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What is driving the corporate bond market development in Asia?

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Abstract

We investigate the development of corporate bond markets in 10 Asian countries from 1995 to 2014. Using panel data on the market size and total issue of bonds by financial and non-financial companies, we confirm that macroeconomic and institutional factors are related to the depth of the market. In addition, we show that the issuance of bonds is also determined by other factors that strongly depend on the issuer type. We show that creditor rights and institutional quality are important in explaining the issuance of bonds by financial institutions. Furthermore, we determine a strong positive association between the level of domestic credit and the market and issue size of corporate bonds. In our opinion, the results indicate that there is a positive relationship between the development of the corporate bond market and the banking sector. These findings indicate that increased demand for bank loans induced the issuance of bonds by financial institutions which, in turn, may have led to the development of corporate bond markets in Asia.

Keywords: corporate bond market, bond issuance, crisis, banking sector, Asia

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1 Introduction

In the last two decades, the corporate bond markets in Asia have expanded rapidly. Since the global financial crisis of 2008, the issuance of corporate bonds has grown fourfold. In addition, corporate bond market capitalization increased from 16.7% to 24.2% of the region's GDP by 2012. The growth of the corporate bond market accelerated after 2009, being mainly driven by the domestic market (Levinger and Li, 2014). The corporate bond market is viewed nowadays as a 'spare tire' for the Asian firms, substituting for the decline in lending by European and US financial institutions during the crisis. Creating a 'spare tire' was one of the main aims of the various government initiatives that were undertaken to create a domestic bond market after the Asian financial crisis of 1997/8. An overview of the various government initiatives aimed at developing the corporate bonds market in the region after the Asian crisis is presented by Plummer and Click (2005), Packer and Remolona (2012), and Park (2016). However, the development of the corporate bond market is uneven across the Asian region. Therefore, the question of what drives the development of the corporate bond market in some of the Asian countries arises. With this study, we try to provide an answer by providing insight behind the growth of the corporate bond market in Asia following the crisis of 1997/8.

Empirical studies investigating the determinants of development of domestic corporate bonds markets in Asia are limited. Eichengreen and Luengnaruemitchai (2004) consider a broad set of determinants of bond market development using panel data for 41 countries for the period from 1990 to 2001. They find that larger economies with stronger institutions, less volatile exchange rates, and more competitive banking sectors tend to be positively associated with bond market capitalization. Claessens, Klingebiel, and Schmukler (2007) focus on public bond market development in 35 countries over the period of 1993–2000. They find that economies that are larger and have greater domestic investor bases, measured by the size of the financial system, have larger domestic bond markets. They show that less flexible exchange regimes are associated with less domestic debt relative to foreign borrowing. Additionally, they report that the development of the government bond market is determined by the level of inflation, fiscal burden, legal origin, and capital account openness. Burger and Warnock (2006) analyze the development of bond markets in 49 countries. Their main findings suggest that countries with stable inflation rates and stronger creditor rights

have more developed bond markets. In addition, their results indicated that bond markets and banking systems share some fundamental factors. Bae (2012) investigates the determinants of government, financial and corporate bond market development using data from 43 countries over the period of 1990–2009. He reports that the degree of economic development is the most important variable in explaining cross-country variation in all three types of bond markets. He does not find any other variable that is robustly related to the financial bond market. In addition, he reports that the fiscal balance, interest rate, domestic credit provided by banks, and existence of a well-developed government bond market matter for the development of corporate bond markets. Bhattacharyay (2013) analyzed the development of the government and corporate bond market in 10 Asian countries over the period of 1998-2008. His results suggest that size and economic development in addition to openness and variability in interest rates are good predictors of the development of the corporate bond market. Burger, Warnock, and Warnock (2015), in a study on 42 smaller Asian economies, document that their economies may enable bond market development by lowering inflation and strengthening the legal rights of borrowers. In line with this finding, Park (2016), who also investigated the development of the corporate bond market in Asia, finds that better macroeconomic performance with stronger institutions contributes to the development of the corporate bond market in terms of size. Consequently, most of the recent studies underline the importance of the economic indicators and legal rights as drivers of bond market development.

We extend the existing research and employ a larger variety of factors that may influence the corporate bond market development in ten Asian countries. In the study, we use data on the size of the corporate bond market as well as on the issuance of corporate bonds in the years 1995-2014. Hence, the data cover the periods following the Asian financial crisis of 1997/98 and the recent financial crisis of 2007/8. Using panel Generalized Least Squares (GLS), we confirm the importance of economic performance and institutional quality on the development of the corporate bond markets in Asia. We find that stronger creditor rights and rule of law are associated with deeper local bond markets. We report that in countries with better creditor rights, more bonds are issued by financial institutions. Additionally, we find a positive association between bank credit growth and corporate bond markets issuance. Burger and Warnock (2006) argued that the necessary conditions for bond market development are very similar to those that

foster the development of the banking system. We argue that a dynamic growth in bank lending can imply an increase in the issuance of bonds by financial institutions, which may lead to the growth of the corporate bond market in terms of size. Hence, we think that the growth of the financial bond market may positively influence corporate bond market development.

However, we do not find strong evidence that the bond markets act as a 'spare tire,' providing a limited offset to reductions in bank lending during a crisis. Indeed, we observe a reduction of the issuance of bonds by financial institutions during the recent financial crisis. We find only weak evidence that this decline is offset by an increase in issuance by non-financial institutions. On the contrary, we find that an increase in the government bond market may crowd out the corporate bond market. Indeed, some of our results indicate that developing the necessary infrastructure as well as the demand side is important in understanding the development of corporate bond markets.

Our paper extends the existing literature in two ways. First, we present an updated analysis of the development of the corporate bond market. In the study, we use newer data and a large number of factors that may determine the development of the corporate bond market. Second, we focus not only on the size of the corporate bond market but also, more importantly, on the volume of capital raised by companies. In addition, we try to establish the determinants of bond issues by financial and non-financial companies. Indeed, our results indicate that the determinants explaining the development of the corporate bond market in terms of size and issuance differ. Moreover, we find differences in the factors determining the volume of issuance of bonds by non-financial and financial companies.

The rest of the paper is organized as follows. Section 2 summarizes the development of the corporate bond market in selected Asian countries over the last two decades. Section 3 describes the data and discusses the factors affecting the size and issuance of corporate bond markets. Section 4 discusses the empirical strategy and shows the estimation results for various factors, whereas Section 5 discusses the results from the 'horse race' regression. Section 6 presents the paper's conclusions.

2 Corporate bond market development in Asia after 1997

The East Asia crisis of 1997 is sometimes called the 'crisis of success'. The crisis was the result of a boom of international lending followed by an abrupt capital

outflow in 1997. On one hand, a capital inflow should be treated in general as a sign of country's high perception and trust. On the other hand, the structure of capital that is coming is of crucial importance. In the case of East Asia, the capital was not stable (short term), and most of the debt was dominated in foreign currency. This constituted a vulnerability to the financial system rather than a strength. The openness to capital flows had been seen as beneficial strategy for emerging economies, yet this paradigm was questioned, and the role of the structure of foreign capital (long term or short term) as well as importance of domestic capital were underlined after 1997 (Weisbrot 2007).

International banks provided a significant amount of capital to domestic banks and non-financial companies in Asia before the crisis of 1997. The features of capital inflow were quite differentiated among the Asian countries. For example in Korea, lending was mainly to banks, and in Indonesia, lending was mainly to non-financial companies. The structure of the foreign capital created the problem of 'double mismatch'. Firstly, the problem was related to the fact that short-term and volatile loans were used by East Asian entities to finance long-term investments in the real sector. Secondly, 'double mismatch' also refers to currencies; that is, there was a mismatch between the currency of loan that was obtained by the Asian companies / banks and the currency of their income. In 1997-1998, the withdrawal of foreign capital resulted in the depreciation of exchange rates (Radelet and Sachs, 2000).

The East Asian financial crisis was a sophisticated phenomenon and created 'double mismatch'; however crucial, these factors are not enough to understand the complexity of this crisis. Among the sources of the turmoil researchers underline apart from excessive leverage, especially in Philippines, Thailand and Malaysia, are a rising fraction of non-performing loans and the role of poor regulatory and institutional environment in some countries. It is worth paying attention to the cases of particular countries. In Korea for example, the vital problem was related to excessive lending to large companies by banks that were effectively controlled by those companies (chaebols). In addition, in Indonesia, the important vulnerability was related to the fact that capital requirements were not really obeyed (Corsetti, Pesenti, and Roubini, 1998).

