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"The Theory and Empirics of Financial Development, Integration and Regionalism in the East Asian Bond Markets"

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1. Introduction

For the financial development of the East Asian region the Asian financial crisis in 1997 has been a decisive turning point. The crisis sparked discussions about crony capitalism, governance, over-reliance on the banking system and the impact of short-term capital inflows. It also highlighted the positive impacts of local bond markets on financial stability and overall economic development. Bond markets perform a number of very diverse roles in the financial system. Governments and cooperations use them as a form of finance, monetary authorities rely on bonds to perform open market operations and control the liquidity of the financial system, and investors can gain valuable information on market expectations through the bond markets.

Except for Japan, the region's bond markets were virtually non-existent prior to 1997. Instead, the region was solely relying on bank debt and equity for finance. The crisis exposed the missing channel of a developed bond market and revealed that this dependence led to vulnerabilities in the region's financial system. The debate among the regional elite that followed the crisis kick-started the rapid development in the East Asian debt markets that followed.

Financially and economically, East Asia is still a very heterogeneous region. From a bond market's point of view two things constitute the East Asian region: (1) the common Asian financial crisis in 1997 and (2) the financial cooperation emerging from this crisis. While this cooperation persists and development converges, the region still remains diverse with many different institutions, levels of development and distinctive financial histories. A first glance at the region's debt markets shows that all countries went through a rapid phase of development during the last decade. Markets developed both quantitatively and qualitatively. Despite the fast pace of bond market development differences remain in many aspects.

1.1. Research Question

This thesis dissects the current state of development and integration in the East Asian debt markets and identifies major determinants that led to the rapid development and explain remaining differences in the level of development. The questions answered are:

- What are the potentials of developing and integrating domestic bond markets?
- What is the state of development and integration in the East Asian bond markets (government and corporate)?
- What are the determinants of bond market growth in East Asia? How can the uneven speed and progress in the regional development of the East Asian bond markets be explained?

1.2. Outline

The following chapter (2) gives an overview of the theory of bond market development, concepts used, as well as the methods applied in this thesis. The region's state of the market will be assessed both quantitatively and qualitatively. In quantity, the size and liquidity of the debt market will be used to compare the markets. In terms of quality, it is evaluated what role bond markets are performing in an economy and which potential benefits arise out of the market development. Given the experience of the Asian financial crisis, a special focus on the aspects of financial stability is employed. Finally, the chapter gives an overview of the most important empirical determinants of bond market development in East Asia.

Chapter 3 uses the established concepts of size and liquidity to examine the current state of the East Asian government- and corporate bond market. The respective markets are analyzed regarding to what extent they are integrated and play a beneficial role in the economy, based on the theory of bond market development reviewed in chapter 2. Throughout this chapter three major observations are formulated as hypotheses of bond market determinants, that will be tested statistically in the next chapter.

Chapter 4 uses an empirical cross-sectional model to evaluate the most important determinants of bond market growth in East Asia. The model is based on the work of Bhattacharyay (2011) and Eichengreen and Luengnaruemitchai (2006) and will be used

to test the three hypotheses stated in chapter 3 in addition to the factors already found in academic literature.

Chapter 5 summarizes the major findings, briefly answers the stated research questions and draws conclusions from the findings.

2. Theory and Method

This chapter will introduce the most important concepts used in this thesis. Size and liquidity are quantitative indicators and will be described after a quick introduction into bonds and the difference between government- and corporate bonds. The following section will give an overview of the qualitative roles the bond markets are playing in an economy and how they can benefit economic growth. The subsequent sections examine the academic literature on which endogenous factors of an economy determine the development of corporate- and government bond markets and the methodology used to test a subset of these determinants empirically for the East Asian bond markets.

The selection of countries dealt with in this thesis is based on the markets targeted by the two regional initiatives to foster bond market development: the Asian Bond Funds and the Asian Bond Market Initiative[1]. The Asian Bond Market Initiative targets the ASEAN+3 bond markets, whereas the Asian Bond Funds target the bond markets of China, Hong Kong, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. By this the bond markets of China, Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Thailand and Vietnam will be dealt with, although the discussion is limited by data availability in some cases.

2.1. Bond Markets

Essentially, bonds are a form of loan that is trade-able. Brown describes bonds as:

> In general terms, a bond is a loan by one party (the investor or holder) to another party (the issuer). The issuer gives the investor a guarantee that he or she will pay interest on the loan at regular intervals and repay the loan at a specified time in the future. In addition, the issuer may retain or grant embedded options that he or she or the investor can exercise in the future. Brown (2006, 1)

[1] For more on these initiatives see chapter 3.3.3.

The interest payed on a bond is called coupon, while the loan that is going to be paid back at the end of a certain period (at maturity) is called principal or redemption value. There are numerous types of bonds that have different and distinctive features, some are very simple, some are complex . For example, rates to calculate the coupon may be fixed or linked to an external measure (like the LIBOR). A zero-coupon bond pays no coupons at all and instead has a price lower than the principal. The maturity of a bond may vary vastly as well. Some bonds are issued for periods of 30-years, some may only last under a year. Some bonds may also include an option for the issuer or holder of a bond, such as the option to convert the bonds into another instruments like shares. Bonds also have different kinds of guarantees. Some bonds are completely guaranteed by another company, some are backed by assets ("asset-backed-securities"), while others may not be backed by anything else than the company that issued them (Brown 2006).

