2.8
12	Kerala	1.3	1.9
13	Madhya Pradesh	1.3	2.7

Source: India stat based on Ministry of Commerce (GOI) data.

Table 7. Distribution of Manufacturing Exports by State in India

	State	1991-99	2000-08
1	Maharashtra	21.1	22.7
2	Gujarati	14.2	24.3
	Tamil Nadu	10.3	7.7
4	Karnataka	5.1	9.7
5	Andhra Pradesh	5.7	5.6
6	Uttar Pradesh	6.0	4.0
7	Haryana	4.2	2.7
8	Odisha	3.2	2.2
9	West Bengal	6.2	3.3
10	Punjab	3.3	2.2
11	Rajasthan	2.7	2.2
12	Kerala	2.4	1.7
13	Madhya Pradesh	4.7	2.8

Source: Pradhan and Das (2016).

2.1.3.4. Unbalanced Investment Trends in Manufacturing

An indirect way of supporting spatial concentration is to examine the distribution of accumulated Gross Capital Formation (GCF). GCF is estimated as the sum of investment in plant and machinery and investment in structures in the formal manufacturing sector in India, as shown in Table 8. The dominance of the five leading states, namely Gujarat, Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh, is evident. Their share in total investment in these 21 states turns out to be more than 58%. Gujarat and Maharashtra maintain their investment share leadership.

What are the forces behind this trend of increasing concentration of manufacturing? One could argue in the post-reform period private entrepreneurs gravitated towards states with relatively better infrastructure and agglomeration advantages (Lall and Chakravorty 2005). This is facilitated by the liberalization of entry of domestic

and foreign firms since 1991. Such states are invariably states that have already achieved higher levels of industrialization, production experience and industrial diversity. The history of industry in a state seems to matter more than geography. Haryana is an exception that is driven by the emergence of automobile industry in Gurgaon district and perhaps proximity to Delhi.

Table 8. Distribution of Cumulative Investment by State: 1999-2000 to 2011-12

State	Share (%)
1. Andhra Pradesh	8.0
2. Assam	0.9
3. Bihar	0.5
4. Chhattisgarh	2.8
5. Goa	0.6
6. Gujarat	17.3
7. Haryana	4.1
8. Himachal Pradesh	1.3
9. Jharkhand	3.5
10. Karnataka	8.8
11. Kerala	1.2
12. Madhya Pradesh	2.9
13. Maharashtra	15.9
14. Odisha	5.4
15. Punjab	2.9
16. Rajasthan	3.2
17. Tamil Nadu	8.5
18. Uttar Pradesh	6.2
19. Uttarakhand	2.5
20. West Bengal	3.6
Total above 20 States	100

Source: RBI (2016).

2.1.4. Education, Skill Supply and Labour Productivity

Bosworth, Collins and Virmani (2007) in their detailed study of sources of growth in India, covering the period 1960-2004, call attention to the low levels of educational attainment of the Indian population and workforce. They point out that India has recently attained an average level of schooling comparable to that achieved in other Asian countries a quarter century earlier (Bosworth, Collins and Virmani (2007), Table 8). In terms of the educational attainment of the workforce, their estimates indicate that nearly 40% of the workforce is found to be illiterates and those who have completed secondary schooling account for 14% of workers, while an additional 6% are estimated to have a university degree (Bosworth, Collins, Virmani 2007). The recent NSS surveys on education and training (NSS Report No. 517 and NSS Report No. 551 brought out by the Ministry of Statistics and Programme Implementation (MOSPI)) in 2013 points out that in India, among the persons of age of 15 years and above, only 2% had technical degrees or diplomas or certificates in 2009-10. Literates with general educational level secondary and above, including diploma/certificate course, have been considered to be educated (NSS Report 517, p. 25). The bottom five states suffer from serious shortage of educated persons. In these states only 17% are found to be educated and more seriously only 12% are found to have secondary education or higher secondary education as against the all-India average of 24% and 16% respectively. Expectedly, Karnataka, Tamil Nadu, Gujarat and Maharashtra emerge as educated states. It is reported that the growth in technical education colleges is concentrated in a few Indian States, particularly the five states of Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra and Kerala. These five states account for 31% of the country's population but 69% of engineering enrollment (Naushad 2013). In brief, high income states have been observed to have a better potential supply of educated persons.

III. Concluding Remarks

This paper discussed some aspects of spatial inequality in India in terms of differences in per capita income and employment shares between states of India in recent years of services-led growth. Measures of spatial inequality are found to have increased since 2004-05. Employment in manufacturing and services sector are found to get increasingly concentrated in relatively better-off states in terms of per capita SDP. The question is whether or not measured inequalities tend to diminish (convergence hypothesis) or accentuate (divergence hypothesis) over time. In the new economics of geography, uneven development is an outcome of the relative strengths of forces of agglomeration (centripetal forces) and forces of dispersion (centrifugal forces). Flow of more investment into a few states like Gujarat, Tamil Nadu and the continuing dominance of Maharashtra suggest that agglomeration benefits outweigh costs associated with agglomeration like rising costs of non-traded goods like power, housing for labour, congestion and competition for skilled labour. Access to infrastructure (for example transportation) electricity power (quality plus quantity) and human capital continue to be the critical determinants of manufacturing location decisions. Greater investment in infrastructure and education in the lagging regions of India are absolutely essential to reduce spatial inequality in incomes and standard of living in India. The post-reform period also facilitated the flow of foreign direct investment (FDI) into India. Available data on the number of investment proposals and the amount of FDI approved clearly indicates concentration of FDI inflows in a few states. This confirms the strengthening of unequal tendencies in the distribution of investment in the post reform period. States with initially well-developed industrial structure and production experience continue to enjoy their comparative advantage. In brief, agglomeration tendencies have not diminished with improved potential market access. Future policy formulation in India cannot afford to ignore the spatial inequality dimension in India.

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6

Expanding Private Business Space for the Marginalized Social Groups in India: Challenges for Inclusive Growth

*Partha Pratim Sahu**

I. Introduction

Of late the manufacturing sector has become a focus of attention for economists and policymakers and India's policy making is increasingly geared towards resuscitating economic growth and job creation, through this sector. New manufacturing policies, such as "Make in India," "Start up India," Special Economic Zones (SEZs), industrial corridors, "ease of doing business," labor reforms and so on are being initiated and adopted to boost industrial growth. In addition to such efforts by the Central Government, individual states are also offering incentives and promotional measures towards a conducive investment climate to attract industrial

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investment. Yet the progress has been far from satisfactory and the sector continues to struggle with a conventional set of constraints relating to skills, technology and innovation, finance, infrastructure, marketing, export, inter-firm linkages and so on. While there is voluminous literature on these facets, issues related to enterprise ownership by social groups and their implications for industrial growth and policies continue to remain one of the most under-studied areas in the Indian context.

During the last four decades the Indian economy has witnessed numerous structural changes. The notable are as follows: the contribution of agriculture to the country's gross domestic product (GDP) declines consistently while the share of the services sector has witnessed considerable increase. Although the manufacturing sector's GDP has been growing faster than the other two broad sectors, i.e. agriculture and services, its contribution to the economy's GDP, employment and exports has not shown any significant dynamism during the last four decades. The share of manufacturing to the country's GDP has remained more or less same at 15 per cent and the share of manufacturing employment to total employment has also remained same at 11 per cent during the last four decades. But the manufacturing sector in India is largely dominated by its unorganized segment.[1] The unorganized manufacturing sector, sometime referred to as the small and medium enterprises (SMEs) sector, has a critical role to play in achieving the objective of faster and more inclusive growth in India, when considering its vast employment potential and share in total industrial output and exports. At present, this sector accounts for over 90 per cent of industrial units, 40 per cent of the total manufacturing output and nearly 35 per cent of India's exports. But an issue of concern has been the perpetuation of an abysmally low level of productivity in this sector,

1) All manufacturing establishments which employ 10 or more workers and use power, and those which employ 20 or more workers without using power, are required by law to register themselves under section 2 m (i) and (ii) respectively of the Factory Act 1948 and come under the purview of Annual Survey of Industries (ASI). Thus surveys on unorganized manufacturing sector cover all the manufacturing units (i.e. units not covered by Annual Survey of Industries) and provide a large variety of estimates for the entire unregistered manufacturing sector, for the years for which these surveys were undertaken.

caused by various infirmities such as a low level of technology in use, limited access to inputs and credits and an unfavourable market environment. This paper is a modest attempt to renew the research agenda on industrial development in general and enterprise ownership in particular. For reasons of data availability, in the present paper we attempt to understand the private business space by analyzing the enterprise ownership pattern in the unorganized segment of the manufacturing sector by various social groups.[2)]

II. Issues and Reviews

Efforts towards achieving inclusive growth have been seriously challenged as some sections of the society are either being left out of or not being able to benefit adequately from the growth process. Social group identity (caste) plays an important role in shaping social and economic outcomes. In the Indian society, the Scheduled Castes (SCs) and Scheduled Tribes (STs) are mostly viewed as socially and economically under-privileged groups. These groups suffer from multiple forms of discrimination and deprivation in terms of their access to crucial markets, i.e. land, labor and credit, and also various outcomes relating to food, health, education, housing, basic amenities etc. They also often live in some of the poorest and most backward regions of the country, including areas severely affected by internal conflict and violence. Although there are several strands of protective and affirmative policies in place to alleviate and moderate discrimination against specific groups, negative

2) In the Constitution of India, the total population has been divided into four major groups: Scheduled Caste (SC), Scheduled Tribe (ST), Other Backward Castes (OBCs) and Others. The SCs and STs are designated groups of historically disadvantaged indigenous people. In official terminology SCs and STs are also termed as Dalits and Adivasis respectively. It may be noted that since 1998–99, OBCs as a group was included in various surveys conducted by the Government of India.

discrimination against lower castes continues to exist and has even escalated in some cases. There is voluminous literature on social and economic discrimination and/or social exclusion contributing to the understanding of these facets. But the role of caste-based differences in ownership within the private business economy has remained one of the most understudied areas in Indian context. To mainstream these disadvantaged groups into the growth process and thus make it more inclusive has been the key challenge for policy makers.

This paper makes an attempt to map out private enterprise ownership, drawing data from the unorganized manufacturing sector (1994–95) and Unincorporated Non-Agricultural Enterprises Survey (2010–11),[3] and highlights the characteristics of the entrepreneurship by social groups, given the limitations of each data set.[4] It departs from existing literature on the issue by an expanded empirical framework including data from more than one source, unlike previous studies, which are based only on one data source, largely the Economic Census.[5] Most of the earlier studies have taken "region" as the unit of study, but we have attempted industry-wise analysis. We have focused here mainly on the caste-based exclusion, especially of the Scheduled Castes, and of Scheduled Tribes. This paper obtains some interesting

3) Non-agricultural enterprises which are not incorporated (i.e. registered under the Companies Act, 1956) were covered in the survey. Further, the domain of "unincorporated enterprises" excluded (a) enterprises registered under Sections 2m(i) and 2m(ii) of the Factories Act, 1948 or bidi and cigar manufacturing enterprises registered under bidi and cigar workers (condition of employment) Act, 1966, (b) government/public sector enterprises and (c) cooperatives. Thus the coverage was restricted primarily to all household proprietary and partnership enterprises. In addition, Self Help groups (SHGs), Private Non-Profit Institutions (NPIs) including Non-Profit Institutions Serving Households (NPISH) and Trusts were also covered (NSSO 2012).

4) It may be noted that the National Sample Survey Office (NSSO) responsible for collecting data on unorganised manufacturing sector has discontinued collecting data on unorganized manufacturing and services enterprises (since 2005–06 and 2006–07 respectively) separately and started collecting data on "non-agricultural enterprises" including both manufacturing and services enterprises in one combined survey. But it may be noted that surveys on unorganized manufacturing and those of unincorporated non-agricultural enterprises are not strictly comparable.

5) The Economic Census provides economy-wide data covering all sectors/activities and types of units (except crop production and plantation).

results which have important policy implications. The analysis also opens up a rich research agenda, including further investigation of various issues to understand better the continuing discrimination and exclusion of certain groups.

The SCs and STs together account for a quarter of the India's population. While between 1991 and 2001 there was no change in their share, the latest available census estimate indicates a rise. The share of the SCs and STs population increased from 24.6 in 1991 to 25.2 in 2011. These groups are more concentrated in rural areas. The SCs and STs population often lives in some of the poorest and most backward regions of the country, including areas severely affected by internal conflict and violence. To provide equal opportunities to all its citizens in social, political and economic spheres various provisions have been made in the Constitution of India. In addition, there are policies, initiatives, preferential treatments to overcome institutionalized caste-based deprivations. These policies include reserved positions in jobs and access to higher education, exclusive or subsidized allocation of resources and benefits. One may argue that over the years, some sections of the tribal population might have benefited from various policies and witnessed some improvements in their situation, but various forms of discrimination and relative deprivation continue to remain in our society. Moreover, we could have new disadvantageous castes emerging as dominant in several pockets of rural India. Recent studies extensively document various dimensions of discrimination and exclusion in land, job, credit, health, education, housing, basic amenities and other public services (World Bank 2011; Harriss-White and Prakash 2010; Thorat 2002; Desai and Dubey 2011; Pal 2016; Kumar 2013).

Several researchers have attempted to understand the process and factors that block or resist business participation by specific communities (Harriss-White, Vidyarthee and Dixit 2014; Deshpande and Sharma 2013, 2015; Vidyarthee 2011, 2015). Urbanization, education, assets (landholdings), social networks, access to information etc. have been used as explanatory variables to explain Dalit participation in private business economy (Murphy 2006,[6]) as cited in Harriss-White and Vidyarthee 2010). The SCs and STs are often constrained to start any new business due to

limited resources, inadequate entrepreneurial abilities and lack of social networks and most of them end up in activities similar to their family/parental business (Jodhka 2010).[7] Marketing obstacles further restrict the possibility to start up a new venture and/or scale up the existing ones. Limited participation in business activities also obstructs the possibilities of skill formation and upward mobility. All these factors offer a substantive basis for policy recommendations.

III. Policies, Programs and Interventions

India has a long history of state-led policies and programs to support and promote the industrial sector in general and the small enterprises sector, in particular. These policies include fiscal and tax incentives, credit and financial incentives such as the priority sector lending, grants and subsidies and infrastructure assistance in the form of industrial estates and promotion of industrial clusters. Besides these, the Government of India also has schemes for entrepreneurial and managerial development, marketing support, export promotion, skill development and technology up-gradation programs.[8] Specifically, to promote entrepreneurship there is an elaborate institutional set up with various programs towards skill development, vocational education and training. For instance, an entrepreneurship development scheme is currently being developed by the Ministry of Skill Development and Entrepreneurship to educate

6) Murphy, C. (2006). The Power of Caste Identity in Private Enterprise Ownership, M. Sc. thesis in Economics and Development, Oxford University.

7) The study further pointed out that 41 per cent of the surveyed respondents started their business with the initial investment of less than Rs. 25,000/-, raising funds mainly from own savings; these enterprises were also found to be operating at a very low scale; a significant proportion of them reported annual turnover below Rs. 1 lakh.

8) For detailed discussion see various issues of SIDBI Report on Micro, Small and Medium Enterprises Sector; Annual Reports of the Ministry of Micro, Small and Medium Enterprises, Government of India.

and equip potential and early-stage entrepreneurs across India, to connect entrepreneurs to peers, mentors, incubators, to support entrepreneurs through Entrepreneurship Hubs, to catalyse a culture shift to encourage entrepreneurship, to encourage entrepreneurship among underrepresented groups, to promote entrepreneurship amongst women and to foster social entrepreneurship and grassroots innovations (Govt. of India 2015). The Rajiv Gandhi Udyami Mitra Yojana (RGUMY) under the Ministry of Micro, Small and Medium (MSME) aims to provide handholding support and assistance to the potential first generation entrepreneurs. It also provides assistance to deal with various procedural and legal hurdles and in completion of various formalities required to set up new enterprises and run existing ones. Many of the entrepreneurship development and training programs are tailor-made for target groups such as SCs and STs. These programs are also specially conducted in rural or less-developed areas and no fees are charged from SCs and STs.

In addition, there are several employment generation and anti-poverty programs initiated by the State and Central Government to promote self-employment and entrepreneurship through provision of assets, skills and other support to the unemployed and the poor. In many of these programs, like Prime Minister's Rozgar Yojana (PMRY), Swarnjaynti Gram Swarojgar Yojana (SGSY), Swarna Jaynti Shahari Rozgar Yojana (SJSRY) and so on, a specific share of the total target is exclusively earmarked for SCs and STs. To have an exclusive focus on the economic upliftment of SCs and STs and to support and supplement the efforts of other Central Ministries, the State Governments and voluntary organizations, the Ministry of Social Justice and Empowerment and Ministry of Tribal Affairs administer various programs and schemes.[9] At the state level as well many initiatives are undertaken, such as providing free plots, loans at subsidized interest rates, relaxations in lending norms for term loans, providing training programs etc. to empower the entrepreneurs of the SCs- and STs-communities. The large private corporate sector, as a part of Corporate Social Responsibility (CSR), has envisaged steps for the creation of entrepreneurs

9) For a complete coverage of schemes and policies see Annual Reports of these ministries.

from SCs and STs (FICCI, 2006; CII-ASSOCHAM, 2007).[10] These include maintaining a database of entrepreneurs belonging to SCs and STs, providing mentoring in quality control, productivity and cost standards, ensuring greater access to capital, facilitating business partnership with enterprises owned and promoted by SCs and STs, collaborating with SIDBI, NABARD[11] for creation of entrepreneurs from SCs and STs and so on. Thus various government ministries and industry associations have been endeavouring to improve their participation in business, but there is no evidence of any visible improvement. However, no systematic evaluation of these policies and provisions has been undertaken.