The strong dependence of economies on commercial banks for domestic financing is highlighted as one of the most important vulnerabilities of the Asian countries in 1997 (Bhattacharyay, 2013). In addition, the lack of well-developed and liquid corporate bond markets was an important factor that reinforced the building of

risks before the Asian crisis of 1997, which made the final consequences more severe. As Greenspan (1999) figuratively said, "*The lack of a spare tire is of no concern if you do not get a flat. East Asia had no spare tires*."

According to the 'spare tire view,' a financial crisis can be mitigated if a country has the legal and market infrastructure that allows the capital market to provide alternative financing to firms when their banking systems cannot be used. A corporate bond market may be a substitute for bank lending and make the system more resistant to financial crisis. The role of developing local financial markets in emerging economies is still being underlined as a vital factor reinforcing stability. The latest publication of IMF (2017), i.e. Chapter 3 of the upcoming *Global Financial Stability Report*, states that governments in emerging economies should pay particular attention to domestic financial markets (equity- and bond-market depth and liquidity), because they are a chance to increase resilience to global financial shocks. Eichengreen and Luengnaruemitchai (2004), and Bhattacharyay (2013) argued that corporate bonds may be also treated as diversification tools for investors that are independent from sovereign bonds and other tools. This leads to the conclusion that the development of local currency corporate bonds may be – at least in theory – the perfect solution for improving the stability of the East Asian financial systems. Consequently, policy makers undertook several regional initiatives to create and encouraging the growth of corporate bond markets following the crisis of 1997/8.

In 2003 and 2004, the Executives' Meeting of East Asia-Pacific Central Banks (EMEAP) launched two projects, namely Asian Bond Funds 1 and 2 (ABF 1 and 2), which aimed at promoting regional bond markets. EMEAP consisted of eight countries: China, Hong Kong, Indonesia, Malaysia, Philippines, Singapore and Thailand. Those countries issued sovereign and quasi-sovereign bonds that were purchased by the foreign exchange reserves of the aforementioned countries associated with Australia, Japan and New Zealand. ABF2 invested $2 billion in domestic currency bonds issued by sovereign and quasi-sovereign issuers in the eight EMEAP markets excluding Australia, Japan and New Zealand to create an innovative, low-cost and efficient product in the form of passively managed index bond funds (increasing investor participation) (Chan et al., 2011). Another important project was the Asian Bond Market Initiative (ABMI). It was launched by ASEAN (Association of South-East Asian Nations: Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar,

Philippines, Singapore, Thailand, and Vietnam in partnership with China, Japan and South Korea) to establish an effective market infrastructure. Among projects held within ABMI were the establishment of a regional bond guarantee agency, the creation of a regional settlement and clearance system for bonds and the strengthening of regional rating agencies (Bhattacharyay, 2013).

Mizen and Tsoukasy (2014) evaluate the impact of ABF, ABF2 and the ABMI policies on corporate bond market size and liquidity in Asia using the difference-in-differences model. In their study, they examine whether companies in the nine countries that took part in the aforementioned policy projects were more likely to issue corporate bonds, whereas the control group consists of companies from Taiwan. Their results show that ABF, ABF2 and ABMI had a positive impact on the probability of issuance. Indeed, one can state that the initiatives undertook in Asia ended with success, whereas East Asia faced a significant growth in bond financing in the years 1998 - 2008. The total bond market increased by 217.3% during that period: the sovereign bond market by 275.3% and the corporate bond market by 65.7% (Bhattacharyay, 2013). The numbers illustrate a significant shift in the Asian financial systems towards capital markets in the last two decades. The Asian corporate bond market relative to the economy is significantly larger than the market in South America nowadays yet still small in comparison to the markets from developed economies (Burger, Warnock, and Warnock, 2015).

Figure 1 shows the development path of the total corporate bond market in the 10 Asian countries[1] in our sample in terms of the total amount of corporate bonds outstanding and relative to GDP. On one hand, the countries differ significantly in terms of economic and financial development. On the other hand, in all but Japan, we can observe a dynamic growth of the corporate bond market in the last two decades.

[Figure 1]

Figures 2-3 present detailed development paths for the corporate bond issuances in countries in our sample. Figure 2 illustrates the development of the corporate bond issuances relative to GDP in two series, i.e., with and without bonds issued by financial institutions. Figure 3 shows the annual volume of total corporate bond issuance from 1995 to 2014.

[1] Hong Kong, People's Republic of China, Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam, Japan, and Korea.

[Figure 2-3]

Interestingly, in spite of the global financial crisis in 2007-2008, the amount of emerging Asian corporate bond issuances unrated or rated by local credit agencies increased in the period from 2005 to 2009 by approximately 331% (Shim, 2012). The increase of issuance may indicate that the corporate bond market fulfilled the 'spare tire' function in East Asia during the recent financial crisis. Jeasakul, Lim, and Lundback (2014) indicated that the East Asian economies showed relative high resilience during the recent financial crisis, whereas Rai (2011) underline the relative stability of their currencies. The question, however, remains whether the changes in the structure of the financial system helped to mitigate the financial crisis in Asia. We leave the question for further research, whereas in this study, we focus on the factors behind the rapid growth of the Asian corporate bond market in the last two decades.

3 Data and descriptive statistics

We use a panel data set with annual observations from 1995-2014 for the following the Asian countries: China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Thailand, and Vietnam. The country coverage and time dimension are based primarily on the availability of data on corporate bond markets in the AsianBondsOnline database, which tracks the bond market in Asian countries. In addition, we have supplemented the data using the World Banks database. We retrieved from the World Bank database most of the independent variables, whereas the definitions of the variables with its data sources are presented in the Appendix.

3.1 Variable definitions

3.1.1 Corporate bond market development

In the study, we employ several dependent variables to measure the development of the corporate bond market. In the literature, the most widely used measure is the ratio of total corporate bond market capitalization to GDP. A drawback is that this measure captures the amount of debt listed, not the amount of funds raised by companies. Thus, the ratio may show a large value of debt raised in the past, whereas the amount of capital raised currently may be small. However, this variable is widely used because it is less cyclical than the latter and thus is better for making comparisons across countries and across time periods.

Our second measure of the development of the bond market is the ratio of total bond issue to GDP during a year. A drawback of this measure is that corporate debt is strongly influenced by the business cycle (Bernanke and Gertler, 1989). Moreover, Becker and Ivashina (2014) show that companies are more likely to issue public debt during a contraction of bank credit supply. Consequently, they find a substitution effect between bank credit and public debt and present a strong pro-cyclical pattern in the debt financing mix of the companies.

The ratio of total bond issue includes debt issued by financial and non-financial companies, whereas both types of firms differ strongly in their capital needs. Thus, we use two additional measures to control for the public bond issued by non-financial and financial companies to GDP. We retrieved the data on the volume of corporate bond issues by non-financial companies and their average maturity. In addition, the value of the bond issued by financial companies is the total corporate bonds issued minus the bonds issued by non-financial companies. We found some discrepancies in the information about the value of the total corporate bonds issued retrieved from AsianBondsOnline and the value of non-financial companies bond issued retrieved from the World Bank. In those cases, we gave priority to the information provided by the AsianBondsOnline. In our opinion, the existing discrepancies between the two datasets do not affect the results of this study.

In measuring both bond market capitalization and bond issues, we restrict ourselves to public debt and domestic companies. We do it because we are especially interested in the determinants of the development of the domestic public bond market, which helps a country's companies raise funds for future development.

3.1.2 Independent variables

Based on the existing empirical research, we have identified several factors that may determine the development of the bond markets in the Asian countries. We grouped those factors in four broad categories characterizing the country, namely economy, financial system, banking sector and institutional framework.