A major feature of bonds is that they are tradable. When issued, bonds are traded in the primary market. The market for bonds that have already been issued is called secondary market. In contrast to stocks, bonds are mostly traded "over-the-counter" (OTC) in a network of dealers and market makers (primarily banks), instead of a centralized exchange. For the East Asian region the Korea Exchange (KRX) is an example of a centralized exchange. It provides a platform for trading Korean treasury-bonds. Government issued bonds usually have a higher potential of being trade in an exchange, as they usually have high liquidity and are widely used in the financial system, since they are often regarded as very safe investments.

Because government bonds play a different, more special role than corporate issued bonds in the economy, both markets will mostly be dealt with separately throughout this thesis. The distinction between government and corporate bonds is based upon the primary data source, AsianBondsOnline, that defines both markets as:

> Government bonds include obligations of the central government, local governments, the central bank, and state-owned entities. Corporates comprise both public and private companies including financial institutions and international organizations. Financial institutions comprise both private and public sector banks and other financial institutions. AsianBondsOnline (2012b)

2.1.1. Size and Liquidity

The two major quantitative variables used to analyze the bond markets in the region are liquidity and size of the respective markets.

2.1.1.1. Size

To measure the absolute size of bond markets the total nominal amount of bonds outstanding will be used. It can be misleading to solely focus on the absolute growth of bond market capitalization as the size of the overall economy differ substantially among countries in the East Asian region. In most cases the ratio of the total nominal amount outstanding to GDP is used instead of absolute volumes of bonds outstanding.

Still, the absolute size of bond markets may not be completely irrelevant. Eichengreen and Luengnaruemitchai (2006, 44) advance the thesis that "[s]mall countries presumably find it more difficult to develop bond markets insofar as liquid securities markets have a certain minimum efficient scale". By this, large economies may consequently have more efficient markets at a lower size to GDP ratio, as smaller economies, because they reach the effective scale more easily. This proposition will be tested empirically in chapter 4.

2.1.1.2. Liquidity

A market's liquidity is an important indicator of its efficiency. In general asset liquidity is an elusive concept and different aspects are mentioned and highlighted in academic literature. Baker (1996)[2] identifies three major properties of asset liquidity in a market: (1) market depth, indicating that there are orders above and below the actually traded price of an asset; (2) market breadth, that requires large amounts of both buying and selling orders; and (3) market resilience, indicating that price changes are followed by numerous orders quickly after the change. Additionally Sarr and Lybek (2002, 5) see two more properties of liquid markets: (4) tightness, indicating small transaction costs, such as a small spread between buy and sell prices; and (5) immediacy, representing the speed with which trades are able to be settled.

The essence of a liquid market is the possibility of investors to sell their assets immediately without adversely effecting the price of the asset. Liquidity is thus an essential attribute of a functioning efficient market. Insufficient liquidity increases the transaction costs within the market as investors have to charge a liquidity-premium for illiquid assets

[2]Cited in (Alexandros et al. 2011, 4).

and are thus increasing the yield for borrowers. Infrequently traded securities also lack content of information that is necessary to make optimal decisions, for both investors and borrowers. An increase in liquidity and a concurrent decrease of the transaction costs can thus provide more efficient information and increase the economic viability of productive projects and thereby spur economic growth (Spratt 2009, 52).

As liquidity has many facets, there are several ways of measuring financial market liquidity. Sarr and Lybek (2002) see four different types of measurements: (1) transaction costs based indicators; (2) volume-based indicators; (3) price-based indicators that resorts to the frequency of new, price-based information influencing the market; and (4) market-impact indicators that try to extract movements due to new information. Each of these indicators is focusing on specific aspects of market liquidity, they all show a certain part of the picture, but not all of it. Despite the numerous ways of measuring liquidity, the availability of data is often a constraining factor, especially in developing markets.

This thesis will only resort to two of the most basic measurements of liquidity, a volume-based and a transaction cost indicator. Transaction costs are most easily measured using the spread between the seller's ask and the buyer's bid-price *(the bid-ask-spread)*. The higher the spread the higher the transaction costs and the more illiquid is a financial market. The benefit of this indicator is that it encompasses all costs that investors face in a trade, the costs of illiquidity, of settlement, taxes and other implicit costs. It is also very easy to observe and data is usually widely available. The downside is that many different factors influence the transaction costs and the indicator consequently can only give a very general picture of liquidity in the market (Sarr and Lybek 2002, 9-10).

The second indicator used, the *turnover-ratio*, is volume-based. It is calculated by dividing the trade-volume (V) within a given period by the total value of securities outstanding (the product of average traded price (P) and the stock outstanding (S)): $Tn = V/P*S$. This indicator is useful in measuring the breadth of the market (numerous and large amounts of orders). A broad market gives investors more resilient and reliable information as it takes large amounts to move the market and markets are thereby not as easily distorted by individual orders. In markets where price, volume and total stock data are easy to obtain (it is for example hard to obtain the stock of the money-market) this is an easily usable measurement of liquidity. The downside of this indicator is that it does not take into account whether large orders influence the asset price (Sarr and

Lybek 2002, 11-13).

