Finance and Economic Development in Korea

Yung Chul Park, Wonho Song, and Yunjong Wang
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Executive Summary

This paper focuses on the following two issues. First, the paper investigates the extent to which financial development has contributed to economic growth in Korea. For this purpose, we introduce four well-known financial development indicators, and seek to find a long-run relationship between output growth and financial development. Second, the effects of financial repression on economic growth are examined. A financial repression index is constructed based on five related measures, and this index is augmented to the growth-finance equation. For the robustness of the results, the model with per capita capital stock is also estimated.

Empirical results show that, among the four financial development indicators, only Private Credit has a stable long-run relationship with output growth. Furthermore, it is found that Private Credit causes output growth positively in the long run and output growth also causes Private Credit in the long run. More precisely, the long-run (non) causality test shows that there is a long-run feedback relationship (or bi-directional causality) between Private Credit and the level of output. On the other hand, financial repression turns out to have affected output growth negatively during the sample period. This implies that although we do not exclude the possibility that repressive financial policies may have had positive effects at early stages of economic development, its overall effects on economy are significantly negative.

JEL Classification No: G10, G20, O12, O16.
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Finance and Economic Development in Korea*

Yung Chul Park**, Wonho Song***, and Yunjong Wang****

I. Introduction

It is widely believed that financial systems and their evolutionary development have been a fundamental component of the overall economic development process. However, it has been difficult to explain theoretically either the importance or the evolutionary process of financial system. This difficulty stems largely from the lack of understanding of the mechanism of interactions between the financial system on the one hand and the real sector of the economy on the

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other. As a result, both the quantitative and qualitative importance of the efficiency of financial system remains controversial. This controversy has made it difficult to identify financial policies for developing countries that are consistent with the objectives of growth and industrialization.

Despite unresolved theoretical controversy between “finance matters” school and “finance is irrelevant” school, a considerable number of empirical studies have provided empirical findings on the finance-growth nexus and have offered a much bolder appraisal of the causal relationship at various levels. Firm-level, industry-level and cross-country studies all suggest that the level of financial development exerts a large, positive impact on economic growth. However, there have been only a few empirical studies in the context of Korea. In explaining the superb economic growth performance of Korea, the role of financial development has hardly been examined. A few examples include Demetriades and Hussein (1996), Demetriades, Devereux, and Luintel (1998), Choe and Moosa (1999), Koo and Kim (1999), Luintel and Khan (1999), and Shin, Cho, and Kang (2001).

This paper contributes to the literature in the following three aspects. First, this paper examines the extent to which financial development has contributed to economic growth using various types of financial development indicators. Previous studies consider only banking sector variables as a financial development indicator, whereas we consider stock market indicators as well as banking sectors indicators. Second, we include in the equation newly constructed financial repression index. These analyses may throw some light on the question of whether the repressive financial policy had been effective in spurring economic growth before the 1997-98
crisis. Moreover, if we may interpret the process of financial liberalization as the qualitative (or efficiency) aspect of financial development, the analysis of the effects of financial repression on growth may be an important complement to the quantitative analysis of financial development. Third, we test long-run non-causality relationship between growth and finance, while some studies focus on short-run causality relationship.

The rest of the paper is organized as follows. Section 2 overviews financial development history of Korea. Section 3 briefly introduces our empirical methodology and data sets used for our analysis, and presents empirical results. Concluding remarks are found in Section 4.
II. Overview of Financial Development in Korea

On the effects of financial development on the allocation of capital, there was a general consensus before the 1997 crisis that East Asian financial systems, which were often characterized as repressive bank-based systems, were effective in allocating external funds to the manufacturing sector, which was the engine of growth. In this way, the East Asian financial systems sustained rapid growth for almost three decades before the outbreak of the crisis. The most comprehensive analysis of finance and growth from the early 1960s to the late 1980s is found in a study on the East Asian miracle by the World Bank (1993). The study approbates and justifies the repressive financial policies of East Asian countries, asserting that such policies ameliorated the adverse consequences of financial market imperfections. In managing the financial systems, the study attributes the East Asian success to the efforts of policy authorities to duplicate the market outcomes.

The alleged merits of the interventionist government policy that exercised tight control over the financial system were questioned even before the crisis broke out in 1997 (Yusuf 2001). Skepticism toward interventionist government grew deeper because of the massive investment in the heavy and chemical industries between 1975 and 1979 (which resulted in huge idle capacity in some of the targeted industries), accelerating inflation, and a growing current account deficit. In retrospect, it appears that these macroeconomic developments, more than anything else, gave impetus to a surge of
economic liberalism that called for comprehensive measures of financial liberalization in the early 1980s (Park 1994).

Since the early 1980s, Korea has implemented a series of policy reforms to liberalize its trade and financial system. It has also succeeded in lowering its inflation rate below 5 percent per year while maintaining rapid economic growth. More significantly, Korea began accumulating a sizable surplus on its current account in 1986. These favorable developments and strong foreign pressures for economic liberalization should have made it much easier to implement financial reform measures. However, after some 10 years of attempts at liberalization, Korea’s financial sector was under rigid and pervasive government control and remained largely closed to foreign competition. Furthermore, continued financial liberalization and market opening in the 1990s weakened considerably the monitoring capacity of banks, although such financial deregulation was expected to improve the allocative efficiency in the long run. Consequently, such transition without proper institutions led to difficulties of preventing moral hazard and eventual financial crises when banks and regulators lack the relevant human capital and resources. Indeed, the structural weakness of Korea’s financial system was manifested in the crisis.

Since the crisis, Korea has introduced and enforced new rules for financial supervision, accounting, and auditing that conform to international standards. Along with these institutional reforms, Korea has made impressive progress in deregulating and opening financial markets. As a result, financial institutions, markets, and government policies have been evolving to a competitive and market-oriented financial system. These developments are expected to overcome the
inflexibility of the existing bank-based financial systems.