We follow mainly Eichengreen and Luengnaruemitchai (2004) in the choice of economic variables that may determine the development of the bond market. We use a country's *GDP* as a proxy for economic size. It is assumed that small countries may have a problem in developing an efficient bond market because they are not able to

attract large companies (even domestic ones), which in turn may lead to lower coverage by analysts and investment bankers. Therefore, it is assumed that small countries may have a problem in developing a deep and liquid corporate bond market. We also control for the development stage of the economy using the variable *GDP per capita.* Less developed countries are more likely to have a more volatile investment environment and weaker institutional framework. Indeed, Bhattacharyay (2013) indicates that there is a positive association between the level of economic development bond market development in Asia. Rajan and Zingales (2003) indicate that countries' openness to international competition increases domestic competition, which may positively affect financial system development. Moreover, an open economy in principle may broaden investor base for local currency corporate bonds due to the substantial presence of foreign investors. We measure a country's *Openness* using the ratio of total exports of goods and services to GDP. Bhattacharyay (2013) argues that a stable exchange rate encourages bond market development. We control for the stability of the *Exchange rate* volatility of a country using the standard deviation of the 12 monthly exchange rates over a 1-year period. Burger, Warnock, and Warnock (2010) show that countries with better historical inflation performance have more developed local bond markets. Hence, we employ the annual change of consumer price index (CPI) to control for the level of inflation. Lastly, we control for the recent global *Financial crisis* using a dummy variable, which takes a value 1 for the year 2008-2009 and zero otherwise. The crisis affected Asian economies through both trade and financial channels, whereas export and stock prices declined by more than 30 and 60%, respectively (Keat, 2009). On one hand, a financial crisis may result in the decline of the corporate bond market. On the other hand, the corporate bond market may substitute a bank's long-term lending during a financial crisis. According to Tendulkar and Hancock (2014), an additional key driver of the development of the corporate bond market following a crisis may be the 'search for yield' by investors. Hence, the financial crisis may have a positive impact on the development of the corporate bond market in Asia.

We control for the structure of the country's financial system by adding the variable stock market capitalization (*Market cap*) to GDP. A sizeable stock market may signal a market-based financial system, what may positively determine the development of the corporate bond market. A large stock market may, however, still be shallow, which would result in high volatility of the returns, thus weakening the development of

the corporate bond market. We control for *Market volatility* using a variable presenting the average of the 360-day volatility of the national stock market index.

A sizeable domestic government debt market may have a negative impact on the development of the private bond market. The variable *Public debt* controls for the size of public debt, especially the government debt market. The variable is calculated as the ratio of the total amount of domestic public debt securities to GDP. Eichengreen and Luengnaruemitchai (2004) claim that an active corporate bond market needs a benchmark yield curve that is provided by a government bond market. Aschauer (1989), however, states that increased public capital crowds out private investment. Hence, we may expect that a significant increase in government domestic debt may negatively affect private credit.

Cowan et al. (2008) find that a large domestic investor base in the form of well-developed private pension funds has a positive impact on the development of the corporate bond market in Latin America. Hence, we employ the variable *Pension funds*, which represents the assets of the pension funds to GDP.

Becker and Ivashina (2014) find strong evidence of substitution between bank credit and private debt, which occurs when the availability of the bank credit declines or the performance of banks deteriorates. We control for the credit supply in the banking sector using the ratio of domestic credit provided by the banking sector to GDP (*Bank credit*). In addition, we use return on equity (*ROE*) and bank interest spread (*Bank spread*) to control for bank performance. The existing research suggests that banks may use their power to suppress the development of capital markets (Benston, 1994). We proxy for the power of banks in a country by means of the combined market share using the assets of the five largest banks (*Concentration*).

Lastly, we include a dummy variable, *Banking crisis*, which takes a value of one during a systematic banking crisis and zero otherwise. Allen, Gu, and Kowalewski (2012) find that the corporate bond market moves in the same direction as bank credit during a bank crisis.

Burger, Warnock, and Warnock (2010) document that countries with stronger legal institutions have more developed local bond markets. In line with this finding, Gu and Kowalewski (2016) find that a country's level of creditor protection determines corporate bond market development. We control for creditor protection using the *Creditor rights* index of Djankov et al. (2007) as a proxy for country-level bondholder

protection. The index, which ranges from zero (weak) to four (strong), measures the laws and regulations that limit expropriation from secured creditors in a country.

Improved information disclosure may overcome adverse selection in the credit market and contribute to credit market development (Jappelli and Pagano, 2002). We proxy for information access using a dummy *Public registry*, which equals 1 if a public credit registry operates in the country and zero otherwise. Djankov et al. (2008) document that the efficiency of debt enforcement is an economically and statistically significant predictor of the development of debt markets across countries. We control for this by employing the variable *Enforcement*, which measures the days required to enforce a contract. Allen, Gu, and Kowalewski (2012) suggested that financial regulation affects the structure of financial systems during both normal and crisis periods. We use an index for *Regulatory quality* that captures perceptions of the ability of the government to formulate and implement sound policies and regulations that promote private sector development. The index ranges from zero to 100.

3.2 Descriptive statistics

In Table 1, we present the descriptive statistics, which show a noticeable variation in the capital market measures across countries. The variable *Corporate bond market capitalization* exhibits high cross-sectional variability, ranging from 0.00 to 74.53% with a mean of 17.55%. The results indicate that there are significant differences in the development of the corporate bond market across countries. As expected, the alternative variable *Corporate bond issue*, which shows the amount of capital raised, exhibits lower variation, ranging from 0.00 to 28.15% with a mean of 5.80%. A closer analysis of the corporate bond issuance shows that the market is dominated by the issuance of bonds by financial intermediaries. The variable *Corporate bond issuance of financial sector* ranges from 0.004% to 22.97% with a mean of 6.01%, whereas the variable *Corporate bond issuance of non-financial companies* from 0.007% to 8.833% with a mean of 2.29%. The independent variables also exhibit high cross-sectional variation confirming different economic, financial and institutional framework among the countries in our sample.

[Table 1]

Table 2 presents a matrix of the pairwise correlation between the explanatory variables. We examined the correlation between the dependent variables and the control

variables but do not report the results for brevity. The results of the descriptive statistics are consistent with the existing literature showing that more developed countries with higher institutional framework have a better developed financial system, including the corporate bond market. As expected, some of the proxies for a country's economic development are highly correlated. Similarly, the variables presenting the institutional framework in a country are highly correlated. Hence, in the regressions, we will use the variables separately.

[Table 2]

4 Methodology and results

4.1 Methodology

We follow Eichengreen and Luengnaruemitchai (2004) and estimate all equitation's using panel Generalized Least Squares (GLS) with corrections for heteroskedastic and penal-specific autocorrelation. Our regression takes the following form:

$$Corporate\ bond\ _{i,t} = \alpha_i + \beta_1 E + \beta_1 X_{i,t} + \varepsilon_{i,t},$$

where $Y_{i,t}$ is one of the variables presenting the development of the domestic private bond market. The variable $E_{i,t}$ denotes the set of proxy variables for country's economic condition, $X_{i,t}$ denotes a vector of conditioning information that controls for the financial system, banking sector and institutional factors, variable α_i is the year fixed effects, $\varepsilon_{i,t}$ is the error term, and *i* and *t* denote country and time period, respectively.

Random-effects estimates are more efficient than pooled ordinary least squares (OLS) estimates and assume that country effects are uncorrelated with regressors, whereas fixed-effects models allow country effects to be correlated with regressors. Therefore, we use both estimation methods to establish the determinants of the corporate bond market development. Although some of the variables of interest, such as determinants for institutional quality, change over time, they are characterized by variations that are not sizable enough to be significant. Fixed-effects estimation requires significant within-group variations in the independent variable to generate a consistent and efficient estimator (Wooldridge, 2002). Thus, the fixed-effects estimator is prone to yielding imprecise coefficients for variables representing institutional quality.

Moreover, fixed effects can aggravate the problem of multicollinearity (Baltagi, 2005). Therefore, we report primarily the results of the random-effects method[2]. In all of the regressions, the independent variables are jointly significant at levels below 1%. Thus, we do not comment further on these aspects.

4.2 Economic determinants

Table 3 presents the results of the random-effects estimations. In specifications (1) and (2), we regress the explanatory variable *Corporate bond capitalization to GDP* on the macroeconomic control variables. Based on the existing literature, we expect that the exogenous macroeconomic situation of the country determines the growth of the corporate bond market. In the next two columns, we present the results, and we repeat the estimation using as the dependent variable the total volume of *Corporate bond issues to GDP*. Once more, we repeat the regressions using as explanatory variables the total volume of *Bond issues of non-financial* and *Financial companies to GDP*.

The regression results provide evidence that better economic performance contributes to the development of the corporate bond market in terms of market size. We find that inflation enters negatively and is significant in almost all the specifications at at least the 5% level. Park (2016) suggests that low inflation may be connected with effective monetary policy, which encourages corporate bond issues. Similarly, we find that the proxies for a country's openness and economic development are positively related to the market size and the volume of issues of corporate bonds. The coefficients for both variables are positive and significant in all the specifications at the 1% level. Only in the specification where the dependent variable is the total volume of bond issues of financial institutions are the coefficients insignificant. One of the explanations for the results is that financial institutions have much easier access to international capital markets than non-financial companies. Hence, they can issue bonds in the international capital markets, when they have regulatory or demand problems in the domestic markets.