The size of a market is also affecting liquidity. For example a larger outstanding stock of government bonds decreases the transaction costs within the market through the money- and futures market. But the sheer size of the market is not the only factor determining liquidity. Structural and institutional factors, such as taxes, clearing- and settlement practices and the outstanding amount of benchmark securities as well as the investor base, the type of investors and whether investors are diverse or trade actively also play a role (McCauley and Remolona 2000, 54).

The major part of the local bond market investor base usually consists of either local banks, mutual funds, pension funds or non-resident investors. In many emerging markets, local banks are the most important participant in the bond markets. In 2005, 42 % of total emerging bonds were held by local banks. Pension funds are predominantly long-term oriented risk-averse funds that are able to provide substantial liquidity, especially in the primary market. Pension funds are largely underdeveloped in emerging markets and are building up their portfolios, thus providing only little liquidity in the secondary market. Mutual funds are similarly underdeveloped in emerging markets but can provide liquidity in the secondary market as they actively trade a large part of their securities. Non-resident investors may also bring liquidity to both the primary and the secondary market, as they tend to have a more diverse portfolio and thus may keep securities even during shocks. Foreign investors are specially attracted by the possibility to hedge against risks by the use of financial derivatives. But foreign participation is sometimes also associated with higher volatility and sudden capital flow reversals. As different investor classes have different preferences, a diverse investor base provides continuous liquidity and may also play an important factor in the transmission of financial shocks in a market. When investors are not very diverse in their preferences and their portfolios not diversified or increasingly leveraged, markets may become less resilient and quickly illiquid during rapid down movements (Turner 2008).

2.2. The Potentials of Bond Market Development

As bond markets are a market-based form of finance, they are regarded to be in certain aspects superior to non-market-based forms of finance. They also diversify the financial system of a country and by this may promote stability and resilience to external shocks.

After shortly introducing concepts of financial instability, the following section sheds

light on the potential benefits on economic growth that result from the development of a bond market, as well as the risks of financial instability. The first subsection will deal with the government bond market, the second with the corporate bond market and the third section will review the potentials of financial integration in the bond markets.

Financial Instability

While the consensus of academic literature sees financial development as beneficial for eonomic growth, there is also a large number of literature that suggests that financial development is a two-edged sword that can come with severe costs aside its positive effects on economic growth (Fink et al. 2003). The development of, and dependence on financial markets gives rise to new forms of economic instability, that are absent in a strictly regulated economy. This financial instability may induce financial crises that can cause severe economic downturns and considerably dampen economic growth. The Asian financial crisis (AFC) is the best example at hand: substantial gains preceded the crisis, but the crisis itself also induced immense costs. Chen and Ravallion (2001) calculated that the AFC increased the number of poor in the region by 22 million. In the context of East Asia it cannot be stressed enough that since the AFC there has been a decisive focus on financial stability in academia and among the elites in East Asia in order to prevent another severe financial crisis. As will be shown, the very effort to establish bond markets in the region stems from the experiences of the financial crisis and the believe that bond markets can increase financial stability and possibly prevent future crises in the region.

Financial instability can originate from several different sources. Eichengreen (2004) identifies four different causes that can lead to financial crises:

- *Unsustainable Macroeconomic Policies*, often caused by weaknesses in the policy making process, can have destabilizing effects on the financial system. Examples are public debt financed by central banks or expansionary fiscal policy that makes a currency peg unsustainable.

- *Fragile Financial Systems* can be rooted in the balance sheets of the domestic actors. Examples of such balance sheet vulnerabilities are a mismatch in currency or maturity.

- *Institutional Weakness* is caused by a lack of accountability and prudential regulation that can lead to problems of moral hazard and adverse selection in financial

markets.

- *Flaws in the Structure of International Financial Markets* lie outside of the domestic markets and can not be influenced directly by the respective actors. Examples are high mobility of capital that can lead to sudden reversals of capital flows or speculators that can exaggerate small vulnerabilities.

When assessing and analyzing the potential benefits of bond market development the possible effects on financial stability will be taken into account.

2.2.1. Government Bond Market

In contrast to firms that have to take both the state of the market and market-regulation as given, governments have multiple roles in the bond market. On the one hand they are regulating the bond markets by providing a regulatory framework and the legislative enforcement of it. They also may play an indirect role in the general financial system and the bond market in particular, through the central bank and public- and other government related institutions. But on the other hand the government is also an active participant in the financial system by borrowing from the financial system and particularly through the government bond market (Spratt 2009, 3). At first this section will take a look why the government bond market, as a market-based form of government finance, has the least disruptive effects on the economy. Then it will deal with potential spill-over effects on the economy, most notably the effects of a yield curve. And thirdly the problem of "original sin" and excessive government debt as a source of financial instability.

2.2.1.1. Versatility of the Government Bond Debt

The government debt market is not the only way for a government to acquire funds. In the path of financial development, market-based borrowing, from an established government bond market at market-determined rates, is the last stage of development. Fry (1997) identifies four different ways for a government to finance its debt:

- by directly borrowing from the central bank and thus monetizing its debt. This kind of lending is associated with inducing inflation.

- by borrowing below market rates through forcing national actors to hold more government securities than they would voluntarily hold and thus reducing inter-

est rates and distorting markets; this kind of government involvement is labeled financial repression and -restriction.