IV. Enterprise Ownership: The Aggregate Scenario

There are multiple data sources providing information on business ownership by social groups. But irrespective of data sources, the SCs and STs own a disproportionately low share (as compared to their population weight) and their share has not also not shown any increase over the years. Participation by SCs and STs in unorganized services enterprises is higher than that in manufacturing enterprises. In 2006-07, about 16.20 per cent and 3.50 per cent of unorganised services enterprises were owned by SCs and STs respectively. The latest available enterprise survey, that of 2010–11, indicates that SCs and STs own 13.40 and 4.00 per cent of unincorporated non-agricultural enterprises respectively, which includes both manufacturing and services enterprises (Table 1).

10) The Federation of Indian Chambers of Commerce and Industry (FICCI); The Confederation of Indian Industry (CII); The Associated Chambers of Commerce of India (ASSOCHAM).

11) Small Industry Development Bank of India (SIDBI) and National Bank for Agriculture and Rural Development (NABARD).

Table 1. Proportion of Enterprises Owned by Various Social Groups (%): Alternative Data Sources

	% share in total population					
	Survey Year	No. of Units in Million	SCs	STs	SCs + STs	Others*
1	2	3	4	5	6 = 4+5	7
% share in total population	2011 Census		16.6	8.6	25.2	74.8
Segment/Data Sources	% of enterprises owned by					
Economic Census, CSO	1998	30.35	7.69	3.97	11.66	88.34
	2005	41.83	8.82	3.64	12.46	87.54
Unorganized manufacturing, NSSO	1994–95	14.29	19.81	9.24	29.05	70.95
Unorganized services, NSSO	2001–02	14.28	16.10	2.60	18.70	81.30
	2006–07	15.15	16.20	3.50	19.70	80.20
All India Census of Small Scale Industries, DCMSME	1987–88	0.58	6.84	1.70	8.54	91.46
	2001–02	10.52	10.00	4.97	14.97	85.04
	2006–07	26.10	11.27	5.09	16.37	83.63
Unincorporated non-agricultural (Manufacturing) enterprises, NSSO	2010–11	17.19	13.40	4.00	17.40	82.60

Note: i) Others include OBCs and all other castes.
ii) The "not recorded cases" have been excluded from the analysis.
Source: Author's own compilations based on NSSO, 1998, 2003, 2009 and 2012; DCSSI, 1992, 2004; DCMSME, 2011; CSO, 2001, 2006.

4.1. Ownership pattern by type of enterprise, 1994–95

About 30 per cent of unorganized household enterprises were owned by SCs and STs together. SCs owned 22.05, 7.18 and 6.18 per cent of enterprises in OAMEs, NDMEs and DMEs segment respectively. This implies that the proportion of SCs-owned enterprises declines as we move in the scale ladder from tiny to big-sized enterprises. The scale disadvantages operate both in rural and urban areas and

also hold true for STs as well. STs owned about 11 per cent in OAMEs and 2 per cent each of NDMEs and DMEs (Table 2 and Figure 1). A significantly large proportion of SCs- and STs-owned enterprises were located in rural areas and of the tiniest size, i.e. OAMEs. Most of these OAMEs also operate inside the household premises, leading to all kinds of problems arising out of conflict between the workplace and living place. Thus with limited access to capital, skill and training, market and lack of entrepreneurial abilities, these groups not only fail to start bigger enterprises but also are constrained from scaling up their existing businesses. The available statistics, however, do not say whether these are ancestral businesses or their present owners are first-generation entrepreneurs.

Table 2. Distribution of Household Enterprises by Social Group of the Owner: 1994-95

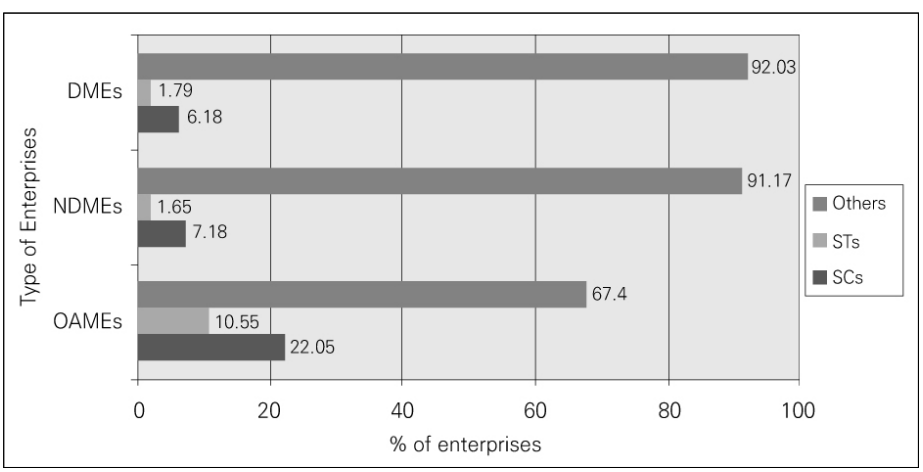
Type and Location	% of enterprises owned by				Distribution across type & location		
	SCs	STs	Others	All	SCs	STs	Others
1	2	3	4	5	6	7	8
OAMEs							
Rural	24.13	12.86	63.01	100.0	80.86	92.40	58.97
Urban	14.72	2.40	82.88	100.0	14.00	4.89	22.00
Total	22.05	10.55	67.40	100.0	94.86	97.30	80.97
NDMEs							
Rural	9.98	2.84	87.18	100.0	2.19	1.34	5.34
Urban	5.25	0.83	93.91	100.0	1.67	0.57	8.35
Total	7.18	1.65	91.17	100.0	3.86	1.90	13.69
DMEs							
Rural	8.69	3.51	87.79	100.0	0.84	0.73	2.36
Urban	4.01	0.31	95.69	100.0	0.45	0.07	2.98
Total	6.18	1.79	92.03	100.0	1.28	0.80	5.34

Table 2. Continued

Type and Location	% of enterprises owned by				Distribution across type & location		
	SCs	STs	Others	All	SCs	STs	Others
All							
6Rural	22.88	12.02	65.11	100.0	83.88	94.46	66.66
Urban	11.67	1.87	86.46	100.0	16.12	5.54	33.34
Total	19.81	9.24	70.95	100.0	100.0	100.0	100.0

Note: Others include OBCs and other general/higher castes.
Source: Author's own estimates based on unit level data on unorganized manufacturing sector, 1994-95.

Figure 1. Ownership Pattern across Social Groups by Type of Enterprise in the Unorganized Manufacturing Sector: 1994-95 NSS Data



4.2. Industry-wise analysis

The share of enterprises owned by SCs and STs also vary significantly across industry groups. An analysis at two-digit level of industrial classification suggests

that in leather, wood products, jute products, wearing apparel and repair services the share of SCs-owned enterprises was high, while in beverages and tobacco, wood products, wearing apparel and basic metal and alloys that of STs was high (Table 3). Enterprises in leather and its products were largely owned and managed by SCs, but their presence across type of enterprise varied significantly; SCs own 90, 47 and 29 per cent of leather-manufacturing units in OAMEs, NDMEs and DMEs segments respectively.

So it is interesting to note that as the scale of operation increases, the share of enterprises owned by SCs decreases. It also seems that SCs move in product lines of their hereditary occupations. In every industry group, the share of SCs-owned enterprises was high as compared to that of STs, irrespective of type and location of enterprises (Table 3). The SCs- and STs- owned enterprises were limited to very few select manufacturing activities in the unorganized manufacturing sector. Moreover, those enterprises were largely in traditional industry groups where the production process is highly labor-intensive.

Table 3. Top Five Industry Groups in Terms of Share Enterprises Owned by SCs and STs

Type and locale of enterprises	NIC	Description	Share of SCs-owned Enterprises	NIC	Description	Share of STs-owned Enterprises
1	2	3	4	5	6	7
OAMEs	29	Leather and Products of Leather	88.22	38	Other Manufacturing Industries	34.59
	27	Wood and Wood Products	35.16	22	Beverages and Tobacco	19.60
	37	Transport Equipment and Parts	27.28	27	Wood and Wood Products	13.47
	25	Jute and Other Vegetable Fibre Textiles	26.54	33	Basic Metal and Alloys Industries	10.90

Table 3. Continued

Type and locale of enterprises	NIC	Description	Share of SCs-owned Enterprises	NIC	Description	Share of STs-owned Enterprises
1	2	3	4	5	6	7
OAMEs	97	Repair Services	23.96	26	Textile and its Products	9.45
NDMEs	29	Leather and Products of Leather	46.94	22	Beverages and Tobacco	4.13
	26	Textile and its Products	18.65	32	Non-Metallic Mineral Products	3.33
	31	Rubber, Plastic, Petroleum and Coal Products	12.77	26	Textile and its Products	2.80
	32	Non-Metallic Mineral Products	9.68	20	Food and food products	2.43
	23	Cotton and Related Products	9.49	27	Wood and Wood Products	2.29
DMEs	29	Leather and Products of Leather	28.72	22	Beverages and Tobacco	9.35
	32	Non-Metallic Mineral Products	10.71	27	Wood and Wood Products	6.47
	22	Beverages and Tobacco	10.61	32	Non-Metallic Mineral Products	4.19
	23	Cotton and Related Products	9.89	97	Repair Services	1.31
	26	Textile and its Products	9.29	39	Repair of Capital Goods	0.95
Rural	29	Leather and Products of Leather	93.47	38	Other Manufacturing Industries	51.08
	27	Wood and Wood Products	34.69	33	Basic Metal and Alloys Industries	24.00

Table 3. Continued

Type and locale of enterprises	NIC	Description	Share of SCs-owned Enterprises	NIC	Description	Share of STs-owned Enterprises
1	2	3	4	5	6	7
Rural	97	Repair Services	28.75	22	Beverages and Tobacco	22.75
	36	Machinery and non-machinery parts	28.11	27	Wood and Wood Products	13.85
	26	Textile and its Products	23.89	26	Textile and its Products	10.26
	29	Leather and Products of Leather	93.47	38	Other Manufacturing Industries	51.08
	27	Wood and Wood Products	34.69	33	Basic Metal and Alloys Industries	24.00
	97	Repair Services	28.75	22	Beverages and Tobacco	22.75
	36	Machinery and non-machinery parts	28.11	27	Wood and Wood Products	13.85
	26	Textile and its Products	23.89	26	Textile and its Products	10.26
Urban	29	Leather and Products of Leather	60.03	27	Wood and Wood Products	6.11
	27	Wood and Wood Products	24.75	32	Non-Metallic Mineral Products	3.98
	30	Basic Chemicals and Chemical Products	19.09	39	Repair of Capital Goods	3.49
	37	Transport Equipment and Parts	14.30	22	Beverages and Tobacco	2.50
	97	Repair Services	13.47	33	Basic Metal and Alloys Industries	2.36

Note: Industry codes and description are based on National Industrial Classification (NIC) 1987. See Appendix 1.

Source: Author's own estimates based on unit level data on unorganized manufacturing sector, 1994–95.

Their presence in capital-intensive/non-agro-based industry groups is negligible, as to start an enterprise in these sectors seems to require a high degree of skill and training and also a bigger amount of investment. There are also significant rural-urban variations. Even within the same product line, the share of SCs- and STs-owned enterprises were higher in rural areas as compared to urban areas. The urban areas seem to pose a greater degree of entry barriers for the tribal entrepreneurs. Both scale and locational attributes thus operate adversely for these groups to participate in the private business economy.

The industry-wise distribution of SCs- and STs- owned enterprises was highly skewed and unevenly distributed across industry groups with a few of these accounting for a disproportionate share (Table 4). Four to five industry groups such as wood and wood products, beverages and tobacco, textile products and wearing apparels, repair services and so on accounted for more than 70 per cent in each category. This pattern holds true not only in rural and urban areas but also for three segments of the unorganized manufacturing sector, i.e. OAMEs, NDMEs and DMEs. But the concentration of STs-owned enterprises was more skewed than that of SCs-owned enterprises.

Table 4. Industry-wise Distribution of SCs- and STs- Owned Enterprises (%): Top Five

Type and locale of enterprises	NIC	Description	Share of industry in total SCs owned enterprises	NIC	Description	Share of industry in total STs owned enterprises
1	2	3	4	5	6	7
OAMEs	27	Wood and Wood Products	34.68	27	Wood and Wood Products	27.77
	97	Repair Services	13.52	38	Other Manufacturing Industries	27.70
	22	Beverages and Tobacco	7.96	22	Beverages and Tobacco	19.57

Table 4. Continued

Type and locale of enterprises	NIC	Description	Share of industry in total SCs owned enterprises	NIC	Description	Share of industry in total STs owned enterprises
1	2	3	4	5	6	7
OAMEs	26	Textile and Textile Products	7.22	26	Textile and Textile Products	6.74
	20	Food and Food Products	6.06	20	Food and Food Products	3.95
	Total of top five		69.45	Total of top five		85.74
	All Total		100.0	All Total		100.0
NDMEs	26	Textile and Textile Products	16.47	20	Food and Food Products	26.26
	97	Repair Services	14.87	27	Wood and Wood Products	16.09
	27	Wood and Wood Products	14.75	97	Repair Services	14.90
	20	Food and Food Products	10.80	26	Textile and Textile Products	10.75
	29	Leather and Products of Leather	10.48	22	Beverages and Tobacco	8.30
	Total of top five		67.37	Total of top five		76.30
	All Total		100.0	All Total		100.0
DMEs	26	Textile and Textile Products	18.26	22	Beverages and Tobacco	45.66
	22	Beverages and Tobacco	15.03	27	Wood and Wood Products	19.09
	32	Non-Metallic Mineral Products	13.18	32	Non-Metallic Mineral Products	17.78
	23	Cotton and Related Products	11.72	26	Textile and Textile Products	4.54
	29	Leather and Products of Leather	10.46	20	Food and Food Products	3.31

Table 4. Continued

Type and locale of enterprises	NIC	Description	Share of industry in total SCs owned enterprises	NIC	Description	Share of industry in total STs owned enterprises
1	2	3	4	5	6	7
DMEs	Total of top five		68.65	Total of top five		90.38
	All Total		100.0	All Total		100.0
Rural	27	Wood and Wood Products	35.52	38	Other Manufacturing Industries	28.10
	97	Repair Services	10.78	27	Wood and Wood Products	27.00
	26	Textile and Textile Products	8.56	22	Beverages and Tobacco	20.15
	22	Beverages and Tobacco	8.14	26	Textile and Textile Products	7.00
	20	Food and Food Products	6.50	20	Food and Food Products	4.30
	Total of top five		69.50	Total of top five		86.55
	All Total		100.0	All Total		100.0
Urban	97	Repair Services	27.12	27	Wood and Wood Products	35.53
	27	Wood and Wood Products	23.06	97	Repair Services	14.71
	29	Leather and Products of Leather	11.32	22	Beverages and Tobacco	9.55
	22	Beverages and Tobacco	6.11	38	Other Manufacturing Industries	7.76
	38	Other Manufacturing Industries	5.79	32	Non-Metallic Mineral Products	5.78
	Total of top five		73.40	Total of top five		73.33
	All Total		100.0	All Total		100.0

Note: Industry codes and description are based on National Industrial Classification (NIC) 1987. See Appendix 1.
Source: The same as in Table 3.

Of the top five industry groups (in terms of incidence as well as weight of tribal entrepreneurship) about three are common for both SCs and STs. But in addition to caste, other factors such as education, household net income, parental entrepreneurship and inter-generational business links are also crucial determinants of the incidence and pattern of entrepreneurship among SCs and STs. There is a need to make an effort in understanding some of these processes that compel these groups to operate at a lower scale and in limited product groups.

V. Ownership Pattern by Type of Enterprise, 2010–11[12)]

Let us now turn to the latest available enterprise survey on un-incorporated non-agricultural enterprises (2010–11) data, which provides information on both manufacturing and service sector enterprises. In the rural OAEs segment SCs and STs owned 16.50 and 6.54 per cent of total enterprises. So far as the rural establishments are concerned SCs and STs owned 8.16 and 4.23 per cent of enterprises. As we move to urban areas the share of enterprises owned by SCs and STs are lower when compared to rural areas (Table 5). In the manufacturing segment, SCs and STs owned 17.17 and 7.43 per cent of rural OAEs enterprises. In bigger size enterprises, i.e. in the establishment segment, their proportions were 8.56 and 3.93 respectively.

12) OAEs and establishments are the two types of enterprises covered in this survey. Own-account Enterprise: An enterprise which is run without any hired workers employed on a fairly regular basis is termed as an own account enterprise. Establishment: An enterprise which is employing at least one hired worker on a fairly regular basis is termed as establishment. Paid or unpaid apprentices, paid household member/servant/resident worker in an enterprise are considered as hired workers (NSSO 2012).