In this section, we briefly overview the evolutionary path of the Korean financial system.

**The Period of Economic Reconstruction (1945-1960)**

With the ceasefire of the Korean War in July 1953, the focus of economic policy was set on the reconstruction of infrastructure and production facilities. However, government tax revenue fell short of the expenditures needed so it had to rely on U.S. aid funds such as the International Cooperation Administration (ICA) and Public Law (PL) 480 for reconstruction projects. However, a chronic shortage of funds could not be easily resolved. Given that financial markets remained underdeveloped, the traditional tools of the central bank such as rediscount rate adjustment, reserve requirement ratio adjustment, and open market operations could not be implemented effectively. Consequently, the government had to rely on direct or selective control of money and credit to channel funds toward productive sectors. Nevertheless, the process of building the foundation for an independent banking and financial system was carried out relatively smoothly (Kim 1997).


Under President Park’s leadership and vision at least in the economic sphere, industrial development came first and financial development later. Financial repression was deemed necessary for his
high-growth strategy. However, the extent of financial repression became less justifiable in the 1970s. With the promotion of heavy and chemical industries in the 1970s, the advantage to the Korean economy of an export-led development strategy either disappeared or became less visible than it had been earlier. Instead, economic policy became increasingly rigid and displayed many of the features usually associated with import substitution regimes.

Some control measures that should have been phased out were retained, and additional restrictions replaced incentives. In particular, Korean policymakers had to tighten their control over finance in order to allocate resources to the fledging heavy and chemical industries that private firms were reluctant to invest in because of their long gestation period and uncertain rates of return. To induce private investment in these industries, the government had to provide ever-more distorted incentives in the form of preferential loans. To facilitate such an allocation, government authorities had to keep nominal bank lending rates below market levels and to intensify credit rationing, resulting in negative real interest rates and rapid expansion of the curb market (Park 1994).

However, the accumulation of financial assets proceeded at a remarkable rate. The ratio of M2 to current GNP showed a rapid increase throughout the period: it was 14.4% in 1962, 26.4% in 1968, 37.8% in 1973, 32.2% in 1975 and 35.2% in 1979. Despite a slight dip due to a high inflation caused by the first oil price shock and the initiation of heavy and chemical industry promotion, a remarkable rise of the ratio on the average is clearly a testimony to successful financial mobilization (Kim 1997).

Despite the operation of the Korea Stock Exchange since 1956 and
the promulgation of the Securities and Exchange Act in 1962, capital markets in Korea played only a minor role until the late 1960s primarily because only a few companies were listed and investments in capital markets tended to earn lower returns than alternative investment (Choe and Moosa 1999). A series of policy measures from the late 1960s have been aimed at creating a favorable environment for the development of capital markets. In particular, Park’s government tried its best to improve the chronic high-leveraged financial structure of businesses by promoting the public listing of enterprises. In the implementation process, however, mandatory rules were used to tame the business community. It was not until the late 1980s that companies became willing to go public on their own. Forcing them to do so in the 1970s was a rather premature idea (Kim 1997).


In retrospect, the economic liberalism that swept the nation in the early 1980s was a reaction to an interventionist regime that was becoming increasingly rigid and debilitating to the economy. The monetary authorities embarked on a course of financial deregulation in 1981 as part of an overall liberalization of the economy. This deregulation has led to privatization of the then major commercial banks, as well as the creation of new commercial banks and a host of non-bank financial intermediaries. Although it has been partial and marked by relapses, deregulation of interest rates has altered the behavior of financial institutions, as well as the modus operandi of monetary policy.
Encouraged by strong current account developments in the mid 1980s, the monetary authorities outlined a gradual lifting of foreign exchange controls and opening of capital markets to foreign competition. The Korean government formally accepted the obligations of Article VIII, Section 2-4 of the IMF’s Articles of Agreement in 1988. This move pushed Korea to abolish its remaining restrictions on payments and transfers for current account transactions.

In 1990, the current account balance started to deteriorate again because of rising inflation, reap appreciation of the Korean won, and recession of the world economy. The current account worsened in 1991, recording a deficit of US$8.7 billion, which was more than four times the level of the preceding year. Facing difficulties in financing the mounting current account deficit, the government responded by encouraging capital inflows. Some of the earlier measures aimed at limiting capital inflows were reversed. Furthermore, the capital account liberalization was once again significantly accelerated by amending the Foreign Exchange Management Act (FEMA) in 1991 (Park 1995).

Furthermore, there was continued pressure from the U.S. Treasury to open up the financial and services markets. The March 1992 bilateral talks formed the basis for the 1993 financial liberalization program. In addition, the decision of the Kim Young Sam government in 1993 under the declaration of “se-gye-wha” (globalization) as the top policy priority to apply for the OECD membership also made Korea subject to further external demands for financial deregulation and capital market opening.

Even the partial nature of capital account liberalization undertaken
during the early 1990s triggered massive capital inflows. Policy makers were particularly concerned about the appreciation of the Korean won, which could undermine the competitiveness of Korean exports, rather than the financial instability generated by volatile capital flows. The government took several steps to liberalize capital outflows. Despite a series of capital account liberalization measures, the Korean government took a gradual approach and thus a considerable number of capital controls on foreign exchange and cross-border capital transactions still remained. For instance, when Korea joined the OECD in 1996, Korea maintained many reservations to the Code of Liberalization of Capital Movements and Current Invisible Operations.1)

On the domestic front, the Korean government announced a blueprint for financial sector liberalization in 1993. This led to deregulating interest rates, liberalizing the issuance of corporate bonds and commercial paper, and sharply reducing subsidized “policy lending” through state-owned institutions. In terms of regulatory restrictions, there were two important changes: (1) deregulating various restrictions on asset and liability management of

1) Members of the OECD agree to adopt the organization’s legal instruments, including the Code of Liberalization of Capital Movements and the Code of Liberalization of Current Invisible Operations (covering cross-border financial services). These two codes incorporate a commitment to move towards full liberalization and not to introduce new restrictions. When the existing members of the organization make the final decision on accepting new members, the number of reservations to these two codes is most critical factor for the consideration of the membership.
financial institutions and (2) encouraging transformation of existing institutions in order to enhance the long-term soundness of the financial sector. However, supervisory reforms did not come along. Ironically, the above two domestic regulatory changes were responsible for increasing short-term foreign currency debts of financial institutions.