In line with Bhattacharyay (2013), we find only weak evidence that the size of the economy or exchange rate variability determines the development of the corporate bond

[2] For brevity, we do not report all the results for the fixed-effects estimations, but they are available upon request. The results based on fixed-effects estimators are similar to those obtained using the random-effects estimators.

market. The coefficient for GDP is positive and significant only in one of the regressions, where the dependent variable is the size of the corporate bond market. In addition, when the dependent variable is the volume of the issue of corporate bond by non-financial entities the coefficient is negative but significant in only one of the specifications.

The coefficient for the dummy variable *Financial crisis* is positive but insignificant in all the specifications. Hence, we do not find strong evidence that the bond market acted as a 'spare-tire' during the financial crisis of 2008 in Asia. In the region, however, the banks were not as strongly affected by the financial crisis as the US or European banks. Hence, the substitution effect between bank credit and issuing new bonds may not be strong, which could explain our results. We will, however, examine more closely the impact of the financial system and banking sector development on the corporate bond market in the next section.

On one hand, we find that most of the coefficients remain stable and do not change their sign across all the specifications. On the other hand, we find some variation across the results when the explained variables are the market size of the corporate bond market and the volume of debt issued by corporations. In addition, the results document that different factors determine the development of the issue of corporate bonds by financial institutions and non-financial corporations. In the last case, it is worth noting that the maturity of the corporate bonds may determine the volume of the issue by non-financial corporations. The coefficient for the variable maturity is negative but significant in only one of the specifications at the 10% level.

[Table 3]

4.3 Financial system and banking sector

Following Eichengreen and Luengnaruemitchai (2004) and Bhattacharyay (2013), we decided to include additional variables that may determine the development of the corporate bond market in Asia. Macroeconomic performance has been found to play a major role in shaping the development of corporate bond market across countries. Hence, in all the following specification, we control for the macroeconomic characteristics of the countries as in the baseline model in Table 3. In all the specifications, the coefficients for the economic variables remain mostly unchanged; however, we do not present them for brevity's sake in Tables 4 and 5.

In Panel A Table 5, we include into the regression variables to control for the country's financial system development. In line with the expectation, we find that stock market development is positively associated with corporate bond market development. The coefficient for market capitalization is positive but only significant in three of the eight specifications. The volatility of the market is negatively related to development of the bond market but the coefficient is insignificant in all the specification.

In all the specifications, we find that the coefficient for the variable *Public debt* is negative and highly significant. Hence, our results support the hypothesis that government debt may crowd out private debt. The results also indicate that the development of the corporate bond markets is strongly influenced by demand. The coefficient for the variable *Pension funds* is positively related to the market size and the issue of corporate bonds by non-financial companies.

In Panel B in Table 4, we employ variables controlling for the banking sector because bank loans can be a direct substitute for corporate bonds. In contrast to our expectation, we find that the size of domestic bank credit and bank concentration is positively related to the market size and the issue of corporate bonds. The coefficients for bank credit and concentration are significant in almost all the specifications at the 1% level. The results are in line with Eichengreen and Luengnaruemitchai (2004), who also report a positive relationship between the level of domestic credit, bank concentration and the size of the corporate bond market. Park (2016) argues that the positive coefficient for bank lending suggests an increase in demand for debt financing and hence is positive for local currency bond issuance. Hence, our results may indicate that financial institutions issue bonds to provide loans to non-financial institutions. Consequently, banks may directly compete and crowd out non-financial companies from the corporate bond market, while offering bank loans as a substitute at the same time. Indeed, we assume that mainly large banks can crowd out smaller companies, which would explain the highly significant coefficient for bank concentration in all the specifications. In addition, we find that low bank spreads are positively and significantly related to the market size and the volume of bonds issued by non-financial companies. We presume, however, in this situation, that low bank spreads indicate strong competition among financial intermediaries, which may be attributed to a developed financial system. In addition, the results show that the volume of bonds issued by non-financial companies is positively related to bank profitability, which

contradicts the substitution effect reported by Becker and Ivashina (2014). Moreover, in the same specification, the coefficient for the bank crisis dummy is negative but it remains insignificant in all the specifications. Consequently, we find only weak support for the substitution effect between bank loans and bonds of non-financial companies when banks are performing poorly.

[Table 4]

4.4 Institutional quality

La Porta, Lopez-De-Silanes, and Shleifer (2006) results suggest that countries' legal system determines the development of the stock market. Gu and Kowalewski (2016) showed that creditor rights and institutional quality determine the development of the corporate bond market relative to the equity market. In addition, Park (2016) finds that in Asia, in addition to economic development, countries with stronger institutions have larger domestic corporate bond markets in terms of share of GDP. Hence, in the following regression, we control for the institutional quality in the countries. We have decided to run separate regressions for the different aspects of the institutional quality because they are strongly correlated with each other.

In Panel A in Table 5, we employ a proxy for the level of protection of creditors and a dummy variable that takes a value of one if a public registry exists in a country and zero otherwise. In all the regressions, the coefficient for creditor right is positive and significant at the 1% level. The results are in line with Gu and Kowalewski (2016) and confirm the importance of the level of creditor rights in the development of the corporate market. In contrast, the coefficient for public registry is negative in almost all the specifications. Additionally, the coefficient is statistically significant in the regressions where the dependent variable is the total issuance of corporate bonds as well the issuance of bonds by financial institutions. The results contradict the findings of Djankov, Mcliesh, and Shleifer (2007), who report that the ratio of private credit to GDP rises following either improvements in creditor rights or the introduction of credit registries. One of the explanations for the results is the low variation of the variable because public registries are present in all the countries by the end of the sample period. Moreover, Gu and Kowalewski (2016) find that information sharing is important only in countries characterized by high investor protection. Consequently, our proxy may

indicate the development of corporate bonds in countries characterized by low quality institutions in the past.

In Panel B, we present the results, controlling for the quality of regulations. In line with the previous findings, we find that the coefficient is positive and statistical significant in all the specifications. The results indicate that the quality of regulations is especially important for the issuance of bonds by financial institutions. This finding may indicate that the quality of regulation is important for the development of not only corporate bonds but also financial institutions. This findings is consistent with Gu and Kowalewski (2016), who report that financial reforms improve the development of the corporate bond market.

In Panel C, we employ a variable that controls for contract enforcement. Djankov et al. (2008) documented the a low level of contract enforcement is correlated with underdeveloped debt markets. The results confirms that the inefficiency in contract enforcement discourage lending. In all the specifications, the coefficient for contract enforcement is negatively related to bond issuance and is statistically significant at the 1% level. In contrast we find that the coefficient of contract enforcement is positively and statistically related to the size of the corporate bond market. Hence, the results indicate that the choice of the dependent variable is important in understanding the development of the corporate bond market.

[Table 5]

5 What is driving the development of the corporate bond market?

Table 6 presents the results of a horse race between economic development, financial system development, banking sector and institutional quality. The results confirm the ambiguous impact of the economic variables on the corporate bond market. In the specifications for the size of the corporate bond market and issuance of bonds by non-financial companies, the coefficients for GDP are negative and significant in most of the specifications at at least the 5% level. We find also that the coefficient for GDP per capita is negative and statistically significant in the specification for the total issuance of corporate bonds and issuance by financial companies. In addition, we find that the coefficient for GDP per capita is positively and significantly related to the size of the corporate bond market. In contrast to the previous results, we find that the coefficient for the dummy variable financial crisis is significant and positive in almost

all the regressions. The coefficient is negative only in one of the specification where the dependent variable is the issuance of the bonds by financial institutions. The results are not surprising because the financial crisis first affected financial institutions and instruments issued by them. At the same time, however, the results indicate that the issuance of bonds by non-financial companies increased during the period of the financial crisis. The results document that different economic factors determine the size and the issuance of the corporate bonds, whereas differences also exist in the factors determining the issuance of the bonds by non-financial companies and financial companies.