Table 5. Proportion of Enterprises Owned by Various Social Groups (%): 2010–11

% of enterprise owned by	All Enterprises*			
	Rural		Urban	
	OAEs	Establishments	OAEs	Establishments
1	2	3	4	5
SCs	16.50	8.16	12.69	4.75
STs	6.54	4.23	1.61	0.81
OBCs	47.18	46.02	44.21	36.77
Others	29.78	41.59	41.49	57.68
All	100	100	100	100
% of enterprise owned by	Manufacturing			
	OAEs	Establishments	OAEs	Establishments
SCs	17.17	8.56	10.95	5.47
STs	7.43	3.93	1.61	0.91
OBCs	47.69	47.53	51.96	43.77
Others	27.71	39.98	35.48	49.85
All	100	100	100	100

Note: * All enterprises include manufacturing, trade and other services. We have excluded "Not recorded" cases from our analysis.
Source: Author's own estimates based on unit level data on Unincorporated Non-agricultural Enterprises, 2010–11.

Let us now focus only on the manufacturing segment of the un-incorporated non-agricultural enterprises sector. The share of enterprises owned by SCs and STs also vary significantly across industry groups. An analysis at two-digit level of industrial classification suggests that in the OAEs segment in leather, wood products, tobacco products, non-metallic mineral products and chemical products the share of SCs-owned enterprises was high. Similarly, in beverages, basic metals, pharmaceuticals, wood products, STs-owned enterprises accounted for a high share (Table 6).

Table 6. Top Five Industry Groups in terms of Share Enterprises Owned by SCs and STs

Type and locale of enterprises	NIC	Description	Share of SCs-owned enterprises	NIC	Description	Share of STs-owned enterprises
1	2	3	4	5	6	7
OAEs	15	Leather	56.26	11	Beverage	68.10
	16	Wood & wood products	30.56	24	Basic Metals	30.27
	23	Other non metallic	17.78	16	Wood & wood products	16.23
	12	Tobacco	16.78	21	Pharmaceuticals	13.73
	20	Chemical products	14.10	25	Fabricated Metal	6.64
Establish ments	15	Leather	21.28	11	Beverage	22.52
	14	Wearing apparel	9.40	24	Basic Metals	7.09
	31	Furniture	9.33	17	Paper & paper products	6.52
	23	Other non metallic	9.23	31	Furniture	3.41
	16	Wood & wood products	9.03	23	Other non metallic	3.21
Rural All	15	Leather	74.90	11	Beverage	69.70
	16	Wood & wood products	31.03	16	Wood & wood products	17.32
	12	Tobacco	17.59	24	Basic metals	13.10
	13	Textiles	16.00	21	Pharmaceuticals	10.78
	23	Other non-metallic	15.42	30	Other transport equipments	9.00
Urban All	15	Leather	37.10	24	Basic Metals	28.48
	16	Wood & wood products	18.22	11	Beverage	16.10
	23	Other non metallic	16.12	16	Wood & wood products	5.81
	12	Tobacco	12.71	17	Paper & Paper products	3.13
	14	Wearing apparel	11.37	22	Rubber & Plastics	2.13

Note: Industry codes and description are based on National Industrial Classification (NIC) 2008. See Appendix 2.

Source: Author's own estimates based on unit level data on Unincorporated Non-agricultural Enterprises, 2010–11.

Enterprises in leather and its products were largely owned and managed by SCs, but their presence across type of enterprise varied significantly. SCs owned 56.26 and 21.28 per cent of leather-manufacturing units in the OAEs and establishment segments respectively, while owning 74.90 and 37.10 per cent of leather-manufacturing units in rural and urban areas respectively. Both locational and scale factors are at work. As we have observed in the foregoing analysis, as the scale of operation increases, the share of enterprises owned by SCs decreases as well. It also seems that SCs continue to operate in product lines of their hereditary/ancestral occupations.

In a large number of industry groups, the share of SCs-owned enterprises was high as compared to that of STs, irrespective of type and location of enterprises (Table 6). However, the SCs- and STs-owned enterprises were limited to very few select manufacturing activities in the un-incorporated manufacturing sector. Moreover, those enterprises were largely in traditional industry groups with highly labor-intensive production process. Their presence in capital-intensive/non-agro-based industry groups is negligible. To start or run enterprises in these sectors seems to require a high degree of skill and training and also large amount of investment. There are also significant rural-urban variations. Even within the same product line, the share of SCs- and STs-owned enterprises was higher in rural areas as compared to urban areas. Over the years, the urban areas seem to pose a greater degree of entry barriers for the tribal entrepreneurs. Both scale and locational attributes thus operate adversely for these groups to participate in the private business economy.

As we have seen in the unorganized manufacturing sector, in the un-incorporated manufacturing segment as well the industry-wise distribution of SCs- and STs-owned enterprises was highly skewed and unevenly distributed across industry groups (Table 7). Four to five industry groups such as wearing apparels, wood and wood products, beverages, tobacco products, textile products, food products etc., accounted for more than 70 per cent in each category. This pattern holds true not only in the OAEs and establishments segments but also in rural and urban locations. But the concentration of STs-owned enterprises was more skewed than that of SCs-owned enterprises. Of the top five industry groups (in terms of incidence as well as weight

of tribal entrepreneurship) about three are common for both SCs and STs. To explain such a pattern, besides castes there are other factors at work such as education, household net income, parental entrepreneurship and inter-generational business links. These are issues which require more dis-aggregated level analysis.

Table 7. Industry -wise Distribution of SCs- and STs- Owned Enterprises (%): Top Five

Type and locale of enterprises	NIC	Description	Share of industry in Total SCs owned enterprises	NIC	Description	Share of Industry in Total STs owned enterprises
1	2	3	4	5	6	7
OAEs	14	Wearing Apparel	24.55	16	Wood & Wood products	30.53
	16	Wood & Wood products	20.31	11	Beverages	16.86
	12	Tobacco	17.28	14	Wearing Apparel	13.69
	13	Textiles	13.19	10	Food Products	10.68
	10	Food Products	7.70	12	Tobacco	10.31
	Total of top five		83.04	Total of top five		82.08
	All Total		100.0	All Total		100.0
Establishments	14	Wearing Apparel	25.42	10	Food Products	19.74
	10	Food Products	12.26	14	Wearing Apparel	12.84
	31	Furniture	9.42	31	Furniture	11.55
	13	Textiles	9.00	11	Beverages	10.06
	16	Wood & Wood products	8.12	23	Other Non metallic	9.04
	Total of top five		64.22	Total of top five		63.23
	All Total		100.0	All Total		100.0
Rural All	16	Wood & Wood products	23.49	16	Wood & Wood products	30.36
	14	Wearing Apparel	20.39	11	Beverages	18.09
	12	Tobacco	18.99	14	Wearing Apparel	12.51
	13	Textiles	13.40	10	Food Products	12.02

Table 7. Continued

Type and locale of enterprises	NIC	Description	Share of industry in Total SCs owned enterprises	NIC	Description	Share of Industry in Total STs owned enterprises
1	2	3	4	5	6	7
Rural All	10	Food Products	8.82	12	Tobacco	9.86
	Total of top five		85.08	Total of top five		82.83
	All Total		100.0	All Total		100.0
Urban All	14	Wearing Apparel	35.27	14	Wearing Apparel	21.00
	13	Textiles	11.57	16	Wood & Wood products	19.66
	16	Wood & Wood products	9.17	24	Basic Metals	10.98
	32	Other manufacturing	8.64	12	Tobacco	8.59
	12	Tobacco	8.47	10	Food Products	6.02
	Total of top five		73.11	Total of top five		66.24
	All Total		100.0	All Total		100.0

Note: Industry codes and description are based on National Industrial Classification (NIC) 2008. See Appendix 2.
Source: Author's own estimates based on unit level data on Unincorporated Non-agricultural Enterprises, 2010–11.

VI. Performance Differences

Several key structural ratios must be considered to explain the performance differences between the enterprises owned by SCs and STs and those by other castes. Standard structural coefficients such as per worker productivity and capital-labor ratio provide considerable insights about the relative efficiency of enterprises. The share of enterprises owned by SCs and STs is not only low but also the returns to these enterprises are low as compared to those owned by higher castes.

Table 8. Share of Principal Characteristics by Social Group/Caste of the Owner: 2010–11

Locale	Type of enterprises	% share in enterprises					% share in workers				
		SCs	STs	OBCs	Others	All	SCs	STs	OBCs	Others	All
1	2	3	4	5	6	7	8	9	10	11	12
Rural	OAEs	17.17	7.43	47.69	27.71	100	17.54	8.16	47.77	26.54	100
	Establishments	8.56	3.93	47.53	39.98	100	6.54	2.86	42.40	48.20	100
	All	16.34	7.09	47.68	28.89	100	14.40	6.65	46.24	32.71	100
Urban	OAEs	10.95	1.61	51.96	35.48	100	10.80	1.69	53.29	34.21	100
	Establishments	5.47	0.91	43.77	49.85	100	4.76	0.84	41.88	52.52	100
	All	9.57	1.43	49.89	39.11	100	7.60	1.24	47.25	43.90	100
All	OAEs	14.89	5.29	49.26	30.56	100	15.06	5.78	49.80	29.36	100
	Establishments	6.56	1.97	45.09	46.38	100	5.44	1.61	42.08	50.88	100
	All	13.55	4.76	48.59	33.10	100	11.22	4.11	46.71	37.96	100
		% share in Gross value added					% share in Fixed assets				
		SCs	STs	OBCs	Others	All	SCs	STs	OBCs	Others	All
Rural	OAEs	14.85	6.04	53.10	26.02	100	14.12	4.26	54.03	27.59	100
	Establishments	5.99	1.92	43.10	48.99	100	3.21	1.07	41.08	54.64	100
	All	10.68	4.10	48.39	36.83	100	8.36	2.58	47.20	41.86	100
Urban	OAEs	8.76	1.19	54.83	35.21	100	7.51	0.74	53.75	38.00	100
	Establishments	4.05	0.84	40.62	54.49	100	3.23	0.54	38.03	58.19	100
	All	5.41	0.94	44.72	48.93	100	4.67	0.61	43.31	51.41	100
All	OAEs	11.91	3.70	53.94	30.45	100	9.76	1.94	53.84	34.46	100
	Establishments	4.59	1.14	41.31	52.95	100	3.23	0.66	38.72	57.39	100
	All	7.35	2.11	46.07	44.47	100	5.66	1.14	44.36	48.84	100

Source: Author's own estimates based on unit level data on Unincorporated Non-agricultural Enterprises, 2010–11.

In 2010–11, SCs owned and managed 13.55 per cent of enterprises, which accounted for 11.22 per cent of employment but just 7.35 per cent of gross value added and 5.66 per cent of fixed assets. Similarly, STs owned and managed 4.76 per cent of enterprises, which accounted for 4.11 per cent of employment, 1.14 per cent of fixed capital and nearly 2 per cent of share in gross value added (Table 8). In terms of all variables, even within SCs- and STs-owned enterprises, the share significantly varies as we move from OAEs to establishments and also from rural to urban areas. In the establishments segments the shares owned by SCs and STs are lower as compared to OAEs. Similarly, SCs and STs owned and managed a higher share of enterprises as compared to their urban counterparts. This pattern also holds true for fixed capital and gross value added as well. In both OAEs and establishments segments, a huge gap between the share in enterprises and that in other principal characteristics was observed and within each segment also there are significant gaps among different social groups. It follows from the above discussion that the ownership of enterprises by different social groups is associated with the performance indicators of an enterprise.

Table 9 provides estimates of select structural ratios both for OAEs and establishments operating in rural and urban areas. It shows that per enterprise gross value added and fixed capital are lower for the SCs- and STs-owned enterprises as compared to those owned by higher castes. This pattern holds true both in OAEs and establishments and also in rural and urban areas. It also implies that the SCs- and STs-owned enterprises possess less employment generating capacity as compared to enterprises owned by high caste (others). Levels of labor productivity (measured as gross value added per worker) and capital to labor ratios (measured as market value of fixed assets per worker) were also higher in enterprises owned by higher castes. The ratio of labor productivity in OAEs between higher caste-(others) owned enterprises and the SCs-owned was 1:0.76, while this ratio was 1:0.81 in establishment (Table 9). Similarly, the ratio of per enterprise gross value added between high caste-owned and that of SCs-owned enterprises was 1:0.80 and 1:0.61 in AOEs and establishment segments respectively.

Table 9. Select Performance Indicators across Social Group/Caste of the Owner: 2010-11

Locale	Type of enterprises	SCs	STs	OBCs	Others	All	Ratio relative to 'Others'		
							SCs	STs	OBCs
1	2	3	4	5	6	7	8	9	10
Per enterprise GVA									
Rural	OAEs	26942	25313	34692	29257	31158	0.92	0.87	1.19
	Establishments	182595	127776	236589	319688	260916	0.57	0.40	0.74
	All	34768	30759	54014	67838	53213	0.51	0.45	0.80
Urban	OAEs	40098	37230	52916	49771	50144	0.81	0.75	1.06
	Establishments	271585	338902	340433	400942	366815	0.68	0.85	0.85
	All	73514	85727	116607	162802	130106	0.45	0.53	0.72
All	OAEs	30491	26640	41742	37991	38121	0.80	0.70	1.10
	Establishments	230718	191028	301922	376298	329558	0.61	0.51	0.80
	All	46037	37569	80487	114054	84884	0.40	0.33	0.71
Per enterprise fixed assets									
Rural	OAEs	44513	31030	61327	53893	54129	0.83	0.58	1.14
	Establishments	213484	154920	491880	777904	569167	0.27	0.20	0.63
	All	53008	37614	102531	150073	103567	0.35	0.25	0.68
Urban	OAEs	124238	83277	187357	193996	181124	0.64	0.43	0.97
	Establishments	625889	630155	920149	1236329	1059015	0.51	0.51	0.74
	All	196655	171194	349686	529491	402799	0.37	0.32	0.66
All	OAEs	66023	36849	110082	113542	100702	0.58	0.32	0.97
	Establishments	436500	297298	761324	1097291	886677	0.40	0.27	0.69
	All	94787	54163	207062	334725	226817	0.28	0.16	0.62
Per worker GVA									
Rural	OAEs	18360	16042	24108	21264	21687	0.86	0.75	1.13
	Establishments	44293	32574	49172	49170	48378	0.90	0.66	1.00
	All	21718	18066	30658	32983	29294	0.66	0.55	0.93
Urban	OAEs	28233	24586	35826	35839	34820	0.79	0.69	1.00
	Establishments	65065	76544	74150	79323	76454	0.82	0.96	0.93

Table 9. Continued

Locale	Type of enterprises	SCs	STs	OBCs	Others	All	Ratio relative to 'Others'		
							SCs	STs	OBCs
1	2	3	4	5	6	7	8	9	10
Urban	All	40442	43240	53813	63381	56866	0.64	0.68	0.85
All	OAEs	20961	16959	28713	27503	26510	0.76	0.62	1.04
	Establishments	55590	46890	64612	68499	65815	0.81	0.68	0.94
	All	27667	21626	41636	49462	42216	0.56	0.44	0.84
Per worker fixed assets									
Rural	OAEs	30334	19665	42616	39171	37675	0.77	0.50	1.09
	Establishments	51786	39493	102231	119646	105532	0.43	0.33	0.85
	All	33112	22093	58197	72965	57014	0.45	0.30	0.80
Urban	OAEs	87476	54997	126845	139693	125772	0.63	0.39	0.91
	Establishments	149949	142326	200418	244598	220728	0.61	0.58	0.82
	All	108184	86349	161377	206136	176052	0.52	0.42	0.78
All	OAEs	45387	23458	75723	82197	70031	0.55	0.29	0.92
	Establishments	105172	72976	162925	199745	177075	0.53	0.37	0.82
	All	56965	31178	107112	145161	112805	0.39	0.21	0.74

Note: The levels of per worker (GVA and fixed assets) and per enterprise (GVA and fixed assets) are in Indian Rupee (per annum).
Source: Author's own estimates based on unit level data on Unincorporated Non-agricultural Enterprises, 2010–11.

Thus in terms of relative efficiency, enterprises owned by SCs and STs do not perform better than those owned and managed by OBCs and other castes. A more detailed industry-wise analysis is essential to arrive at a better understanding of the implications of castes on economic performance of micro and small enterprises. It would also be interesting to identify situations under which the conditions of these enterprises will improve. Success in reducing the performance gap between the tribal and higher caste owned enterprises will depend to a large extent on providing an enabling environment that nurtures businesses run by SCs and STs.

VII. Conclusion

Let us recapitulate the main findings of the analysis of available data. Notwithstanding the lack of systematic and comprehensive data, it is apparent that the proportion of enterprises owned and managed by SCs and STs is low as compared to higher castes and disproportionally low as compared to their share in total population. It is a little disturbing to see that, over time, their shares have not changed, even if the absolute number of total enterprises has grown enormously.

Across all data sources that we have discussed, we found that participation of SCs and STs in the private business economy is of low order and is limited to very few product lines, such as leather, beverages, textile and wearing apparels, wood and wood products and so on. The phenomenon of under-representation is amply visible across all data sources. Notwithstanding the comparability problems across data sources, we did not find any significant improvement in their participation, although there are a series of government policies and schemes as we have discussed in the third section of this paper. Further, in terms of performance indicators, the enterprises owned by SCs and STs operate less efficiently than those owned by higher caste entrepreneurs. There must be a host of constraints such as institutional, technological and marketing-related factors that hold back these enterprises to operate at the very bottom of the productivity hierarchy and from growing faster at a rising level of productivity. Undoubtedly, a more systematic and detailed probe is called for.