First, there was asymmetry in the regulations on short-term vis-à-vis long-term borrowing. The government boosted incentives for short-term debts by making it mandatory to provide detailed information and obtain permission from the regulatory authorities in the case of long-term borrowing, whereas short-term borrowing was regarded as trade-related financing and therefore not strictly regulated under the Foreign Exchange Management Law. Thus, banks and firms had been operating on a long-term basis with short-term foreign borrowings, leading to significant discrepancy in the maturity structure.

Second, the number of financial institutions dealing with foreign currency-denominated activities increased in a short period of time. Later in 1994 and 1996, the twenty-four existing investment banks were allowed to become merchant banks, joining the six existing ones. Several merchant banks, owned by the chaebols, served as an important vehicle for raising the fund required for the chaebols’ voluminous investment, thereby lacking adequate loan assessment to their parent companies. 30 merchant banks were heavily engaged in offshore operations by borrowing cheap short-term Japanese funds from Hong Kong to finance mostly long-term investment projects.²)

²) Commercial banks felt pressure to compete with the merchant banks, and also began to borrow abroad at short-term maturities.
With 80 percent short-term debts put into 70 percent long-term assets, the maturity mismatch blew up when Korea’s credibility plummeted after the Dongbang Peregrine fiasco (Kim, Kim and Wang 2001).

The misallocation of credit was facilitated by a weak system of prudential regulations. Loan classification standards and provisioning were less stringent in Korea and were based upon backward looking criteria that focused more on borrowers’ prior loan servicing record and availability of collateral rather than their future capacity to repay. Loose restrictions on banks’ risk concentration led to large exposures to certain chaebols that were heavily leveraged and dependent mainly upon bank financing. In addition, the bulk of corporate bonds issued carried a bank guarantee that exposed the financial system to even more corporate risk. Accounting and disclosure standards were also below international best practices. The lack of a liquid bond market and of transparency in the equity market also hindered the development of strong corporate governance and market discipline (Chopra et al. 2002).

The problem of weak prudential supervision was compounded by fragmented supervision and widespread forbearance. Supervision of the financial sector was divided between the Office of Banking Supervision at the Bank of Korea (commercial banks) and Ministry of Finance and Economy (specialized banks and nonbank financial institutions). The lack of unified supervisory framework created opportunities for regulatory arbitrage and permitted unsound banking practices to prevail. In particular, lax supervision allowed merchant banks to enjoy freedom without any discipline. When Korea embarked on the IMF structural adjustment program, merchant
banks were the first to go through restructuring.  

The Period of the Crisis and after

Immediately after the crisis began, the top priority in Korea was to restore market confidence to prevent bank runs and capital flight. Once the bleeding phase was over, the Korean government moved on to resolving insolvent financial institutions and to rehabilitating those that were weak but still viable. The financial restructuring plan also included the adoption of international standards of regulation and supervision, as well as a scheme for capital market development. Banks were required, for example, to adopt forward-looking criteria in evaluating the quality of their assets (Park 2001).

However, those measures for financial sector reform were not entirely new. Apparent reform initiatives, such as the establishment of a Presidential Commission on Financial Reform, had already been called for. Yet, the authorities failed to take any action, partly because of conflicts between different interest groups in the public and private sector, and partly because of reluctance to take bold policy measures in the lead-up to the presidential elections in December. After the crisis hit, the Presidential Commission’s recommendations suddenly assumed much greater relevance. The Commission had recognized that reform was needed, not just in the content of financial sector regulation, but also in the organizational structure of the bureaucracy responsible for regulation and supervision (IMF  

3) As the first step of the penal procedure, the Korean government had suspended the operations of 14 most unhealthy merchant banks in December 1997.
2003).  

The structural program for the financial sector in Korea was undertaken in two rounds. The first round was intended to address the immediate instability of the financial sector through the closing or resolution of troubled financial institutions and the disposal of their non-performing loans (NPLs). 64 trillion won of public funds were mobilized with the approval of the National Assembly in early 1998 for this purpose. However, with the bankruptcy of Daewoo in mid-1999 and the deterioration in the financial conditions of other large firms, banks’ solvency positions were eroded once more (Cho 2002).  

A second round of financial sector restructuring was initiated around the end of 2000, when another 40 trillion won were mobilized with the approval of the National Assembly. The collapse of Daewoo also brought to the forefront the weaknesses of the non-bank financial institutions. In particular, the bank-based financial sector restructuring in the first round provided the wrong incentives to corporate restructuring. It indirectly allowed some chaebols to expand

4) There were three important differences between the Commission’s recommendations and the IMF’s restructuring program. First, the Commission did not specify the sequencing of the reforms. Second, the Commission did not offer recommendations on the resolution of the NPL problem, partly because it was charged with offering a “big picture” vision of reform, but also because its members, like most outside observers, were not aware of the depth of the problem. Third, while it recommended the establishment of a consolidated supervisor, the Commission did not fully address the issues related to the bureaucratic structure of supervision.
their businesses instead of restructuring by issuing large amounts of corporate bonds. By benignly neglecting the investment trust corporations (ITCs), the government did mitigate the first credit crunch problem in the short run. But the long-run costs of delaying the resolution of non-bank financial institutions were too big to justify the bank-based restructuring policy (Oh and Rhee 2002).

