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Does Economic Structure Determine Financial Structure?*

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Abstract

In this paper, we examine the relationship between the structure of the real economy and a country's financial system. We consider whether the development of the real economic structure can predict the direction of evolution of a country's financial structure. Using data for 108 countries, we find a significant relationship between real economic structure and financial structure. Next, we exploit shocks to the economies in India, Finland and Sweden, and South Korea and show that changes in the economic structure of a country influence the evolution of its financial system. This suggests that financial institutions and capital markets change in response to the structure of industries.

Keywords: financial system, economic structure

Classification codes: G20; O14; O16

1. Introduction

The structures of financial systems vary among industrial and developing countries. In some countries, financial systems are predominantly bank-based, while in others they are dominated by capital markets. Only fragmented theories exist in the literature that explain the prevailing differences in country financial structures, which are defined as the mix of financial markets, institutions, instruments, and contracts that prescribe how financial activities are organised at a particular date.

The existing studies explain the prevailing differences in financial structures using legal origin and protection, politics, history, and culture as factors. This paper considers the link between the real economic structure and the financial system of a country. Such a relationship is influenced by the funding sources for corporate investment that differ depending on firm and project characteristics (Allen, 1993; Boot and Thakor, 1997; Allen and Gale, 1999). Consistent with this theory, banks are more appropriate for the financing of traditional asset-intensive industries, whereas capital markets favour innovative and risky projects. One implication of this theory is that the real economic structure of a country, whether it is asset intensive or service oriented, could determine its financial structure. For instance, financial systems in countries such as Germany and Japan would remain bank-based as long as their economies are dominated by manufacturing industries. Contrastingly, the financial system in the United States will continue to be market-oriented as long as service and highly innovative companies constitute a large share of the economy. Consequently, the financial systems of the United States, Germany, or Japan will remain at polar extremes because of their economic structures even though the countries are at a similar stage of development.

Robinson (1952) argues that financial intermediaries and markets emerge when required by

industries. Consequently, intermediaries and markets appear in response to economic structure. The idea that the form of financing, and thus the country's financial structure, depends on the type of activity that firms engage in has not yet been directly addressed in the literature. To provide evidence of the hypothesis that structure and changes in the real economy determine the direction of evolution of a country's financial system, we first must distinguish the different financial structures across countries. However, although recent attention has shifted to a more systematic classification of financial systems, the literature provides only very broad measures and definitions for classification. Consistent with the literature this study classifies a country's financial system as either bank-based (the German or Japanese model) or market-based (the Anglo-Saxon model). In the bank-based financial system, financial intermediaries play an important role by mobilising savings, allocating credit, and facilitating the hedging, pooling, and pricing of risks. In the market-based financial system, capital markets are the main channels of finance in the economy (Allen and Gale, 2000).

Our theory builds on Rajan and Zingales (2003a) who note that bank-based systems tend to have a comparative advantage in financing fixed-asset-intensive firms rather than high technology research and development-based firms. Rajan and Zingales (2003a) argue that fixed-asset-intensive firms are typically more traditional and well understood, and the borrower has the collateral to entice fresh lenders if the existing ones prove overly demanding. As per Rajan and Zingales (2003a), loans are well collateralised by physical assets, and therefore are liquid; hence, the concentration of information in the system will not be a barrier to the financing of these assets. Conversely, the authors argue that market-based systems will have a comparative advantage in financing knowledge industries with intangible assets.

Consequently, we suggest that countries with a majority of physical-asset-intensive firms,

depending on external finance, will be more likely to possess a bank-oriented financial system. However, capital markets should develop more effectively in countries with firms that are based on knowledge and intangible assets. We test this hypothesis by identifying fixed-asset-intensive firms within the economic sector defined as industry by the standard classification system for economic activity. Conversely, in this study the service sector acts as a proxy for knowledge and intangible asset firms. The relative importance of the two types of firms in an economy will be represented by the relative volume of activity of the two different economic sectors. The standard system of classification for economic activity includes a third sector, agriculture. We classify agriculture as a physical-asset-intensive industry because land and agricultural machinery may be used as collateral and, therefore, we assume that firms in the agricultural sector will prefer bank financing over capital markets.

We first present some historical evidence showing the nexus between real economic structure and financial system. In order to test our outlined hypothesis, we use a panel data set for 108 countries and employ both the panel OLS and a two-step generalised-method-of-moments (GMM) system. Additionally, we investigate the robustness of the results by introducing different additional control variables and testing the heterogenous effects. The results suggest that there is a negative and significant relationship between a country's economic structure (industry versus service sector) and financial system structure (stock market versus banking sector). In economies where the service sector carries more weight economically than industry and agriculture, the country tends to have a market-based financial system. In contrast, a bank-based financial system is more likely to emerge in economies with many fixed-asset-intensive firms.

Next, we conduct event studies using the treatment effect estimation to isolate the endogeneity concerns. We analyse different types of exogenous shock to the structure of the real

economy and its impact on financial structure. We employ three events that changed the economic structures of the countries and further investigate their impact on the financial structure using a difference-in-difference strategy. The first event is India's structural reforms in 1991 as a positive shock to the country's economy; the second one is the demise of the Soviet Union as a negative shock to the economy of Finland and Sweden; the third one is the economic reforms in the 1980s and early 1990s in South Korea. In India and South Korea we find that after the structural reforms of the economies, the service sector grew in relative terms and the stock markets in both countries experienced significantly faster growth than their banking systems, compared to the control countries. In Finland and Sweden we document that following the negative shock the service sector gained in relative importance, which was followed by the faster growth of the equity market in comparison to the banking system. Overall, the results of the three different event studies confirm our hypothesis that the relative importance of financial intermediaries and markets is determined by the industry needs of a country.

The findings of this study are interesting from a regulatory perspective and lend insight into the development of financial structures worldwide. The main policy implications from this study are that financial structures should be evaluated in terms of whether they meet the requirements of the real economy and industries. Furthermore the financial structure cannot be changed as long as the economic structure does not change. The results provide insight into the reasons for limited capital markets growth in developing countries despite official stimulation efforts from governments and multilateral organisations (Schmukler et al., 2007). According to our study of many developing countries, as long as economies remain relatively agriculture- and industry-oriented, any government effort to create or further develop a capital market is likely to not be very successful. Additionally, any regulation that attempts to force a change in the financial

system may result in a discrepancy in the economic and financial structure. Therefore, such efforts or regulations may introduce financial constraints that can further stall economic growth because financial structure influences output levels and economic growth (Levine and Zervos, 1998; Luintel et al., 2008).

This paper is organised as follows. Section 2 presents a short review of the literature on economic and financial structures. Section 3 presents some historical evidence on the nexus between economic structure and financial structure. Section 4 describes the data and the descriptive statistics. Section 5 introduces the econometric methodology, and Section 6 presents the main results as well as the event studies. Section 7 describes the industrial-level evidence. Finally, Section 8 provides concluding remarks.

2. The real economy and finance nexus

A number of explanations for financial structure exist in the literature; however, none are able to provide a comprehensive account of the observations. The first explanation is based on legal origin and investor protection. Levine (1997) builds on the work of La Porta, Lopes-de-Silanes, Shleifer, and Vishny (1997, 1998; henceforth LLSV) stating that legal systems originate from a limited number of legal traditions: English common law or French, German, and Scandinavian civil law. In his study on financial development and economic growth, the author employs measures of creditors' rights and demonstrates that they may explain the emergence of bank-based financial systems. Modigliani and Perotti (2000) argue that legal institutions determine the degree of financial development and the financial structure of a country. They argue that market-based systems flourish in environments with strong institutions. Ergungor (2004) also attempts to explain differences in financial structure by examining legal origin across countries. His study presents evidence that countries with civil law financial systems are more

likely to be bank-oriented than common law countries. In the author's opinion, this evolution is a result of effective rule of law in common law countries, which improves shareholder and creditor rights protection. A perspective has emerged in the literature that legal origin can be used to explain the structure of a financial system.

However, Rajan and Zingales (2003a) argue that countries with a common law system did not rely on markets to a greater extent than civil law systems at the beginning of the last century. They report that in 1913, the ratio of France's stock market capitalisation to GDP was twice as high as that of the United States, which is a country that has an environment that favours capital market development according to the legal origin perspective. It is therefore problematic to argue that legal origin is the main determinant of financial structure. The view presented below is that both the structure of the financial system and the laws will adapt to the needs and demands of the economy. One example of this is branching regulation in the United States banking sector. Rajan and Zingales (2004) note that as technology improved the ability of banks to lend and borrow from customers at a distance, competition increased in the United States even when banks had no in-state branches. Politicians who could not prevent this competition because they lacked jurisdiction, withdrew the regulations that limited branching. Another example is the removal of the Glass-Steagall Act, which had restricted banking activities in the United States since 1933. In this case, the introduction of the Financial Modernisation Act in 1999 followed the creation of the first financial holding company in the United States and removed past restrictions. Therefore, we argue that economic demand may enhance the evolution of the financial structures and of the legal system.

The existing empirical results show also that legal investor protection may support financial development. For example, LLSV (1997) show that countries with poorer investor protection

have less developed capital markets. Demirgüç-Kunt and Levine (2004) find that countries with stronger protection for shareholder rights tend to have a more market-based financial system. Djankov et al. (2007) investigate cross-country determinants of private credit and find that legal creditor rights are statistically significant and quantitatively important in determining private credit development, while there is no evidence showing that creditor rights are converging among legal origins. Moreover, Djankov et al. (2007) confirm that shareholder protection is positively related to stock market development.

The second explanation for financial structure is based on political factors. Biais and Perotti (2002) provide a theoretical model of government incentives to structure privatisation policy so that financial shareholders are diffused, which may be designed to ensure re-election. Additionally, Perotti and Volpin (2004) argue that established firms have an incentive to limit entry by retarding financial development, which may well impact the financial structure. Perotti and von Thadden (2006) use a theoretical model to demonstrate the effect of the distribution of income and wealth in democratic societies and their influence on the financial structure of an economy.

Moreover, according to Rajan and Zingales (2003a, 2004) structures of the financial system are unstable and evolve over time. They argue that a financial system will develop toward the optimal structure but will be hindered by politics, which are often influenced by powerful, incumbent groups. Similarly, Cull and Xu (2013) argue that financial development is driven by political economy. In their opinion financial development may reflect the interests of the elite, rather than providing broad-based access to financial services. Song and Thakor (2012) develop a theory of how a financial system is influenced by political intervention that is designed to expand credit availability. They show that the relationship between political intervention and financial

system development is nonmonotonic. In the early stage of financial development, the size of markets is relatively small and politicians intervene by controlling some banks and providing capital subsidies, while in the advanced stage when the financial sector is most developed, political intervention returns in the form of direct-lending regulation.

A third explanation is that historical factors may influence the existing shape and development of the financial system. Monnet and Quintin (2007) argue that the legal differences in countries with bank-based and market-based financial systems are fading as a result of government efforts to deregulate and liberate financial systems in the last few decades. However, institutional convergence has not implied financial convergence across countries. The argument is based on the assumption that the historical fundamentals of financial systems are relevant and any change in structure is costly. Thus, the authors claim that the past structure of a financial system explains and determines the existing structure. Torre et al. (2013) argue that financial development paths are found to be strongly dependent on initial level of per capita income. Furthermore, the regular dynamics that financial development followed can be largely explained by the underlying frictions that hinder financial contracting. The structure of the financial system and its evolution over time reflect efforts to find the path of least resistance around these frictions.

Another perspective is presented by Stulz and Williamson (2003) who argue that culture matters for financial development since it affects the costs per capita, development of institutions and how resources are allocated in an economy. They use religion as a proxy for culture and show that a country's principal religion predicts the cross-sectional variation in creditor rights better than the origin of its legal system. They report that creditor rights are stronger in countries where the main religion is Protestant rather than Catholic, which may also explain why Catholic countries have a less developed banking system and debt market. In line with this, Kwok and

Tadesse (2006) argue that national culture may be an important determinant of a country's financial structure and present evidence that countries characterised by higher uncertainty avoidance (risk aversion) are more likely to have a bank-based system. On the other hand, Beck et al. (2003) do not find a robust, and consistent relationship between a country's principal religion and financial development. Thus, the existing results on the relationship between financial development and religion are ambiguous.

This variety of approaches suggest that there is no consensus with respect to the determinants of financial system structure. We suggest that specialisation patterns in a financial system are influenced by the composition of the economy, which in turn is determined by a country's endowments. In our view, the financial structure may adapt to the needs of the economy as has been reported by economic historians such as Gerschenkron (1962), Tilly (1967), and Chandler (1977).

Allen (1993) and Allen and Gale (1999, 2000) use a theoretical framework to argue that markets are superior at funding new innovations with uncertain outcomes, whereas banks are superior at providing additional funding for existing, more mature enterprises. In Allen and Gale's (1999) model, individual investors agree to disagree on the feasibility of new projects with uncertain returns. In a financial system where each investor makes an individual decision with respect to an investment, more innovative but risky projects are funded compared to a financial system where the investment decision is delegated to a bank manager. Consequently, the authors' framework would indicate that markets are more likely to finance innovative industry.

However, the existing empirical work is less conclusive concerning the impact of the financial structure on economic or industry growth. For example, Beck et al. (2000) and Beck and Levine (2002) show that the overall level of financial development and legal system

efficiency exert a significant and economically large effect on economic growth; however, there is no cross-country empirical support for similar effects on financial structure. However, Demirgüç-Kunt and Levine (2004) concede that the result of economic performance being impervious to financial structure does not necessarily imply that institutional structure is of no consequence to industry and economic growth. Instead, it may simply indicate that either there is no optimal institutional structure that fits every situation at all times, or the indicators used in the literature may not satisfactorily capture the roles of banks and markets. The findings have been confirmed also by Tadesse (2002) and Demirgüç-Kunt et al. (2012). Beck et al. (2013) explore the relationship between the size of different financial institutions and their impact on firms' access to financial services. They show that dominance of banks in most developing and emerging countries is associated with lower use of financial services. On the other hand, larger banks may actually ease financing constraints of small firms in low-income countries.