The existing data sets, however, cannot address these and several other aspects that need to be probed for a well-informed and fact-based policy for promotion of enterprises among SCs and STs. Therefore, several categories of information need to be either included in the existing data sources or new comprehensive data bases need to be developed. This would include, for instance, issues such as how they started and what constraints they experienced when starting and running the enterprises; how they responded to technology-intensive industrialization and growth

during the globalized regime; how they responded to the post-2008 global economic slowdown; constraints these enterprises face while operating in the domestic market and tap new markets; their access to formal institutions in credit, technology, market, skill and training and so on. To conclude, caste has been a systemic barrier for certain disadvantaged groups to participate in private business activities. To overcome these barriers, one important step would be to develop a comprehensive and policy-sensitive database focusing on disadvantaged and discriminated groups, which could be placed in the public domain, making identification and intervention more effective. Moreover, in order to supplement secondary data sources, field surveys and case studies will also need to be undertaken. Subject to these limitations, the results of this article call for more relevant data and detailed studies to better understand the continued phenomenon of under-representation, exclusion and discrimination of SCs and STs in India, who remain voiceless and confined to the marginal spaces of the formal and informal sectors of both the economy and society. The overall enabling environment relating to policies, incentive structures, and improvements in vital physical and institutional infrastructure (power, transport, and information network), access to better credit, training and skill and effective regulatory mechanism will be crucial to improve the participation by marginalized social groups in the private business economy and also scale up their existing business.

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Appendix 1

Description of manufacturing activities under the survey coverage of NSS 51st Round, 1994–95 (Based on National Industrial Classification, 1987)

NIC Code	Description
1	2
20–21	Food Products
22	Beverages, etc.
23+24+25	Cotton, Wool, Jute etc.
26	Textile Products
27	Wood Products
28	Paper Products
29	Leather Products
30	Rubber Products
31	Chemical Products
32	Non–metallic Mineral Products
33	Basic Metal Ind.
34	Metal Products
35+36	Machine tool and Elect. Machinery
37	Transport Equipment
38	Other Manufacturing
39+97+99	Repair Services

Note: Industry groups from 20 to 29 are classified as agro-based industry and the other as non-agro-based industry.

Appendix 2

Description of manufacturing activities under the survey coverage of NSS 67th Round, 2010–11 (Based on National Industrial Classification, 2008)

NIC ode	Description
1	2
10	Manufacture of food products
11	Manufacture of beverages
12	Manufacture of tobacco products
13	Manufacture of textiles
14	Manufacture of wearing apparel
15	Manufacture of leather and related products
16	Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
17	Manufacture of paper and paper products
18	Printing and reproduction of recorded media
19	Manufacture of coke and refined petroleum products
20	Manufacture of chemicals and chemical products
21	Manufacture of pharmaceuticals, medicinal chemical and botanical products
22	Manufacture of rubber and plastics products
23	Manufacture of other non-metallic mineral products
24	Manufacture of basic metals
25	Manufacture of fabricated metal products, except machinery and equipment
26	Manufacture of computer, electronic and optical products
27	Manufacture of electrical equipment
28	Manufacture of machinery and equipment N.E.C.
29	Manufacture of motor vehicles, trailers and semi-trailers
30	Manufacture of other transport equipment
31	Manufacture of furniture

NIC ode	Description
32	Other manufacturing
33	Repair and installation of machinery and equipment

Note: Industry groups from 10 to 17 are classified as agro-based industry and the other as non-agro-based industry.
N. E.C.: Not elsewhere classified.

7

Development of Key Performance Indicators and Impact Assessment for R&D Sector in Palestine

Rabeh Morrar*

Introduction

It becomes clear that a nation's economic growth depends on its capacity to educate, innovate, and compete. An investment in research and development (R&D), basic and applied, becomes the cornerstone in the flow of innovation and the increase of competitiveness in modern economics in the era of globalization and openness. R&D and innovative activities are essential to improve the economic performance at the micro and macro levels and are the main driving forces of the growth process in advanced economies. The research innovation in science offers a multi-directional solution to overcome the challenges and contribute to improving the living standards and quality of life.

In Palestine, educational and economic situations are constrained or governed mainly by the political situation. Palestine is an isolated and geographically divided

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country, and its resources are controlled and its economy is dependent on the occupation. As a consequence, the Palestinian economy is weak, unsustainable and mainly dependent on donations. However, Palestinians in the past decades have invested remarkably in human capital through education and career professionalism. Palestine is a young nation, where a large portion of the population is young and under eighteen years old. This portion is 46% in the West Bank and 61% in Gaza (UNESCO, 2014). Palestinian businesses have a reputation for professionalism and product quality. Moreover, the challenge to the occupation and the imposed hard living conditions have created a resilient, determined and innovative Palestinian community. Consequently, more and more well-educated and passionate young people are turning to entrepreneurship as a means to create their own job opportunities and improve their communities. Numerous organizations are emerging to support this trend, and many of these businesses address local gaps and needs within the community. Combined with exceptional technical talent, Palestinian entrepreneurs are the key to advancing economic development.

The subject of R&D in Palestine has gradually become more visible between researchers and policy makers in both private and public sectors, despite the fact that it is still not translated into policies and acts. This is consistent with increasing debate focusing on R&D, technology and innovation development at regional and international levels mainly to face the fast growth of globalization and competition.

Like any other economic activity in Palestine, R&D activities are affected highly by the existing political and economic instability mainly due to the Israeli occupation of the Palestinian lands, which sharply influences the business environment and makes the Palestinian economy unattractive for both local and foreign direct investment. Also, the industrial sector in Palestine grew slowly in the last two decades and Palestinian people still mainly depend on imports for most of their goods and services. Despite the increasing concern about the importance of R&D for economic development by different stakeholders in Palestine — as indicated by the number of scientific conferences and research held each year, participation of R&D personnel in international conferences, in addition to universities' interest

in research— the R&D sector still remains very small, new and does not receive sufficient attention in either the private or public sectors in Palestine. This reality is manifested in various R&D indicators.

Many of the previous studies found a direct relationship between research and the overall development of nations as well as individual firms, and also a positive influence of R&D on patents, and the number of publications and innovations (Griliches, 1984; Bound *et al.* 1984; Hall *et al.* 1986). The main purposes of this paper are to find the determinant of R&D performance and to explore the relationship between R&D activities and their output in terms of the number of research, patents, prizes and honors in the Palestinian non-private institutions. It also explores whether public funding for R&D crowds out private funds. Before the estimation of previous relationships using econometric models, we will diagnose, using descriptive statistics, the performance of R&D in Palestine based on different indicators such as R&D personnel, R&D expenditure, and R&D outcome. Part one will survey the literature about R&D in Palestine and the world. The second part describes the performance of the R&D sector in Palestine in regards to a set of indicators like the number of R&D personnel, R&D expenditure, and R&D outcomes. The third part shows the methodology for finding the determinants of R&D in terms of the number of researches and investigating the impact of R&D on patents, national and international prizes. Also, it describes the methodology for testing the crowding out effect between public and private funding for R&D. The fourth part includes the results of the empirical models and the conclusion.

1. Literature Review

For decades, technological change and innovation, driven by R&D have been the most important sources of productivity growth and increased welfare. As the

international competition grew fiercer than ever in the late 1990s, many firms have adjusted their development strategies based on R&D globalization (Reddy, 2000; Amsden, Tschang & Goto, 2001).

The general definition of R&D is introduced by Frascati Manual (OECD, 1993, paragraph 57) as follows: "Research and experimental development (R&D) compromise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture, and society, and the use of this stock of knowledge to devise new applications." He added that R&D consists of three main activities: basic research, applied research, and experimental development. Basic research is mainly the theoretical work undertaken to obtain new knowledge about phenomena and observable facts without any application works. Applied research is also an original investigation implemented to obtain new knowledge. It is oriented on a specific or particular objective. Experimental development is the systematic development of new material or products based on the knowledge obtained from research and particular experiment, new processes, systems, and services. It improves the substantiality of the existing products and services. Khurana (2006) provided that the definition of R&D includes six types of R&D activities – basic research, applied research, new product development, product adaptation and extension, product support engineering, and process engineering. The first two are normally classified as "research" and the last four as "development." Djellal *et al.* (2003) mentioned that the basic criterion for distinguishing between R&D and other related activities is that R&D necessarily includes an appreciable element of novelty and the resolution of scientific or technological uncertainty.

The relationship between R&D and economic performance at the macro and micro level has long been empirically explored by researchers since the 1960s (Mansfield, 1962; Griliches, 1986; Edquist, 2000). Sandu and Modoran (2008) studied the impact of R&D on the development of the economic productivity of Romania between 1996 and 2006 using total factor productivity as an indicator. They found a negative influence of government R&D investments on the growth of the total

productivity. Meanwhile, a highly significant positive influence is found for private investment in R&D. Sakurai *et al.* (1996) estimated the relationship between R&D and economic performance in 10 OECD countries using a pooled regression model and total factor productivity as an indicator for economic performance. Results indicated that the rate of return of both R&D variables (direct and indirect R&D) is positively significant. Johansson and Loof (2008) using a sample of 1767 manufacturing firms in Sweden, investigated how a firm's R&D strategy influences the firm performance as measured by productivity and profitability. They revealed that firms with persistent R&D activities perform better than others in regards to productivity, but occasional R&D is associated with lower performance than no R&D at all.

Regarding cooperation for R&D, there is quite an established body of literature that stresses the role of inter-firm partnership on the ability of firms to improve their learning and knowledge absorption (Gulati, 1995, 1997; Uzzi, 1997, Morrar, 2011; Morrar *et al.* 2012). Hagedoorn *et al.* (2006) explored the impact of knowledge flows in inter-firm R&D networks for 152 ICT companies in the Netherlands between 1975-1999, using patent citations as a proxy for measuring the flows of technological knowledge between companies that engaged in inter-firm R&D partnering. They found a central and efficient network positioning, and a non-negligible common knowledge with partners, fosters the mutual flow of knowledge. Lopez (2008) explores the determinants of R&D cooperation in Spain. The study focuses on the impact of information flows or spillovers on R&D cooperation. He found that cost-risk sharing is the most important determinant of R&D cooperation in Spain.

The literature reports more than one indicator to present somewhat a diverse picture to the relationship between R&D, patents, new product development and the number of citations. Many researchers found a positive and strong relationship between R&D spending and patents (Griliches, 1984; Bound *et al.* 1984; Hall *et al.* 1986). Bogner & Bansal (2007) and Cardinal & Hatfield (2000) found that firms' ability to generate inventions measured by patents is directly related to R&D spending. Hagedoorn and Duysters (2002) found a positive correlation between

R&D and patents in computer industries, and Ahuja and Katila (2001) also found a strong correlation between R&D and patents in chemical industries. However, Hitt *et al.* (1991) show a low correlation of only 0.2 between R&D intensity in US companies and their patents intensity. Peeters and Van Pottelsberghe de la Potterie (2006) found that the firms which implement more basic and applied research experience more patents and find a positive impact of R&D expenditure in the patent. Kendall *et al.* (2010) found that R&D spending is positively correlated with both patents and product innovation. Meo and Usmanit (2014) in a study about the impact of R&D expenditure on research publications, patents and high-tech exports among European countries found that the investment in R&D is associated with high rates of scientific progress and research outcomes. They found also a positive association between the number of universities and the increasing number of ISI research papers. Helpenny *et al.* (2010) examined the link between the percentages of GDP spent on R&D and number of publications, finding that the percentage of GDP spent on R&D was positively correlated with the number of publications.

Some researchers found a negative relationship between R&D spending and the number of inventions (Acs and Audretch, 1990; Adams and Brock, 1986; Graves and Langowitz). The effectiveness of invention for a firm depends on the technological capabilities that reside in its research and development function; successful innovation is not guaranteed (Tsai, 2005). Nerkar and Roberts (2004) found that the link between R&D spending and the ability of the firm to introduce new inventions and innovations is unlikely.

The issue of the relationship between private and non-private R&D investment has been a controversial issue in many of the previous related theoretical and empirical works. Diamond (1998) found a 1.04 coefficient of additionality on the effect of federal funding of basic research on a private funding of basic research in US macro time series data between 1953-1993. Guellec and Van Pottelsberghe de la Potterie (2003) found a 0.08 coefficient of additionality for government funding on business funded research in 17 OECD countries between 1981-1996. Gorg and

Strobl (2007) found a negative coefficient of additionality of large public grants to Irish manufacturing firms on the firm's investment in R&D, and positive additionality effect for the small public fund. Economic Insight (2015) studied how much the private investment is caused by the public investment at both macro and micro level analysis in the UK. They found that the result of the econometric model was consistent with a crowding-in effect of public expenditure on R&D. In this regards, a 1% increase in public expenditure on R&D leads to between 0.48% and 0.68% increase in private expenditure on R&D.

In Palestine, the studies about R&D and innovation are limited (Jafari *et al.* 2008; Morrar and Gallouj, 2016; Morrar and Abdelhadi, 2016; Morrar *et al.* 2016). Jafari *et al.* (2008) was one of the first studies in Palestine which discussed R&D activities in the Palestinian private sector based on two questionnaires: one was for the R&D providers and the second was for the beneficiaries using the research. They classified R&D providers into research centers in Palestinian universities, specialized local research institutions, ministries of the Palestinian National Authority, the General Federation of Palestinian Industries, Pal-trade, and unions of specialized industries (mines, paper, pharmaceutical, food, IT systems, etc). The study revealed that the level of persuasion of the private sector institutions in research, the need and potential benefits of R&D, and the ability of institutions to benefit from internet services are major causes limiting institutional use of R&D. Limitations also include: the availability and allocation of a budget for specialized and qualified research teams, budget for outsourcing the services of other specialized research center and organizations working in R&D, calculating the return on R&D in comparison to the cost thereof and finally, the availability of equipment (used in R&D). They found also that surveys are the most popular form of R&D activities that are demanded or preferred by the private sector, followed by quantitative and exploratory research and finally descriptive research and case studies. They indicated that the private sector mainly uses R&D to improve the quality of existing products, to create new products and goods and to extend or to increase market share in the local market.

Morrar & Gallouj (2016) investigated the performance of the R&D sector

in Palestine between 1995 and 2009. They found that until the mid-1990s, certain service sectors (such as the R&D, financial and telecommunications sectors) either didn't exist in Palestine or were very small. They also found that the performance of the R&D sector was very low in comparison to other service sectors in most of the performance indicators used. For example, in 2009 the value added of the R&D sector represents only 0.36% of the total value added of the service sector. Output contributes to 0.32%; it employs only 0.19 of the total employees in the service sector and only 0.05% of the total firms in the service sector. In another study, Morrar & Gallouj (2016) investigated the role of ICTs in enhancing the service sector productivity in Palestine. They found that around 32% of firms in the information and communication sector implemented R&D related to ICT, 21% in financial intermediation. Only 1.6% of industrial firms engage in R&D related to ICT. They also found that R&D have a negative influence on labor productivity in the Palestinian service sector. This might be explained by the obstacles that limit the private sector in Palestine from benefiting from the results of R&D, but the impact of ICT labor on labor productivity will improve if it is complemented by investment in R&D. This reality means that the R&D impact on firm productivity will be positive if it is complemented by labor with a high intensity of ICT.

2. The Main R&D Indicators in Palestine

R&D activities in Palestine are affected highly by the political and economic instability that exists mainly due to the Israeli occupation of the Palestinian lands, which sharply influences the business environment and makes the Palestinian economy unattractive for both local and foreign direct investment. Also, the industrial sector in Palestine grew slowly in the last two decades and Palestinian people still mainly depend on imports for most of their goods and services. Despite the increasing

concern about the importance of R&D for economic development by different stakeholders in Palestine, as indicated by the number of scientific conferences on research held each year, participation of R&D personnel in international conferences, in addition to universities' interest in research, R&D sector is still very small, new and does not receive sufficient attention in either the private or public sectors in Palestine. This reality is manifested in various R&D indicators.

2.1 R&D Personnel

In the 2013 R&D survey implemented by the Palestinian Central Bureau of Statistics (PCBS), R&D personnel, in addition to researchers who are directly involved in R&D activities, including PhD students and all persons providing an indirect service, such as general service employees and skilled staff, are classified as follows. Administrators: Persons who are engaged in the management and administration of a business, such as managers, accountants, administrative staff. Another category is technicians and equivalent, i.e. persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences (technicians), or social sciences and humanities (equivalent staff), and finally the support staff which includes skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with (or providing services to researchers involved in) such projects.

Table 1 below shows that in 2013, only 8,715 employees were in the R&D sector in Palestine, amongst which the 4,533 researchers showed a distribution of 3,510 male and 1,023 female. Only 2,492 researchers were with full-time equivalent (FTE[1]), which means that the number of researchers with FTE per million of

1) The percentage of time spent by a person throughout the year on research and experimental development. Thus, a person who normally spends 30% of his time on R&D and the rest on other activities (such as teaching, university administration, and student counseling) should be considered as 30% FTE. Similarly, if a full-time R&D worker is employed at an R&D unit for only six months, this results in an FTE of 50%. For reporting purposes, the total sum of

inhabitants is only 566. The total expenditure on R&D per researcher with FTE is about 24,600 US dollars. It is important to denote that these figures and data do not include R&D personnel in the private sector because the survey was oriented to the non-private sector (governmental, NGOs and higher education institutions), which is one of the limitations of this study.