On the external front, the Korean government aimed for a far more extensive capital market opening than what had been agreed with the IMF. A variety of policies to induce foreign capital in an attempt to overcome the financial crisis were introduced, and measures for capital account liberalization have been undertaken. The individual shareholding limit of foreigners has increased drastically from 7 to 50 percent on December 11, 1997, and the ceiling was lifted completely on May 25, 1998. All regulations on foreign purchase of debt securities were eliminated in December 1997. All domestic enterprises, regardless of size, were allowed to borrow without limit from overseas as long as the maturity would not exceed one year. All the short-term money market instruments, such as commercial paper and trade bills, were also completely liberalized on May 25, 1998. These developments brought Korea’s capital markets on a par with the level of openness of advanced countries.

In addition, the financial restructuring brought significant changes in the ownership structure of financial institutions in Korea. First, foreigner’s access to the financial sector in Korea was completely liberalized after the crisis. Foreign banks and securities companies were allowed to establish subsidiaries on April 1998. 100% foreign ownership of Korean financial institutions was allowed and foreign nationals were allowed to become directors of Korean banks. As a
result, notwithstanding the initial low degree of penetration, foreign bank’s control over assets of local banks jumped to 4.3 percent in 1999 from less than one percent in Korea in 1994.5)

Second, as a result of the capital injection to the troubled banks, many major commercial banks were nationalized. Average government ownership stakes in commercial banks, weighted by bank assets, rose from 17 percent at the end of 1996 to 58 percent at the end of 1998, and then fell to 34 percent at the end of 2001. In January 2002, the authorities announced a plan to complete the privatization process over the next three to four years (IMF 2003).

5) Foreign bank penetration in Korea is still lagging behind that in other emerging market economies in Central Europe and Latin America. By contrast, foreign investment banks, in particular American and European ones, have established a monopoly position in providing two major capital market services in East Asia: underwriting in the primary market and trading and consulting in the secondary market. See Park (2002) for further information and discussion.
III. Finance and Growth Nexus: Long-run Causality

This section provides empirical evidence on whether financial development has contributed to economic growth in Korea. For this purpose, we apply VAR-Cointegration method to aggregate macro data sets. Based on the estimated models, long-run non-causality test is performed to investigate whether the financial development causes economic growth.

1. Methodology

Using the maximum likelihood approach of Johansen (1988), a VAR model is estimated as follows:

\[ \Delta X_t = \mu + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \ldots + \Gamma_{p-1} \Delta X_{t-p+1} + \alpha (\beta' X_{t-p}) + u_t \]

where \( X_t \) is a vector of first-order integrated variables. Each column of \( \beta \) is the cointegrating vector. The is the error correction coefficient (adjustment coefficient or loading factor) which indicates the speed of adjustment towards the long-run equilibrium. Note that the coefficients \( \beta \) are unrestricted so that they must be normalized in some way. For illustration, assume that there is one cointegrating vector in the VAR of two variables. Normalizing the coefficient of the first variable, GDP in this case, gives the following structure of the long-run relationship:
\[
\begin{pmatrix}
\Delta GDP_t \\
\Delta FD_t
\end{pmatrix} = \begin{pmatrix}
\alpha_1 \\
\alpha_2
\end{pmatrix}(1 - \beta_2)
\begin{pmatrix}
GDP_{t-1} \\
FD_{t-1}
\end{pmatrix}
\]

where FD stands for Financial Development Indicator. Then, for this cointegrating vector to be meaningful as an output relationship, the adjustment coefficient \(a_t\) must be negative and significant.

A test of zero restrictions on \(a\) is the test of weak exogeneity (Johansen and Juselius, 1992). Hall and Milne (1994) show that weak exogeneity in a cointegrated system is equivalent to the notion of long-run causality. Thus, for instance, non-rejection of the null \(a_t=0\) implies that output vector is weakly exogenous with respect to the financial development vector; that is, financial development does not cause output in the long run. Likewise, the test of the null \(a_2=0\) is the test for whether output causes financial development in the long run.

Two Johansen cointegration tests—maximum eigenvalue test and trace test—are performed to examine the existence of cointegration relations. The number of lagged differences is \(\Delta X_{t-\rho+1}\) fixed at 2 or 3 considering the sample size. Detailed results on the cointegration tests are omitted to save space, and they are available from the authors upon request.

2. Data

We use annual data on income and financial development indicators. As income variable (YI), we use real per capita GDP. As financial development indicators (FD), we use (i) private credit, (ii) liquid liabilities, (iii) stock market capitalization, and (iv) value traded.
Financial Development Index

The definitions of each variable are as follows. Private Credit (PC) is the value of credits by financial intermediaries to the private sector divided by GDP. Liquid Liabilities (LL) is currency plus demand and interest-bearing liabilities of banks and nonblank financial intermediaries divided by GDP. Stock Market Capitalization (MC) is the value of listed shares divided by GDP. Value Traded (VT) is the value of total shares traded on the stock market exchange divided by GDP. These variables are from Demirgüç-Kunt and Levine (2001).\(^6\)

<Table 1> Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Log GDP</th>
<th>PC</th>
<th>LL</th>
<th>MC</th>
<th>VT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>15.226</td>
<td>0.714</td>
<td>0.439</td>
<td>0.222</td>
<td>0.238</td>
</tr>
<tr>
<td>S.D.</td>
<td>0.500</td>
<td>0.319</td>
<td>0.159</td>
<td>0.165</td>
<td>0.222</td>
</tr>
<tr>
<td>Growth</td>
<td>0.062</td>
<td>0.048</td>
<td>0.035</td>
<td>0.046</td>
<td>0.102</td>
</tr>
</tbody>
</table>

<Table 2> Correlation of Level Values

<table>
<thead>
<tr>
<th></th>
<th>Log GDP</th>
<th>PC</th>
<th>LL</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log GDP</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>0.976</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LL</td>
<td>0.973</td>
<td>0.960</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>MC</td>
<td>0.827</td>
<td>0.720</td>
<td>0.772</td>
<td>1.000</td>
</tr>
<tr>
<td>VT</td>
<td>0.880</td>
<td>0.791</td>
<td>0.832</td>
<td>0.959</td>
</tr>
</tbody>
</table>

Notes: 1. All variables are in natural logarithms.