Carlin and Mayer (2003) investigate the relationship between institutional and financial structures with industry characteristics in a cross-sectional setting. They find that the differences in financial structure impacted the real economy by affecting the growth and investment decisions of various industries. The industries that were heavily dependent on equity financing were found to grow more rapidly in countries with a market-based financial system. Additionally, they find that the financial structure has an impact on industrial growth and on R&D investment. Those findings are consistent with Binh et al. (2008). Rioja and Valev (2011) do not confirm that the financial structure affects economic growth; however, they find that a bank-based financial system is associated with stronger physical capital accumulation. Lin, Sun and Jiang (2009) propose that a financial structure is optimal for a country at some stage of economic development only when the financial structure matches the industrial structure (see also Lin, 2012). Luintel et

al. (2008) show that the complete absence of cross-country support for a financial structure reported by certain panel or cross-section studies may be a result of inadequate accounting for cross-country heterogeneity.

The current study differs from the existing literature on financial structure and economic growth. Instead of examining the relationship between growth and finance, we concentrate only on the nexus between economic structure and financial structure. However, in providing evidence that the economic structure determines financial structure, we provide support for the existing research, which has documented that financial structure is relevant to industry and economic growth.

3. Historical evidence

The literature investigating the structural changes in the economy links them to different factors. Smith (1776) argues that the main dynamic impulse to changes comes from the division of labour. The labour specialization was associated with productivity gains and innovation, resulting in changes in the composition of economic activity and the evolution of a new structure of the economy. Schumpeter (1928) claims that innovation is a major force that led to changes in the economic structure. In recent years a number of studies attempted to provide a general conception of the structural changes in the economy when taking into account the influence of technological changes explicitly (Silvia and Teixeira, 2008).

The literature underlines that technological changes are often the main cause of structural changes in the economy in the last decades (Hansen and Prescott, 1993). The profound changes in the economy due to the advantage of science and technology reflects the employment in the sectors (Gali, 1999). In the last two centuries employment shifted from agriculture to manufacturing, while in recent years it is shifting to services. The major technological innovation

stimulates the expansion of new industries and economic growth, while the importance of industries with older technologies declines. An illustration of the process of structural changes are Kondratieff long waves. Kondratieff (1979) proposes that the economy develops in long and short economic cycles. The long waves have an average length of roughly 50 years, while the short business cycles range from 7 to 11 years, which generally cover an upswing and a downswing. Kondratieff detected two and half such waves from 1790 to 1917, the first cycle of which coincided with the invention of the steam engine that changed textile production. The second cycle was associated with the development of the railroad, and the third cycle was caused by electricity. The fourth cycle after the World War II, was possibly triggered by the widespread usage of oil and cars. The contemporary cycle, which is numbered as the fifth, is caused by IT technology.

The contribution of Schumpeter (1939) to Kondratieff cycles theory was the identification of innovations as the main trigger for structural economic changes. Apart from the Kondratieff cycles he distinguished a long (Kuznets), intermediate (Junglars) and short waves (Kitchin) of about 18, 8 and 4 years in duration, respectively. The first wave, led to growth of coalfields and factory towns in north and west of Britain. As a result the share of labour in agriculture started to decline from 37% in 1801 to 10% in 1911, whereas in the years 1500-1801 the share of labour employed in agriculture was higher and it ranged from 40% to 75% (Allen, 2000). The decline of labour in agriculture prior to the Industrial Revolution is related to the Agriculture Revolution in Britain, which occurred in three waves in the years 1520-1850 (Allen, 1999).

Using the US as an example, Table 1 shows the employment changes across industries over the last century (1910 vs. 2015). In 1910 almost one third of the employees worked on farms, which later further declined to 27% in 1920, compared to less than 1% in 2015. In

manufacturing, employment also decreased from 22% in 1910 to less than 9% in 2015. A decline in employment can also be observed in the industries of forestry, mining, construction or transportation. On one hand, domestic service, such as maids and cooks in private households, accounted for over 4% percent of employment in 1910.* On the other hand, today's economy includes professional services, related to computers and electronics that did not exist a century ago. The professional services industry accounted for almost 29% of employment in 2015. Moreover, employment in the wholesale and retail trade industry increased from just over 9% in 1910 to almost 23% in 2015. An increase in employment could also be observed in finance and real estate or educational services over the century (Leon, 2016). Indeed, the data on employment points to a strong shift in the employment from manufacturing toward service industries over the last century.

[TABLE 1]

The literature on economic history often associates the Agriculture and Industrial Revolution with the financial revolution and the development of the modern financial system. For example, Schumpeter (1939) argues that services provided by financial intermediaries and markets are essential for technological innovation and economic development. Similarly, Dobb (1960) and Sen (1960) underline the need for directing investment resources toward expanding the capacity of basic sectors. Indeed, the first cycle – the Industrial Revolution and the following waves are associated with the vast expansion of financial intermediaries as a result of the demand of entrepreneurs in new industries, whereas in the first years the investments were largely financed by industrialists (Fohlin, 2012). With the formation of the central banks, which stabilized the monetary system, the countries' nationwide banking system started to appear.

* This sector does not exist anymore.

These banks contributed to and partly resulted from industrialization, whereas many of them were founded by industrialists. In most of the European continental countries, a group of large banks emerged that pioneered universal banking by providing both debt and equity financing to the new emerging industries. In those countries' banks often remained the dominant financial intermediary in the economy.

By the late 17th century, organized securities markets began to develop in essentially all industrialized economies. In the following years, several large trading companies especially in France and England, issued shares that were traded in non-organized stock markets. The bankruptcy of one of them – the Mississippi Company – resulted in the creation of the first organized stock exchange in France in 1724. By the end of the 19th century, trading of securities in organized exchanges was common in the industrialized nations of Europe and its colonies, the US, and Japan.

In the beginning of the 20th century all the industrial countries had a relatively well developed and diversified financial system, which consisted of a banking system and securities markets. Dimson et al. (2002) show that the ongoing structural changes in the economy were accompanied by changes in the composition of listed companies. Table 2 presents the industrial composition of listed companies in the US and the UK in the beginning of 1900 and 2000. In 1899 the railroad companies accounted for 50% and 63% of stock market value in the UK and US, respectively. A century later, railroads declined and represented close to zero in the majority of industrialized countries. Moreover, the stocks of many industries such as textiles, iron and coal have declined as well (Dimson et al., 2002). On the other hand, there are still some similarities today between 1990 and 2017. The service industry, represented by banking and insurance industries was present in a significant way in 1900 and is present today. Another feature that

stands out is the high share of companies from industries that did not exist in 1900. Among these companies, technology, oil, gas, telecommunication, media and healthcare are the largest industries in 2017, and together they represent 62% and 47% of the market in the US and UK, respectively (Dimson et al., 2016, 2017).

[TABLE 2]

The changes in the composition of companies listed in the stock markets reflect a wave of transformative innovation starting from the Agriculture and Industrial Revolution. As shown above the newly emerging industries led to changes in the composition of the economic structure. A large body of literature presented strong evidence that the capital accumulation was associated with an increase in the volume of financial intermediation (Goldsmith, 1969; Atje and Jovanovic, 1993; King and Levine, 1993). Most of the existing studies, however, do not distinguish between the two different financial structures – market- and bank-oriented financial systems, which emerged over the last century. Our aim is to fill this gap by investigating the development of the two different systems.

4. Data and descriptive statistics

4.1 Sample

Our sample consists of a panel of observations for 108 industrial and developing countries over the sample period 1972 to 2015. We use the revised financial structure database of Beck et al. (2001, 2010) and Čihák et al. (2012, 2013) to construct the financial structure indicators and update the missing information with the data from Demirgüç-Kunt and Levine (2004). The data for economic structure are from the World Bank WDI database.

We average data over non-overlapping, five-year periods and provide nine observations per country when available. The first period is from 1972 to 1976, the second period is from 1977 to

1981, and so on. The last period is from 2012 to 2015 with only four years, due to data availability. Table A.2 in the Appendix presents the average value of the relevant factors concerning the financial, economic, and institutional structure of the countries in our sample.

We also control for systemic banking crises because they may influence the structure of the financial system (Allen et al., 2012). We follow the definition of a systemic banking crisis by Laeven and Valencia (2013), which documents a systemic banking problem as a crisis when a country's corporate and financial sector experience a substantial number of defaults. However, because the alterations in economic fundamentals in successive periods are typically minor, it is not easy to provide an exact definition and differentiation of a banking crisis. This paper uses the initial date of systemic banking crises provided by Laeven and Valencia (2013); therefore, 147 banking crises around the world during 1972 to 2011 are considered in the analysis.

4.2 Variable definition

Our hypothesis is that countries with a predominance of tangible-asset-intensive industries are more likely to exhibit a bank-based financial system. However, economies with a strong service sector are more likely to exhibit a market-based financial system. To test the hypothesis, we require appropriate indicators for the financial structure and the structure of the real economy.

We follow Beck and Levine (2002) and Levine (2002) to construct the measures for the financial system structure. The main indicator for financial structure (*Structure*) is the first principal component of two variables that measure the comparative *Size* and *Activity* of markets and banks. The first variable *Size* equals the log of the ratio of market capitalisation to private credit. Market capitalisation is defined as the market value of listed shares divided by GDP and is a measure of the size of stock markets relative to the economy. Private credit represents the value of credits by financial intermediaries to the private sector divided by GDP. It is a broader

measure of financial intermediation because it includes all the financial institutions, such as deposit money banks, but excludes credit issued by the monetary authority. The second measure *Activity* equals the log of the ratio of value traded to private credit. Value traded equals the value of stock transactions as a share of national output. It is frequently used as an indicator of stock market liquidity. It is an important measure because stock market size and liquidity are entirely different issues. Stock markets could be sizable because of a substantial number of listings but may be illiquid or shallow because of a lack of active trading.

For robustness we also use an alternative aggregation of the financial structure variable called *Aggregate*. The variable is a principal component of the three variables: *Size*, *Activity*, and *Efficiency*. The last variable measures the relative efficiency of a country's stock markets compared to that of its banks, calculated by the total value traded in the stock market over the overhead costs in the banking system. Higher values of the financial structure measures indicate more market-based financial systems.

The main regressor, the one that we are checking for correlation with financial structure, is an indicator of the significance of the industrial sector in the real economy. Our main claim is that the predominance of the industrial sector, represented in this study by tangible-asset-intensive firms, will induce a financial system to be bank-based, as opposed to a service-oriented economic structure that will lead to a market-based financial system. We use, therefore, a ratio that has an indicator of the industrial sector as the numerator and a variable for the service sector as the denominator. Higher values of this indicator suggest that the industrial sector (fixed-asset-intensive firms) plays a more significant role in a given economy than the service sector (firms based on knowledge and intangible assets). To divide the real economy into the two different industries, we use gross value added for the three main economic sectors: *Agriculture*, *Industry*,

and *Service*. *Agriculture* is defined as the value of gross value added generated by agriculture, hunting, forestry, and fishing as a percentage of GDP. *Industry* is defined as the value of gross value added generated from mining, manufacturing, construction, electricity, water, and gas. *Service* is defined as the gross value added generated from the wholesale and retail trade, hotels and restaurants, transport, government, financial, professional, and personal services such as education, health care, and real estate services. Because land, agriculture, and machines may be used as collateral, we classify *Agriculture* together with *Industry* as an asset-intensive sector, whereas we use the *Service* sector as a proxy for firms based on knowledge and intangible assets.

We measure the real *Economic Structure (ES)* by combining the three variables in two different ways. The first variable ES_1 equals *Agriculture* and *Industry* to total gross value added. It is a measure of the importance of the asset-intensive sectors in the economy. For the second measure, we decided not to employ *Agriculture* because sector development in certain developed countries may depend on state subsidies and transfers rather than on funds raised through the financial system. Hence, this sector may to a lesser extent influence the shape of a country's financial structure. Therefore, we construct our second measure ES_2 by dividing *Industry* by *Service only*. This variable reflects the importance of the asset-intensive industry with respect to knowledge and intangible asset sectors.

The changes in gross value added, and therefore the proxies, can provide unclear information concerning a country's economic structure. In the majority of countries, the share of industry value added has been declining in recent decades. However, an increasing share of service gross value added does not necessarily mean that economies are becoming more service-oriented. In recent years, many changes in economic structures have been a result of service activity outsourcing. These service activities were previously carried out internally by industrial

enterprises, for example, the marketing activities of an industrial sector firm. In this case, the salaries of the employees form part of the gross value added recorded for the industrial sector. If the industrial firm outsources the marketing activities and subsequently purchases them from a specialist producer, the salaries of the employees will now be part of the gross value added of the service sector. Consequently, there will appear to have been a decline in the share of industry and a rise in the share of the services sector although there may have been no changes in the quantity of services actually produced. We assume that such factors affect all of the countries in the sample and should not significantly alter the results of this study.

The literature provides some evidence that other factors may determine the structure of a country's financial system. We therefore augment the baseline regressions with various institutional variables to assess the robustness of our results when controlling for the additional determinants of the financial structure proposed by the existing literature. Those determinants are legal origin, legal protection, political, historical, and cultural factors.

We follow LLSV (1998) and identify the legal origin of each country's company or commercial law as French, German, Scandinavian, British, or Socialist. Because all the former socialist countries in our sample have reverted to their prior legal system, we follow Harper and McNulty (2008) and replace the Socialist legal origin with Russian legal origin. The dummy variable L_{Russia} equals one if the former socialist country company/commercial law has Russian legal origin and zero otherwise. The dummy includes many former socialist countries; however, it should be emphasised that not all of them had Russian legal origin. The majority of the countries moved either to German or French legal origin, which they adhered to prior to communism. The dummy for French civil law (L_{French}), German civil law (L_{German}), and British common law ($L_{British}$) legal origin are constructed in an identical manner as the Russian

legal origin dummy, whereas the Scandinavian legal origin (*L_Scandinavian*) is captured in the regressions as the reference level. Based on the existing evidence, we expect to observe a negative correlation between the dummy for the French, German, and Russian civil law legal origin and the financial structure indicators. Conversely, we expect a positive relationship between our financial structure measures and the dummy for the British common law legal origin.

The political view holds that civil and common law differ in their emphasis on the rights of private property compared to the rights of the State. To account for the possibility that the legal system influences the structure of the financial system through the political channel, we include a common law dummy, which is an alternative legal variable. The dummy *Common Law* takes the value one for common law countries and zero otherwise.