- by borrowing in a foreign currency; this usually creates additional costs by exposing the government to exchange rate risks. Governments are usually only able to borrow in the medium and short term through this option. This can create a vicious circle in which most emerging economies are not able to borrow in their own currency abroad. This phenomenon is called "original sin" and will be dealt with more closely in section 2.2.1.3.2. Furthermore, borrowing in a foreign currency is associated with inducing upward pressure on the domestic currency which can have negative effects on inflation or exports.

- The last possibility to finance government debt is by borrowing directly through capital markets at undistorted market interest rates. This kind of finance creates no market distortions and is thus regarded as the most efficient form of borrowing in the long term.

Except for the option of solely market based finance, the other options are, at least in some way, disturbing market allocation and are associated with negative effects on growth and total welfare. Excessive monetization of government debt increases reserve money and is likely to cause inflation. As is well explored in economic literature inflation imposes various costs on the economy and reduces economic growth. Because the negative effects on economic growth are not immediately visible the implementation of such growth dampening and inflation-inducing policies can nevertheless be tempting for governments and policy-makers. For example, the finance of a certain policy by forcing domestic actors to lend cheaply to the government is ultimately crowding-out private investments and hiding the real costs of a government investment (Fry 1997, 6).

In contrast to the first three methods of finance described above, a completely voluntary auction of government debt would allow a more efficient allocation of capital and would have the least disturbing effects on economic growth. A survey among central banks by Fry (1997) came to the conclusion that voluntary government debt markets are perceived to reduce inflation induced by government lending, impose stronger fiscal discipline on governments by reflecting the true market costs of debt finance and increase liquidity of government debt securities. Liquid government securities may consequently increase the efficiency of capital allocations by providing a benchmark yield curve, foster the creation of new financial instruments and increase the overall attractiveness of the

country as an investment center (Fry 1997, 117).

As a side node, it has to be mentioned that some sort of coordination between the central bank and the government is necessary, so that the issuance of government securities does not conflict monetary policy targets by the central bank. Governments should thus make public in advance how many securities will be issued, so that the central bank can absorb fluctuations in the money supply (World Bank 2001, 4 and 10).

This leads us to the usage of the bond market for monetary policy. Central banks can conduct monetary policy more easily when the government bond market is both deep and liquid. As it can use open market operations to fine-tune the short-term liquidity as well as to withdraw liquidity in the medium- and long-term from the financial system. Without a developed and liquid bond market, central banks have to rely on non-market based instruments. The most common non-market instrument are reserve requirements: By increasing the reserve requirements banks have to put a higher reserve for their assets on their deposits at the central bank. This drains liquidity from the financial sector.[3] Since it is costly for the banking sector to adjust their balance sheet when coping with such an increase or decrease in reserve requirements, this instrument is rarely used alone.

Instead, central banks increasingly try to use market-based instruments such as open market operations, in order to sterilize unneeded liquidity in the market without forcing financial institutions to adapt their balance sheets (Nyawata 2012). Such open market operations include:

- The selling of securities: A central bank sells some of the securities it owns in order to decrease the cash in circulation. These securities usually are government securities. The central bank has to own these securities in the first place in order to be able to sell them. This imposes certain limits on this option, when it is not coordinated with the government. With close cooperation the government could issue government securities and deposit the proceedings at the central bank. This would have the same effect on liquidity, but would not fragment the market.

- The issuance of central bank bills is a more direct option: In this case central banks issue bonds on their own, receiving cash in circulation but in turn have to pay the coupon on the bonds. These bonds usually have short maturity, but this also depends on the central bank's strategy and the willingness of the private sector to buy these securities.

[3]For a more detailed and theoretical explanation of Sterilization see Agénor and Montiel (2008, 226-227).

- For very short maturities central banks use repurchase agreements (repos) or various lending facilities to fine-tune the money supply. As technically these are not bonds but instruments, they are not relevant for this discussion of government bond markets in East Asia.

The central bank may use any combination of these policies to withdraw or inject liquidity from or into the financial system. The advantage of the issuance of central bank bills is that the central bank can act independently and no coordination with the government is necessary. There is also no need of an already established market for treasury bonds (T-bills). The downside is that central bank bills are only similar to, but not equivalent to T-bills. This could possibly lead to a fragmentation of the domestic bond market. When the central bank coordinates the monetary intervention with the government and uses government- instead of central bank securities it can help "to lump" and create a market (McCauley and Remolona 2000, 55).

When issuing government debt and when tuning liquidity, the market based auctions of government bonds have the least disturbing and crowding-out effects on private actors. A market based allocation of capital is also more efficient and causing less miss allocations than other forms of government finance. Although Spratt (2009, 108) notes that there is little direct evidence linking the development of government bond markets to economic growth, such a market is still seen to be a vital part of financial markets and able to increase the resilience of the domestic financial system. The establishment of a vital government bond market can thus be considered to be the best option when considering government finance and is also providing various spill-over effects into other parts of the economy.