2. Financial development indicators are calculated as log (100*FD).

---

\(^6\) Sample periods of most of the data are 1971-1997, while those of market variables are 1976-1997.
<Table 3> Correlation of Growth Rates of Variables

<table>
<thead>
<tr>
<th></th>
<th>Log GDP</th>
<th>PC</th>
<th>LL</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log GDP</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>-0.851</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LL</td>
<td>-0.231</td>
<td>0.352</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>MC</td>
<td>0.468</td>
<td>-0.398</td>
<td>0.254</td>
<td>1.000</td>
</tr>
<tr>
<td>VT</td>
<td>0.287</td>
<td>-0.443</td>
<td>0.069</td>
<td>0.614</td>
</tr>
</tbody>
</table>

Note: All variables are in natural logarithms.

Tables 1-3 provide summary statistics of the data. Table 1 shows that Private Credit is the largest among the four indicators, while the growth rate of Value Traded is the highest. Table 2 shows that two banking sector financial development indicators (PC and LL) are more correlated with the level values of GDP than the market sector indicators (MC and VT). Table 3 presents the correlation of growth

<Figure 1> Financial Development Indicators

![Financial Development Indicators Chart](chart.png)
rates of the variables. Note that some variables take negative values. The fact that the contemporaneous correlations between the growth rates of PC and LL and the growth rates of output are negative while they are highly positive between the level values suggests that the relationship between financial development and output is a long-run one. Thus, these results lend support to our testing of long-run causality. Figure 1 shows four financial development indicators.

**Financial Repression Index**

We measure financial repression (REP) by collecting information on directed credit programs, reserve requirements, inflation rates, and interest rate controls. These variables are known to be closely related to financial repression by Roubini and Sala-i-Martin (1992), and Chun (2002), among others.

Directed loan ratio is calculated as one minus the ratio of general loans to total Bank of Korea (BOK) lending. Banks usually do not have controls over the usage of directed loans, thus this ratio can become a good indicator of how freely banks can allocate their financial resources according to their own assessment of the projects.

As argued by McKinnon (1982), a high reserve ratio proxies for the degree of financial underdevelopment and/or repression. In particular, high required reserve for commercial banks will force them to hold a greater amount of non-interest bearing monetary reserves; this represents an important source of seigniorage for the government in many developing countries. In the paper, we consider required reserve ratios for both demand deposits and time and savings deposits.
As discussed in Roubini and Sala-i-Martin (1992), countries that are financially repressed tend to have higher inflation rates (thus lower real interest rates) than countries that are financially developed. One of the reasons why government follows policies of high inflation is to expand the tax base on which seigniorage is collected.

Interest controls began to be lifted in 1988 and further relaxation on directed credit and interest rates took place in 1990s. The controls are measured by dummy variables. The dummy takes the value 0 if the control is present. We then subtract 1 from the measure as new liberalization policies are taken. In this way, we can reflect gradual change in the interest rate control policies. This measure is taken from Chun (2002). We then transform the index so that the minimum value takes zero.

In summary, countries that are characterized by a high degree of financial repression will witness higher directed loan ratio, higher required reserve ratio, higher rates of inflation, and higher degree of interest rates controls than otherwise. Table 4 provides the correlations among the various financial repression indicators, and Figure 2 shows the time series patterns of the policy variables.

These variables can, in principle, be used individually or jointly as indicators of financial repression in equations that aim to test the effects of financial repression on economic growth. If the variables are used individually, however, this strategy is likely to suffer from omitted-variable bias because repressive policies may be at work simultaneously. On the other hand, joint use of all variables in the same equation, though potentially more informative, entails serious econometric problems, as these policies are likely to be highly correlated.
These difficulties can be avoided if a summary measure of financial repression is constructed which incorporates the joint influence of several or possibly all policy variables. In this paper we construct a summary measure of financial repression using the well-known statistical method of principal components.\(^7\) Thus, our financial repression index is defined as the first principal component, which account for 66.7% of the total variation in the underlying policy variables. The summary index is displayed in the last panel of Figure 2.

<Table 4> Correlations Among Various Financial Repression Indicators

<table>
<thead>
<tr>
<th></th>
<th>LOAN</th>
<th>RES_D</th>
<th>RES_T</th>
<th>INFLATION</th>
<th>I_CONTROL</th>
<th>REP</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOAN</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RES_D</td>
<td>0.650</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RES_T</td>
<td>0.697</td>
<td>0.967</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFLATION</td>
<td>0.595</td>
<td>0.653</td>
<td>0.605</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I_CONTROL</td>
<td>0.868</td>
<td>0.418</td>
<td>0.468</td>
<td>0.428</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>REP</td>
<td>0.902</td>
<td>0.887</td>
<td>0.899</td>
<td>0.773</td>
<td>0.744</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: LOAN=directed loan ratio, RES_D=required reserve ratio for demand deposits, RES_T=required reserve ratio for time and savings deposits, I_CONTROL=interest rate control measure, REP=summary measure of financial repression.

\(^7\) Demetriades, Devereux, and Luintel (1998) constructed similar index for Korea for the period of 1953-1989 using information on interest rate controls, reserve and liquidity requirements, and directed and concessionary lending programmes.
<Figure 2> Financial Repression Index

- Directed Loan Ratio
- Required Reserve Ratio (Demand Deposit)
- Required Reserve Ratio (Time & Savings Deposit)
- Inflation Rate
- Interest Control
- Financial Repression Index
It appears that the index reflects quite well many of the policy shifts that occurred during the sample period.\footnote{For more details on the history of financial liberalization process in Korea, see Cha, Kim, and Perkins (1997).} It tends to increase until 1980, diminishes rapidly in early 1980s, reaches small peak at 1990, and decreases since then. This means that the degree of freedom that financial institutions enjoyed has been generally increasing over the sample period.\footnote{In this sense, this index indirectly measures the qualitative or efficiency part of financial development.} This index is strongly correlated with all policy variables ranging from 0.744 to 0.902, the most correlated with the directed loan ratio. A transformation of this measure (with 1997=1 and taken logarithms) is used in the analysis.