The results confirm that the characteristics of the financial system play an important role in explaining the development of the corporate bond market. In all the specifications, the coefficient for public debt in the specifications is negative but insignificant in most of them. Hence, we find only weak evidence that public debt is crowding out corporate bonds. In contrast, the results show a strong and negative relationship between the development of the equity market and the corporate bond market. In all the specifications, the coefficient for market capitalization is negatively related to the development of the corporate bond market and significant in most of them. We may hence assume that the equity market is a substitute for the debt market, whereas we find that coefficient for market volatility is negative and statistically significant in almost all the regressions. Thus, the results indicate that for the development of the corporate bond market, it is important that the capital markets are well developed.

In addition, we find that the coefficient for domestic credit is positive and significant in almost all the specification at at least the 1% level. We do not find, however, evidence that domestic credit can be a substitute for corporate debt. Indeed, the coefficient for the profitability of the banks is positively and significantly related to the issuance of the bonds by non-financial entities. Moreover, we find that corporate bonds are more likely to be issued when the bank spreads are low. The coefficient for concentration is now negative and significant in the specification for the size and issuance of corporate bonds by financial institutions. Hence, the results indicate that there is a positive correlation between the banking sector health and development of the corporate bond market. This is also consistent with the fact that banks play a crucial role in organizing and providing services in the process of bond issuance, acting as dealers

and market makers (Eichengreen and Luengnaruemitchai 2004). Potential competition between those two financing sources, i.e. banking loans and corporate bonds, is covered in East Asia by interlinkages and complementarities that are present between traditional banking lending and corporate bonds.

In line with previous results the coefficients for *Creditor rights* are positive and significant in almost all the specifications. In addition, the coefficient for *Public registry* is again negative and significant for the specification of the issuance of total corporate bonds and by financial entities. In our opinion, this indirectly confirms the finding of Djankov, Mcliesh, and Shleifer (2007) who documents that legal creditor rights are quantitatively important determinants of private credit. We assume that in countries with high creditor rights banks are financing the loans issuing corporate bonds, which would explain the positive correlation between domestic credit and issuance of bonds. Our hypothesis is strengthened by the fact that the coefficient for creditor rights is positive, yet insignificant for the specifications issuance of bond by non-financial corporations. Indeed, we think that the increase of the issuance of the bonds by financial institutions may positively determine the development of the corporate bond market for non-financial institutions. It would explain the positive correlation between bank profitability, concentration and issuance of the bonds by non-financial companies.

A similar situation was observed in Japan, where financial liberalization aimed at the development of the government bond market induced the growth of the corporate bond market (Abiad and Mody, 2005). Consequently, we assume that the rapid development of the financial institutions induced the development of the non-financial corporate bonds market. This view is strengthened by the results presenting different determinants for the issuance of the bonds by financial and non-financial corporations. We have checked the robustness of our results in several ways. First, we replace the variables proxing for openness, inflation, stock market capitalization, public debt, bank concentration and creditor rights with alternative proxies. Second, we estimate the specifications using OLS and Tobit, whereas we find that the coefficients on the variables of interest do not change materially.

[Table 6]

6 Conclusions

In the aftermath of the Asian crisis of 1997/98, the role of the corporate bond market received increased attention. A common view was that the development of debt markets might mitigate the adverse impact of financial crises in the future. The reasoning is that corporate bond markets can provide an alternative source of financing if other financing channels, such as bank financing, dry up during a financial crisis. This view was shared by Asian policy makers, who promoted the development of private debt markets as part of the response to the Asian crisis of 1997. Since then, various initiatives have been undertaken, and the corporate bond market has grown dynamically in the Asian region. Nevertheless, the growth of the corporate bond market across the Asian countries has been mixed.

In this study, we try to shed some light on the drivers of the corporate bond market in ten Asian countries in recent years. We analyze different factors that are associated with the development of the corporate bond markets. We find that countries with better economic performance and stronger legal institutions have more developed corporate bond markets in terms of size and total issuance. Moreover, we find a positive association between bank credit growth and corporate bond markets issuance. Burger and Warnock (2006) argued that the necessary conditions for bond market development are very similar to those that foster development of the banking system. We argue further that increased bank credit growth may lead to an increase in the volume of bond issue by financial institutions, which results in larger corporate bond markets. However, we do not find evidence that bank loans may be a substitute for corporate bonds. Indeed, our results indicated that good performance by banks is positively related to the volume of issuance by non-financial corporations. Hence, our results indicate that the banking sector and corporate bond market for non-financial companies develop simultaneously. In contrast, we find that an increase of the government bond market has a negative impact on the market and issue size of the corporate bonds in Asia. Thus, the structure of the bond market may strongly be determined by the supply side. However, we also find that the demand side plays an important role in explaining the growth of the corporate bond market. Our results show a positive association between the assets of pension funds and the market and issue size of corporate bonds.

Lastly, some limitations of our study should be noted. In the study, we did not control for the quality of the companies issuing the bond and consequently the quality

of the bond market development. More importantly, we do not establish whether the bond market was an important 'spare tire' in Asia during the recent financial crisis. However, our results indicate a positive and significant relationship between the banking sector and corporate bond market. Thus, perhaps the structure of the financial system should be investigated on the merits of debt versus equity instead of bank-based vs. market-based financial system. This would mean, however, that the development of corporate bond market may not provide a sustainable 'spare tire' during a systematic bank crisis. Indeed, Levine et al. (2016) showed that in countries with stronger shareholder protection laws, firms increase the volume of equity issuances in response to systematic banking crises. Hence, his results show that equity markets may ameliorate the adverse effects of banking crises by providing alternative financing. Whether corporate bond markets will amplify the effects of a banking crisis remains an unanswered question, which we leave for further research.

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Appendix

Table A1 Definitions of the main variables

Variable	Definition	Source
Corporate bond capitalization	Corporate bond market capitalization to GDP	Asian Bonds Online
Corporate bond issuance	Total issuance of corporate bonds to GDP	Asian Bonds Online
Corporate bond issuance of financial institutions	Total issuance of corporate bonds by financial institutions to GDP	Own computations
Corporate bond issuance of non-financial institutions	Total issuance of corporate bonds by non- financial institutions to GDP	
GDP	Logarithm of gross national product (in billions US dollars)	World Bank
GDP per capita	Logarithm of gross national product per capita (US dollars)	
Openness	Export of goods and services to GDP	
Exchange rate	Standard deviation of the 12 monthly exchange rates over 1-year period	Own calculations based on Asia Regional Integration Center
Inflation	Annual growth rate of consumer price index	
Financial crisis	A dummy variable that equals 1 for the years 2008-20009 and 0 otherwise.	
Market cap	Total value of listed shares to GDP	
Market volatility	Average of the 360-day volatility of the national stock market index.	
Public debt	Total amount of domestic public debt securities (amount outstanding) issued in domestic markets as a share of GDP.	World Bank
Pension funds	Assets of pension funds to GDP. Any plan, fund, or scheme that provides retirement income.	
Bank credit	Private credit by deposit money banks to GDP.	
ROA	Commercial banks' pre-tax income to yearly averaged total	

	assets.	
Bank concentration	Ratio of the five largest banks' assets to total banking assets.	
Bank spread	Difference between the lending rate and deposit rate. The lending rate is the rate charged by banks on loans to the private sector, and the deposit interest rate is the rate offered by commercial banks on three-month deposits.	
Banking crisis	Dummy variable that equals 1 during a severe systematic banking crisis and zero otherwise.	
Creditors rights	Index aggregating creditor rights. The index ranges from 0 (weakest creditor rights) to 4 (strongest creditor rights)	Djankov, Mcliesh, and Shleifer (2007)
Public registry	Dummy variable that equals 1 if a public credit registry operates in the country and 0 otherwise.	
Regulatory	Index for regulatory quality that captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development, ranging from 0 to 100.	World Bank
Enforcement	Number of days to resolve a payment dispute through courts.	Djankov, Mcliesh, and Shleifer (2007)