LLSV (1998) argue that stock markets tend to be underdeveloped in civil law countries compared to common law countries. Rajan and Zingales (1998) argue that banks are predominant in countries with an ineffective legal system and where contract enforcement is lacking because the banks are able to enforce contracts through market power. Demirgüç-Kunt and Levine (2004) show that countries with more legal protection to minority shareholders tend to have a market-oriented financial system. Additionally, Claessens and Laeven (2003) show that weaker legal frameworks diminish the availability of external resources and show an assets substitution effect, which is the investment in more fixed assets relative to intangible assets compared to firms operating in a strong legal environment because of weaker (intellectual) property rights. Because common law provides more protection to minority shareholders, we expect a positive relationship between the common law dummy and the financial structure variables.

We follow Djankov et al. (2007) and Spamann (2010) to identify creditor protection and

shareholder protection at the country level, respectively. Creditor rights are an ex-post mechanism that protects creditors upon default. Djankov et al. (2007) construct creditor rights index based on LLSV(1997) and expanded their sample from 49 to 133 countries. The creditor rights (*CR*) index, which ranges from zero (weak) to four (strong), measures the power of secured lenders in bankruptcy from four aspects which include creditors' consent for reorganization, no automatic stay to seize collateral, secured creditors paid first and management out. In the meanwhile we also control for shareholder protection, using use the anti-director rights (*ADR*) index. The original *ADR* index of LLSV (1998) aggregates six dimensions of shareholder protection rules. Among the six components, three are concerned with shareholder voting, including voting by mail, voting without blocking shares and calling an extraordinary meeting; the others are concerned with minority protection, including proportional board representation, preemptive rights and judicial remedies. Pagano and Volpin (2005), however, criticize the *ADR* index for its ad hoc nature and mistakes in coding. In response, Djankov et al. (2008) provide a revised *ADR* index, which was better theoretically grounded and more reliably weighted for 72 countries. Spamann (2010) further improves the index involving leading local lawyers and provided a corrected *ADR* index for forty-six countries, which is used in this study.

Monnet and Quintin (2007) use a theoretical model to demonstrate that financial structure differences can persist between two economies even when their fundamental characteristics have converged. This implies that changes in a financial structure are costly and are an explanation as to why financial systems still differ across countries. The main implication from the model is that the history of a financial structure is required for an understanding of its current structure.

We therefore must take into account the past fundamentals of financial structure. We control for the past structure by employing variables representing the historical size (*H-size*),

activity (*H-activity*), and structure (*H-structure*) of the financial system, which have been calculated using the data from the year 1972 to 1976. However, we are not able to calculate the historical financial structure for all the countries because of missing data and limited time series. Moreover, we do not have historical variables for efficiency or aggregate variables because the data on overhead costs required for the calculations was available only from the year 1980.

Finally, we introduce a religion variable into the model to measure culture as a potential explanation of diversity in the financial structures. Consistent with Beck et al. (2003) and Djankov et al. (2007), we use the religion, practiced by the largest proportion of the population to examine the potential impact of culture. Existing literature argues that religion shapes people's views on property rights, competition and the role of the government (Stulz and Williamson, 2003). For example, both Landes (1998) and Beck et al. (2003) argue that Catholic and Muslim countries tend to have xenophobic culture and both church and governments maintain control which limits competition and private property rights protection. Our religion index identifies four categories of religion, Catholic, Muslim, Protestant and other religions. The Protestant religion is captured in the regressions as a constant hence it is omitted. All the definitions and sources of the main variables are listed in Table A.1 in the Appendix.

4.3 Descriptive statistics

Table 3 presents the descriptive statistics and correlations for all the variables used in the regression analysis. The results indicate a large variation in financial and economic structures across the sample countries.

The variable *Structure* exhibits high cross-sectional variability ranging from -3.67 to 2.88 with a mean value of 0.02. The variable *Aggregate* also shows a large variation, ranging from -3.21 to 2.01 with a mean value of 0.02. The variable *Structure* identifies Armenia, Guatemala,

and Uruguay as the countries with the most bank-based financial systems in our sample. Conversely, Hong Kong, Singapore, and Zimbabwe are classified as economies with the most market-based financial systems in the sample. When the variable financial aggregate is used, Switzerland, instead of Zimbabwe, is classified as the country with the most market-based financial systems in our sample, followed by Zimbabwe, Finland as well as the United States, whereas Armenia, Guatemala, and Uruguay are still classified as the economies with the most bank-based financial systems. The variables ES_1 and ES_2 also display considerable cross-country variation. The first real economic indicator classifies Nigeria, Papua New Guinea, and Oman as tangible-asset-intensive economies, whereas Hong Kong, Luxembourg, Barbados, and the United States are classified as intangible-asset-intensive economies. In the case of Barbados, the result is driven by the importance of single sectors, that is, the development of the tourism sector in their economy. In the case of Panama, the economy is primarily based on the tourism, trade, and transit sectors, whereas for Barbados the outcome is mainly driven by the development of the tourism sector. For these countries, overall the service sectors account for over three-quarters of GDP on average during our sample period. When we exclude the agriculture sector and compute the second measure for economic structure, the countries Oman, Kuwait, and Saudi Arabia are classified as the countries with the most tangible-asset-intensive economies in our sample. Conversely, Hong Kong, Luxembourg and Barbados are classified as intangible asset-based economies, followed by Greece and the United States. As a result of the exclusion of the agriculture sector, we are able to observe certain changes in the classification of economies as asset intensive, whereas the classification of intangible-asset-intensive economies remains almost unchanged. On average, economies tend to be more based on the service sector than on the agriculture and industry sectors. Among industrialised countries, the size of the agriculture and

industrial sector with respect to that of the service sector ranges from 23% in the United States to 65% in China.

The statistics in Table 3 show that each of the financial structure indicators is negatively correlated with the two indicators of the real economic structure; however, such association is more significant for our main economic structure indicator, confirming our assumption with respect to the existing relationship between financial and economic structures. Additionally, as shown in other studies, there is a strong positive correlation between financial structure and British law, whereas the relationship between financial structure and the French and Russian Law implies the opposite. The results are consistent with the existing studies that demonstrate a positive relationship between common law and capital market development. Moreover, consistent with the literature, shareholder protection shows a strong positive and significant relationship with the relative growth of capital markets to banking sector. Creditor protection, however, shows no statistical significant association with countries' financial structure. The impact of the historical financial structure is also significant on the current structure of financial system. In addition, the results show that Catholic countries tend to have more bank-based financial systems, while Muslim countries tend to have the opposite. For the other religions excluding the Protestant, the correlation tends to be quite mixed. Consistent with Stulz and Williamson (2003), we also find that the Catholic countries protect the rights of creditors less well.

[TABLE 3]

5. Methodology

We use different regression models in the study to assess the impact of economic structure on financial structure. First, we use a panel OLS model to test whether economic structure determines financial structure with the following basic model:

$$y_{i,t} = \alpha ES_{i,t} + \beta X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (1)$$

where, $y_{i,t}$ represents one of the five measures for *Financial Structure*, ES is one of the two economic structure indicators, X is a set of additional explanatory variables including legal origin, legal protection, history as well as religion, $\varepsilon_{i,t}$ is the error term, and i and t denote country and time period, respectively.

Panel OLS with heteroskedasticity-consistent standard errors allows us to correct for errors that are both heteroscedastic and contemporaneously correlated within countries, whereas it does not control for endogeneity, which may cause simultaneity bias. To address this problem, we use the two-step generalised method of moments (GMM), a dynamic panel procedure developed by Arellano and Bond (1991), Arellano and Bover (1995), and implemented by Blundell and Bond (1998) as a second step to test the relationship between financial and economic structures. The regression equations have the following form:

$$y_{i,t} = \alpha ES_{i,t-1} + \beta X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (2)$$

where $y_{i,t}$ represents one of the five measures for *Financial Structure*, ES is one of the two economic structure indicators, and X is a set of contemporaneous explanatory variables. In the regression, μ_i captures unobserved country-specific effects, λ_t is a time-specific effect, $\varepsilon_{i,t}$ is a time-varying error term, and i and t represent the country and time period respectively.

The consistency of the *system* GMM estimator depends on the validity of the instruments and the validity of the assumption that the error terms do not exhibit serial correlation. We use the specification tests suggested by Arellano and Bond (1991), Arellano and Bover (1995), Blundell and Bond (1998), and more recently by Roodman (2009) to test our specifications. The first is the Hansen J specifications test, which tests the validity of the instruments. The second

test examines the hypothesis that the error term $\varepsilon_{i,t}$ is not serially correlated. We test whether the differenced error term is second-order serially correlated because, by construction, the differenced error term is likely to be first-order serially correlated even if the original error term is not. A failure to reject the null hypotheses of both specification tests provides support to our model.

In order to further identify the causal relation between economic structure and financial structure, we conduct event studies and employ the structural reforms in India in 1991, the demise of the Soviet Union in 1991 and the economic reforms in South Korea in the 1980s and early 1990s as different shocks to the structure of the real economy. We employ a difference-in-difference strategy by introducing an interaction term of the variables *Shock* and *Treated* to examine how such a change in economic structure causes the change in financial structure. We use the following identification as the regression model:

$$y_{i,t} = \alpha'' Shock_t \cdot Treated_i + \beta'' Shock_t + \gamma'' Treated_i + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (3)$$

where the *Shock* represents the exogenous shock to the structure of the real economy; and *Treated* is defined as one for the treated countries, and zero for the control countries. μ_i captures unobserved country-specific effects, λ_t is a year-specific effect, $\varepsilon_{i,t}$ is a time-varying error term, and i and t represent the country and year. Instead of using five-year average panel dataset, we use the yearly panel dataset for the event studies.

6. Empirical Results

6.1 Baseline results

In this section, we present the baseline results on the association between economic structure and financial structure. We use five measures of financial structure characteristics as the dependent variable respectively, and two economic structure indicators as the main explanatory

variables. Table 4 reports the results. In Panel A, we use panel OLS regressions with country fixed effects to control for the country-level heterogeneities. In Panel B, we employ the two-step system GMM method. The results show consistently that the variables for economic structure are negatively and significantly associated with financial structure. The negative sign implies that an increase in the size of the service sector with respect to the industry and agriculture sector would lead to an increase in the significance of the stock market in the financial system. Moreover, the interpretation of the coefficients suggests that a change in the economic structure will have a greater impact on the activity and efficiency of the financial sector and, to a lesser extent, on its size.

When the second variable for economic structure is employed, the results are less statistically significant. The coefficient for economic structure remains negative and is significant in a majority of the specifications. Only when the dependent variable is the aggregate measure for financial structure is the coefficient for economic structure insignificant. One interpretation for the weaker results could be that in using the second variable we exclude agriculture, which is an important sector of the economy in certain countries and may have a significant impact on a country's financial structure.

[TABLE 4]

The findings confirm that the structure of an economy exerts an influence on the direction of the evolution of the financial system. Countries with asset-intensive industries tend to have a bank-based financial system. Conversely, market-based financial systems are more likely to evolve in countries where the service sector represents a large part of the economy. Hence, a shift in the economy from industry toward service may be associated with a change in the financial structure. Moreover, the coefficients on economic structure in the regressions imply a substantial

impact on all aspects of the financial structure. If a country's economic structure moves toward intangible asset-intensive industries, it would potentially increase first the liquidity and efficiency of the capital market and then its size. However, all these interpretations must be accepted with caution. In practice, we expect that development of the service sector would increase the need to finance through capital markets, which would result in the expansion of the market. However, change in financial structure is a long-term process that may not immediately follow a shift in the economic structure.

6.2 Robustness check and discussion

We then investigate the robustness of our results and control for other variables, suggested in the literature, that may also influence a country's financial structure. We group these controls into four categories according to the different perspectives on the financial structure determinants outlined in Section 2. We still employ the five measures of financial structure as the dependent variable respectively. However, for brevity we only report the results using *Structure*, which is the principal component of *Size* and *Activity*.

Table 5 presents the results. Overall, the addition of control variables does not change the main results. The coefficients of the economic structure remain negative and highly significant in all the specifications. In column (1) and (2). We only introduce the dummy for the legal origin of common law so the civil law dummy is captured as a constant in the regressions. The results show that on average common law countries have significantly more market-based financial systems than civil law countries do, consistent with the existing literature. In column (3) and (4), instead of only controlling for the common law origin, we also control for the French, German, and Russian legal origins. The coefficients for the French, German, and Russian legal origin enter negatively into the regressions. However, the coefficients for those legal origins show a weaker

relation to the financial structure indicators. Only the coefficients for German and Russian legal origin are negative and significant when we employ the second measure of economic structure which excludes agriculture from consideration. Generally, we find relatively weak evidence of the impact of civil law legal origins on financial structure. Moreover, we assume that Russian legal origin is more significant only because it reflects the ongoing changes in the corporate governance and accounting standards in the former socialist countries for the last two decades. Those reforms and changes in the economic structure resulted in the rapid development of capital markets in those countries, which we assume is captured to some extent by the legal dummy.

[TABLE 5]

In column (5) to (8) we extend these analyses by controlling for investor protections instead of legal origins. Incorporating the controls for the possible influences by creditor and shareholder protection in one country helps to isolate the independent association between economic structure and financial structure. We employ both the corrected and the revised versions of the anti-director rights index developed by Spamann (2010) and Djankov et al. (2008) respectively as a proxy for shareholder rights. The main results still hold, suggesting that if a country's economic structure moves to industries with more intangible assets, the capital markets are likely to grow and get more efficient. The coefficients of creditor rights enter negatively but insignificantly in all the specifications. In contrast, the coefficients of shareholder rights enter positively and statistically significantly in all the specifications, indicating that the improvement in shareholder protection is beneficial for capital market development, which is consistent with Djankov et al. (2008).

In column (9) and (10), we modify the regressions by introducing the historical financial structure variables. Using the historical values, we proxy for the past structure of the financial system. The results only partially confirm the relationship between the past and present financial

structure. The coefficients for the past financial structure are positive and significantly related to the present financial structure at the 10% level only when we use the second measure of economic structure. Consequently, we do not find strong evidence confirming that the past financial structure influences the present structure of the financial system. The results indicate that great reversals are also possible, consistent with the findings of Rajan and Zingales (2003b). Moreover, the coefficients for economic structures remain negative and statistically significant in both columns. Consequently, we find that the evolution of the economic structure has an impact on the current structure of the financial system rather than its history.