**Unit Root Tests**

Next, we apply several unit root tests to determine the order of integration of the variables. It is well known that the commonly used unit root tests such as the Augmented Dickey-Fuller (ADF) Test or the Phillips-Perron (PP) Test have very low power in small samples. This implies that the tests too frequently fail to reject the null of unit root hypothesis when the alternative hypothesis is actually true. To overcome this problem, we also apply the DF-GLS test developed by Elliott, Rothenberg, and Stock (1996) and the KPSS test developed by Kwiatkowski, Phillips, Schmidt, and Shin (1992). The DF-GLS test is known to have very large powers over the conventional unit root tests. The KPSS test is a test of stationarity as a null hypothesis, and thus its results are complementary to the results of other tests.
The unit root test results are provided in the Appendix. The results show that for all financial development indicators as well as real GDP and capital stock, the null of unit root hypothesis is not rejected for level values, while the null is rejected for first differenced values. In some cases, ADF and PP tests do not provide clear conclusions about the stationarity of the variables, whereas the DF-GLS test more clearly distinguishes the stationarity of the variables. In the case of the financial repression indicators, however, the ADF, PP, and DF-GLS tests fail to give us a definite answer. In this case, the KPSS test shows that the variable is I(1) process. Therefore, we conclude that all the variables are I(1) process.

3. Empirical Results

Now we present the estimation results in Tables 5-8. We normalize the coefficient of output to be one, so that the estimated cointegration relation is as follows:

\[ GDP_t = \mu + a_t FD_t \]

The long-run relationships are identified in this cointegrating framework. Table 5 shows the results of this simple model when only one financial development indicator is included as a regressor. \( a_t \) is the adjustment coefficient of the output vector. As argued above, for the cointegrating vector to be meaningful, \( a_t \) must be negative and significant.
<Table 5> Estimation Results

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>1.144***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.051)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LL</td>
<td></td>
<td>0.875***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.118)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC</td>
<td></td>
<td></td>
<td>0.258***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.051)</td>
<td></td>
</tr>
<tr>
<td>VT</td>
<td></td>
<td></td>
<td></td>
<td>0.457***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.042)</td>
</tr>
<tr>
<td>α₁</td>
<td>-0.169***</td>
<td>0.021</td>
<td>0.074**</td>
<td>0.0627***</td>
</tr>
<tr>
<td></td>
<td>(0.069)</td>
<td>(0.083)</td>
<td>(0.043)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>LM</td>
<td>0.38</td>
<td>0.11</td>
<td>0.18</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Notes: 1. Dependent variable is log real per capita GDP.
2. Standard errors are in parenthesis.
3. ***, **, and * imply 1%, 5% and 10% significance levels, respectively.
4. 3 lags were used. Lag length of 4 was used for column (4) because no cointegration was found for the lag length of 3.
5. LM tests are serial correlation tests for VAR residuals. P-values are under the null of no serial correlation. LM tests are of third order except (4) whose order is 4.

All the coefficients of FD are positive and significant as expected. This means that financial development is positively related to the output growth in the long run. The magnitudes of coefficients for the banking sector FDs are larger than those for the market sector FDs. Thus, there exists an almost one-to-one relationship between PC and LL and output. Looking at the adjustment coefficients, however, we find that those of equations (2)-(4) are positive, failing to provide a stable long-run relationship between financial development and output growth. In contrast, the adjustment coefficient of Private
Credit has a correct and significant sign. Therefore, only Private Credit has a stable long-run relationship with output growth.

<Table 6> Long-run Causality Test

<table>
<thead>
<tr>
<th></th>
<th>FD→YI</th>
<th>YI→FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>7.526 (0.006)***</td>
<td>26.599 (0.001)***</td>
</tr>
<tr>
<td>(2)</td>
<td>0.091 (0.762)</td>
<td>10.057 (0.002)***</td>
</tr>
<tr>
<td>(3)</td>
<td>3.758 (0.052)</td>
<td>2.743 (0.097)</td>
</tr>
<tr>
<td>(4)</td>
<td>17.607 (0.001)***</td>
<td>4.527 (0.033)***</td>
</tr>
</tbody>
</table>

Notes: 1. p-values are in parenthesis.
2. ***, **, and * imply 1%, 5% and 10% significance levels, respectively.

We now turn to the issue of causality. Test results are reported in Table 6. Hall and Wicken’s weak exogeneity tests are long-run causality tests that are $\chi^2$ distributed. Figures in the parenthesis are the marginal p-values (i.e., marginal significance level) of likelihood ratio tests under the null that the associated loading factor ($a$) under consideration is zero.

The null $a_t=0$ (no causation from financial development to output growth) is rejected for Private Credit and Value Traded. Note however that the loading factor of Value Traded has the wrong sign. Thus, only Private Credit causes output positively in the long run. For the other direction, we can say the similar story. That is, the null $a_t=0$ (no causation from output growth to financial development) is rejected for Private Credit, Liquid Liabilities, and Value Traded, but we ignore the latter two indicators for the same reason as above. Hence, output growth causes Private Credit in the long run. Therefore, the long-run (non) causality test shows that there is a
long-run feedback relationship (or bi-directional causality) between Private Credit and the level of output.\textsuperscript{10)  

It is well known that bivariate causality tests suffer from omitted variable problems and lead to erroneous causal inferences (Lutkepohl 1982).\textsuperscript{11)  Thus, causality test including only a financial development indicator and income variable is likely to be mis-specified and the results of such studies are open to question. 