2.2.1.2. Yield Curve and the spill-over effects of the government bond market

The most acknowledged spill-over effect of government bond markets are the effects of a yield curve onto the economy. The yield curve "represents the relationship between market remuneration (interest) rates and the remaining time to maturity of debt securities. The information content of a yield curve reflects the asset pricing process on financial markets" (ECB 2012). A yield curve consists of yields (interest) on a certain security at different points in time. Government securities are considered to be usually the most liquid and sometimes the safest securities in a financial market. A government-benchmark yield curve thus gives investors and other actors in financial markets valuable insights on expectations of interests and economic activity at different points in time. The US

yield curve has for example predicted nearly every recession after World War II with the only exception of a slowdown in the late 1960s. But the reliability of the yield curve as a predictor has recently been challenged and evidence for emerging economies has remained scarce, especially because most emerging economies only recently developed liquid domestic securities markets (Mehl 2006).

In order to develop a benchmark yield curve it is essential for the government to issue benchmark securities in accordance with certain benchmark maturities. When the government concentrates on these maturities they will be more liquid, which will in turn decrease the costs of finance and enables the market to use them as convenient benchmarks. When the government spreads the benchmarks across a wide range of maturities it provides the necessary information to investors to build a yield curve (World Bank 2001, 13).

The fact that government bond yields can be used to be the base for other securities, instruments and derivatives can also provide other spill-over effects to the economy. Inflation-indexed debt securities may for example provide a market-based estimation of expected inflation.

2.2.1.3. Financial Stability

Regarding the government bond market there are two potential sources of financial instability. The first one is the excessive use of government debt and the second derives from a flaw in the structure of international financial markets, that prevent emerging markets to borrow abroad in their own currency.

2.2.1.3.1. Unsustainable Macroeconomic Policies – Excessive Government Debt

While the development of a government debt market has several positive externalities to the economy, public debt can also have a destabilizing effect on the economy. This is especially the case when debt levels become excessive. Reinhart and Rogoff (2010) find that high levels of public debt (above 90 % of GDP) are associated with weak GDP growth rates, while the same link is relatively weak below this threshhold. As this finding is consistent among developing and developed countries, it shows that excessive government debt has a negative impact on growth. Although public debt levels in Asia are relatively high and have particularly risen in the last decade, this has to be mainly attributed to the simulatenous accumulation of foreign exchange reserves and not to the

actual accumulation of public debt as will be described later[4].

2.2.1.3.2. Flaws in the Structure of International Financial Markets – Original Sin East Asia's local currency bond markets developed rapidly in the last decade. This has mainly been attributed to the growth of local currency markets. This kind of domestic borrowing has several positive effects on the economy by intermediating more efficiently between domestic actors. But it could also be necessary to transfer resources between foreign and domestic actors, for example to finance large projects, to smooth consumption and especially to finance a public deficit in times of a crisis (more on this in chapter 2.2.3.1).

Historical experience suggests that developing countries found it difficult to borrow abroad in their own domestic currency, irrespectively of their previous policies or behavior. This phenomenon is termed "original sin". Original sin is defined as

> "a situation in which the domestic currency cannot be used to borrow abroad or to borrow long term, even domestically. In the presence of this incompleteness, financial fragility is unavoidable because all domestic investments will have either a currency mismatch (projects that generate pesos will be financed with dollars) or a maturity mismatch (long-term projects will be financed with short-term loans)". (Eichengreen and Hausmann 1999, 3)

There are several, mostly multi-factor explanations why original sin exists and why the international bond markets are dominated by only five currencies. For this analysis it is only important that original sin can cause severe exposure to developing countries balance sheets.

The theory of original sin was increasingly challenged in the 2000s. Emerging market debt was becoming attractive to foreign investors due to a high return compared to a relatively low variance during this time. At the same time this period also marked a decade of very high international liquidity and a high appetite for risk. And the investor base of emerging market economies increasingly included non-leveraged investors such as dedicated emerging market bond funds. These developments led academia to challenge whether original sin is still prevalent (Turner 2012, 20, 25).

[4]Even though East Asian countries have been using fiscal policies to dampen the impact of the global financial crisis from 2008-2009.

2.2.2. Corporate Bond Market

The potential benefits of the corporate bond market on economic growth lies in it's role of financial intermediation. The debate whether financial intermediation in general is beneficial for growth is still ambiguous and not entirely resolved. It started as early as in 1911 with Schumpeter (1993), by now about five major strands have emerged. The major consensus is the supply leading hypothesis which maintains that growth in the financial sector positively effects economic growth. The demand leading hypothesis sees the reverse causality that economic growth is endogenously driving the growth in the finance sector. Lucas (1988) view that in a neo-classical world with zero-transaction costs and perfect information the financial sector should be neutral and have no direct effect on economic growth is another minor strand, that has been vigorously attacked from many different sides. The last branch of theory about financial intermediation sees a negative causal relationship between financial sector development and growth (Fink et al. 2003, 6-7). The major consensus of contemporary theory suggests that there are positive effects of financial sector development on economic growth although financial development without providing the necessary sound financial institutions can foster financial instability (Spratt 2009).

2.2.2.1. The Bond Markets and Financial Intermediation

Economic theory on financial intermediation has primarily been covering the role of equity and bank debt in corporate finance. The macroeconomic effects of bond markets and their respective development have not seen that much exposure. To analyze the effects on the economy we will refer to the model of bonds, bank debt and equity by Bolton and Freixas (2000). They created a financial markets model that incorporates equity, bonds and bank debt under asymmetric information, that covers the finance decision of corporations with different amounts of risk as well as a supply of bank debt based on the costs of intermediation. The model demonstrates the decisions of companies to choose the optimal capital structure. Risky firms, such as start-ups, are only able to fund themselves through the issuance of equity or are otherwise unable to obtain funding. Firms that are still risky, but relatively safer, are able to finance through bank debt. Bank debt provides a flexible way of finance, as it is renegotiable and banks have the special expertise to assess the risk adequately. The safest and most established firms use the bond market to obtain cheap finance as they only face a small premium since their possible bankruptcy costs are negligible or very low. Those safe firms are thus able

to circumvent the intermediation costs of banks.