Figure 1 **Amount of corporate bonds outstanding to GDP (in %)**

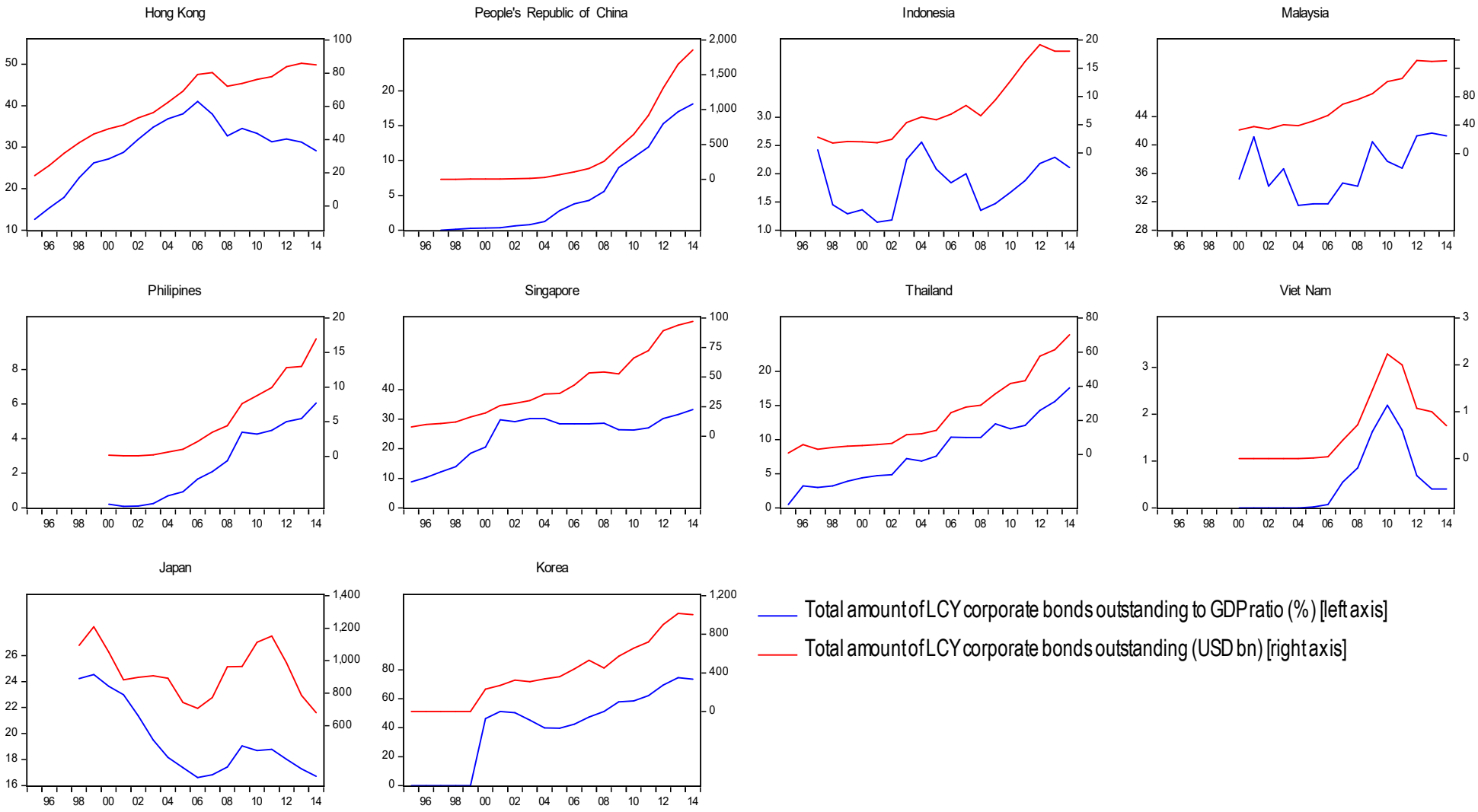

Figure 2 **Corporate bonds annual issuance volume to GDP (in %)**

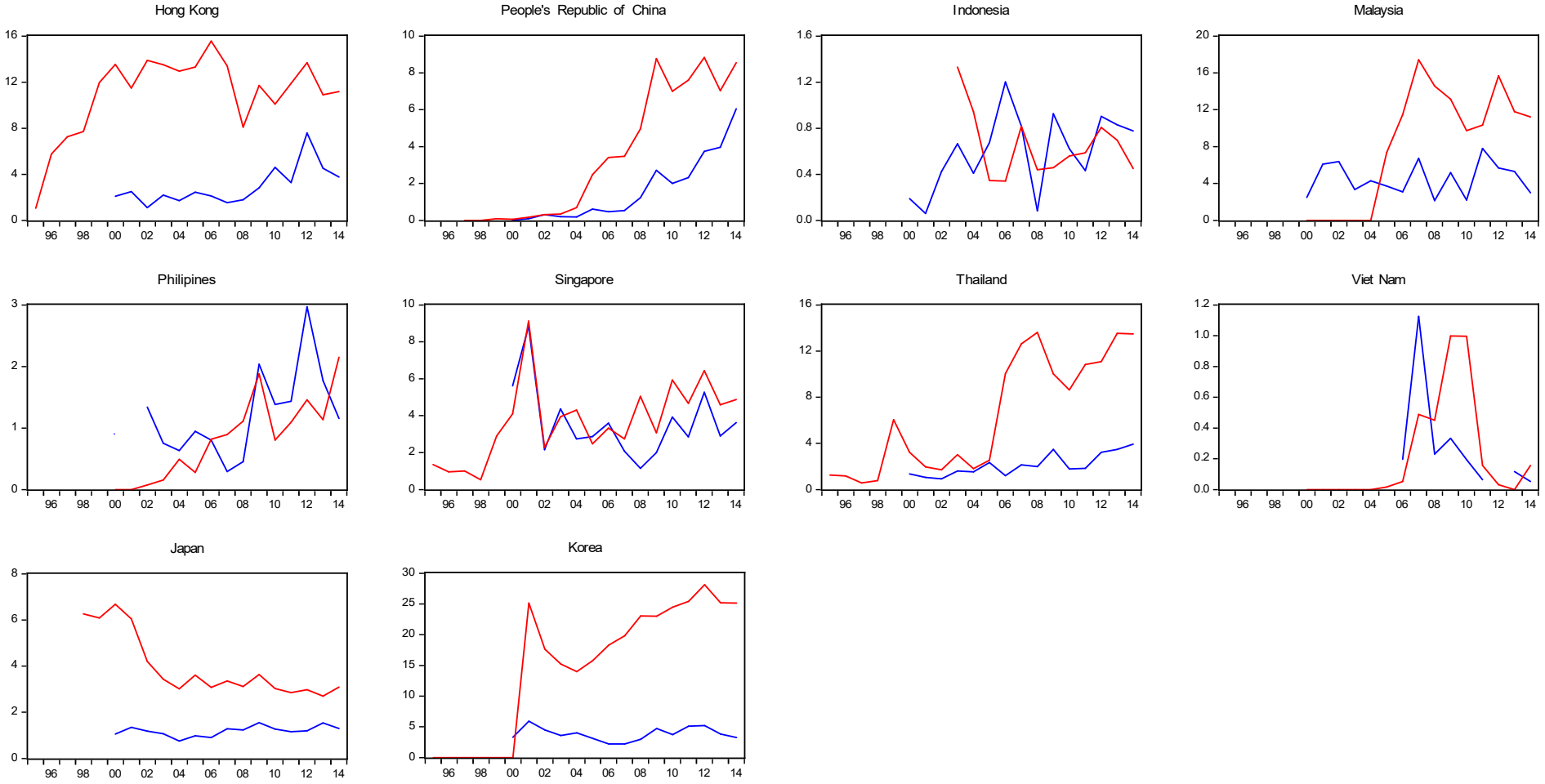

Figure 3 **Total issuance of corporate bonds in USD billions in the years 1995-2014**