Table 1. Main indicators for R&D in Palestine, 2013

Value	Indicator
8,715	Number of R&D Personnel
5,162	Number of R&D Personnel with Full-Time Equivalent (FTE)
4,533	Number of Researchers in R&D
3,510	Number of Researchers (Males) in R&D
1,023	Number of Researchers (Females) in R&D
2,492	Number of Researchers in R&D with FTE
566	Number of Researchers in R&D with FTE per Million Inhabitants
24.6	Total expenditure on R&D (USD 1000) per Researcher with Full-Time Equivalent (FTE)

Source: PCBS 2014, R&D Survey, 2013.

R&D personnel is distributed in different Palestinian sectors as following: 2,873 persons (33%) in the governmental sector, 1,148 (13%) in non-governmental organizations, and 4,694 (54%) in higher education institutes (see Table 2). Numbers denote that the largest bulk of R&D personnel are employed in the higher education sector. This is expected, knowing that Palestine includes more than 29 universities and community colleges in the West Bank and Gaza with 7,000 faculty members; 3,000 are Ph.D. holders in different disciplines. Numbers in Table 2 may be misleading; they exaggerate the R&D activities in the governmental sector since there are no real public R&D institutions. This might be mainly impeded by the methodology of the R&D survey in Palestine mentioned earlier. Thus we expect that R&D personnel in the governmental

FTEs should be rounded to the next integer and the reporting of decimals avoided.

sector are mainly providing an indirect R&D service, such as coordination, management and administration services, laws and regulations, and funding issues.

Table 2. R&D personnel in Palestine by sector of employment and gender, 2013

Gender		Total	Sector of Employment
Female	Male		
770	2,103	2,873	Governmental
419	729	1,148	Non-Governmental Organizations
980	3,714	4,694	Higher Education

Source: PCBS 2014, R&D Survey, 2013.

Researchers in R&D in Palestine are distributed in all academic fields and disciplines (see Table 3). Humanities and social sciences have the highest ratio of R&D researchers with 34.2% and 27.7%, respectively. This might be explained by the high demand for such research disciplines by local and international NGOs which have intensively studied the Palestinian social, political and economic situations over the last three decades in order to allocate their fund resources. Therefore we find many NGOs in Palestine specialized in producing research and consultancy in political sciences, political economic, social sciences. Also, humanities and social sciences in universities are among the oldest disciplines. Medical sciences, engineering & technology have a low rate of employment of researchers in R&D, which might be contributed to by the novelty of these fields in Palestine and due to more than 40 years of occupation of the Palestinian territories.

Table 3. Researchers in R&D in Palestine by academic field, 2013

No. of Researchers	Percentage	Academic Field
749	16.5	Physical Sciences
494	11	Engineering & Technology

Table 3. Continued

No. of Researchers	Percentage	Academic Field
265	5.8	Medical Sciences
219	4.8	Agriculture Sciences
1,255	27.7	Social Sciences
1,551	34.2	Humanities Sciences

Source: PCBS 2014, R&D Survey, 2013.

As we have mentioned previously, R&D personnel include both those directly or indirectly involved in R&D activity. Therefore amongst the 8,715 R&D personnel in Palestine, only 4,533 (52.5%) are researchers in R&D, 2,113 (24%) are administrators, 1,276 (14.5%), and 793 (9%) are in other related activities (see Table 4).

Table 4 also clarifies that around 30% of R&D personnel hold a Ph.D. degree, 19% a master degree, and 30% a bachelor degree. It is important to know that around 94% of Ph.D. holders are classified as researchers in R&D. This is straightforward because most of the R&D personnel who are indirectly involved in R&D like administrators and technicians hold undergraduate degrees.

Table 4. Distribution of R&D personnel by educational attainment and occupation

Occupation				Total	Educational Attainment
Others	Administrators	Technicians	Researchers		
401	331	53	3	789	Secondary and less
154	434	293	117	998	Associate Diploma
166	884	829	784	2,663	Bachelor
2	23	2	17	45	High Diploma
57	305	81	1,190	1,632	Master
13	136	18	2,422	2,588	PhD
793	2,113	1,276	4,533	8,715	Total

Source: PCBS 2014, R&D Survey, 2013.

2.2. R&D expenditure

Based on the Palestinian R&D survey in 2013 (see Table 5), the total expenditure on R&D was US$ 61.4 million for all non-private sectors, which was less than 0.01% of GDP in 2013. The governmental sector contributed to around 56% of total R&D expenditure, non-governmental organizations contributed to 21%, and 23% was the contribution of higher education institutions.

Table 5. Value of expenditures (US$ 1,000) and percentage distribution on R&D in Palestine by sector of employment, 2013

Value	Percentage	Sector of Employment
34,466	56.1	Governmental
12,823	20.9	Non-Governmental Organization (NGOs)
14,117	23.0	Higher Education
61,406	100	Total

Source: PCBS 2014, R&D Survey, 2013.

Table 6 below classifies the sources of funding for R&D expenditure into 6 main categories. Funding from abroad, government enterprises and NGOs are the main three sources of funds, with 26.9%, 22.3% and 21.8% respectively. 18.7% of the fund is classified as self-funding, 4.1% from higher education institutions and 3.7% from the private sector.

Table 6. Percentage distribution of total expenditure on R&D in Palestine by source of funding, 2013

Percentage of Funding	Source of Funding
4.1	Higher Education Institutions
22.3	Government Enterprises
21.8	Non-profit Enterprises
3.7	Private Enterprises

Table 6. Continued

Percentage of Funding	Source of Funding
26.9	Funding from Abroad
18.7	Self-Funding
2.5	Non-Stated (Others)

Source: PCBS 2014, R&D Survey, 2013.

2.3. R&D outputs in Palestine

R&D activities in Palestine are divided into 4 main categories (see Table 7): basic research (34.3%), applied research (30.6%), studies and consultations (26.7%), and experimental development research (8.3%).

Table 7. Percentage distribution of R&D by type, 2013

Number of research	Percentage	Type of Research
1,121	26.7	Studies and Consultation
1,447	34.4	Basic Research
1,289	30.6	Applied Research
348	8.3	Experimental Development Research

Source: PCBS 2014, R&D Survey, 2013.

Table 8 classifies R&D outputs by number of rewards into international standard book number (149), 116 national prizes for researchers and inventors, 72 international prizes for researchers and inventors and 9 patents.

Table 8. Outputs of R&D in Palestine by number of rewards, 2013

Number	Outputs
116	National Prizes for Researchers and Inventors

Table 8. Continued

Number	Outputs
72	International Prizes for Researchers and Inventors
9	Patents
149	International Standard Book Number

Source: PCBS 2014, R&D Survey, 2013.

2.4. Indicators of R&D in the Private Sector

Based on the PCBS Economic Survey in 2015, R&D in the private sector is divided into three main activities: scientific research and development, advertising and market research, and other professional, scientific and technical activities (see Table 9). We find that other professional, scientific and technical activities represent the largest R&D subsector regarding the number of institutions and the number of employees, followed by advertising and market research then finally scientific research and development. The advertising and market research have the highest economic performance in regards to the amount of output and value added. Scientific R&D is the smallest R&D subsector with 30 institutions and 179 employees only, which might be explained by the novelty of this sector and low demand for scientific R&D due to the weak industrialization process and the political and economic instability in Palestine.

Table 9. The economic indicators of the R&D sector in 2015

	Economic Activity		
Indicator	Scientific research and development	Advertising and market research	Other professional, scientific and technical activities.
No. of Institutions	30	346	808

Table 9. Continued

Indicator	Economic Activity		
	Scientific research and development	Advertising and market research	Other professional, scientific and technical activities.
Number of Employed Persons	179	1,513	1,918
Wage Employees (USD 1,000)	142	1,177	973
Compensation of Employees (USD 1,000)	1,367.9	7,968.8	6,331.8
Output (USD 1,000)	2,480.1	28,459	23,164.3
Intermediate Consumption (USD 1,000)	869.8	6,238.2	6,560.8
Gross Value Added (USD 1,000)	1,610.3	22,220.8	16,603.5

Source; PCBS, 2016. Economic Survey Series, 2015.

3. Methodology and Data

In this section, we develop an econometric approach to trace the determinants of R&D performance in the Palestinian R&D institutions. Performance outcomes are tracked for a sample of 87 institutions in 2013. The model for estimating this relationship should take into account that the relationship between R&D expenses and its outcome is a multi-dimensional process which must be understood from multiple perspectives. Therefore, the outcome of R&D is measured by a set of indicators like the number of researches, patents, prizes from national and international parts. Also, R&D activities are measured through a large set of variables.

We will use a simple process of analysis depending on the multiple regression approach and cross-sectional data, taking into account the problems of multicollinearity, normality, and autocorrelation. The econometric equation is as follows:

*Num_Research=B0+B0*TOT_exp+B0*MA_researcher+B0*PhD_researcher +B0*MA_Tech, B0*PhD_Tech+B0*MA_admin+B0*PhD_admin+B0*FTE_90*

*+B0*FTE_70+B0*FTE_50+ei*

Where:

Num_Research is the dependent variable and denotes the total number of research and represents the performance of the R&D sector. Regarding the dependent variables: TOT_exp is the total expenditure on R&D activities inside the institutions; MA_researcher is the number of researchers in the institutions holding master degree; PhD_researcher is the number of researcher holding Ph.D. degree; MA_Tech is the number of technicians holding master degree; PhD_Tech is the number of technicians with Ph.D. degree; MA_admin measures the number of administrators holding master degree; PhD_admin represents the number of administrators holding Ph.D. degree; FTE_90 is the number of researchers with 91%-100% full-time equivalent; FTE_70 is the number of researchers with 71%-90% full-time equivalent; FTE_50 is the number of researchers with 51%-70% full-time equivalent.

Because R&D is a multidimensional construct, three other R&D performance indices will be employed in this study: patents, national prizes for researchers and inventors, and international prizes for research and inventors. Each one of them will be considered as the dependent variable and will be regressed separately against three main variables: the total number of researches, total expenditure on R&D and the total number of researchers.

In the second part of this work, we will measure the efficiency of fund structure for each type of research (basic research, applied research, and experimental research). In other words, we will test the significance of each research fund on the number of produced research studies in basic research, applied research, and experimental research. It is important to reveal the most efficient funding mechanism for each type of research. Here we also use a simple methodology depending on multiple regression analysis.

The econometrics model for basic research, applied research and experimental research are given consequently as follows:

$$Basic\_Res=B0+B1*fund\_HE+B2*fund\_Gov+B3*fund\_NGO+B4*Fund\_priv+B5*fund\_aborad+B6*fund\_self+B7*Num\_researcher+B8*TOT\_exp+I$$

$$Applied\_Res=B0+B1*fund\_HE+B2*fund\_Gov+B3*fund\_NGO+B4*Fund\_priv+B5*fund\_aborad+B6*fund\_self+B7*Num\_researcher+B8*TOT\_exp+I$$

$$Experm\_Res=B0+B1*fund\_HE+B2*fund\_Gov+B3*fund\_NGO+B4*Fund\_priv+B5*fund\_aborad+B6*fund\_self+B7*Num\_researcher+B8*TOT\_exp+I$$

Where:

Basic_Res is the number of researches in basic science; Applied_res is the number of researches in applied science; Experm_Res is the number of researches in experimental science; fund_He is the percentage of funds from higher education enterprises; fund_gov is the percentage of funds from government enterprises, fund_NGO is the percentage of funds from non-profit nterprises; find_priv is the percentage of funds from private enterprises; fund_abroad is the percentage of funds from abroad, fund_self is the percentage of funds from self; num_researchers is the total number of researchers; and Tot_exp is the total number of expenditures on R&D.

Another important estimation we implement here is whether other sources of R&D funding institutions (public fund, higher education institution, NGOs) are crowding-out private funding or not. In other words, we see if the funds from government, NGOs, and higher education institutions negatively impact the propensity of private firms to spend money on R&D activities.

A simple regression model will be estimated for private funding against each other type of funding, as follows:

$$Priv\_fund=B0+B1*HE\_fund+ei$$
$$Priv\_fund=B0+B1*Gov\_fund+ei$$
$$Priv\_fund=B0+B1*NGO\_fund+ei$$

Such that:

Priv_fund is the % of funds from private enterprises, HE_fund is the % of funds from higher education, Gov_fund is the % of funds from the government, NGO_fund is the % of funds from nonprofit institutions.

Data and sample

We will use a cross-sectional data to investigate the functions of this study. Secondary data about both the dependent and independent variables are obtained from the PCBS. In 2014, PCBS implemented the R&D survey which covers the R&D activities in R&D institutions during 2013. To focus on enterprises with material R&D expenses, the sample was limited to R&D institutions i.e. institutions which implement R&D activities and expense. This provides a sample of 143 institutions including higher education institutions, non-profit organizations, and government institutions. The response rate was 79% of the institutions, over-coverage was 15%. Weights were calculated for each sampling unit and designed to reflect the sampling procedures. Adjusted weights are important to reduce the bias resulting from non-responses and also to take account of changes since the Establishments Census 2012 was conducted. Thus, a sample of 87 firms was obtained to implement this study.

4. Results

In Table 10 below, the analysis shows that the number of technicians holding Ph.D. degrees is one of the most important variables that are responsible for research generation in the Palestinian R&D institutions. An increase by one in the technicians holding Ph.D. degrees will lead to an increase by 8.65 in the number of researches. This might be explained by the fact that Ph.D. technicians are mainly working

in scientific fields like physics, chemistry, engineering, pharmacy and medicine, which are considered very productive in the Palestinian higher institutions compared with social sciences and arts.

Also the increase in the number of researchers holding a Ph.D. degree will positively affect the performance of R&D institutions measured by the number of researches introduced, i.e. an increase by one in the number of Ph.D. holders leads to only an increase of 0.61 in the number of R&D researches. The low productivity of Ph.D. holders can be related to the fact that a large percentage of Ph.D. holders mainly in the higher education institutions do not engage in research, due to the lack of research fund or motivations from the university or other sources of funding. This is clear in the social sciences and art faculties which are less productive in R&D than life sciences and engineering.

One of the unexpected results is the negative influence for the master degree researchers on the number of researches conducted in the Palestinian R&D institutions. This reflects a kind of diseconomies of scale in the number of researchers holding a master degree, which might be explained by the weak research performance of master degree holders who mainly graduated from local higher education institutions with weak research skills and capabilities. Also, many master researchers are mainly working as assistants for Ph.D. researchers and Ph.D. technicians with more administrative tasks and routine works.

Table 10. Determinants of R&D performance measured by total number of research

	Dependent variable	
	Total # of research	
	Coefficient	Sig
(Constant)	*3.68	0.05
Total Expenditures	1.51E-06	0.21
#of Researchers, Master	***-1.08	0.00
#of Researchers, Ph.D.	***0.61	0.00

Table 10. Continued

	Dependent variable	
	Total # of research	
	Coefficient	Sig
#of Technicians, Master	0.84	0.45
#of Technicians, Ph.D.	***8.65	0.00
#of Researchers, 91%-100% FTE	***0.22	0.006
#of Researchers, 71%-90% FTE	0.22	0.42
#of Researchers, 51%-70% FTE	***0.73	0.00
#of Administrators, Master	-0.55	0.17
#of Administrators, Ph.D.	-0.10	0.89
R2	0.895	0.000
Adjusted R-squared	0.88	
D.W	2.08	
Breusch-Godfrey Serial Correlation LM Test	F-statistics = 0.02	Prob. F(1,75) = 0.65
Heteroskedasticity Test: Breusch-Pagan-Godfrey	F-statistic = 1.138042 Obs*R-squared=11.33	Prob.F(10,76) = 0.3460 Prob. Chi-Square(10)=0.33

Table 10 also shows that there is no positive advantage for full-time researchers over part-time researchers. For example, the number of researchers with 51% to 70% full-time equivalent shows better research performance than full-time researchers (number of researchers with 91-100% full-time equivalent). This might be explained by the fact that most researchers in higher education institutes are not full-time researchers; they have teaching and administrative tasks instead of research activities, which is also true for public institutions and NGOs.

In Table 11, we replaced the number of research studies by patents as an indicator of R&D performance. Not all R&D research studies are translated into inventions and innovations. Moreover, in Palestine, much of R&D research studies are consultations, reports, etc. The results show that the number of R&D researches positively influences the number of patents that R&D institutions can obtain, but

the slope coefficient is very small; a one thousand increase in R&D research achieves only two patents. The same result is true for the number of R&D researchers; it has a positive impact on the number of patents, but a one thousand increase in the number of researchers will lead into one patent only. This clearly shows the inefficiency and low quality of research in Palestine and the disconnection between research outcomes, innovation, and reality. Many of the R&D research studies in the universities are not applied research but mainly for academic objectives in order to ascend in the promotion degree.