Finally in column (11) and (12), we further incorporate the dummy variables for religions, as a proxy for a country's national culture, in the regressions. Our results show that religion may also affect financial structure. Using Protestant countries as a benchmark, Catholic countries on average have more bank-based systems, while Muslim and other religious countries do not seem to have a significantly different financial structure with Protestant countries. Consistently with Beck et al. (2003), we also find a strong correlation between Catholic religion and French civil law legal origin (correlation 0.47 in Table 3), which suggests that it may be particularly difficult to distinguish between Catholic religion and the French civil law tradition. Overall, controlling for religious factors does not change our main results, confirming that economic structure is significantly negative associated with financial structure.

6.3 Heterogenous effects

As discussed in Section 2, some existing studies argue that the finance-growth nexus may also depend on the strength of institutional factors including legal and political institutions. For example, Beck et al. (2000) emphasize that what matters more for the linkage of finance and growth is the efficiency of the legal system in protecting outside investors' rights. A related

perspective is the political economy view, arguing that governments play an important role in building an effective and inclusive financial system (Demirguc-Kunt, 2012). Consistently, Rajan and Zingales (2003b) argue that politicians act in their own interests and do not intervene into the financial system to further improve public welfare but to divert the flow of credit to politically connected firms (see also, e.g. Becker and Stigler, 1974). Hence, we assume the nexus between economic structure and financial structure also depends on the effectiveness of legal and political institutions. In other words, we hypothesize that the relationship between economic structure and financial structure is stronger in countries with more effective legal or political systems. In order to further identify the causal relationship between financial structure and economic structure, we then examine the heterogeneous effects by splitting our sample.

Table 6 presents the results using subsamples of different countries. In column (1) to (4) we split our sample into countries with less or more developed legal systems based on the median value of the legal enforcement index defined by the days of contract enforcement (Djankov et al. 2007); and in column (5) to (8) we split our sample into countries with more or less effective governments based on the median value of the government effectiveness index (Kaufmann et al., 2011). The results show that in column (3) and (4) the coefficients of economic structure are significantly negative whereas those in column (1) and (2) are statistically insignificant although also negative. The coefficients of economic structure in column (5) to (8) point to a similar pattern. Overall it suggests that the impact of economic structure on financial structure is significantly stronger for countries with more developed legal systems or more effective governments, supporting our hypotheses. The *Chi-sq* tests on the coefficients of economic structure suggest that the economic impact is significantly more pronounced when we apply the second measure of economic structure, which excludes agriculture for analysis.

[TABLE 6]

During systemic banking crises and economic recessions, economic structure may evolve faster based on the nature of the economy, e.g. whether the economy is service-sector-driven or manufacturing-driven. Therefore, we examine whether the economic structure affects financial structure in a stronger manner during the recessions. We split the sample and examine the impact of economic structure on financial system during normal periods versus systemic crises, with the results presented in Table 7. We run the regressions for normal periods in column (1) and (2) and for crisis periods in column (3) and (4), and find that, a systemic banking crisis does not change the observed relationship between economic and financial structure. Moreover, this relationship is more significant and pronounced during crises than during normal periods. The *Chi-sq* tests on the coefficients of economic structure further suggest that the difference is significant. This is consistent with existing literature on the change of financial structure during systemic banking crises. For example, Allen et al. (2012) find that during the crises the financial structure may experience short-term reversal, and can revert back in a few years after the crises. Financial crises usually are accompanied by economic recessions, during which the manufacturing or service sector may decline. Therefore, such effect can come from the short-term change of economic structure during crises.

[TABLE 7]

6.4 Event studies

6.4.1 Structural reforms in the early 1990s in India

In order to further isolate the potential endogeneity concerns, we conduct event studies using a difference-in-difference strategy. We explore the shocks to the structure of the real economy and investigate how the financial structure responds to such shocks.

The first event we employ is the structural reforms and liberalizations in the early 1990s in India. Continuous structural reform policies were launched in India in 1980s and 1990s. However, Panagariya (2005) documents that the difference between the reforms in 1980s in India and those in 1990s is that the former were limited in scope and without a clear road map whereas the latter were systematic and systemic. In mid-1991, India's exchange rate was subjected to a severe adjustment, which led to the 1991-92 crisis in India (Cerra and Saxena, 2002). In response to the crisis, the government obtained assistance from the IMF, followed by the domestic structural reforms that they mandated. The so-called post-crisis reform started from the "Statement of Industrial Policy" in July 1991, which emphasized accelerating the process of industrial and import delicensing, and then shifted to further trade liberalization and tax reform. As a result, the economic structure, in terms of the relative importance of manufacturing to service sector, started to turn downward in the early 1990s. Afterwards, the service sector in India has grown faster than the other sectors, to become the dominant sector in the economy. Figure 1 shows the change of economic structure and financial structure in India from 1960 to 2015. Due to the data limitation of value traded in the stock market before 1978 for India, we use the variables *Size* to measure financial structure instead of the variable *Structure*, the principal component of *Size* and *Activity*, as in previous sections.

[FIGURE 1]

Hence, we employ the structural reforms in India in the early 1990s as a shock to the economic structure and examine how the financial structure changes before and after such a shock in India versus other Asian developing countries.[†] In the regression *Treated_India* is defined as one for India, and zero for other Asian countries excluding India, South Korea, Japan,

[†] We exclude Japan, Singapore and Hong Kong for our analysis as these regions have more developed financial sectors and real economies.

Singapore and Hong Kong. *Shock_India* is defined as one from 1993 to 2015, after the launch of the reform measures, or zero before 1990. We drop the years of 1991 and 1992 from our analyses, considering the crisis and the following announcement of the reform policies in India during this period. Figure 2 plots the financial structure (the variable *Size*) for both treated and control countries, showing that the stock market rose in both treated and control countries in mid-1980s, while after the policy change the Indian stock market continued to rise relative to its banking sector until the Asian financial crisis in the late 1990s[‡].

[FIGURE 2]

Table 8 Panel A reports the regression results. In the event studies we use the yearly panel data instead of the 5-year averaged panel data to capture the yearly change of both economic structure and financial structure before and after different shocks. We did not introduce the year and country fixed effects in order to report the coefficients of time indicator and the time-invariant legal and culture variables. Instead, to consider the impact of the macro-economy, we include GDP growth as a control variable in all the specifications. In column (1) we incorporated the dummy variable, *Shock_India*, *Treated_India* and their interaction term. In column (2)-(4) we further added the legal and cultural variables into the specifications. The results show that overall the stock market is less developed than the banking system in the treated country, India, with the *Treated_India* dummy entering with a strong negative sign. However, the interaction enters with a significant and positive sign in all the regressions, indicating that after the structural reforms, the stock markets experienced significantly faster growth than the banking systems, compared to those in the control countries. Consequently, the findings from the impact of structural reforms in India on financial structure confirm the negative causal link between economic structure

[‡] There was a correction in the stock market for the control countries in the end of 1980s due to the stock market crash in the US in 1987 and its spill-over effect. However the correction lasted for only about two years.

(industry versus service sector) and financial structure (stock market versus banking system).

[TABLE 8]

6.4.2 Collapse of the Soviet Union

The second event we use is the collapse of the Soviet Union, as an exogenous shock to the economies of Finland and Sweden. We examine how the financial structure of Finland and Sweden responds to such a shock. During 1991 to 1993, both countries experienced economic contraction[§]. Gorodnichenko et al. (2012) argue that the collapse of the Soviet Union was the cause of the restructuring of the manufacturing sector and the economic depression in Finland so it provides a unique natural experiment for which we know with precision the timing, nature and size of the shock that hit the Finnish economy. Finnish manufacturing industries experienced a deep contraction due to the exposure to Soviet trade. The shock to the economy triggered a systematic banking crisis in 1991 and a currency crisis in 1992, with volatile interest and exchange rates (Englund and Vihriälä, 2008). Afterwards, the depression in Finland led to dramatic changes in the Finnish economy, and the rise of Nokia and the telecommunications industry, and the corresponding change in economic structure. Due to the close ties between Sweden and Finland, the economic structure of Sweden experienced a similar trend, though the recession is milder and the causes of the systematic banking crisis are different (Englund and Vihriälä, 2008)** . In Figure 3 we plot the change of economic structure and financial structure for Finland and Sweden from 1974 to 2015.

[FIGURE 3]

[§] From 1991 to 1993, the average GDP growth rate of Finland and Sweden is -3.3% and -1.5% respectively.

** According to the World Bank report “Foreign Trade Statistics in the USSR and Successor States”, the total trade volume between Finland and the Soviet Union (export and import) is 3,827 million USD in 1990 and drops to 379 million USD in 1991. The total trade volume between Sweden and the Soviet Union is 926 million USD in 1990 and drops to 98 million USD in 1991. <http://documents.worldbank.org/curated/en/172291468752103344/Foreign-trade-statistics-in-the-USSR-and-successor-states>

Hence, we employ the collapse of the Soviet Union as an exogenous shock to the economic structure and examine the financial structure before and after such a shock for Finland and Sweden versus other countries that were not hit by such a shock but have a similar level of economic development. In order to isolate the possible spill-over effect, we exclude Norway and Denmark from our analysis. Hence, in the regression *Treated_SU* is defined as one for Finland and Sweden and as zero for other OECD countries excluding Nordic countries. *Shock_SU* is defined as one since 1993 or zero before 1988. In order to isolate the potential impact of the movements on trade relationship in those years, we dropped the time period between 1988 and 1992. Figure 4 plots the financial structure (the variable *Structure*) for both treated and control countries. We find a similar trend of financial structure in the a few years before the shock while a deviated trend after the shock, suggesting that the parallel trends assumption is likely to be satisfied.

[FIGURE 4]

Table 8 Panel B reports the regression results. In column (1) we include only the dummy variables *Shock_SU*, *Treated_SU*, and the interaction term as well as GDP growth. Similarly to the specifications in the example of India, we did not incorporate the country and year fixed effects in the regressions. The results show that *Treated_SU* enters with a negative but insignificant sign, suggesting that on average the financial structure of treated countries is not significantly different from the control countries. The interaction enters with a significant positive sign, showing that after the collapse of Soviet Union, which hit severely the manufacturing of the treated countries, the stock markets in the treated countries experienced significantly faster growth relative to the banking system than those in the control countries. Then in column (2) we further control for the common law legal origin, so the civil law legal origin is captured as

constant in the regression. In column (3) we control for the investor protections and in column (4) we control for the religion respectively. Our results still hold when we control for more factors that would possibly affect the financial system structure, suggesting a negative casual link between economic structure (agriculture and manufacturing versus services) and financial structure (stock market versus banking system).

6.4.3 Economic Reforms in the 1980s and 1990s in South Korea

The third example we use is the economic reforms in the late 1980s and early 1990s in South Korea as a shock to its economic structure. We also examine how the financial structure responds to it. From the 1960s to 1980s, South Korea achieved rapid economic growth at an average of more than 8 percent per year. Prior to the 1950s, South Korea had little industrialization and a small and underdeveloped stock market, but became a high-income country by the 1990s, making it a stellar example of industrial catch-up in the late 20th century. Since the mid-1980s, the government started to intervene in heavy industries which led to enormous structural change afterwards in its industrial structure and exports (Chang, 1993). Such industrial policy measures included the coordination of complementary investments (the so-called *Big Push*), policies to ensure scale economies, as well as the state acting as a venture capitalist and incubating high-tech firms in new materials, mechatronics, aerospace etc. (Chang, 2011). The importance of manufacturing in the economy started to decrease from the end of 1980s, with the service sector expanding continuously (Figure 5). Figure 6 plots the change of financial structure for both the treated and control countries before and after the reform was launched.

Table 8 Panel C reports the regression results using the example of South Korea. The specifications are similar with those in the previous event studies. *Shock_Korea* is defined as one

from 1995 to 2015, after the launch of reform policies, or zero before 1984. We drop the years between 1985 and 1994 from our analyses because of the launch of the policy measures during this period. *Treated_Korea* is defined as one for South Korea, or zero for other Asian countries excluding Singapore, Japan, India, South Korea and Hong Kong. The results show that overall the stock market is less developed in South Korea than in the control countries; however the interaction term enters with significant and positive signs in all the specifications, indicating that after the shock the stock market in South Korea experienced significantly faster growth than that in the control countries. The finding using the example of South Korea points to the same prediction that the economic structure (industry versus service sector) negatively affects the financial structure (stock market versus banking sector), further confirming our main finding on the relations between economic structure and financial structure.

[FIGURE 5]

[FIGURE 6]

7. Industrial-level evidence

To check the robustness of our main results we conduct a wide array of additional analyses; however, for brevity we do not report them in full^{††}. First, we check the consistency of the results after removing outliers. These outliers are eliminated after considering the scatter plot of the main financial and economic structure indicators. We eliminate those countries that fall particularly far from the regression line and then repeat the estimation on the new sample. After eliminating the extreme observations, we still find a significant and negative relationship between economic and financial structure. Second, we increase the set of explanatory variables and add variables for country GDP, inflation, area, latitude, dummies for landlocked economies, transition economies,

^{††}These robustness results are available in full on request.

or developing countries. Including these variables does not affect either the significance level or the sign of the estimated coefficients. Third, we divide the countries in the sample into two groups based on their membership in the OECD. We assume that countries belonging to the OECD are on average more developed than non-OECD member countries. Using the two separate samples we compute again the baseline regressions. The results indicate that the relationship between financial structure and economic structure is much stronger in industrial countries than in developing countries. One possible explanation for this result is the different development stage of the financial system itself. In developing countries, the financial structure is emerging and adjusting to the needs of the real economy at the same time. Moreover, rapid changes in the financial structure are often caused by additional factors such as liberalisation or political transformation. Conversely, in most of the industrial countries, we may assume that the financial system may already have an optimal structure, whereas changes are only caused in case of significant changes in the economic structure, which takes substantial time.