Three interesting implications result out of this model: At first the finding that the cost of intermediation is an important factor in the determination of bank loan supply. When these costs, represented by the interest rate spread (the difference between the lending and deposit rate), are small and able to generate a large enough supply of bank loans, the need for equity-finance diminishes (Bolton and Freixas 2000, 342). The second finding is that when firms issue too many junior bonds banks have an incentive to inefficiently liquidate the firm since their bank debt is senior to these bonds. This difference in debt priority also handicaps the renegotiation and restructuring of bank debt and bonds (Bolton and Freixas 2000, 337). The most important finding is related to the fact that banks face costs of raising capital themselves. For this reason banks will try to securitize the part of the bank loan that is the most safe to free their balance sheets to reuse this capital more efficiently. The standard explanation of securitization used to see the role of securitization in monitoring and pooling small loans into bigger securities. This finding enhances this explanation, and sees securitization additionally as an option to provide banks a possibility to free their balance sheets from the most safest assets and use the capital instead where the return is higher (Bolton and Freixas 2000, 338-9).

Now what are the benefits of a corporate bond market and why should governments seek to establish such a market? According to this theory the absence of a corporate bond market has negative effects on economic growth. The costs on GDP growth relates to the opportunity costs of not having a well established liquid bond market that supports sophisticated instruments such as securitization. The absence of such a market leads to an inefficient capital structure in firms: safe firms will have to use bank debt to finance themselves. This is more costly for both, firms (they face higher costs of capital since banks have to charge a spread on their own costs of capital) and banks (they can use their capital not efficiently and have to keep safe low-yield debt on their balance sheets), than the possibility to finance through the bond market or respectively securitize the safe assets. A corporate bond market consequently facilitates investment and allows society to put capital to more efficient use.

The bond market also allows to finance huge long-term projects, such as infrastructure investments, more easily. This is very relevant for the East Asian region as the banking-based financial system came to its limits already prior to the AFC: Large companies with big infrastructure projects and huge needs for finance had difficulties financing their

projects without giving control and partly ownership to banks, a problem that could have been circumvented by an established bond market (Eichengreen and Luengnaruemitchai 2006, 40).

There exist several strands of theory that answer whether the development of the financial sector has a positive effect on economic growth. We expect, according with the economic mainstream, that financial intermediation in general, and the bond market specifically, have a positive effect on the allocation of capital and consequently on economic growth. Recent empirical research support these expectations.

2.2.2.1.1. The Empirics of Financial Intermediation While the theoretical debate about the effects of financial intermediation on the economy has been going on for over a century the empirical research has been gathering pace only more recently. Research grew mostly due to an increased availability of data as well as more robust quantitative methods. Levine (1997) created one of the most comprehensive empirical and theoretical research that demonstrates the positive link between financial development and long-run economic growth for all three parts of the domestic financial markets. The central functions of financial intermediaries that establish this positive relationship are the mobilization of savings, the management of risk, the obtaining and providing of information and the facilitation of exchange (Spratt 2009, 52). Similar comprehensive research over a large number of countries, and specifically on the influence of bond market development on economic growth have not yet been published, mainly due to the lack of available data (Barth et al. 2006, 12). Instead most of the available research focuses on equity or bank debt. Analyses of corporate bond market development, especially for the East Asian region, have been scarce.

2.2.2.2. Financial Stability

The most pressing issue of financial stability with regard to the corporate bond market is that the absence of a functioning bond market may foster instability. As this section will show, this is a major conclusion the East Asian countries drew from the AFC. The development of a corporate bond market has since then been an aim of high priority.

2.2.2.2.1. Fragile Financial Systems Asian financial systems experienced heavy financial turmoil during the AFC due to maturity and currency exposures in their balance sheets. Preceding the AFC strong inflows of capital were enforcing the already strong

economic growth. The problem was even more exaggerated by the fact, that Asian savers had only little opportunities to invest their savings locally. Instead they invested mainly in dollar-denominated foreign-assets, which in return were "recycled" back into Asia in the form of short-term finance. As bank-lending was the dominant form of finance, banks used short-term foreign-currency liabilities to finance their local business, mainly local long-term infrastructure projects. This resulted in the so called "double mismatch" problem, consisting of a maturity (liquidity) and a currency mismatch: With a sudden stop of capital inflows it became increasingly hard for banks to refinance their short-term loans in order to keep up their long-term oriented local business (maturity mismatch). Simultaneously, they financed their debt in foreign-currencies (mainly US dollars) but had their core business, returns and claims still denominated in their local currency. The sudden appreciation of foreign currencies exposed the banks to massive exchange-rate risks (currency mismatch). The double mismatch made both refinance and repayment nearly impossible and fed back through the financial system and into the "real economy", causing a downward spiral (Ismail and Sivalingam 2006, 28).