The total R&D expenditure has no significant impact on the number of patents, which denotes that the R&D expenditure is misallocated, fragmented and not connected to an R&D, innovation and development plan. Researchers at the university who are responsible for a high percentage of R&D activities are obtaining little funding for their R&D activities from their institutions. According to the data we find that the average R&D expenditure in government institutions is US$ 987,412 but the average number of research studies is only 19, while the average expenditure in higher education institutions is US$ 742,994 and the average number of research studies is 111. This reality will also reflect on the patents.

The results in Table 11 also denote that, except for the relationship between total R&D research and international prizes, we find that the total R&D research, the total R&D researchers, the total R&D expenditure are all not efficient in regards with national and international prizes for researchers and inventors. This explains the disconnection between the R&D research system and research awards.

Table 11. Determinants of R&D performance represented by patents, national and international prizes

Dependent variable						
	Patents		National prizes for researchers and inventors		International prizes for research and inventors	
	Coefficient	Sig	Coefficient	Sig	Coefficient	Sig
Constant	-.037-	.395	.632	.069	.274	.154

Table 11. Continued

Dependent variable						
	Patents		National prizes for researchers and inventors		International prizes for research and inventors	
	Coefficient	Sig	Coefficient	Sig	Coefficient	Sig
Total number of researches	**.002	.009	.010	.071	***.010	.002
Total expenditures on R&D	1.977E-9	.930	-7.124E-8	.69	3.403E-8	.73
Total number of researchers	***.001	.028	.004	.47	.002	.55
R2	0.45	0.00	0..175	0.00	0.334	0.00
Adjusted-R2	0.42		0.145		0.31	
D.W	1.77		2.15		2.09	
Breush-Godfrey Serial correlation LM-test	F-stat=0.25	Prob. F(2,81)=0.78	F-stat=0.34	Prob. F(2,81)=0.71	F-stat=2.43	Prb. F(2,81)=0.09
Heteroscedasticity Test: Harvey	F-stat=0.54	Prob. F(3,83)=9.82	F-stat=2.3	Prob. F(3,83)=0.08	F-stat=1.63	Prob. F(3,83)=0.18

In many countries, basic research is mainly funded by the public sector because the private sector is not concerned with financing raw knowledge, novel ideas, theories, and prototypes which have no immediate commercial use. On the other hand, applied research is primarily implemented by private firms, which convert basic research into new products (Gersbach *et al.* 2009).

As we have mentioned earlier, we classify research into three main types — basic research, applied research and experimental research — and will study the efficiency of the research fund structure for each type. In other words, we will investigate whether the R&D fund structure in Palestine is efficient for each type of research.

Table 12. The relationship between research funding and research performance measured by number of basic, applied, and experimental researches

	Dependent variable					
	Number of researches in basic research		Number of researches in applied research		Number of researches in experimental research	
	Coefficient	Sig	Coefficient	Sig	Coefficient	Sig
(Constant)	-8.19	0.75	1.17	0.97	-8.04	0.40
% of Funding from Higher Education	0.28	0.43	0.25	0.58	0.19	0.15
% of Funding from Government	0.018	0.94	-0.07	0.83	0.05	0.56
% of Funding from Non-Profit Enterprises	0.10	0.70	0.001	0.99	0.08	0.39
% of Funding from Private Enterprises	0.21	0.58	0.26	0.59	0.15	0.26
% of Funding from Abroad	0.10	0.70	0.06	0.85	0.10	0.30
% of Funding from Self	0.09	0.73	0.019	0.95	0.16	0.12
Number of Researchers Total	***0.31	0.00	***0.18	0.00	0.005	0.58
Total Expenditures	-6.01E-07	0.69	1.15E-06	0.55	**1.23E-06	0.03
R2	0.698	0.0	0.35	0.0	0.19	0.02
Adjusted- R2	0.66		0.29		0.10	
D.W	1.92		1.84		1.55	
Breusch-Godfrey Serial Correlation LM Test	F-statistics=0.23 Prob. F(2,76)=0.79		F-statistics=0.45 Prob. F(2,76)=0.63		F-statistics=1.75 Prob. F(2,76)=0.15	
Heteroskedasticity Test: Breusch-Pagan-Godfrey	F-statistic=1.12 Prob.F(8,78)=0.32		F-statistic=0.22 Prob.F(8,78)=0.9		F-statistic=1.32 Prob. F(8,78)=0.24	

Table 12 shows that regarding basic research, none of the fund sources are efficient. In other words, the increase in the percentage of funding from the government, higher education, the private sector, NGOs, abroad and self-funding will not improve

the performance of basic R&D research activities. This might be explained by the fact that basic R&D research studies are mainly implemented in higher education enterprises which are mostly not funded and are mainly for the promotional purposes of academic staffs. Results also show that the total number of researchers has a positive impact on the number of basic R&D researches. This reality might be explained by the fact that around 50% of workers in R&D are in higher education institutes which mainly yield basic R&D research. Finally, none of the research fund sources are efficient in the case of applied and experimental research. Only the total R&D expenditure is effective in experimental research.

One of the most important questions that have been asked in the literature is whether public funding and funds from NGOs crowd-out private investment in R&D. Thus here we study how much private investment is caused by public investment. In Table 13 below, we investigate the impact of other sources of funding on private R&D investment to see if any crowding-out effect exists. Results show that there is no crowding-out effect either from government funds or from NGO funds to private investment. Meanwhile, we find that funds from higher education institutions motivate private investment in R&D. This might be embedded to the development in the last years of R&D networks and collaboration relationships between the private sector and universities.

Table 13. The crowd-out effect between private and other types of fund

	Dependent variable					
	Private fund to R&D		Private fund to R&D		Private fund to R&D	
	coefficient	sig	coefficient	Sig	coefficient	sig
Constant	2.2	0.06	4.3	0.02	4.2	0.02
Fund from higher education institute	***0.37	0.001				
Fund from NGO's			-0.034	0.321		
Fund from government					-0.03	0.35

Table 13. Continued

	Dependent variable					
	Private fund to R&D		Private fund to R&D		Private fund to R&D	
	coefficient	sig	coefficient	Sig	coefficient	sig
R2	0.119	0.001	0.012	0.332	0.01	0.35
Adjusted- R2	0.10					
D.W	2.175					
Heteroskedasticity Test: Breusch-Pagan-Godfrey	F-statistic=0.18 Prob.F(8,78)=0.67					

Conclusion and Policy Implications

In this work, we empirically addressed the determinants of R&D performance in Palestinian R&D institutions. The R&D performance index is measured by a set of indicators like number of research studies, patents, prizes from national and international bodies. The results show that the number of technicians holding a Ph.D. degree is one of the most important determinants of R&D outcomes measured by the number of research studies, i.e. one more Ph.D. technician will increase the number of researches by 8 units. However, one more Ph.D. holder only increases the number of researches by 0.66. This huge gap between technician Ph.D. holders and overall Ph.D. holders is due to how technicians mainly work in the fields of engineering, physics, chemistry, computer science, and pharmacy, which are considered highly productive in research in Palestinian universities in comparison with Ph.D. holders in social sciences and arts. In an unexpected result, we found that the increase in the number of researchers with a master degree will negatively impact the research outcomes, which might be explained by the weak performance of master students who have mainly graduated from local higher education institutions with weak research skills and capabilities. One of the important results is that part-time researchers (researchers with 51% to 70% full-time equivalent) have better research performance than full-time researchers (number of researchers with 91-100%

full-time equivalent), which might be explained by the fact that most researchers in higher education institute are not full-time researchers, they also have teaching missions.

Other indicators for R&D performance such as patents, local and international prizes for R&D are regressed separately against three main independent variables: total number of research studies, total expenditures on R&D and total number of researchers. Despite the positive and significant sign for the coefficients of the two variables: number of research studies and the number of researchers, their impact on the number of patents is still very low (very low slopes). For example, the increase in the number of R&D researchers by one thousand will increase the number of patents by only one. Also each one thousand of R&D researches generates only 2 patents. Total expenditure on R&D has no significant impact on the number of patents, which denotes that R&D expenditure is misallocated and not connected with an innovation plan.

In the second part of the empirical analysis, we found the funding mechanism for R&D in Palestine to be inefficient; neither of the research fund sources have a significant impact on the number of basic, applied and experimental research studies. This indicates that R&D institutions in all sectors should adopt new strategies or policies of R&D funding which are linked with R&D outcomes. This reality means that the funding is increasing the number of produced research studies.

Finally, we discovered no crowding-out effect from government funding and funds from NGOs to private investment. Meanwhile, we found that funding from higher education institutes motivates private investment in R&D.

There are many different policy instruments that can be used to prompt R&D performance and to allocate R&D resources efficiently. The very low R&D expenditure in Palestine requires a comprehensive plan for reforming and prompting the R&D sector; government subsidies should be the cornerstone of this plan. In other words, the government should use the public funding to foster private research and development (R&D). This is consistent with one of the important findings of the study, that public R&D subsidies tend to stimulate additional company-financed R&D, i.e.

the public subsidies are complementary and thus "add" to private R&D investment.

Policy makers are expected to intervene because the system of knowledge generation and diffusion does not achieve its objectives of contributing to innovation (low patents rate for example) in an efficient manner. For example, the government should create an awareness of the importance of R&D investment among different economic sectors and institutions and form a well-developed network between the different actors of the R&D system which eases the flow of knowledge among them, minimizes R&D risk and ensures a market-based R&D strategy. In other words, the role of governments is not limited to providing funding for education, but extends further to facilitating linkages and enhancing the dynamism of the national R&D and innovation system. Also, the government should strengthen the institutional framework in order to protect patents and intellectual property rights, improve the business climate to attract R&D-intensive foreign direct investment, and to ensure the efficient allocation of R&D resources among recipients. The private sector should improve its internal R&D environment in order to create a threshold level of absorptive capacity in order to tap into the R&D activities developed by universities and public research centers, and also to create R&D-led production. Also, the development of national innovation policy is essential to improve the investment climate for R&D. The objective would be to provide the necessary infrastructures, public R&D, human capital, and regulatory regimes, in addition to fiscal and financial incentives to private firms undertaking R&D.

While it is well-known that the master degree usually lays the ground work for Ph.D. studies and future researchers, this study found that R&D researchers in Palestine holding a master degree negatively influence R&D performance, thus indicating a need to reform the educational system in Palestinian universities. Master programs in Palestinian universities produce thousands of graduates every year, and it is necessary for these programs to adapt a mixed method of research-based approaches and course-based (taught) approaches to ensure that the students obtain both structured course modules through lectures and seminars, and cultivate the necessary research skills to succeed in their Ph.D. and future research work.

International prizes for research and inventors are one of the important factors which motivate and inspire Palestinian researchers to proceed in R&D, but this is not the case for national prize systems for R&D. Therefore, policymakers in R&D, particularly within the government and universities, should come to view that the institutionalization of a prize system for R&D is crucial for R&D activities in Palestine; it channels R&D researchers toward valuable endeavors. Such prizes might be introduced through financial support for R&D, the incubation of R&D output into new patents and innovations, funding the participation of researchers in international conferences, direct links between R&D performance and the promotions and awards system in the universities and research centers.

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8

World Park Special Status on Some Representative Protected Areas of Mongolia

Oyungerel Baast*

I. Introduction

North East Asia is a sub-region of Asia comprising five countries: the People's Republic of China, Japan, Republic of Korea, Mongolia and Democratic People's Republic of Korea (UNEP, 2004). It has the highest population of all the sub-regions with a total of 1.5 billion people (http://ru-world.net/north-east-asia/). All five countries are unique in terms of their natural landscape, cultural heritage and biodiversity. For example, Eastern China is bound by the Yellow Sea and Western China has major mountain ranges, notably the Himalayas. Mongolia comprises the largest unfenced grassland steppe in the world and Gobi Desert, which is the second-largest desert after the Sahara. Korea forms a peninsula that extends from the Asian mainland and is surrounded by the Sea of Japan and Yellow Sea. Japan is an island country with unique landscape and biodiversity as well.

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Compared statistics (UNEP-WCMC, 2016) in information about protected areas (PAs) and their activities in North East Asian countries are shown in Table 1. Protected Areas Management Effectiveness (PAME) was very similar between the four countries except for the Democratic People's Republic of Korea. Japan and China have more national and international protected areas, whereas there were less protected areas or a lack of data communication in the Democratic People's Republic of Korea. Comparing the percentage coverage of protected areas, Japan and China is leading the terrestrial (19%) and marine (4%), respectively.

Through the East Asian-Australian Flyway Partnership, countries in North East Asia collaborate in protecting migratory birds (see more information in http://www.birdlife.org/asia/programmes/migratory-birds-and-flyways-asia). This is an example of how countries can unite under a joint goal.

Table 1. Protected Areas in North East Asian Countries

Countries	Number of National Protected Areas	Number of International Protected Sites	Coverage of Protected Areas %	PAME %
Mongolia	89	19	17% terrestrial	53.2
China	2066	88	17% terrestrial 4% marine	59.1
Japan	4845	55	19% terrestrial 1% marine	50.9
Republic of Korea	560	23	8% terrestrial 1% marine	58.5
Democratic People's Republic of Korea	31	3	2 terrestrial 0% marine	Not possible to assess

Source: UNEP-WCMC (2016). Global statistics from the World Database on Protected Areas (WDPA). Cambridge, UK: UNEP- WCMC.

During the Rio Summit in 1992, Mongolia declared that the country is aiming to designate 30% of its territory as protected areas through Parliament Resolution No-43, 1993. Based on the six IUCN basic categories (Dudley, 2008), different countries choose and adopt their own appropriate categories with some adjustments. Mongolia officially has four different categories for protected areas such as Strictly Protected Areas, National Parks, Nature Reserves and Natural Monuments. Apart from that, new sites are emerging sites that are starting to attract international level regard through their own unique characteristics to the World Heritage, Biosphere Reserve, RAMSAR conventions, South East Asian rare animals and bird conservation network, North East Asian Crane Site Network and Global Transboundary Protected Areas Network.

Internationally recognized sites include the following: two World Heritage Sites, six UNESCO-MAB Biosphere Reserves, 11 Ramsar Sites-Wetland of International Importance, two Trans-boundary Protected Areas, the East Asia Endangered Animal & Bird Conservation Network and the North East Asia Crane Conservation Network. Six trans-boundary parks with Russia and seven trans-boundary parks with China are planned to be established (Oyungerel, 2010). World Heritage-Uvs Lake Depression has been approved as a transboundary protected area (Kurbatskaya *et al.*, 2013). Furthermore there are six potential transboundary areas with Russia, seven potential transboundary areas with China under the process of developing protected area justification and proposals (Oyungerel, 2005).

Since the 1990s, the area of Mongolia designated as protected areas has expanded significantly, to the current total of 90 protected areas which now covers 26.2 million hectares, or 17.5% of the country's surface, according to a report by the "Strengthening the Protected Area Net¬work" Project MON/10/302 by UNDP/GEF of 2012. The Government of Mongolia and Ministry of Nature Environment and Tourism (MNET) have a target to protect 30% of the land area of Mongolia. Mongolia is attempting to bring up its national parks, which cover 44.5% (11.4 mill hectare) of all protected area in Mongolia, to the international standard level of type II category of IUCN. Based on this, 30 sites recognized as international natural parks can apply and potentially meet the standard criteria.

Worldwide, other countries choose their own special sites based on several criteria, such as being representable as historical classic objects, with biological evolution evidence, ongoing geological processes, unique natural phenomenal landscape, significant geomorphic or physiographic features and exclusive sites with rare wildlife and plants which possess outstanding universal value from the point of view of science or conservation (Deguignet *et al.*, 2014). World Heritage Sites are conserved under the World Heritage Convention worldwide (Deguignet *et al.*, 2014), and national level sites are potentially conserved locally while attracting visitors from other countries and advertisement. Mongolia has an exceptionally wide potential of defining special protected sites while attracting international tourism with its nomadic lifestyle and preservation of pristine landscape with ancient historical sites. Mongolian identified protected areas are of high value from historical and biological perspectives, and they can be potentially brought up to international level recognition worldwide by certain selected criteria.

Mongolian national parks accounted for only 0.48% of the total sites covered by protected areas and this indicates that historical and cultural heritage have less protection (Oyungerel 2016, unpublished data). A special World Park status can be understood as including mandatory national parks but could also include specific areas where other protected categories exist. Because of their global importance, valuable places based on their own goal are protected by the PA network in accordance with directions. For example, some of the world's few remaining grassland ecosystems in the Eastern Mongolian protected areas are protected, while on the northern border in Central Asia some aquatic desert ecosystems are associated with a unique environment to create a small amount of natural places.

World historical monuments and the Emperor Chingis' own identity of Mongolia are seen in such sites as Khan Khentii, Onon-Balj National Park, and Altai Tavan Bogd National Park, the world's major center of fresh water and permafrost glaciers, while camels and the Gobi bear of Great Gobi SPA, among other species on the international Red List of Threatened Species, are widespread. Eastern Mongolia is also home to the world's endangered species such as gazelle. The only proven large-scale Hunnu grave site in the world is in Mountain Noyon.

II. Protected Areas of Mongolia

Protecting places means preserving and conserving for the future and using them in the future when necessary. Reserves are designated to maintain biodiversity conservation, use natural resources wisely with certain flexible regulation, and allow reduced population of plants and animals to regenerate (Oyungerel, 2004). On other hand, it is nationally and globally important places that provide vital habitats for migratory birds, and other species, and it is aimed to restore natural landscape and allow use of natural resources sustainably over a long time. 20% of global terrestrial land is supposed to be designated as reserves that aim to conserve the pristine state of natural conditions for more sustainable production and sustainable development in the future (Helliwell, 1976).