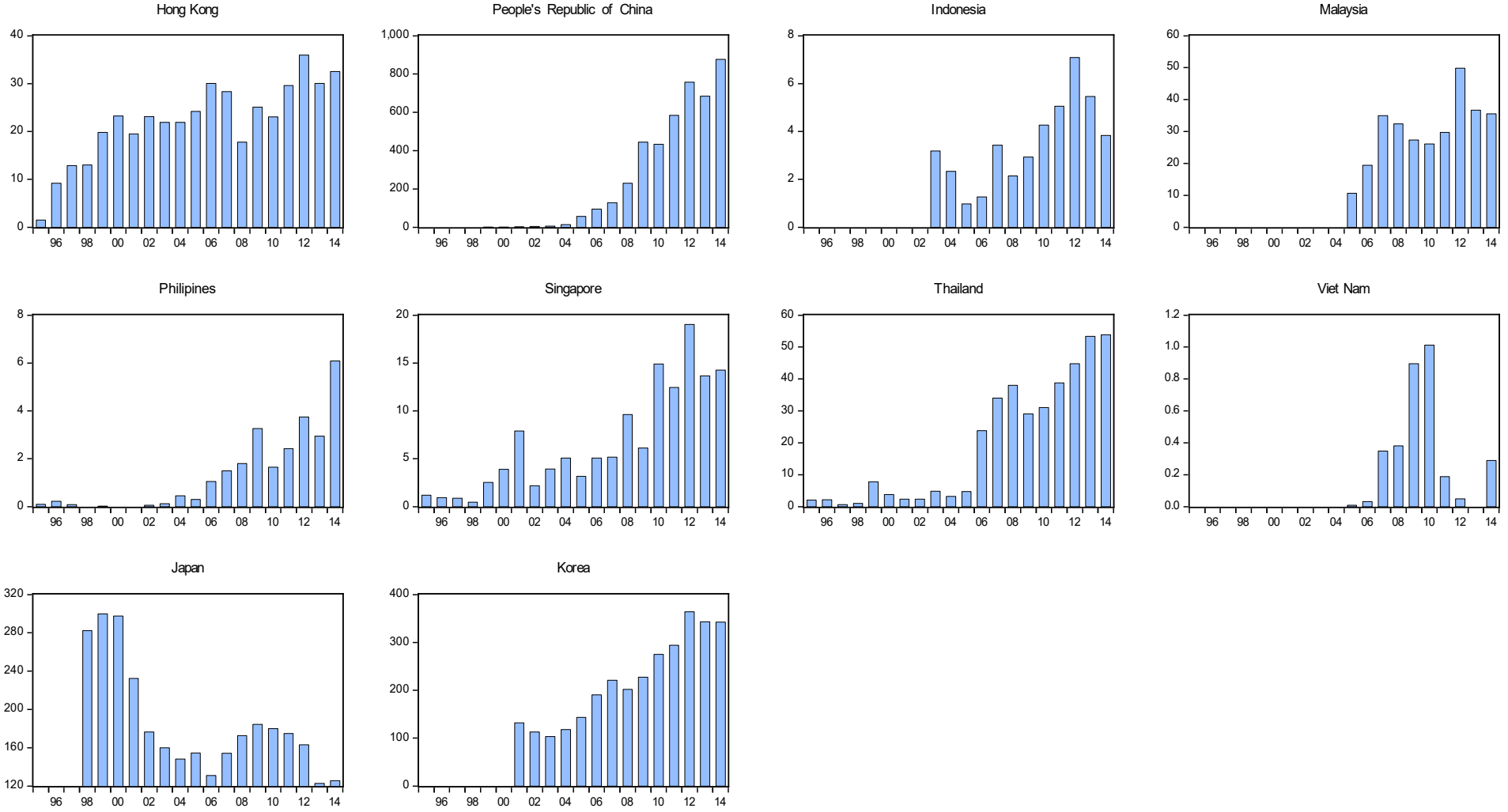

Table 1. **Descriptive statistics**

Variables	N	Mean	Std dev	Min	Max
Corporate bond cap.	178	17.55	17.31	0	74.53
Corporate bond issuance	172	5.802	6.644	0	28.15
Corporate bond issuance (financial sector)	108	6.01	5.986	0.004	22.97
Corporate bond issuance (non-financial sector)	142	2.29	1.838	0.007	8.833
Maturity	142	6.756	1.987	2.727	13.17
GDP	200	26.54	1.434	23.77	29.93
GDP per capita	200	19,155	17,584	1,489	83,689
Openness	200	75.1	62.75	9.053	230.3
Exchange rate	190	0.0275	0.0378	0	0.252
Inflation	199	3.851	5.437	-4.023	58.39
Financial crisis	200	0.1	0.301	0	1
Market Cap	191	132.5	205.5	0.409	1,086
Market volatility	187	23.68	9.412	7.772	68.02
Public debt	175	34.61	38.42	0.429	190.8
Pension funds	119	21.2	20.62	0.305	61.94
Bank credit	200	96.96	46.71	18.16	233.4
Bank concentration	184	64.4	20.6	31.76	100
ROA	190	0.783	2.214	-16.44	6.493
Interest rate spread	197	3.477	1.47	0.167	7.681
Banking crisis	170	0.153	0.361	0	1
Creditors rights	200	2.325	0.918	1	4
Public registry	200	0.5	0.501	0	1
Regulatory Quality	160	0.522	0.869	-0.781	2.247
Enforcement	200	304.4	150.1	69	570

Table 2. **Pairwise correlation of explanatory variables**

	GDP	GpC	O	ER	CPI	FC	MC	MV	PD	PF	BC	ROA	BC	BS	BC	CR	PR	R
GDP	1																	
GDP per capita	0.14	1																
Openness	-0.44	0.71	1															
Exchange rate	0.02	-0.11	-0.23	1														
Inflation	-0.23	-0.29	-0.12	0.36	1													
Financial crisis	0.08	0.06	0.03	0.11	0.05	1												
Market cap	-0.16	0.56	0.70	-0.23	-0.14	0.04	1											
Market volatility	-0.03	-0.23	-0.14	0.11	0.23	0.29	-0.08	1										
Public debt	0.50	0.30	-0.23	-0.01	-0.25	0.06	-0.08	-0.16	1									
Pension funds	-0.31	0.52	0.61	-0.19	-0.35	0.01	0.30	-0.35	0.19	1								
Bank credit	0.32	0.49	0.39	-0.13	-0.31	-0.02	0.52	-0.02	0.08	0.29	1							
ROA	0.03	0.07	0.11	-0.43	-0.29	0.06	0.10	-0.38	-0.03	-0.03	-0.13	1						
Bank concentration	-0.30	0.29	0.45	-0.15	-0.17	-0.06	0.17	-0.12	-0.29	0.41	0.07	0.01	1					
Bank spread	-0.49	0.03	0.40	-0.13	0.05	0.04	0.29	-0.05	-0.44	-0.03	-0.24	0.24	0.13	1				
Banking crisis	-0.05	-0.20	-0.20	0.57	0.19	-0.16	-0.17	0.27	-0.01	-0.07	0.01	-0.50	-0.11	-0.07	1			
Creditors rights	0.03	0.61	0.62	-0.05	-0.21	-0.01	0.62	-0.03	-0.22	0.51	0.63	-0.05	0.28	-0.06	-0.15	1		
Public registry	0.29	-0.38	-0.45	0.02	0.15	0.00	-0.32	-0.04	0.32	0.14	-0.15	0.05	-0.28	-0.21	0.07	-0.34	1	
Regulations	0.03	0.88	0.72	-0.13	-0.35	-0.01	0.63	-0.13	0.23	0.60	0.59	-0.07	0.31	-0.02	-0.09	0.78	-0.52	1
Enforcement	-0.05	-0.60	-0.54	0.22	0.33	0.00	-0.29	-0.02	0.18	-0.33	-0.47	-0.07	-0.55	0.18	0.23	-0.57	-0.65	0.53

Table 3. **Corporate bond market and economic development**

This table presents coefficients from country GLS regressions of corporate bond capitalization and issue to GDP on economic control variables. Year dummies and constants are not shown to save space. Variables definitions are in Appendix in Table A1. Full results are available from the authors upon request.

	Corporate bond		issuance					
	market capitalization		Total		non-financial		financial	
GDP	0.716	4.510***	0.185	0.797	-0.351***	-0.121	-0.560	-0.647
	(0.814)	(1.044)	(0.380)	(0.486)	(0.109)	(0.142)	(0.475)	(0.681)
GDP per capita	0.001***		0.000***		0.000***		-0.000	
	(0.000)		(0.000)		(0.000)		(0.000)	
Exchange rate	12.338	77.695**	8.452	20.915	-7.218	-1.136	30.235	27.380
	(36.402)	(39.147)	(18.578)	(19.241)	(6.634)	(6.986)	(31.343)	(34.716)
Inflation	-0.297	-0.503**	-0.447**	-0.464**	-0.128**	-0.133***	-0.463**	-0.474**
	(0.229)	(0.237)	(0.183)	(0.182)	(0.050)	(0.049)	(0.228)	(0.231)
Openness		0.157***		0.025***		0.009***		-0.003
		(0.021)		(0.010)		(0.003)		(0.014)
Financial crisis	11.515	11.422	4.600	4.559	0.851	0.929	0.333	0.339
	(7.715)	(8.131)	(3.471)	(3.475)	(0.688)	(0.683)	(3.067)	(3.066)
Maturity					-0.107	-0.136*		
					(0.072)	(0.070)		
Number Observations	168	168	162	162	132	132	99	99

Note: Standard errors are presented in parentheses, and ***, **, and * denote statistical significance at 1%, 5% and 10%, respectively.