These experiences of the AFC have heavily influenced the desire of East Asian countries to develop their domestic bond markets. The chairman of the Fed during the AFC, Alan Greenspan, coined the common term of the missing "spare tire": East Asia's financial system was heavily reliant on banking as a form of intermediation. When this channel broke down the region was lacking a backup source of financial intermediation. "The lack of a spare tire is of no concern if you do not get a flat. East Asia had no spare tires." (Greenspan 1999).

Since then a functioning bond market was seen as this designated spare tire that could assuage or even prevent future crises. Because domestic local currency- and foreign currency-denominated bond markets can provide finance in the right currency and maturity so that governments and companies can finance themselves in accordance with their project's maturity and currency exposure. This limits fragilities in the national balance sheets.

But bond markets could also provide a channel through which Asian investors could invest their savings directly in Asia instead of the need to recycle them back into the region. This view was already shared within Asia before Greenspan made the common remarks mentioned above. In 1998 the then financial secretary of Hong Kong, Donald Tsang, cited the lack of a robust and efficient Asian bond market as one of the main reasons for the turmoil of the AFC. The establishment of an efficient, diverse and robust

financial system in Asia has at least since then been a concern for policy makers and an issue for regional cooperation (Park and Wyplosz 2010, 76).

2.2.3. Financial Integration and the Bond Market

Integrated financial markets are believed to have several potential benefits. Countries can reap these benefits from opening up their markets to foreign investors and integrating either regionally or internationally. Financial integration is defined by Baele et al. (2004) as follows:

> "The market for a given set of financial instruments and/or services is fully integrated if all potential market participants with the same relevant characteristics
>
> 1. face a single set of rules when they decide to deal with those financial instruments and/or services;
> 2. have equal access to the above-mentioned set of financial instruments and/or services; and
> 3. are treated equally when they are active in the market."
>
> (Baele et al. 2004, 6)

For East Asian bond markets to be fully integrated they have to fulfill all the conditions above: the first condition is that they either have harmonized rules and regulations or have to be integrated into one single offshore market. The second condition depends first and foremost on the *de facto* and *de jure* possibility to move capital into these markets. This condition is termed *openness* and is closely related to the liberalization of a country's capital account (Corbett 2010, 101 and 97). It is necessary to distinguish between de facto and de jure openness since even though a country can have a de facto open capital account there may be other obstacles that prevent equal access of investors and capital from moving freely. And vice versa, countries may have a de jure closed capital account but actors may de facto find a way to circumvent them. The third condition needs states to treat all market-participants equally, by this foreign investors should not face any specific impediments for bond markets to be fully integrated.

Assuming a de jure integration, investors from different juristictions should all assert the same price to an asset. This is called the "law of one price", a strong implication of the financial integration definition. The law of one price implies, that in fully integrated

markets, assets, with the same risk and generating the same cash flow, should be traded at the same price, independent of the issuer. For this measurement it is very important to choose comparable assets, which have the same risk characteristics, and to take exchange-rate risk into account (Baele et al. 2004, 13). Similar approaches regarding yields, shocks and portfolios can all be used to measure the de facto degree of integration.

Full de facto integration is not even achieved in the European Union's bond markets, although the degree of integration increased rapidly after the introduction of the European Monetary Union (Baele et al. 2004). East Asian bond markets are expected to be far less integrated than the European Union, given capital controls, different legal traditions, financial institutions and regulations.

2.2.3.1. Benefits of Bond Market Integration

Regional or international financial integration can have several beneficial effects on bond markets, as the investor base is broadened liquidity is increased. Additionally new options become available to domestic actors, such as regional risk-sharing and consumption smoothing. The following section gives a brief overview of the benefits of bond market integration.

2.2.3.1.1. Increased Liquidity The major benefit of regionally integrated markets is an increase in liquidity, due to increased market participation and a broader investor base. As liquidity is crucial for the efficiency of a market and the information content of price signals, financial integration can tremendously improve the domestic markets (Borensztein and Loungani 2011, 54). And since institutional investors in less developed markets often have buy-and-hold strategies, foreign market participants are more likely to trade and thus increase the liquidity in the secondary market significantly (Peiris 2010, 3, 7). For countries with small domestic bond markets increased foreign participation would also allow to issue larger amounts of debt and diversify the investor base (Black and Munro 2010, 106).

Extended liquidity in the secondary market reduces transaction costs and the premium investors have to demand on the yield in order to account for the potential of illiquidity when they want to sell the asset. Higher integration and foreign participation thus potentially decreases the yield in the domestic markets. Peiris (2010) tests this proposition with regard to emerging markets in general, including some East Asian bond markets. He finds that on average a "1 percentage point increase in the share of

foreign investors in the government bond market will tend to lower yields by about 6bps on average" (Peiris 2010, 13).

2.2.3.1.2. Consumption Smoothing and Risk Sharing Ever since the development of Milton Friedman's permanent-income-theory it has been widely accepted that economic agents try to smooth their consumption over time. As economic agents lend money in "bad" times, they save money in "good" times to achieve this smoothing effect. The same concept can be applied to whole countries or companies, which accordingly lend or save in international capital markets in order to smooth domestic consumption. By allowing capital markets to play this counter-cyclical role, financial integration can help to increase welfare and smooth economic growth, especially when economic shocks are only temporary in nature (Agénor and Montiel 2008, 484-485).