Mongolia has four types of national and three types of international protected sites, whereas there are 13 types of national and three types of international protected sites in the Republic of Korea (Table 2).

Table 2. Comparison of protected area type numbers of North East Asian countries.

Countries	Number of different types of national protected areas	Type of international protected sites1
Mongolia	4	3
Republic of Korea	13	3
Democratic People's Republic of Korea	5	1
Japan	15	3
China	8	3

Source: International protected areas: World Heritage Site, UNESCO-MAB Biosphere Reserve Ramsar Site-Wetland of International Importance.

The Protected Areas which cover a total of over 26.2 million hectares, or approximately 17, 5% of the country's surface, have become main tourism destinations in Mongolia (Figure 1).

Figure 1. Global Trade Growth Enters Period of Stagnation

Note: The five different colors indicate the protected areas including strictly protected areas (red color), National Parks (yellow), Natural Reserves (yellow green), Monuments (orange) and locally protected areas (dark goldenrod).

Due to lack of appropriate management of natural resources usage, conservational planning and management, tourism cannot contribute well for Protected Area development. Despite difficulties, a protected areas management plan was developed to maintain balance between the protection and enhancement of its sensitive natural environment, socio-historical sites and improve social and economic outcomes for

local residents, the supporting plans such as tourism management plan and business plan have still not been developed.

30 National Parks of Mongolia cover an area of 11.4 million ha - 44.5% of total protected areas in the country (http://mpa.gov.mn).

The following are the categories of Special World Park Status:

I. Area that preserves evidences of world's geological and evolutionary history.

II. Special natural ecosystem and region, habitat of globally endangered species, habitat of the source population of unique species and unique scenic landscape.

III. Traditional knowledge and traditional lifestyle that is in harmony with nature and preserved by the indigenous or ethnic groups of local people. A place where people use natural & living resources sustainably and their livelihood directly depends on ecosystem services.

IV. Area that preserves world historic and cultural heritage of humanity evidences of human evolutionary history and ancient Mongolian cultural heritage.

Mongolia's protected areas represent the country's very best landscapes, ecosystems, wildlife habitats, watersheds and forests. International and domestic visitors are attracted to these protected areas because they offer the opportunity to enjoy wide open spaces, solitude, adventure, to connect to nature and the chance to experience some of the best hospitality in the world. Globally, these values are becoming increasingly rare and sought after.

Protected areas are important carbon sinks and provide buffers against the effects of human induced global warming.

2.1. Significance of Natural Reserve Parks

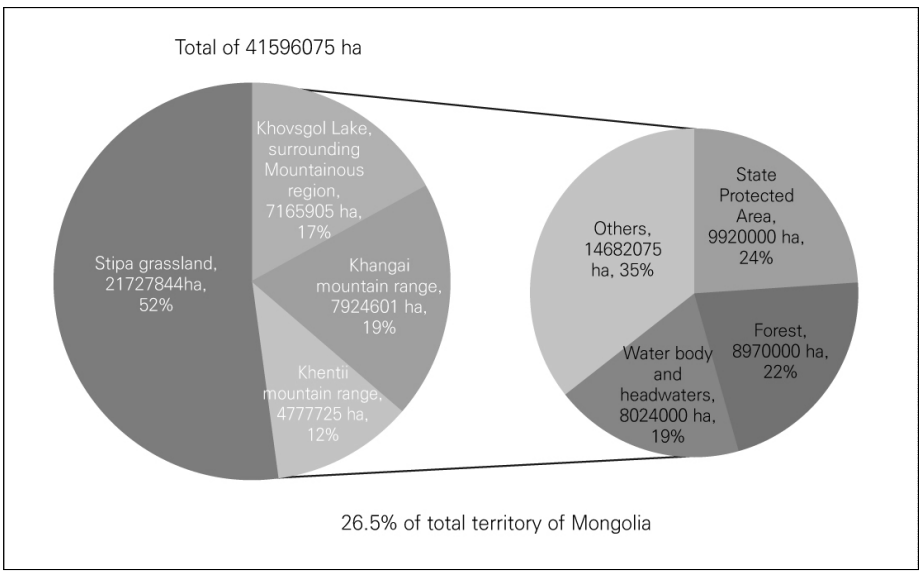
These proposed parks (see Figure 2) play a critical role for biodiversity conservation, protection of the vital forests that provide stable supply of water resources and water regulating functions, core distribution of permafrost that sustains important run-off generating area of rivers and ecological balance of vital ecosystems and preservation of vulnerable

habitats that occur on the meeting point of natural regions. This also plays an essential role for keeping solid boundaries between steppe grassland, gobi, and desert region that are degraded and decertified, thus preventing biodiversity from degradation, depletion and decline and sustaining ecological balance and services for the country.

This will enable opportunities to incorporate socio-economic characteristics in planning and managing of natural resources, sustainable use of resources, involving the local community in conservation, and implementation of a community-based nature conservation concept.

Eco-regions, river basins and landscape will be preserved with their biological resources and ecological connectivity that are internationally accepted goals of conservation approaches. These parks will meet international requirements and can be internationally accepted within the category of protected areas and receive international attention. All of such representative protected areas will be discussed below. See the information about total area in Figure 2.

Figure 2. Proposed Protected Areas for World Park



2.2. Change Mountain Range Natural and Cultural Heritage

The central mountains of Khangai range play an important role for maintaining the ecological balance of ecosystems of not only Mongolia but also Central Asia. Orkhon River valley originates from Khangai Mountain and preserves priceless natural and cultural heritage, rare archaeological remains and historic sites, many endangered species of plant and animal and a unique natural landscape. Orkhon River valley conserves precious evidences of human history of the world. The UNESCO's World Heritage Committee declared Orkhon Valley as a World Heritage site. The remains of Kharkhorum city, the capital and important cultural and trade centre of the Mongol Empire of Chingis Khaan, resides in the valley. Kharkhorum was not only the former administrative centre of the empire but also it used to be an important trade and cultural centre which played a key role for connecting the East and West. The Orkhon Valley Nature and Cultural Heritage covers 353.04 thousand ha area.

2.3. Khangai Natural Reserve Park

Khangai Mountain is the meeting point of forest, taiga, steppe grassland, Gobi and desert. It restricts distribution of these distinct regions and forms an independent region that maintains the general natural balance and integration of Mongolia. The geographical location, mountain formation, landscape distributions, spatial layout of Khangai Mountain indicate it as an independent great region. Therefore, the characteristics of Mongolia are centered in Khangai Mountain, which is surrounded by Taiga Mountain of the southern Baikal region, Central Asian desert, Altai-Soyon Mountain, Daurian-Mongolian steppe and Great Khyangan Mountain and the countries interconnecting these great regions. The Khangai Mountains comprise globally significant watersheds and headwaters of rivers that join the basin of the north Arctic Ocean and closed basin of Central Asia.

The flora of Khangai Mountain represents species from the Siberian taiga, Mongolian steppe grassland and Daurian steppe. The mountain steppe and mountain forest belt prevail. The high altitude alpine zone of Khangai Mountain contains species that grow in Altai and Soyon, and relict species from Himalaya can also be found with relatively young endemic species. The characteristics of fauna formed by the species living between Siberia and Central Asia are inhibited in Khangai.

Khangai Mountain covers the administrative region of Arkhangai, Bayankhongor, Uvurkhangai, Zavkhan and Khuvsgul aimag and it covers about 7,924,601.1 ha and a total of 151,026 people live in the area.

2.4. Khentii Mountain Park & Cradle of Mongolian Governance

This heritage place covers the central and eastern mountains of the Khentii Mountain range. The area conserves a unique natural landscape, mineral springs and historic remains of the great Chingis Khaan. It is home to many endangered plant and animal species. The Onon-Balj River basin of the area is the only place in Mongolia that is covered by an assemblage of pine forest, larch forest, birch forest and mixed forest. These forests play a significant role for preserving water, regulating and storing a stable source of water for the river and maintaining the ecological balance of the place. It is also home for various endangered cranes, bustard, and other migratory birds.

The region has unique communities of aquatic plants and animals from East Asia. The Onon-Balj River basin is the part of the Mongol-Daurian eco-region that is one of the 200 global conservation priority eco-regions of the 21st century. In terms of flora, the area comprises species that represent the northern edge of Central Asia and it is dominated by the forest steppe flora of Dauria and Manjuur. Many historic places represent Chingis Khaan's history, including Deluun Boldog, the birth place of Chingis Khaan, which resides in the area. It can be designated as a cultural heritage, the cradle of Mongolian governance. Designated area covers 4.7 million ha.

2.5. Khentii Nature Reserve Park

The Khentii Mountain taiga forest is at the southern edge of the Siberian forest and northern edge of the Central Asian forest and it is relatively low in elevation compared to the Khangai and Khovsgol Mountain ranges. It is extensively covered by taiga forest, making it a unique landscape in Mongolia. With the headwaters of Kherlen, Onon, Tuul, Estii, Zakhar, Shoroot, Minj, Eroo Rivers originating from Khentii, the region is rich in fresh water resources.

The forest in Khentii grows not only on north-facing slopes like the forests in Khangai, Altai, Khovsgol but also grows on south-facing slopes as well. All seven species of native needle trees (3 species of pine, 2 species of larch and 2 species of fir) of Mongolia grow in Khentii.

Khentii provides a significant level of water-storing and water-regulating ecosystem services. It plays a vital role for sustaining regular supply of water for rivers, regulating water allocation, and providing ecological balance. It is home to the globally endangered white-naped crane, hooded crane and great bustard. It is rich in fresh water biodiversity. Species of Daurian-Manjuur indicators grow and live in the Onon River basin.

The proposed Khentii Nature Park belongs to the administrative region of Dornod, Tuv, Selenge, Khentii aimag and green belt of Ulaanbaatar City and covers 4,777,725 ha. There are 69,859 people living in the area.

2.6. Natural and Cultural Heritage of the Mongol Altai Mountain range

The Mongol Altai Mountain range is part of the Altai Mountain range and is located in the western Mongolia region. 70% of mountains occur in the range of 2,000-3,000 meters above sea level, with the remaining 30% occurring above 3,000 meters from sea level. It is prevailed by cool climate. There are 250 glacial rivers that cover 514 sqr. km area in total.

There are many unique beautifully formed places in Mongol Altai and most of these places are designated as state protected areas, including Altai Tavan Bogd, Siilkhem Mountain, Munkhkhairkhan, Myangan Ugalzatiin Mountain National Parks, and Khukh Serkh, Turgen and Tsagaan Shuvuut strictly protected areas.

There are many glacial lakes such as Khoton Khorgon, Dayan, Munkhkhairkhan waterfall and Turgen Goojuuriin waterfall. All of the above mentioned places are valuable natural heritages of Mongol Altai Mountain.

Over 20 ethnic and social groups have rich cultural diversity and speak their own dialects and languages. They are still adhere to traditional customs, beliefs, values and intellectual and material heritages. The place is richest in cultural diversity and unique in Mongolia.

The nominated site "Natural and Cultural Heritage of Mongol Altai Mountains" covers 12.1 million ha.

2.7. Altai Tavan Bogd National Park

This park of nomadic cultural civilization belongs to the western part of Mongolia. Mongol Altai Range is a continuation of Mongolia's part of the Altai Ranges. Through observation of general global warming and changes in climate and environment, a proposal to nominate this area as a Transboundary Biosphere Reserve was not accepted. It is very important to observe and monitor the Altai mountains system, its peaks, glaciers and eternal snow caps, which are one of the important parts of the monitoring globalization process of western (Atlantic) and eastern (Pacific) airflow movements, activation and repetition to Altai Ranges during summer each year.

The Mongol Altai Range is the main habitat of endangered species that are registered in the World Red Book, such as the snow leopard, Argali sheep, ibex and many others.

The Mongol Altai region's identity is very unique in that it is the main land for many ethnic groups who have kept their own culture, traditions, religions, languages, such as durvud, togrguud, urianhai, zakhchin and Kazakhs, Tuvans and Khoton.

2.8. Stipa Grassland Nature Reserve Park

The Dornod Mongolia Steppe is located in the eastern corner/part of Mongolia which represents the steppe ecosystem of Central Asia. This steppe ecosystem is very common in Mongolia but quite rare in neighboring countries. This kind of wild and dry steppe landscape is very rare throughout the world. About 70 percent of Mongolian white gazelles are found in the steppe region. It represents the globally rare stipa grassland ecosystem and is home to the globally threatened Mongolian gazelle and many other endangered species.

While the Mongolian stipa grassland is considered as part of the extensive Euro-Asian arid steppe it is also unique. It comprises eastern Mongolian steppe grassland and Mongolian Daurian steppe. It covers 28.2% of the territory of the country and lies over 444,548 square km. 9.6% of this region is designated as state protected areas. It provides the core habitats for Mongolian gazelle (Procapra guttorosa) where herds consist of several hundreds and thousands of gazelle individuals. Unique ecological phenomena, migration of hoofed mammals, can be observed in the Eastern Mongolian stipa grassland.

139500 people live in the proposed Stipa grassland nature reserve park.

This proposed park covers a total of 12.1 million ha area and overlies the administrative regions of 37 soums from Khentii, Dornod, Sukhbaatar and Govisumber aimag.

2.9. Great Gobi Strictly Protected Area

This area is located in the northern part of the great desert of Central Asia, and is an important area for protecting the vulnerable Gobi ecosystem and habitat of world endangered wildlife which are registered in the International and Mongolia's Red Book, such as wild camels, wild horses, black tailed gazelles, Gobi bears, snow leopards, argali sheep, ibex and many others. There is much potential to exchange research information to protect and conduct researches/surveys on the

Gobi/desert ecosystem of Central Asia at the international level through the approval of the International Biosphere Reserve in 1990.

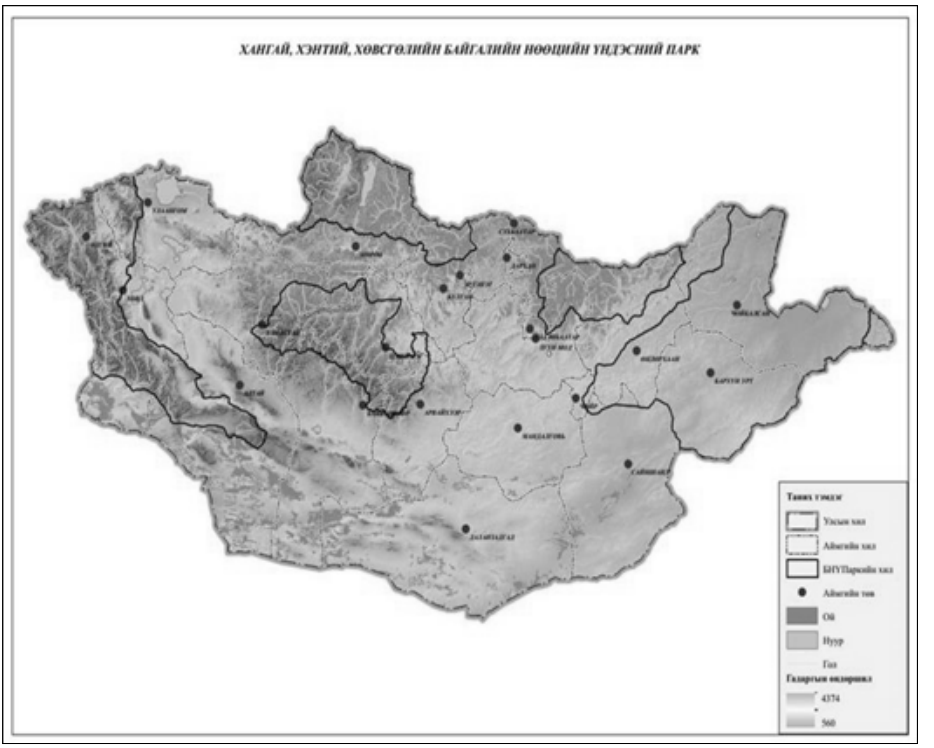
The Great Gobi Strictly Protected Area is divided into the two main parts of "A" and "B," which encompass a total of 53,000 square km. The Great Gobi Strictly Protected Area is the 15th largest protected area in the world. The A and B parts of the Great Gobi Strictly Protected Area are separated by "Aj Bogd" mountain and more than 150 km of wide ranges, which are different from each other in their landscape and ecological regions.

Great Gobi A lies in the southwestern part of Mongolia in an arid region of the Gobi desert. The vegetation is dominated by desert and desert steppe. Great Gobi A is a habitat of endangered mammals, such as wild camels which are registered in the International Red Book.

Great Gobi B is a nature reserve in Gobi desert, situated in the south-western part of Mongolia which represents the eastern part of Zuungar – Kazakhstan desert under Midlle Asia, Kazakhstan and Central Asia. These areas are desert steppe, arid mountains, deserts and semi-deserts. The climate in the very eastern part is quite mild.

All of the above mentioned features show that it is possible to gain the status of a World Park (see the marked area in Figure 3). Thus, if a condition of a special conservation is created through this initiative of conserving Protected Areas in Mongolia by issuing/accrediting for the special status of a World Park, then there are many places which have historical, cultural and natural heritages. Also some of these heritages cover vast lands along with many places which cover small unique areas.