Fourth, in the case of the OECD countries the data availability on the composition of value added for most of the industries allows us to calculate an alternative measure of economic structures, where we control for the firm asset characteristics in the given industry. In this analysis, the primary data source is the OECD STAN database for industrial analysis, which enables retrieval of gross value added for 47 industries representing nine main sectors of the economy in 25 countries. We divide the industries using firm specific characteristics from either an asset-intensive or knowledge sector, where we measured asset intensity as the ratio of tangible assets (property, plant and equipment) to total book assets of the firm in the industry, whereas the company specific data was computed using data from the Bureau van Dijk's ORBIS database.

According to our theory, asset-intensive firms with tangible assets may use the assets to

collateralise their bank debt. Hence, in countries dominated by asset-intensive industries bank-based financial systems are more likely to emerge. In contrast, knowledge-based companies with a low level of tangible assets are often forced to use either equity or bonds to finance their needs. Therefore, countries dominated by industries with intangible assets are more likely to have a market-based financial system.

Classifying industries as either asset or tangible asset intensive, where we distinguish industries using ratios calculated on firm level data, we again construct two alternative measures for economic structure and employ them in the basic regression. The results of those regressions are similar to those we have presented previously and the coefficients of the economic structure were again negative and statistically significant. Overall the robustness tests at the industry-level also confirm our findings on the link between economic structure and financial structure.

8. Conclusion

Our results provide new evidence concerning the causes and causality of the direction of evolution of the financial system structure. Using both OLS, dynamic panel techniques and event studies we document that the economic structure is closely linked to the shape of the financial system. We find that countries with asset-intensive sectors are more likely to have a bank-based system. Conversely, countries with sectors that are based on knowledge and intangible assets are likely to exhibit a market-based financial system. The results suggest that the structure of the real economy may influence the structure of the financial system. Additionally, even during systemic crises, such a relationship still holds. Moreover, we conduct event studies using a difference-in-difference strategy in order to address the problems of potential endogeneity. We use different shocks that alter the economic structures in India, Finland and Sweden, and South Korea. In all the countries the shocks resulted in significant development of the service sector relative to the

industry sector. The changes in economic structure were followed by changes in the structure of financial system, where the stock market gained on importance relative to the banking sector. Consequently, the results of the event studies suggest a causal relation between economic structure and financial structure.

In our opinion, these results present a missing link in the explanation as to why country financial structures still differ. The results, however, confirm that other factors may influence the structure of the financial system. Consequently, a financial system may not always have an optimal structure, which may be a result of political arrangements or the interests of incumbent groups (Rajan and Zingales, 2003). Therefore, we assume that financial systems may not always be able to reach their optimal structure. However, as existing barriers are removed the structure of a financial system may develop and gain ground, but it would be independent of further changes in the real economic structure. Finally, when the financial system has reached its optimal structure with respect to the characteristics of the real economy, our theory implies that any increase in the significance of fixed-asset-intensive sectors would lead to an increase in the role of banks with respect to the stock market.

The main policy implications of the model are that despite efforts from governments and multilateral organisations, particular those from the emerging economies, country capital markets will not grow in size or activity as long as the economy remains asset-intensive. Therefore, governments should focus on improving the transparency or efficiency of the existing financial structure and less on the development of the stock market because the market will develop as soon as the economic structure changes. These results are consistent with Robinson (1952).

Finally, this study contributes to the ongoing debate on the relative merits of bank-based versus market-based financial systems with respect to the promotion of economic growth. Our

paper presents plausible explanations to Luintel et al. (2008), that financial structure matters with respect to economic growth.

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Table 1 Employment by Industry in the US: 1910 vs. 2015

This table compares the employment by industry in the US in the year of 1910 and 2015. The employment is shown in thousand persons and in the ratio to GDP (percent). ^a includes farmers, managers, laborers, and foremen. ^b for 2015 the “other” category includes leisure and hospitality (except for food services and drinking places), repair and maintenance, and membership associations and organizations. Sources: U.S. Bureau of Labor Statistics and U.S. Census Bureau.

<i>Industry</i>	<i>1910</i>		<i>2015</i>	
Farm workers ^a	11,533	31.2%	1,073	0.8%
Forestry and fisheries	250	0.7%	52	0.0%
Mining	1,050	2.8%	768	0.5%
Manufacturing	8,230	22.3%	12,317	8.6%
Construction	2,300	6.2%	6,446	4.5%
Transportation and public utilities	3,190	8.6%	5,404	3.8%
Wholesale and retail trade	3,370	9.1%	32,561	22.8%
Finance and real estate	520	1.4%	8,124	5.7%
Educational services	900	2.4%	13,724	9.6%
Other professional services	770	2.1%	41,012	28.7%
Domestic service	2,150	5.8%	—	
Personal service	1,520	4.1%	1,402	1.0%
Government not elsewhere classified	540	1.5%	11,748	8.2%
Other ^b	600	1.6%	8,306	5.8%
TOTAL	36,923	100%	142,936	100%

Table 2 Sector Weights in UK and US Equity Markets: 1899 vs. 2000

This table compares the weights of sectors in the equity market of UK and US over the last century. The industry composition is based on the industrial classification that was in effect in 1990. Source: Dimson et al. (2002).

<i>Sectors</i>	<i>United Kingdom</i>		<i>United States</i>	
	1899	2000	1899	2000
Railroads	49.2	0.3	62.8	0.2
Banks and finance	15.4	16.8	6.7	12.9
Mining	6.7	2	0	0
Textiles	5	0	0.7	0.2
Iron, coal, steel	4.5	0.1	5.2	0.3
Breweries and distillers	3.9	2.1	0.3	0.4
Utilities	3.1	3.6	4.8	3.8
Telegraph and telephone	2.5	14	3.9	5.6
Insurance	1.9	4.4	0	4.9
Other transport	1.4	1.5	3.7	0.5
Chemicals	1.3	0.9	0.5	1.2
Food manufacturing	1	2	2.5	1.2
Retailers	0.7	4.4	0.1	5.6
Tabaco	0	1	4	0.8
Sectors that were small in 1900	3.4	46.9	4.8	62.4
TOTAL	100	100	100	100

Table 3 Descriptive Statistics and Correlations

This table presents the summary statistics and correlations for the variables used in the paper. The data are averaged over the period 1972-2015. The definitions of the variables are provided in the Appendix Table A.1.

	Size	Ac.	Ef.	Str.	Aggr	ES ₁	ES ₂	H-S	H-A	H-S	L_B	L_F	L_G	L_R	CR	C_A	R_A	Cath	Mus.	O_re
																D	D	.	.	g
<i>Panel A: Descriptive Statistics</i>																				
Mean	-0.75	-2.62	0.25	0.02	0.02	0.45	0.65	-1.34	-3.46	-1.34	0.32	0.39	0.16	0.09	1.94	3.73	3.40	0.36	0.19	0.20
Std. Dev.	1.03	1.91	3.02	1.03	1.04	0.13	0.38	1.19	1.36	1.19	0.47	0.49	0.37	0.28	1.06	0.94	1.11	0.48	0.40	0.40
Min.	-4.74	-8.41	-6.95	-3.67	-3.21	0.07	0.08	-3.85	-6.32	-3.85	0	0	0	0	0	2	1	0	0	0
Max	2.51	1.14	5.15	2.88	2.01	0.81	4.02	0.19	-0.74	0.19	1	1	1	1	4	5	5	1	1	1
Obs.	542	562	431	540	426	654	654	126	153	126	827	827	827	827	774	396	585	827	827	827
<i>Panel B: Correlations</i>																				
Size	1																			
Activity	0.65	1																		
Efficiency	0.49	0.89	1																	
Structure	0.90	0.90	0.76	1																
Aggregate	0.78	0.96	0.91	0.96	1															
ES ₁	-0.05	*	*	*	*	1														
ES ₂	-0.04	0.07	0.17	0.16	0.07	0.72	1													
H-Size	0.47	0.15	0.46	0.33	0.35	*	*	1												
H-Activity	0.35	0.34	0.16	0.38	0.27	0.01	0.01	0.74	1											
H-Structure	0.55	0.33	0.29	0.48	0.39	-0.17	-0.13	0.94	0.91	1										
L_British	0.36	0.12	0.07	0.26	0.17	0.24	0.02	0.57	0.48	0.59	1									
L_French	*	*	*	*	*	*	*	-0.02	-0.07	0.06	0.18	*	1							
L_German	0.08	0.10	0.10	0.00	0.10	0.14	0.01	-0.13	*	0.54	*	*	1							
L_Russia	0.25	*	*	0.11	*	0.15	0.08	*	*	0.26	0.20	0.26	*	1						
CR	0.05	0.01	0.06	0.21	0.01	-0.05	0.01	0.46	0.14	0.24	0.25	0.20	0.25	0.17	0.05	1				
C_ADR	0.20	0.18	0.40	0.19	0.39	0.04	0.02	0.22	0.01	-0.09	0.20	0.20	0.10	*	0.19	1				
R_ADR	0.33	0.34	0.38	0.37	0.42	0.11	0.14	0.52	0.24	0.42	0.46	*	0.21	*	0.09	0.18	0.71	1		
Catholic	*	*	*	*	*	*	*	-0.14	-0.07	-0.00	*	0.47	0.10	*	*	*	*	*	1	
Muslim	0.12	0.06	0.02	0.08	0.08	0.24	0.20	*	*	*	0.02	0.16	*	0.04	0.03	0.12	-0.04	*	1	
Other_reg	-0.04	0.02	-0.01	-0.01	-0.03	0.20	0.17	-0.02	0.22	0.06	0.04	*	0.15	0.36	0.11	0.13	0.32	0.27	*	1

Note: * indicates statistical significance at 5 percent level.

Table 4 Economic Structure and Financial Structure: Baseline Results

This table reports the baseline results on financial structure and economic structure. The dependent variable is the five measures of financial structure respectively. The explanatory variables included in the regressions are two measures of economic structure (ES). In PANEL A, we use OLS with country fixed effects. In PANEL B, we use two-step system GMM. ***, ** and * represent significance at 1, 5, and 10 percent level respectively; Robust standard errors are reported in parentheses.

Dep Var	<i>Size</i>		<i>Activity</i>		<i>Efficiency</i>		<i>Structure</i>		<i>Aggregate</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>PANEL A: OLS</i>										
ES1	-	-	-	-	-	-	-	-	-	-
	3.574*		5.552*		5.042**		3.430*			
	**		**		*		**			
	(0.939)		(1.359)		(1.648)		(0.871)			
ES2										
		-		-		-		-		
		0.718*		1.510*		1.022		0.800*		-
		*		**		*		*		-
		(0.404)		(0.522)		(0.583)		(0.358)		0.146
										(0.274)
Cons	0.706*	-0.338	-0.481	1.883*	2.082**	0.656	1.374*	0.438*	0.367	0.053
	*			**	*	**	**	*		5
	(0.382)	(0.230)	(0.555)	(0.300)	(0.651)	(0.320)	(0.353)	(0.204)	(0.306)	(0.152)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Obs.	561	561	572	572	483	482	555	555	467	467
Ct num	108	108	108	108	108	108	108	108	108	108
R ²	0.065	0.020	0.065	0.032	0.047	0.014	0.070	0.028	0.008	0.001
<i>PANEL B: two-step system GMM</i>										
ES1	-	-	-	-	-	-	-	-	-	-
	3.871*		10.59*		12.24**		4.502*			
	**		**		*		**			
	(1.228)		(2.016)		(3.804)		(1.167)			
ES2										
		-		-		-		-		
		0.853*		2.724*		1.337		1.206*		-
		*		**		**		**		-
		(0.374)		(0.604)		(0.600)		(0.356)		0.367
										(0.224)
cons	0.215	1.038*	0.798	2.486*	4.488**	-	1.272*	-0.182	0.434	0.090
		**		**	*					0
	(0.721)	(0.386)	(1.194)	(0.638)	(1.391)	-	(0.670)	(0.327)	(0.476)	(0.174)
Obs.	561	561	572	572	483	482	555	555	467	467
Ct num	108	108	108	108	108	108	108	108	108	108
Hansen J	0.129	0.448	0.167	0.154	0.215	0.353	0.128	0.395	0.026	0.067

AR(2) 0.012 0.009 0.024 0.011 0.030 0.064 0.012 0.005 0.019 0.013

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Table 5 Economic Structure and Financial Structure: Controlling for Other Factors

This table reports the results of the regressions when controlling for more factors. The dependent variable is Structure, defined as the principal component of Size and Activity. The explanatory variables included in the regressions are two measures of economic structure (ES), dummies for legal origin of the country (British, German, French, and Russia), creditor rights, revised or corrected anti-director rights, historical index for financial structure as well as dummies for the religion of the country (Catholic, Muslim, and other religions rather than Catholic, Muslim and Protestant). Note that the dummy of Scandinavian as legal origin as well as the dummy of Protestant as religion are captured as constant in the regressions. We do not include the country fixed effects in the regressions in order to report the coefficients for time-invariant variables. We run the regressions using all the five measures of financial structure respectively as the dependent variable but we only report the results using Structure. ***, ** and * represent significance at 1, 5, and 10 percent level respectively; Robust standard errors are reported in parentheses.