To address this issue, we extend the model to include two additional variables. One variable is the financial repression index as introduced above. There have been many arguments on whether financial repressionist policies in Korea had positive effects on economic growth or not. However, serious empirical analysis has not been present except Demetriades and Luintel (2001). Thus, we add to the literature by analyzing the effects of newly constructed financial repression index on output growth. The other variable is per capita capital stock. A simple growth model one can think of is a Cobb-Douglas production function with capital (K). Thus, in theory, we can interpret financial intermediation as an important component of the aggregate production function. 

\textsuperscript{10)  This result is in accordance with that of Luintel and Khan (1999). Our paper is different from theirs in the definition of financial development indicators. They defined financial depth as a ratio of total deposit liabilities of deposit banks to one period lagged nominal GDP. 

\textsuperscript{11)  According to Lutkepohl (1982), high-dimensional time series model building seems to be required. It is well known that Granger-causality in a bivariate system may be due to an omitted variable. It is also known that non-causality in a bivariate system may theoretically result from neglected variables. Thus, both cases are possible.
### Table 7: Estimation Results

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>1.095*** (0.054)</td>
<td></td>
<td></td>
<td></td>
<td>0.510*** (0.032)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LL</td>
<td></td>
<td>0.626*** (0.126)</td>
<td></td>
<td></td>
<td>0.445*** (0.039)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC</td>
<td></td>
<td></td>
<td>0.053 (0.086)</td>
<td></td>
<td></td>
<td>0.058*** (0.004)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VT</td>
<td></td>
<td></td>
<td></td>
<td>0.263*** (0.002)</td>
<td></td>
<td></td>
<td>0.068*** (0.003)</td>
<td></td>
</tr>
<tr>
<td>REP</td>
<td>-0.080 (0.075)</td>
<td>0.065 (0.095)</td>
<td>-2.106*** (0.274)</td>
<td>-0.800*** (0.013)</td>
<td>-0.060*** (0.013)</td>
<td>-0.153*** (0.036)</td>
<td>-0.026*** (0.009)</td>
<td>-0.083*** (0.007)</td>
</tr>
<tr>
<td>K</td>
<td></td>
<td></td>
<td></td>
<td>0.355*** (0.019)</td>
<td>0.431*** (0.035)</td>
<td>0.592*** (0.008)</td>
<td>0.523*** (0.008)</td>
<td></td>
</tr>
<tr>
<td>(\alpha_1)</td>
<td>-0.237*** (0.066)</td>
<td>0.007 (0.036)</td>
<td>-0.029 (0.020)</td>
<td>-0.470*** (0.083)</td>
<td>-0.416* (0.214)</td>
<td>-0.173 (0.181)</td>
<td>-0.406 (0.883)</td>
<td>0.459</td>
</tr>
<tr>
<td>LM</td>
<td>0.05*</td>
<td>0.20</td>
<td>0.60</td>
<td>0.89</td>
<td>0.14</td>
<td>0.60</td>
<td>0.07*</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Notes: 1. Dependent variable is log real per capita GDP. 2. Standard errors are in parenthesis. 3. ***, **, and * imply 1%, 5% and 10% significance levels, respectively. 4. Lag length of 2 was used for (2) and (3) because no cointegration was found for lag length of 3. 5. Lag length of 2 was used for (7)-(8) due to insufficient number of observations. 6. LM tests are serial correlation tests for VAR residuals. P-values are under the null of no serial correlation. LM tests are of second order.
In table 7, columns (1)-(4) present results when financial development index and financial repression index are included. The coefficients of FD are positive and significant in all cases. Now, the adjustment coefficients of MC and VT also have correct signs and that of VT is highly significant. The summary measure of financial repression enters negatively except LL. Thus, the coefficients of column (4) also have correct signs and significance. Columns (5)-(8) show the results when we also include per capita capital stock in the equation. Then, we get slightly better results. More coefficients become significant and the adjustment coefficients of (5)-(7) take negative values, although only that of (5) is significant at the 10% significance level.

The evidence shows that the results of Private Credit are most robust to the change of model specifications. Even though the adjustment coefficient became slightly less significant when the capital stock is included, the likelihood ratio test for the coefficient of capital stock to be zero is rejected at the 5% significance level (LR test statistic is 5.167). Moreover, no autocorrelation is found in the residuals by the Lagrange Multiplier test. Therefore, as in the case of the simple model, only Private Credit provides a stable long-run relationship with output.

The evidence that we have presented in this paper suggests very clearly that financial repressionist policies had negative long-run effects on real output. Roubini and Sala-i-Martin (1992) also argued that policies of financial repression have negative effects on economic growth. However, this result is in contrast to that of Demetriades and Luinl (2001) and Demetriades, Devereux, and Luinl (1998), where they obtained positive effects of financial repression on productivity
and financial development in Korea. This difference may result from the different definition of financial repression index and different sample period selected. Their studies include very early period of economic development (1956-1994 and 1953-1989) and, during the periods, some repressionist policies may have managed to make a small transitory contribution to output growth. On the other hand, our results clearly show that financial repressionist policies had significantly negative effects on growth for the period of 1971-1997.