Figure 3. Proposed protected areas for World Park status are highlighted in black lined areas.



III. Situations In Protected Areas

3.1. Introduction about Mongol Daguur

Using Mongol Daguur SPA as an example, we have made an assessment of the changes in landscapes occurring from 1992 to 2011. We determined the chief

causes of these changes and outlined the principal management tasks regarding specially protected natural territories, focusing on minimizing the level of negative effects. We examine the ecological problems faced by the SPA, and the associated hazards, and suggest recommendations on an optimization of management of the SPA with a view to decrease the possible occurrence of challenging ecological hazards.

The Mongol Daguur SPA is located in the northeastern border area of Mongolia. The SPA extends over parts of the soums Chuluunkhoroot, Gurvanzagal and Dashbalbar of Dornod Aimag. The total area of the SPA is 109,016 ha. The State Great Khural of Mongolia approved border areas of the Mongol Daguur SPA by its Resolution No. 26 in 1995.

This SPA is divided into two parts: "A" and "B." The part "A" is located in Chuluunkhoroot soum. The northern border of SPA is duplicated with the state border. The part "A" is located between the north latitude of 114030'-115030', east longitude of 49045'- 50015' that borders the Russian Federation along the Yanlah River Valley. Total area is 87780 ha. The part "B" of Mongol Daguur SPA is located along the Ulz River Valley between northern latitude of 114055'-115037', eastern longitude of 49038'- 49044' through the borders of Chuluunkhoroot, Gurvanzagal, and Dashbalbar soums. Total area is 15,236 ha.

The Mongol Daguur SPA occupies the northern part of the Daurian steppe eco-region, which has been acknowledged as one of the most significant sites for conservation of the planet's biodiversity, within the Global 200 list, on the border between two of its components, the Mongolian-Manchurian steppe and the Daurian forest-steppe. The steppe sites are currently poorly represented in the World Heritage list. The Daurian steppe is one of the vastest and well-preserved examples of steppe natural complexes on Earth, comprising intra-zonal wetlands and forest-steppe landscapes that are of great significance for conservation of the universal biodiversity. A virtually complete historical set of plants and animals that are typical of the Daurian steppes and forest-steppes is represented at this site. Almost all types of vegetation associations are characteristic for the region, as well as a complex distribution of mammalian and bird species (50 and 327 species, respectively) being present here.

The species structure diversity and abundance of birds and mammals, as well as the number of rare species at this site, are considerably higher compared to the same figures at the other steppe territories of Eurasia and the planet in general. This can be attributed to a number of factors: its biotope diversity (the entire range of landscapes and biotopes that is typical of the Daurian eco-region is located here), its location situated at a place where the migration flyways of the birds become narrow and at the place of junction of large bio geographical units, as well as its variability of ecosystems caused by climate cycles.

The East Asian-Australasian flyway of waterfowl, semi-aquatic, and passerine birds becomes narrower in the Torey hollow; therefore, it is the key resting site for these birds. The Torey lakes with the mouths of the Imalka and Ulz rivers, as well as a part of the Ulz river floodplain, are inscribed on the list of wetlands of international importance and important bird's areas. Up to 3 million migrating birds stop here. Among the avian species observed at the site, more than half are vagrant birds. A total of 15 globally endangered species inscribed on the IUCN Red List (2011) have been observed in this territory: one critically endangered, three endangered, and 11 vulnerable. In addition, about 40 species have been inscribed on the Red Data Books of the Russian Federation and Mongolia. The site is of special significance for conservation of the crane species. Six crane species inhabit the territory: up to 20% of the total world population of the Demoiselle Crane, up to 12% of the world population of the Hooded Crane, 5% of the White-naped Crane, and up to 1% of the Siberian Crane accumulate in the Torey hollow before the autumn migration. The Torey lakes are one of the four breeding sites known in the world of the Relict Gull (over 20% of the world population); the lake hollow and the adjacent regions are the habitats of approximately 13% of the total world population of the Eastern Great Bustard. It is one of the last Paleoarctic regions still inhabited by numerous herds of wild ungulates — dzerens (Mongolian gazelles). The territory is of key importance for conservation of natural massive transboundary migration routes of dzeren, which is the last grandiose phenomenon of this type in Central Asia. The total number of migrating dzerens annually staying for winter

at this region is as high as 100,000 individuals (5–8% of the total number of the species); the number of non-migrating dzerens is 7–8 thousand individuals (Kiriluk *et al.*, 2013).

This territory is an outstanding example of evolutionary processes: the natural communities of the Torey hollow and the adjacent regions were formed under conditions of periodic climate change, which was the reason for the development of a number of adaptations to continuous deep changes in existence conditions at the level of species and communities. Under contemporary conditions, the climatic cycles during which an arid phase replaces the wet phase occur over relatively short periods of time (approximately 30 years), thus causing substantial and relatively swift rearrangement of steppe ecosystems and a drastic rearrangement of wetland ecosystems. The periodic transformation of wet biotypes into dry and back provides the optimal conditions for the existence of a number of species with different (sometimes opposite) ecological requirements within the same territory. The site is of an undoubted scientific significance as an example of adaptation of the species and ecosystems to the continuously changing climatic conditions and is an important object for monitoring these processes (Kiriluk *et al.*, 2013).

3.2. History of Economic Development

Mongol Daguur (Daurian) region was sparsely populated until the 1940s. The economy engaged by local residents was traditional animal husbandry and it was free of any other economic activities and outside disturbances. However, a railway between Choibalsan in Mongolia and Borj in Russia was built in 1956 and Ereentsav border custom point and Chuluunkhoroot Soum were established and settled by humans. A state farm Ereentsav was set up based on Chuluunkhoroot Soum and it provided a basis for use of its vicinity for farming and cultivation. In the 1980s, it was one of the important state farms in the country as it had 20,000 ha rotational cultivation land (A map on Ereentsav farmland). However, during the transition

to the democracy and market economy in the country, the state farm was closed down and farming or cultivation no longer took place in Chuluunkhoroot territory. At present, the abandoned farmland is being restored to its natural state.

Some game species e.g. Siberian/Mongolian marmot, roe deer, Mongolian gazelle, red fox, and grey wolf are hunted by local residents in small numbers for subsistence or household purpose. No commercial hunting of the wild species takes place in the region. The Mongolians have no tradition to hunt birds, so birds are not hunted at all. However, there were some reports on bird hunting by specialists and officers from the Soviet Union, who worked at the Mardai uranium deposit in the 1980s. They came to Ulz River valley and Lakes Galuut, Duruu, and Khukh in spring and autumn to hunt water birds. According to previous research papers, water birds were largely hunted in Tari Lake and the lower part of Ulz River in Russia at the beginning of the 19th century.

3.3. Changes in Landscape Structure PA in Dauria

Our investigation into the dynamics of landscape cover used digital satellite images acquired by Landsat-TM and Landsat-ETM, which were converted to the synthesized scan pattern referenced to the topographic map. The ERDAS IMAGINE software package was employed for a classification of land use units on satellite images. The software used included the ESR1 Inc. products: ArcMap G1S desktop package, ERDAS Imagine, I1WIS, and ENVI. The analysis also used the most significant cartographic publications (Oyungerel and Munkhdulam, 2011), and other cartographic and statistical materials.

Data from analyzing the satellite images intimate that along the border between two of its components, the Mongolian-Manchurian steppe and the Daurian forest-steppe, forests steppe were replaced to a significant extent by steppe with meadow and bog-meadow associations, while the meadow steppes gave way to shrub birch steppe (see Table 3). There is severe deflation of sands, especially near the mouths of

smaller rivers along the lake's left shores, such as the Baruun Tari Lake.

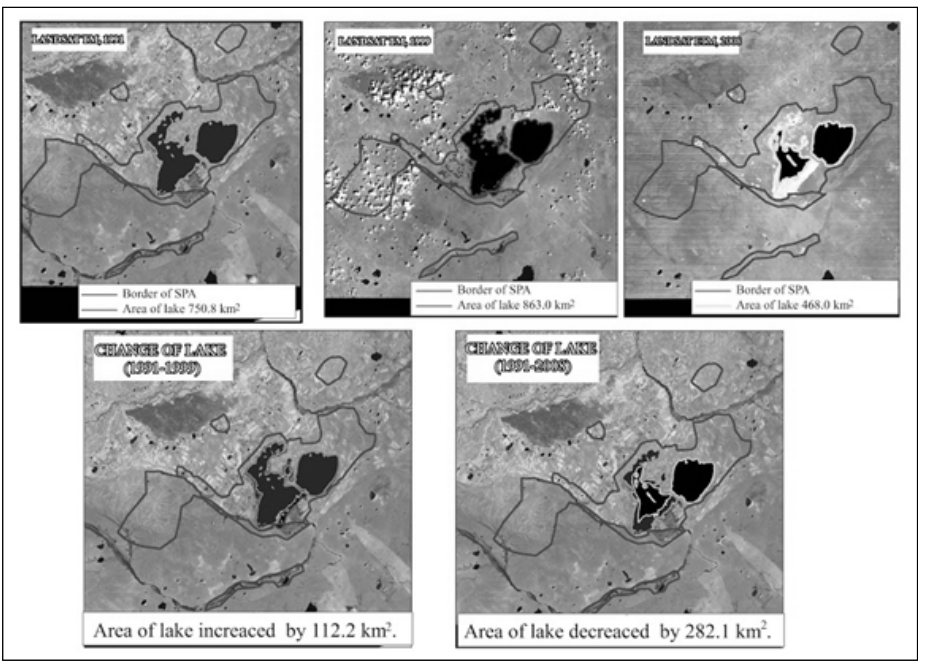
Table 3. Land cover changes in 1991-2008

Landscape types	Area, km2		Change	
	1991	2008	km2	%
Lake	7.8	0.0	7.8	0.05
Wetland	61.8	14.4	47.4	29.8
Meadow	12.1	49.9	37.8	23.7
Steppe	26.3	34.6	-8.3	0.05
Bare land	30.3	35.5	-5.2	0.03
Grope field	4.2	0	4.2	0.02
Sand	0.3	0	0	0
Dried lake		0.44	0.44	0.003

Overall, our investigation shows that the main factors that are responsible for changes in the park's landscape cover are due to global warming (by 60%) and are determined by anthropogenic impacts, including overgrazing and the 40%-excess of the utilization of steppe resources.

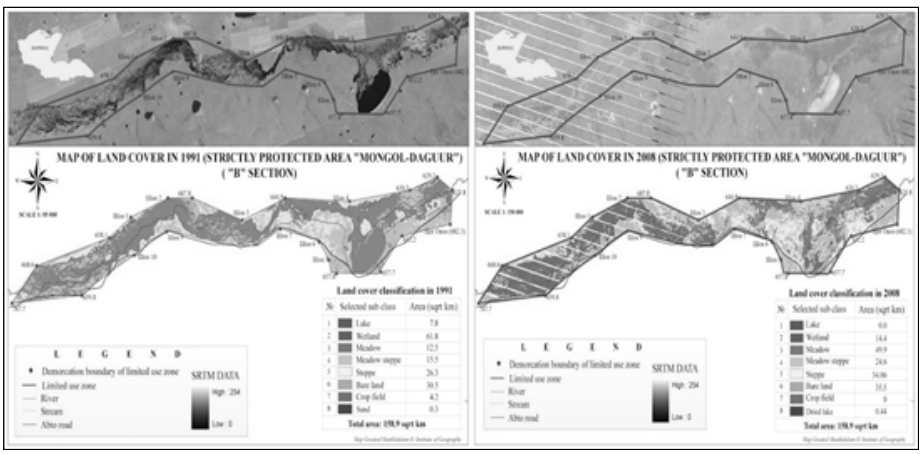
For example, the water surface area of Lake Baruun Tari has increased over recent years (see Figure 4). This is due to two factors, one of which is global climate change. Currently there is taking place an intensification of global processes influencing the dynamics of the largest glaciers, which leads to a water level rise in the lake. The studies show that in the transition zone between the Daurian steppe and the Central desert zone, warming is quite conspicuous. Annual average air temperature is around – 0.9 to 1.5oC in the eastern part of Mongolia. Probably an instance of absolute high and low temperature occurs once in every 20 years. The variation of many years' air average temperature shows the area warmed up to 0.6-1.9°C since observations began in the region.

Figure 4. Water surface changes of Lake Baruun Tari (1991-1999 and 1991-2008)



The other reason lies in severe anthropogenic impacts. The findings attest that in the Daurian steppe with pasturing, the change in the landscape area of Dauria SPA was 101.8 km2 in total for the period from 1991 to 2011 (Figure 5).

Figure 5. Land cover of Mongol Daguur PA in 1991 and 2008



With the transition to a market economy, some stock raisers have begun to increase their own herds which have a negative influence on the state of the pasture lands. While 18,000 head of livestock used the territory of the SPA for grazing in 1991, their numbers have now increased to 32,000, or nearly twice. Overgrazing has caused a degradation of vegetation and soil cover, which promotes permafrost thawing, sanding and desertification. Comparison of areas with and with no vegetation revealed that soil temperature is lower in the former case.

Fluctuations in climate humidification cause dramatic changes in water ecosystems. Disturbances of an anthropogenic origin have a negative influence on the state of the rivers flowing. A very commonly occurring kind of such an impact is pollution from loads on pastures, and from yurts located nearby water sources.

IV. Organization of Management and Economic Impact of Protected Areas

In this context, the principal missions of protected areas are: protection of pristine natural territories for the preservation and conservation of biological diversity, and for maintenance of the protected natural complexes and objects in a natural state; organization and conduct of scientific research, including the keeping of the "Chronicles of Nature"; conduct of ecological monitoring and educational activity; assistance in training scientific personnel and specialists in the field of environmental protection; encouraging local residents to participate in environmental protection measures with prospects for presentation of ecological forms of nature management using the park as the base.

The scope and functions of the park listed above suggest that the park's future management can be formulated as follows. To refine the zoning arrangement requires taking into account the representativeness of landscapes, and updating, reconciliation and approval of zoning changes, and the expansion and establishment of protected zones based on monitoring results on rare animal species and on the state of landscapes should become the immediate top-priority measures. To optimize the layout of the park's territory, it is imperative that assessments be made of natural and anthropogenic factors affecting the natural complexes of the protected area, with the relevant investigations repeated on a regular basis, and that a data bank be created and the new management plan be worked out.

It will be necessary to raise the degree of staff training as well as to improve material and technical equipment of the park. Ecological education and involvement of the local population and administrative bodies in decision-making is a main concern for the park's biodiversity conservation. Considering that illegal mining is underway even within the protected areas, and especially in light of the current situation of minerals, it is necessary to foresee the possible outcome of the existing situation and propose the optimal ways to resolve emerging conflicts.

It is important to step up the involvement of local residents in the protection of especially valuable natural sites, including in the protection of forests, rivers, lakes, the flora, and the fauna, with the participation of volunteer inspectors by foreseeing payment of the relevant remuneration to them. It will also be important to proceed to implementation of the cooperation agreement between Mongolian National Park and the adjoining Park on the Russian and Chinese side.

The achievement of all the goals formulated above will facilitate optimization of the park's territory ma¬nagement, a strengthening of transboundary collabo¬ration between Mongolia and Russia as well as China, and an impressive increase in the flow of tourists on both sides.

It is not enough for us to know that parks contribute significantly to local and national economies; our stakeholders, public and governments must also understand this and invest in parks accordingly (Kiriluk *et al.*, 2013).

The wider economic benefit of parks encompasses the broad range of assets that contribute to our present and future quality of life and prosperity, including the value of ecosystem services such as water, soil, climate regulation and pollination; direct economic returns from tourism and the socio-economic benefits attached to recreation, the impact on people's physical and mental health, as well as cultural health. Some of these values are more easily quantified than others such as tourism.

Based on conservative calculations and estimate outlines some of the additional potential revenue is from park entry fees. This forecast excludes potential revenue from additional state allocations from better business planning and using the economic justification for parks, tour operator fees, allowing all parks to charge entrance fees, daily vs entrance fees, the establishment of a concession system, any return from land use fees, mining and biodiversity off-sets, a return from ecosystem services, corporate sponsorships, new tourism opportunities, debt for nature swaps and it assumes that the current level of investment by donors remains the same.

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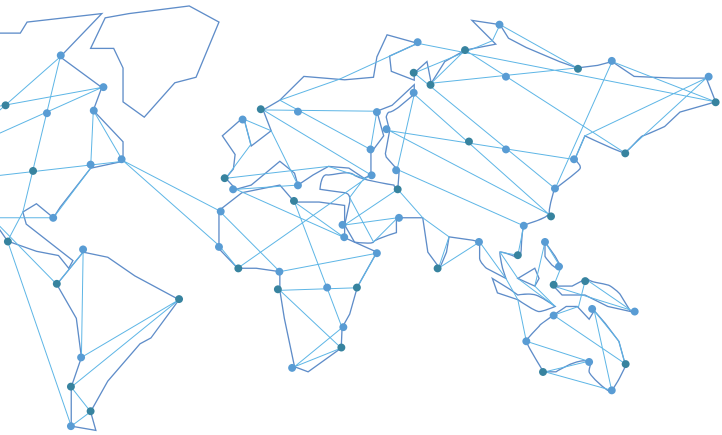

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