Dep Var.	Structure									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ES1	-2.952*** (0.663)		-2.916*** (0.691)		-3.970*** (0.889)		-3.884*** (0.788)		-6.623*** (1.432)	
ES2		-0.505* (0.267)		-0.490* (0.265)		-1.089** (0.444)		-1.079*** (0.418)		-2.170 (0.639)
English	0.667*** (0.175)	0.565*** (0.183)	0.419** (0.198)	0.178 (0.193)						
French			-0.169 (0.223)	-0.310 (0.212)						
German			-0.393 (0.249)	-0.464* (0.240)						
Russian			-0.449 (0.346)	-0.801** (0.336)						
CR					-0.0415 (0.0998)	-0.0255 (0.0980)	-0.136 (0.0848)	-0.106 (0.0772)		
C-ADR					0.307* (0.160)	0.279* (0.167)				
R-ADR							0.394*** (0.106)	0.388*** (0.106)		
HStructure									0.244 (0.174)	0.307 (0.171)
Catholic										
Muslim										
Other_relig										
Cons	1.009*** (0.300)	0.0909 (0.198)	1.240*** (0.287)	0.469** (0.191)	0.812 (0.686)	-0.0396 (0.673)	0.586 (0.475)	-0.391 (0.435)	2.660*** (0.388)	1.536 (0.249)
Country FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Obs.	497	497	497	497	281	281	388	388	96	96
Ct num	93	93	93	93	44	44	65	65	14	14
R ²	0.097	0.046	0.109	0.067	0.088	0.074	0.189	0.168	0.395	0.395

Table 6 Economic Structure and Financial Structure: Heterogenous Effects

This table reports the results of the regressions using subsamples of different countries. The dependent variable is *Structure*, defined as the principal component of *Size* and *Activity*. The explanatory variables included in the regressions are two measures of economic structure (ES) as well as dummies for legal origin of the country (British, German, French, and Russia). The dummy of Scandinavian as legal origin is captured as constant in the regressions. We do not include the country fixed effects in the regressions in order to report the coefficients for time-invariant variables. We run the regressions using all the five measures of financial structure respectively as the dependent variable but we only report the results using *Structure*. ***, ** and * represent significance at 1, 5, and 10 percent level respectively; Robust standard errors are reported in parentheses.

Dep Var.	<i>Structure</i>							
	Less developed legal system		More developed legal system		Low government effectiveness		High government effectiveness	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ES1	-2.279 (1.450)		3.295*** (0.796)		-1.378 (1.097)		3.442*** (0.954)	
ES2		-0.0703 (0.385)		1.020*** (0.359)		0.00371 (0.330)		-0.887* (0.461)
English	1.056*** (0.354)	0.928*** (0.306)	0.396* (0.218)	0.217 (0.231)	0.653* (0.371)	0.612 (0.398)	0.469** (0.230)	0.379* (0.221)
French	0.430 (0.387)	0.449 (0.355)	-0.193 (0.234)	-0.269 (0.238)	0.0434 (0.420)	0.0908 (0.428)	-0.0305 (0.274)	-0.0735 (0.265)
German	-0.173 (0.403)	0.0218 (0.329)	0.0835 (0.329)	0.0541 (0.317)	- -	- -	-0.374 (0.256)	-0.439* (0.247)
Russian	- -	- -	-0.311 (0.479)	-0.636 (0.489)	- -	- -	1.264*** (0.151)	1.503*** (0.143)
Cons.	0.376 (0.758)	-0.635* (0.324)	1.372*** (0.324)	0.730*** (0.234)	0.126 (0.724)	-0.580 (0.452)	1.423*** (0.372)	0.664** (0.272)
Chi- sq(ES) (P- value)			-1.015 (0.229)	-0.950* (0.071)			-2.064 (0.142)	-0.891* (0.099)
Country FE	NO	NO	NO	NO	NO	NO	NO	NO
Obs. Ct num.	206	206	291	291	150	150	342	342
R ²	40 0.056	40 0.088	53 0.195	53 0.105	33 0.055	33 0.045	59 0.097	59 0.075

Table 7 Economic Structure and Financial Structure: the Impact of Crisis

This table reports the results of the regressions using subsamples during normal periods and crises. The dependent variable is *Structure*, defined as the principal component of *Size* and *Activity*. The explanatory variables included in the regressions are two measures of economic structure (ES) as well as dummies for legal origin of the country (British, German, French, and Russia). The dummy of Scandinavian as legal origin is captured as constant in the regressions. We do not include the country fixed effects in the regressions in order to report the coefficients for time-invariant variables. We run the regressions using all the five measures of financial structure respectively as the dependent variable but we only report the results using *Structure*. ***, ** and * represent significance at 1, 5, and 10 percent level respectively; Robust standard errors are reported in parentheses.

Dep Var.	<i>Structure</i>			
	Normal periods		Crisis periods	
	(1)	(2)	(3)	(4)
ES1	-1.867*** (0.691)		-5.047*** (1.180)	
ES2		-0.0956 (0.258)		-1.333*** (0.501)
English	0.265 (0.239)	0.0944 (0.238)	0.820** (0.320)	0.477* (0.264)
French	-0.274 (0.259)	-0.383 (0.253)	-0.0355 (0.260)	-0.238 (0.288)
German	-0.355 (0.274)	-0.402 (0.267)	-0.496* (0.283)	-0.622** (0.317)
Russian	-0.752** (0.353)	-1.003*** (0.344)	0.859** (0.395)	0.329 (0.462)
Cons.	0.946*** (0.319)	0.340 (0.238)	1.786*** (0.416)	0.713*** (0.268)
Chi-sq (ES) (P-value)			-3.179*** (0.009)	-1.237** (0.023)
Country FE	NO	NO	NO	NO
Obs.	414	414	83	83
Ct num.	93	93	57	57
R ²	0.111	0.086	0.233	0.137

Table 8 Event Studies**Panel A** The Impact of Structural Reforms on Financial Structure in India

This table reports the results of the regressions examining the impact of the structural reforms in early 1990s. The dependent variable is *Size*. *Shock_India* is defined as one from 1993 to 2015, after the launch of reform measures, or zero before 1990. We drop the years of 1991 and 1992 from the analysis because of the financial crisis and corresponding structural reforms in this period. *Treated-India* is defined as one for India, and zero for other Asian countries excluding Singapore, Japan, India, South Korea and Hong Kong. We do not include the country fixed effects in the regressions in order to report the coefficients for the time-invariant variables. ***, ** and * represent significance at 1, 5, and 10 percent level respectively; Robust standard errors are reported in parentheses.

Dep. Var	<i>Size</i>			
	(1)	(2)	(3)	(4)
Shock_India	0.176 (0.245)	0.183 (0.247)	0.212 (0.267)	0.183 (0.249)
Treated_India*Shock_India	2.015*** (0.264)	1.997*** (0.266)	1.915*** (0.280)	1.998*** (0.268)
Treated_India	-1.120*** (0.356)	-1.796*** (0.408)	-1.557*** (0.517)	-0.843 (0.571)
Commonl		1.092** (0.538)		
CR			-0.102 (0.185)	
R-ADR			0.160 (0.468)	
Catholic				0.660** (0.313)
Muslim				0.239 (0.347)
Other_relig				-0.559 (0.607)
GDPgrowth	0.0139 (0.0146)	0.0174 (0.0143)	0.0376*** (0.00932)	0.0173 (0.0145)
Cons.	-0.807** (0.357)	-1.237*** (0.357)	-1.066 (2.031)	-0.539* (0.310)
country FE	NO	NO	NO	NO
Year FE	NO	NO	NO	NO
N	323	323	259	323
Ct num	12	12	8	12
R ²	0.384	0.404	0.525	0.404

Panel B The Collapse of the Soviet Union and Its Impact on Financial Structure in Finland and Sweden

This table reports the results of the regressions examining the impact of the collapse of Soviet Union as an exogenous shock on the financial structure. The dependent variable is *Structure*. *Shock_SU* is defined as one from 1993 to 2002, after the collapse, or zero from 1979 to 1988, before the collapse. We drop the years between 1989 and 1992 from our analysis, in order to avoid noise. *Treated_SU* is defined as one for Finland and Sweden, and zero for other OECD countries excluding Nordic countries (Finland, Sweden, Norway and Denmark). We do not include the country fixed effects in the regressions in order to report the coefficients for time-invariant variables. ***, ** and * represent significance at 1, 5, and 10 percent level respectively; Robust standard errors are reported in parentheses.

Dep var.	<i>Structure</i>			
	(1)	(2)	(3)	(4)
Shock_SU	0.811*** (0.164)	0.795*** (0.169)	0.820*** (0.182)	0.790*** (0.171)
Treated_SU*Shock_SU	0.900*** (0.186)	0.916*** (0.191)	0.889*** (0.202)	0.920*** (0.192)
Treated_SU	-0.258 (0.206)	-0.124 (0.215)	-0.385* (0.226)	-0.555* (0.297)
Commonl		0.666*** (0.195)		
CR			-0.0764 (0.119)	
R-ADR			0.168 (0.127)	
Catholic				-0.400 (0.298)
Muslim				0.682*** (0.240)
Other_relig				-0.285 (0.332)
GDP growth	0.0443* (0.0234)	0.0439* (0.0257)	0.0473* (0.0283)	0.0459* (0.0262)
Cons.	-0.655*** (0.215)	-0.788*** (0.224)	-1.049** (0.457)	-0.363 (0.302)
Country FE	NO	NO	NO	NO
Year FE	NO	NO	NO	NO
Obs.	426	426	400	426
Ct num.	32	32	31	32
R ²	0.393	0.389	0.395	0.389

Panel C The Impact of Economic Reforms on Financial Structure in South Korea

This table reports the results of the regressions examining the impact of the economic reforms in late 1980s and early 1990s. The dependent variable is *Size*. *Shock_Korea* is defined as one from 1995 to 2015, after the launch of reform measures, or zero before 1984. *Treated_Korea* is defined as one for South Korea, and zero for other Asian countries excluding Singapore, Japan, India, South Korea and Hong Kong. We drop the years between 1985 and 1994 from our analysis due the policy changes during this period. We do not include the country fixed effects in the regressions in order to report the coefficients for time-invariant variables. ***, ** and * represent significance at 1, 5, and 10 percent level respectively; Robust standard errors are reported in parentheses.

Dep. Var	<i>Size</i>			
	(1)	(2)	(3)	(4)
Shock_Korea	0.367 (0.263)	0.371 (0.264)	0.478 (0.418)	0.371 (0.266)
Treated_Korea*Shock_Korea	1.087*** (0.275)	1.093*** (0.278)	1.169*** (0.391)	1.093*** (0.280)
Treated_Korea	-0.977** (0.460)	-0.619 (0.482)	-1.334** (0.535)	-0.709 (0.600)
Commonl		0.981* (0.570)		
CR			-0.171 (0.208)	
R-ADR			0.183 (0.532)	
Catholic				0.815** (0.403)
Muslim				0.568 (0.420)
Other_relig				-0.390 (0.661)
GDPgrowth	0.0196 (0.0152)	0.0218 (0.0157)	0.0587*** (0.0144)	0.0217 (0.0159)
Cons.	-1.020** (0.418)	-1.399*** (0.402)	-1.346 (2.154)	-0.917 (0.580)
country FE	NO	NO	NO	NO
Year FE	NO	NO	NO	NO
N	264	264	202	264
Ct num	12	12	8	12
R ²	0.498	0.520	0.704	0.520

Appendix**Table A.1** Definitions of main variables and data sources

<i>Financial development</i>		
Private credit	Equals the amount of private credit by money banks and other financial institutions divided by GDP	
Stock market capitalization	Equals stock market capitalization divided by GDP	Beck et al. (2001, 2010); Čihák et al. (2012, 2013)
Stock market value traded	Equals stock market total value traded divided by GDP	
<i>Financial structure</i>		
Size	Equals the log of the ratio of stock market capitalization to private credit	
Activity	Equals the log of the ratio of value traded to private credit	
Efficiency	Equals the ratio of total value trade to banking overhead costs	Beck et al. (2001, 2010); Čihák et al. (2012, 2013)
Structure	Equals the principal component of the two variables of <i>Size</i> and <i>Activity</i>	
Aggregate	Equals the principal component of the three variables of <i>Size</i> , <i>Activity</i> and <i>Efficiency</i>	
<i>Economic structure</i>		
ES1	Equals the ratio of the value added of agriculture and industry to total gross value added	World development indicators, the World bank
ES2	Equals the ratio of the value added of industry to service sector	World development indicators, the World bank
<i>Law and governance factors</i>		
Legal origin	Indices created by coding countries by legal origin, which can be divided into five categories-English Common Law, French Civil Law, German Civil Law, Scandinavian Civil Law and Russian Civil Law	LLSV (1997, 1998)
Creditor rights	Indices aggregating creditor rights, which range from 0 (weakest creditor rights) to 4 (strongest creditor rights)	Djankov et al. (2007)
Corrected ADR	Corrected indices of the original anti-director rights index, with improved data collection, coding and documentation	Spamann (2010)
Revised ADR	Revised index of the original anti-director rights index, which aggregates shareholder protection in over 100 articles, including shareholder voting and minority protection	Djankov et al. (2008)
Debt contract enforcement	The number of days to resolve a payment dispute through courts.	Djankov et al. (2007)
Government effectiveness	The index captures perceptions of the	Kaufmann et al. (2011)

quality of public services, the quality of civil service etc., and the creditability of the government's commitment to such policies.