<Table 8> Long-run Causality Test

<table>
<thead>
<tr>
<th></th>
<th>FD→YI</th>
<th>YI→FD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>13.378 (0.001)***</td>
<td>29.798 (0.001)***</td>
</tr>
<tr>
<td>(2)</td>
<td>0.050 (0.823)</td>
<td>16.608 (0.001)***</td>
</tr>
<tr>
<td>(3)</td>
<td>2.521 (0.112)</td>
<td>6.784 (0.009)***</td>
</tr>
<tr>
<td>(4)</td>
<td>29.55 (0.001)***</td>
<td>0.714 (0.398)</td>
</tr>
<tr>
<td>(5)</td>
<td>5.377 (0.020)**</td>
<td>9.461 (0.002)***</td>
</tr>
<tr>
<td>(6)</td>
<td>0.789 (0.374)</td>
<td>1.949 (0.163)</td>
</tr>
<tr>
<td>(7)</td>
<td>0.428 (0.513)</td>
<td>0.480 (0.489)</td>
</tr>
<tr>
<td>(8)</td>
<td>0.455 (0.500)</td>
<td>7.025 (0.008)***</td>
</tr>
</tbody>
</table>

Notes: 1. p-values are in parenthesis.
   2. ***, **, and * imply 1%, 5% and 10% significance levels, respectively.

Table 8 presents the long-run causality test results based on the results obtained in Table 7. Overall results are very similar to those in Table 6. That is, only Private Credit has plausible coefficients and significant causal relationships with output. Therefore, our causality test results are very robust to the model specifications and we conclude that there has been a feedback relationship between financial development and output growth.
IV. Conclusion

This paper investigates the role of financial development in Korea’s economic growth using various measures of financial development. Among the four competing financial development indicators, only Private Credit has a stable long-run relationship with output growth. Private Credit causes output positively in the long run, and output growth also causes Private Credit in the long run. Therefore, the long-run (non) causality test shows that there is a long-run feedback relationship (or bi-directional causality) between Private Credit and the level of output.

Another important issue that is dealt with in this paper is how the financial repression in early 1970s has affected the performances of Korean economy. There have been many studies regarding the effects of financial repression on financial development and economic growth. However, few attempts have been made to examine the issue in Korea, except Demetriades and Luintel (2001), for example. In this paper, a financial repression index is constructed based on five related measures, and this index is augmented to the growth-finance equation. Financial repression turns out to have affected output growth negatively during the sample period. This implies that although we do not exclude the possibility that financial repressionist policies may have had positive effects on growth at early stages of economic development, its overall effects on economy are significantly negative.
References


Tests for an Autoregressive Unit Root.” *Econometrica* 64, 813-836.
Lutkepohl, Helmut. 1982. “Non-causality Due To Omitted Variables.” *Journal
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Appendix

[1] Data Source

Data span for most variables is 1971-1997, while that for stock market variables is 1976-1997. Real GDP data are from the Bank of Korea. Data for Private Credit, Liquid Liabilities, Stock Market Capitalization, and Stock Market Value Traded are quoted from Beck, Demirgûç-Kunt and Levine (2001). All data used for constructing the financial repression index, except the interest rate control data, are obtained from the Bank of Korea.

[2] Unit Root Tests

To test unit roots in the series, four tests are used: Augmented Dickey-Fuller (ADF) Test, Phillips-Perron (PP) Test, DF-GLS Test by Elliott-Rothenberg-Stock (1996), and KPSS test by Kwiatkowski, Phillips, Schmidt, and Shin (1992). ***, **, and * implies 1%, 5%, and 10% significance levels, respectively. All the variables are in natural logarithms.

<With only intercept, Level>

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF</th>
<th>PP</th>
<th>DF-GLS</th>
<th>KPSS</th>
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</thead>
<tbody>
<tr>
<td>GDP</td>
<td>0.040</td>
<td>0.016</td>
<td>-0.278</td>
<td>1.602***</td>
</tr>
<tr>
<td>Private Credit</td>
<td>0.693</td>
<td>0.971</td>
<td>0.349</td>
<td>0.660**</td>
</tr>
<tr>
<td>Liquid Liabilities</td>
<td>2.582</td>
<td>2.060</td>
<td>0.453</td>
<td>0.405*</td>
</tr>
<tr>
<td>Market Capitalization</td>
<td>-1.655</td>
<td>-1.145</td>
<td>-1.696*</td>
<td>0.446*</td>
</tr>
<tr>
<td>Value Traded</td>
<td>-0.929</td>
<td>-1.027</td>
<td>-0.806</td>
<td>0.389**</td>
</tr>
<tr>
<td>Financial Repression</td>
<td>0.356</td>
<td>0.147</td>
<td>0.205</td>
<td>0.397*</td>
</tr>
<tr>
<td>Capital Stock</td>
<td>-1.502</td>
<td>-1.476</td>
<td>-0.822</td>
<td>0.937***</td>
</tr>
</tbody>
</table>
<With intercept and time trend, Level>

<table>
<thead>
<tr>
<th></th>
<th>ADF</th>
<th>PP</th>
<th>DF-GLS</th>
<th>KPSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>-2.126</td>
<td>-2.073</td>
<td>-2.246</td>
<td>0.111</td>
</tr>
<tr>
<td>Private Credit</td>
<td>-5.552</td>
<td>-2.386</td>
<td>-2.684</td>
<td>0.161*</td>
</tr>
<tr>
<td>Liquid Liabilities</td>
<td>-0.997</td>
<td>-1.033</td>
<td>-1.838</td>
<td>0.254***</td>
</tr>
<tr>
<td>Market Capitalization</td>
<td>-2.143</td>
<td>-1.419</td>
<td>-2.550</td>
<td>0.335***</td>
</tr>
<tr>
<td>Value Traded</td>
<td>-1.644</td>
<td>-1.843</td>
<td>-1.728</td>
<td>0.105</td>
</tr>
<tr>
<td>Financial Repression</td>
<td>-1.791</td>
<td>-1.508</td>
<td>-2.340</td>
<td>0.421***</td>
</tr>
<tr>
<td>Capital Stock</td>
<td>-2.837</td>
<td>-1.146</td>
<td>-2.872</td>
<td>0.251***</td>
</tr>
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</table>

<With only intercept, First Difference>

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<th>ADF</th>
<th>PP</th>
<th>DF-GLS</th>
<th>KPSS</th>
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<With intercept and time trend, First Difference>

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<tbody>
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