Table 4. **Corporate bond market and financial system development**

This table presents coefficients from country GLS regressions of corporate bond capitalization and issue to GDP on financial system (Panel A) and banking sector (Panel B) control variables. All of the regressions include all variables as specified in Table 4. Year dummies and constants are not shown to save space. Variables definitions are in Appendix in Table A1. Full results are available from the authors upon request.

	Corporate bond				issuance			
	market capitalization		Total		non-financial		financial	
Panel A: Financial system								
Market cap.	0.009	0.025***	0.003	0.011***	-0.001	0.000	0.004	0.010***
	(0.008)	(0.009)	(0.003)	(0.004)	(0.001)	(0.001)	(0.003)	(0.004)
Market volatility	-0.195	-0.290	0.085	-0.128	-0.051	0.023	0.131	-0.133
	(0.217)	(0.388)	(0.095)	(0.159)	(0.031)	(0.037)	(0.119)	(0.155)
Public debt	-0.075**	-0.219***	-0.075***	-0.119***	-0.007*	-0.023***	-0.089***	-0.103***
	(0.038)	(0.047)	(0.016)	(0.019)	(0.004)	(0.004)	(0.018)	(0.019)
Pension funds		0.380***		0.025		0.068***		-0.018
		(0.122)		(0.049)		(0.012)		(0.050)
Observations	147	108	141	107	123	105	93	84
Panel B: Banking sector								
Bank credit	0.158***	0.141***	0.080***	0.097***	0.011**	0.011*	0.107***	0.146***
	(0.023)	(0.028)	(0.011)	(0.013)	(0.005)	(0.006)	(0.025)	(0.026)
ROA	0.606	0.514	0.296	0.420	0.516**	0.494**	0.562	0.582
	(0.448)	(0.477)	(0.265)	(0.264)	(0.238)	(0.239)	(0.883)	(0.826)
Bank concentration	0.131***	0.136***	0.057***	0.074***	0.020***	0.020***	0.045*	0.065***
	(0.045)	(0.049)	(0.021)	(0.021)	(0.007)	(0.007)	(0.025)	(0.024)
Bank spread	-2.560***	-3.178***	-0.128	0.160	-0.341***	-0.358***	-0.278	0.502
	(0.651)	(0.733)	(0.302)	(0.316)	(0.113)	(0.128)	(0.427)	(0.456)
Bank crisis	-2.024	-2.228	0.485	0.283	-1.255*	-1.264*	0.516	0.266

	(4.054)	(4.303)	(1.968)	(1.923)	(0.758)	(0.763)	(3.080)	(2.884)
Observations	137	137	132	132	108	108	80	80

Note: Standard errors are presented in parentheses, and ***, **, and * denote statistical significance at 1%, 5% and 10%, respectively.

Table 5. **Corporate bond market and institutional development**

This table presents coefficients from country GLS regressions of corporate bond capitalization and issue to GDP on variables proxing for creditor rights (Panel A), regulatory quality (Panel B), and enforcement (Panel C). All of the regressions include all variables as specified in Table 4. Year dummies and constants are not shown to save space. Variables definitions are in Appendix in Table A1. Full results are available from the authors upon request.

	Corporate bond		issuance					
	market capitalization		total		non-financial		financial	
Panel A Creditor rights								
Creditor rights	11.900***	15.016***	4.720***	5.791***	1.022***	1.173***	6.134***	7.492***
	(1.228)	(5.474)	(0.528)	(0.574)	(0.186)	(0.210)	(0.656)	(0.636)
Public registry	-2.822	-4.176	-4.818***	-4.496***	0.052	0.008	-6.030***	-5.626***
	(2.010)	(7.489)	(0.883)	(0.827)	(0.323)	(0.318)	(1.002)	(0.878)
Observations	168	168	162	162	132	132	99	99
Panel B Regulatory quality								
Regulations	15.942***	17.908***	7.118***	4.700***	1.051**	0.651*	8.140***	3.882***
	(3.112)	(2.640)	(1.467)	(1.258)	(0.452)	(0.341)	(1.860)	(1.433)
Observations	141	141	138	138	124	124	93	93
Panel C Enforcement								
Enforcement	8.140***	3.882***	-0.024***	-0.024***	-0.006***	-0.006***	-0.030***	-0.030***
	(1.860)	(1.433)	(0.004)	(0.004)	(0.001)	(0.001)	(0.004)	(0.004)
Observations	168	168	162	162	132	132	99	99

Note: Standard errors are presented in parentheses, and ***, **, and * denote statistically significance at 1%, 5% and 10%, respectively.

Table 6. **Determinants of the corporate bond market**

This table presents coefficients from country GLS regressions of corporate bond capitalization and issue to GDP on economic, financial and institutional control variables. The regressions control for year effects, which are not reported to save space.

	Corporate bond				issuance			
	market capitalization		total		non-financial		financial	
GDP	-2.483**	-1.375	1.374***	0.014	-0.828***	-0.671***	2.684***	0.777
	(1.116)	(2.428)	(0.497)	(0.441)	(0.193)	(0.178)	(0.588)	(0.516)
GDP per capita	0.000***		-0.000***		0.000		-0.000***	
	(0.000)		(0.000)		(0.000)		(0.000)	
Exchange rate	-28.453	-38.852	-13.412	-20.432	-4.228	-3.766	26.138	20.394
	(30.201)	(46.459)	(16.312)	(15.429)	(7.806)	(7.807)	(35.843)	(34.385)
Inflation	0.458	0.655	0.139	-0.071	0.050	0.068	0.474	0.107
	(0.345)	(0.565)	(0.190)	(0.178)	(0.069)	(0.066)	(0.300)	(0.268)
Openness		-0.009		-0.070***		0.006		-0.075***
		(0.038)		(0.013)		(0.004)		(0.013)
Financial crisis	43.319***	48.878***	21.376***	20.885***	1.344**	1.362**	-58.494***	7.198***
	(6.964)	(13.644)	(3.225)	(2.966)	(0.550)	(0.549)	(14.974)	(2.415)
Maturity					0.000	-0.003		
					(0.064)	(0.064)		
Market cap.	-0.016***	-0.014	-0.008***	-0.004*	-0.003***	-0.003***	-0.008***	-0.005*
	(0.005)	(0.011)	(0.002)	(0.002)	(0.001)	(0.001)	(0.003)	(0.003)
Market volatility	-0.334*	-0.520	-0.263***	-0.270***	0.006	0.002	-0.409***	-0.338***
	(0.175)	(0.319)	(0.078)	(0.071)	(0.032)	(0.031)	(0.094)	(0.083)
Public debt	-0.031	0.037	-0.009	-0.018	0.001	0.003	-0.012	-0.029**
	(0.035)	(0.065)	(0.016)	(0.012)	(0.006)	(0.005)	(0.018)	(0.015)
Bank credit	0.110***	0.104*	0.058***	0.071***	0.023***	0.021***	0.021	0.056**

	(0.031)	(0.061)	(0.014)	(0.013)	(0.006)	(0.006)	(0.023)	(0.023)
ROA	0.456	0.441	0.195	0.224	0.560**	0.553**	-0.589	-0.472
	(0.473)	(0.508)	(0.254)	(0.239)	(0.218)	(0.218)	(0.637)	(0.610)
Bank concentration	-0.071*	-0.015	-0.026	0.000	0.008	0.006	-0.065***	-0.044**
	(0.043)	(0.070)	(0.019)	(0.019)	(0.006)	(0.007)	(0.021)	(0.021)
Bank spread	-5.044***	-3.874***	-0.723**	-0.140	-0.481***	-0.516***	-0.536	0.162
	(0.772)	(1.378)	(0.356)	(0.361)	(0.126)	(0.134)	(0.418)	(0.452)
Creditor rights	10.352***	13.331***	4.950***	5.273***	0.297	0.344	7.918***	7.289***
	(1.795)	(3.976)	(0.795)	(0.702)	(0.303)	(0.273)	(1.011)	(0.901)
Public registry	-2.339	-6.322	-7.512***	-6.965***	0.320	0.178	-8.625***	-6.732***
	(2.466)	(4.866)	(1.131)	(0.918)	(0.468)	(0.401)	(1.369)	(1.094)
Observations	137	137	132	132	118	118	88	88

Note: Standard errors are presented in parentheses, and ***, **, and * denote statistical significance at 1%, 5% and 10%, respectively.