Culture
Religion

Indices created by coding countries based on religion, which can be divided into three categories, Catholic, Muslim and Other religions. Djankov et al. (2007)

Banking crises
Systemic banking crises

Represents a banking crisis when a country's corporate and financial sectors experience numerous defaults. Laeven and Valencia (2013)

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Table A.2 Country-averages of the main regression variables

Country	Size	Activity	Efficiency	Structure	Aggregate	ES1	ES2	Law
Argentina	-0.90	-2.55	-1.02	-0.05	0.15	0.43	0.65	F
Armenia	-2.85	-6.93	-5.81	-2.42	-2.42	0.64	1.15	R
Australia	0.01	-1.26	3.70	0.89	1.08	0.31	0.41	B
Austria	-2.00	-3.67	1.41	-0.99	-0.11	0.36	0.52	G
Bahrain	0.20	-3.17	1.08	0.37	0.27	0.48	0.93	-
Bangladesh	-1.35	-3.93	-1.25	-0.71	-0.66	0.52	0.45	B
Barbados	-0.17	-3.68	-1.15	0.02	-0.12	0.19	0.21	B
Belgium	-0.30	-2.09	2.69	0.41	0.73	0.27	0.35	F
Bolivia	-1.73	-6.82	-4.69	-1.77	-1.89	0.51	0.69	F
Botswana	0.07	-3.12	-1.58	0.32	-0.05	0.55	1.12	B
Brazil	-0.63	-1.84	1.32	0.46	0.60	0.42	0.64	F
Bulgaria	-2.28	-4.44	-2.36	-1.37	-1.26	0.51	1.04	F
Canada	-0.09	-1.56	3.49	0.68	1.00	0.31	0.42	B
Chile	0.17	-2.38	1.31	0.70	0.56	0.46	0.73	F
China	-1.37	-1.01	3.70	0.13	0.56	0.65	1.39	G
Colombia	-0.50	-3.03	-0.79	0.13	0.04	0.48	0.64	F
Costa Rica	-1.50	-4.97	-3.43	-1.10	-1.26	0.39	0.47	F
Croatia	-0.77	-3.61	-1.03	-0.29	-0.42	0.35	0.44	G
Cyprus	-1.73	-3.81	0.28	-0.88	-0.59	0.30	0.35	-
Czech Republic	-1.06	-1.87	1.27	0.05	0.16	0.41	0.64	F
Cote d'Ivoire	-0.69	-4.29	-2.50	-0.45	-0.30	0.54	0.66	F
Denmark	-0.71	-2.53	3.11	0.06	0.71	0.29	0.37	R
Ecuador	-1.26	-4.77	-3.51	-0.91	-1.15	0.47	0.57	F
Egypt, Arab Rep.	-0.54	-2.21	1.56	0.24	0.47	0.51	0.67	F
El Salvador	-1.04	-5.26	-2.85	-0.93	-1.09	0.42	0.50	G
Estonia	-1.19	-2.82	0.43	-0.30	-0.19	0.33	0.44	G
Fiji	-1.74	-5.86	-4.10	-1.35	-1.60	0.40	0.36	B
Finland	-0.42	-1.35	4.02	0.56	1.15	0.39	0.57	R
France	-0.98	-1.90	3.59	0.09	0.93	0.29	0.36	F
Georgia	-1.44	-5.40	-4.64	-1.19	-1.50	0.52	0.65	R
Germany	-1.35	-1.73	3.30	-0.07	0.68	0.33	0.48	G
Ghana	-0.22	-3.37	-3.01	0.08	-0.46	0.65	0.64	B
Greece	-0.76	-2.51	1.78	0.28	0.45	0.25	0.26	F
Guatemala	-3.04	-6.34	-5.15	-2.35	-2.28	0.41	0.48	F
Guyana	-0.94	-6.52	-4.02	-1.31	-1.52	0.57	0.71	B
Hong Kong, China	0.36	-0.16	4.66	1.34	1.51	0.09	0.10	B
Hungary	-1.00	-1.66	0.84	0.15	0.16	0.36	0.49	G
Iceland	-1.19	-2.60	1.16	-0.23	-0.05	0.33	0.38	R
India	0.13	-0.76	2.21	1.04	0.99	0.59	0.75	B
Indonesia	-0.51	-1.60	1.17	0.44	0.58	0.59	1.07	F
Ireland	-0.67	-2.36	2.72	0.12	0.38	0.35	0.51	B
Italy	-0.97	-2.16	2.71	0.31	0.61	0.30	0.39	F
Jamaica	0.55	-2.52	-1.43	0.76	0.27	0.33	0.41	B
Japan	-1.03	-1.41	4.13	0.20	0.74	0.36	0.55	G
Jordan	0.15	-1.44	2.01	0.85	0.79	0.32	0.40	F
Kazakhstan	-0.64	-3.64	-1.82	-0.23	-0.49	0.47	0.73	R
Kenya	-0.41	-3.57	-1.68	-0.08	-0.27	0.50	0.39	B

Country	Size	Activity	Efficiency	Structure	Aggregate	ES1	ES2	Law
Korea, Rep.	-0.84	-0.71	3.93	0.52	1.10	0.46	0.69	G
Kuwait	0.16	-1.02	3.24	0.98	1.10	0.64	1.83	F
Kyrgyz Republic	-1.82	-2.65	-2.51	-0.60	-0.76	0.59	0.74	R
Latvia	-1.86	-4.80	-2.50	-1.25	-1.22	0.31	0.38	G
Lebanon	-1.35	-4.08	-0.50	-0.76	-0.63	0.27	0.29	F
Lithuania	-0.76	-3.17	-1.24	-0.16	-0.35	0.37	0.49	F
Luxembourg	-0.17	-4.60	0.37	-0.08	-0.03	0.17	0.20	F
Macedonia	-2.08	-4.24	-2.36	-1.21	-1.16	0.42	0.52	F
Malawi	0.24	-3.14	-3.12	0.41	-0.27	0.59	0.54	B
Malaysia	0.16	-1.40	3.47	0.87	1.04	0.57	0.95	B
Malta	-1.39	-4.86	-0.42	-1.00	-0.80	0.45	1.02	F
Mauritius	-0.57	-3.69	-0.01	-0.21	-0.14	0.40	0.47	-
Mexico	-0.93	-1.35	0.58	0.48	0.66	0.40	0.56	F
Moldova	-1.01	-2.81	-1.39	-0.17	-0.15	0.43	0.44	R
Mongolia	-1.45	-4.10	-2.32	-0.81	-0.93	0.52	0.68	G
Montenegro	0.42	-2.66	-0.24	0.65	0.27	0.32	0.31	-
Morocco	-0.55	-2.64	1.02	0.11	0.28	0.45	0.56	F
Namibia	-2.60	-5.19	-2.96	-1.78	-1.62	0.42	0.59	B
Nepal	-0.97	-4.30	-1.60	-0.61	-0.68	0.64	0.45	B
Netherlands	-0.53	-1.26	4.31	0.53	1.10	0.31	0.41	F
New Zealand	-0.64	-2.47	1.58	0.11	0.06	0.37	0.45	B
Nigeria	-0.06	-3.25	-2.01	0.21	-0.09	0.69	1.36	B
Norway	-1.14	-2.24	2.93	-0.10	0.60	0.39	0.61	R
Oman	-0.15	-1.88	0.91	0.56	0.40	0.70	2.41	F
Pakistan	-0.34	-1.56	1.31	0.54	0.60	0.50	0.47	B
Panama	-1.23	-5.24	-1.60	-1.03	-0.98	0.30	0.34	F
Papua New Guinea	1.48	-5.20	-3.35	0.91	0.05	0.68	1.10	B
Paraguay	-2.35	-5.52	-4.38	-1.73	-1.78	0.53	0.73	F
Peru	0.02	-2.21	-0.49	0.55	0.32	0.44	0.62	F
Philippines	0.33	-1.50	1.24	1.05	0.77	0.54	0.77	F
Poland	-0.79	-2.27	0.66	0.27	0.21	0.37	0.54	F
Portugal	-1.27	-2.12	2.32	-0.14	0.21	0.29	0.36	F
Romania	-1.57	-4.03	-2.79	-0.86	-1.00	0.58	1.22	F
Russian Federation	-0.11	-1.27	-0.06	0.76	0.41	0.46	0.76	R
Saudi Arabia	-0.01	-0.67	2.99	0.99	0.98	0.60	1.55	B
Serbia	-0.55	-3.61	-2.15	-0.05	-0.39	0.46	0.59	F
Singapore	0.44	-0.56	4.65	1.27	1.50	0.33	0.50	B
Slovak Republic	-2.19	-4.36	-1.26	-1.31	-1.07	0.40	0.60	F
Slovenia	-1.27	-3.08	-0.36	-0.41	-0.38	0.37	0.54	F
South Africa	0.30	-2.02	2.56	0.77	0.91	0.41	0.63	B
Spain	-0.58	-2.01	3.62	0.28	0.99	0.32	0.42	F
Sri Lanka	-0.37	-2.60	-0.42	0.23	0.01	0.49	0.56	B
St. Kitts and Nevis	0.08	-4.50	-1.14	-0.15	-0.40	0.29	0.36	B
Swaziland	-0.89	-4.54	-4.46	-0.45	-1.14	0.55	0.86	B
Sweden	-0.96	-1.98	3.91	0.08	1.09	0.33	0.46	R
Switzerland	-0.23	-0.28	4.06	0.98	1.23	0.29	0.40	G
Tanzania	-0.77	-4.72	-4.35	-0.62	-1.10	0.57	0.47	B
Thailand	-0.75	-1.64	2.85	0.44	0.64	0.49	0.68	B

Country	Size	Activity	Efficiency	Structure	Aggregate	ES ₁	ES ₂	Law
Trinidad and Tobago	-0.04	-3.38	-0.88	0.18	-0.01	0.51	1.03	B
Tunisia	-1.72	-4.11	-0.42	-0.97	-0.65	0.46	0.59	F
Turkey	-0.21	-0.26	2.09	0.99	0.99	0.47	0.56	F
Uganda	-0.73	-5.64	-5.39	-0.87	-1.41	0.61	0.39	B
Ukraine	-0.95	-4.11	-2.50	-0.54	-0.78	0.51	0.86	R
United Kingdom	-0.08	-0.85	4.07	0.90	1.08	0.25	0.33	B
United States	-0.51	-0.83	3.88	0.66	1.11	0.23	0.28	B
Uruguay	-3.52	-7.67	-6.52	-3.01	-2.89	0.39	0.49	F
Venezuela, RB	-1.20	-4.27	-3.92	-0.73	-1.14	0.54	1.10	F
Vietnam	-2.31	-3.46	0.49	-1.11	-0.69	0.58	0.87	F
West Bank and Gaza	-0.10	-1.98	0.02	0.55	0.27	0.35	0.41	-
Zambia	0.26	-4.79	-4.47	-0.07	-0.72	0.55	1.00	B
Zimbabwe	0.96	-1.19	0.75	1.37	1.21	0.46	0.56	B

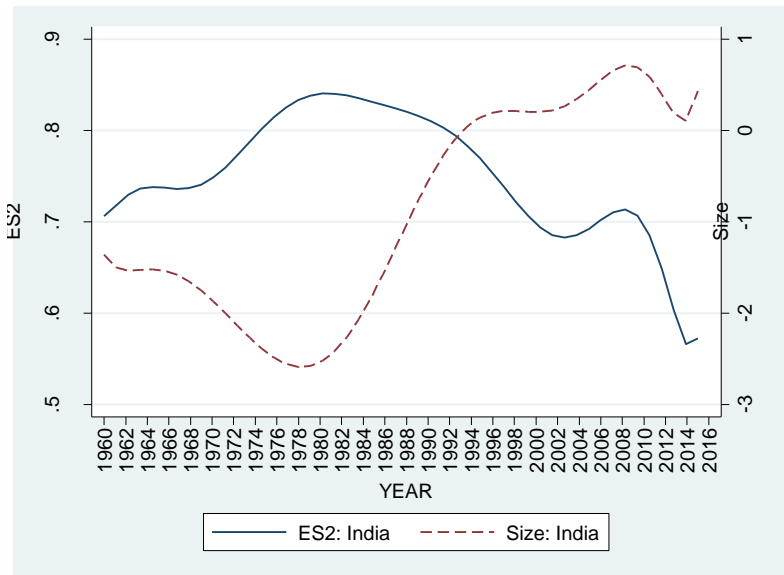


Figure 1 Change of Economic Structure and Financial Structure in India

Note: This figure plots the change of economic structure (the variable *ES2*) and financial structure (the variable *Size*) from 1960 to 2015 in India. Due to data limitation of value traded in the stock market, we use the variable *Size* instead of *Structure* to measure finance structure. To smooth the volatile yearly change for economic growth and stock market performance, we use the local polynomial smooth plots. Data source: World Bank, Bombay Stock Exchange.



Figure 2 Change of Financial Structure: the Impact of the Structural Reforms in India in early 1990s

Note: This figure plots the yearly change of financial structure (the variable *Size*) for India and the mean of *Size* for the control countries from 1960 to 2015. The treated country is India and the control group includes other Asian countries except Japan, India, Korea, Rep., Singapore and Hong Kong. Data source: World Bank, Bombay Stock Exchange.

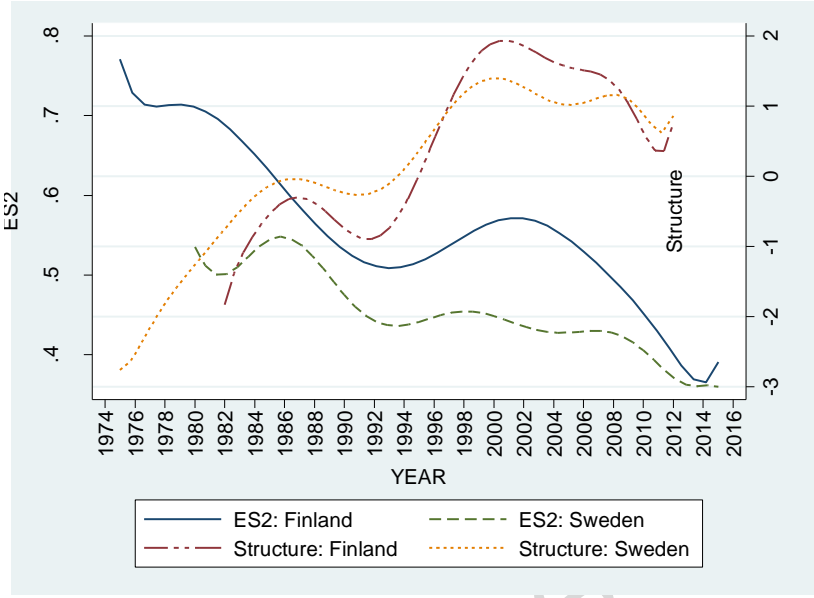


Figure 3 Change of Economic Structure and Financial Structure in Finland and Sweden

Note: This figure plots the change of economic structure (the variable *ES2*) and financial structure (the variable *Structure*) from 1974 to 2015 in Finland and Sweden. To smooth the volatile yearly change for economic growth and stock market performance, we use the local polynomial smooth plots. Data source: World Bank.

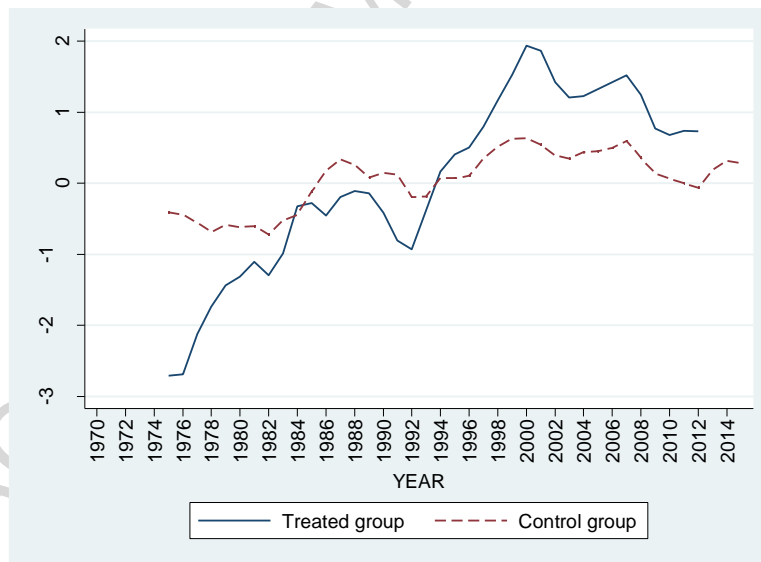


Figure 4 Change of Financial Structure: the Impact of the Collapse of the Soviet Union

Note: This figure plots the yearly change of the mean value of financial structure (the variable *Structure*) between 1975 and 2015. The treated group includes Finland and Sweden, and the control group includes other OECD countries excluding Nordic countries (Finland, Sweden, Norway and Denmark). Data source: World Bank.

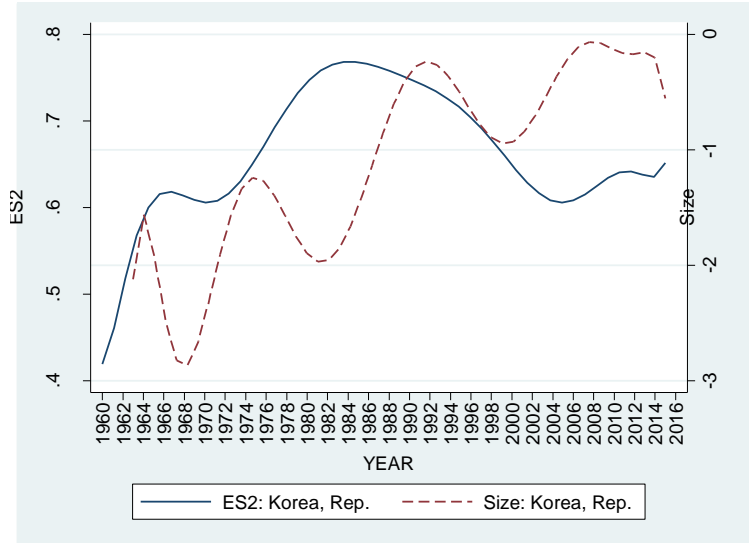


Figure 5 Change of Economic Structure and Financial Structure in South Korea

Note: This figure plots the change of economic structure (the variable *ES2*) and financial structure (the variable *Size*) from 1960 to 2015 in South Korea. Due to data limitation of value traded in the stock market, again we use the variable *Size* instead of *Structure*. To smooth the volatile yearly change for economic growth and stock market performance, we use the local polynomial smooth plots. Data source: World Bank, Korean Stock Exchange.

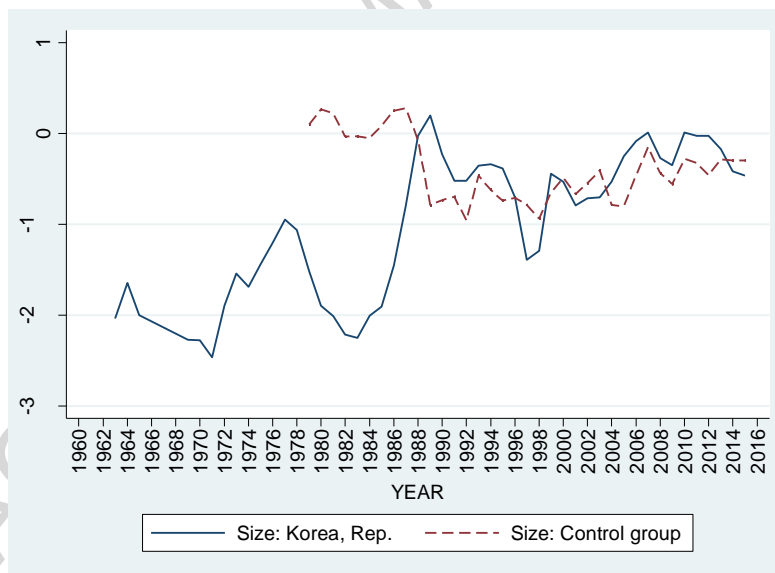


Figure 6 Change of Financial Structure: the Impact of the Economic Reforms in South Korea in late 1980s and 1990s

Note: This figure plots the yearly change of financial structure (the variable *Size*) for South Korea and the mean of *Size* for the control countries from 1960 to 2015. The treated country is South Korea, and the control group includes other Asian countries except Japan, India, Korea, Rep., Singapore and Hong Kong. Data source: World Bank, Korean Stock Exchange.

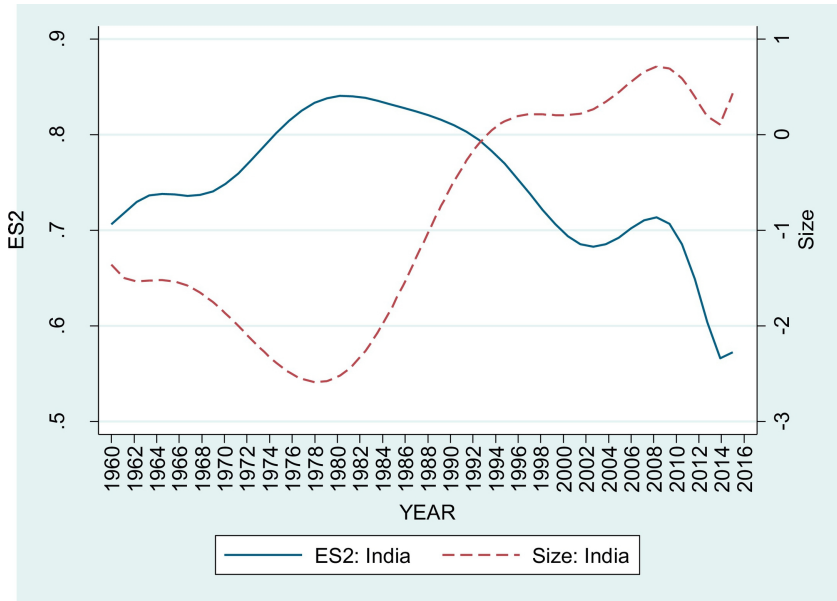


Figure 1

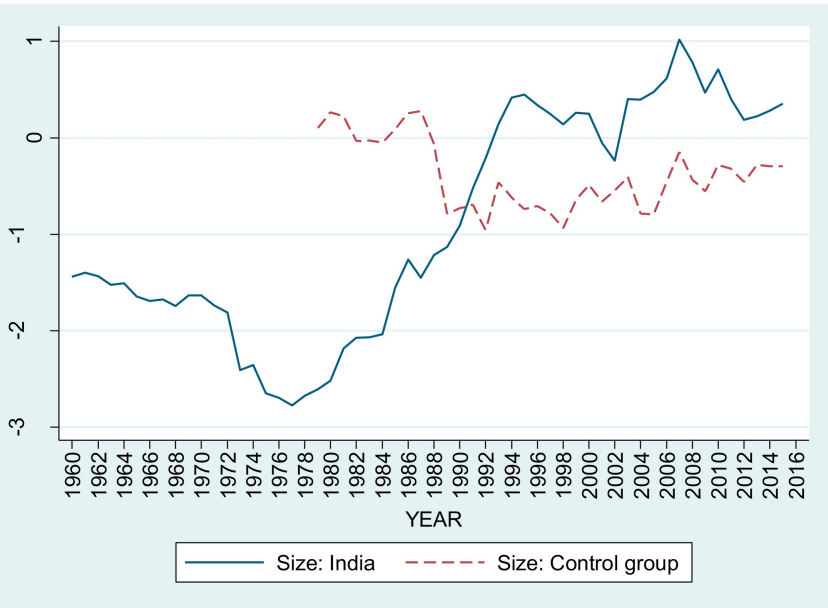


Figure 2

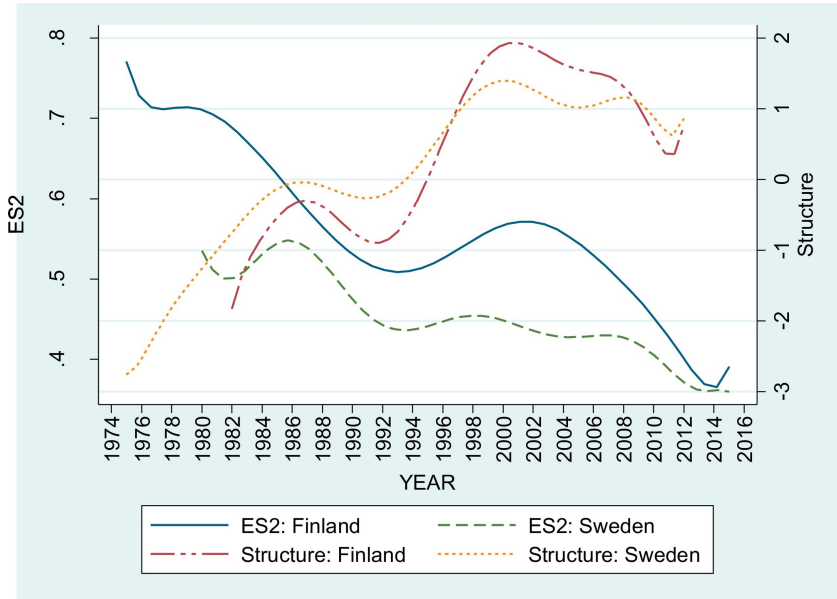


Figure 3

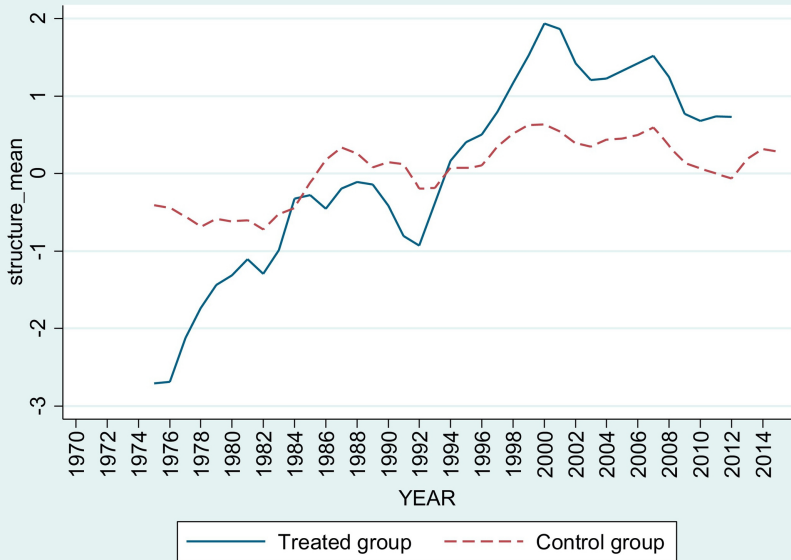


Figure 4

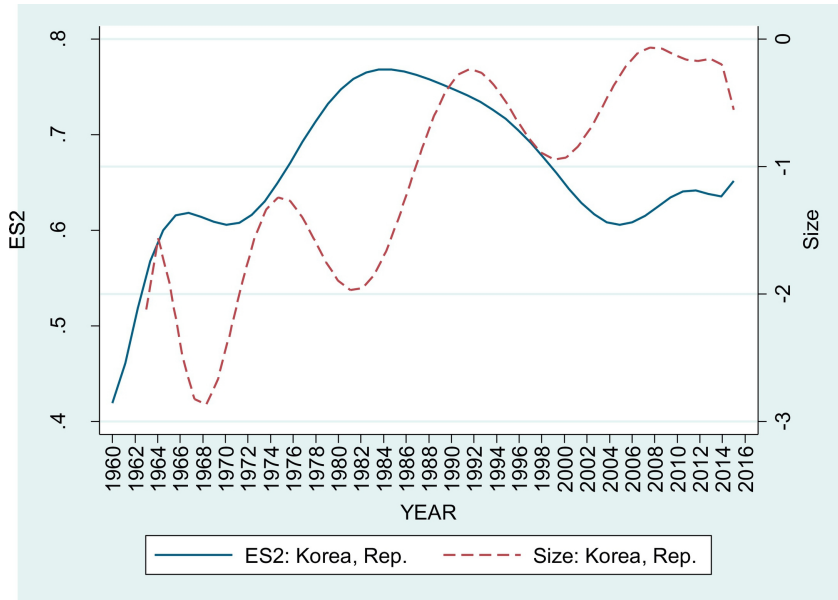


Figure 5

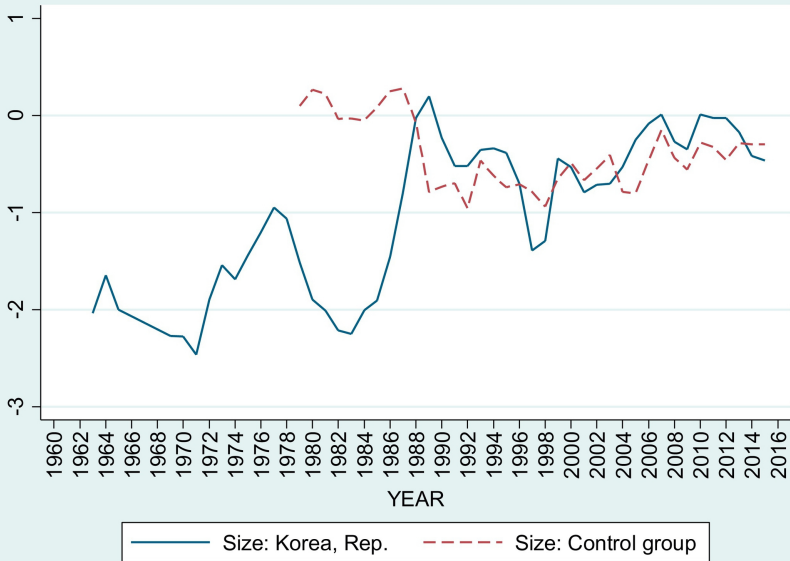


Figure 6