Both the government and the corporate bond market can thus be a transmission mechanism that allows to smooth consumption over time. In times of crisis governments often prefer to run fiscal deficits in order to support the domestic economy. Simultaneously, corporations and domestic financial institutions consolidate their finances and try to increase their equity. In times of crisis domestic actors may thus be reluctant to lend. Foreign actors can provide the necessary capital to smooth consumption in this situation. Although East Asian economies are heavily dependent on trade and consequently equally susceptible to trade-driven shocks. Johansson (2008) finds that correlation- and volatility levels in the East Asian debt capital market indicate that investors can benefit from diversifying their portfolio regionally.

2.2.3.1.3. Enhanced Macroeconomic Discipline The benefit of enhanced macroeconomic discipline is directly linked to the positive impacts of capital flows. As international capital markets are rewarding good and penalizing bad economic policies, countries will have more incentives to follow good economic behavior, drop unsustainable macroeconomic policies and reduce the occurrences of economic mistakes when integrating into the international capital markets. Good policies will not only foster domestic growth but additionally attract foreign capital and by this boost investment and growth. But increased capital flows without the necessary macroeconomic discipline can also have the reverse effect on the economy and may foster financial instability instead of boosting robust growth (Agénor and Montiel 2008, 488).

This argument is also directly linked to yields in the government bond market. As an extended participation of foreign investors drives policy makers to have sound macroe-

conomic policies in order to keep yields low. Governments furthermore are not able to force foreign investors to hold government bonds (financial repression) and are forced by this to have more sustainable policies. It is moreover necessary to have convincing monetary policies that keep inflation low in order to keep a a long-term involvement of foreign investors. The induced lower government bond yields and macroeconomic discipline are both having positive effects on economic growth.

2.2.3.2. Financial Stability

As the East Asian countries already experienced during the Asian financial crisis, liberalization and increased participation in the international and regional markets may also expose the economy to new risks and be a potential source of economic instability.

2.2.3.2.1. Fragile Financial Systems Although the access to foreign capital provides domestic economic agents with additional sources of finance, it seems to come at the price of making financial systems more fragile. Especially, short-term portfolio inflows seem to increase the volatility of capital movements and prices, they are also to be susceptible to rapid movements, herding of investors and very easily affected by contagion, for example due to a loss in investors confidence (Agénor and Montiel 2008, 491). Agénor and Montiel (2008, 493) identify the possibly destabilizing effect of an uneven pattern of lending of foreign banks. This argument can similarly be adapted for the corporate bond market: foreign investors may limit their investment in corporate debt with low credit-ratings and concentrate only on the highly rated part of the market, in order to avoid risk. Such an uneven distribution in the debt-capital market would be likely to decrease the efficiency of the financial system and may also have an adverse effect on overall output and growth.

2.2.3.2.2. Institutional Weakness Institutional weaknesses, especially the problem of asymmetric information between foreign investors and domestic actors, can lead to a miss-allocation of capital. This miss-allocation of capital inflows can have an impeding effect on long-term growth and even be a source of financial instability if used to finance speculative investments or investments of poor quality. The destabilizing effects can also be a result of already existing distortions in the domestic financial system (for example due to poor regulations, supervision or corporate governance). This emphasizes the necessity to establish good regulatory practices along the side of liberalizing the capital

account (Agénor and Montiel 2008, 490).

2.2.3.2.3. Flaws in the Structure of International Financial Markets International financial markets may have structural shortcomings that can lead to financial instability. For one there is a certain pro-cyclicality of capital flows, that especially effects developing economies. While foreign investors may invest heavily during a boom, they might be reluctant to invest in "bad" times. This structural flaw may cancel the effect of consumption smoothing and, even worse, cause additional instability in the domestic financial systems (Agénor and Montiel 2008, 491). The experiences of the AFC demonstrated this effect for the East Asian countries. During the global financial crisis, East Asian countries faced similar pro-cyclical capital outflows as investors in the EU and the US tried to consolidate their balance sheets. Another structural source of instability is the problem of original sin. This has already been dealt with specifically in section 2.2.1.3.2.

2.3. The Determinants of Bond Market Development

After the AFC, the fact that East Asia did not have developed bond markets which could have mitigated the crisis was heavily discussed in academic literature. In order to shed more light on the development of bond markets in emerging countries, and particularly in Asia, Eichengreen and Luengnaruemitchai (2006) conducted a comprehensive empirical study on the determinants of bond market development. Similar studies on the determinants of bond market development have been conducted by Dickie and Fan (2005), Burger and Warnock (2006), and most recently Bhattacharyay (2011). The following section will take a look at the most important endogenous determinants of bond market growth. These will be empirically examined for the East Asian region and the period after the crisis in chapter 4. The first subsection deals with macroeconomic- and the second section with institutional factors.

2.3.1. Macroeconomic Factors

Size of the Economy The size of the economy seems to be an important factor for bond market development, as small economies may face more difficulties due to the lack of a minimum effective scale, that provides sufficient market participants and liquidity. Small markets may also be more volatile as single orders and investors have a larger impact on

the market. As increased volatility and insufficient liquidity require investors to charge an additional premium could also make the market unattractive to issuers of bond debt. Especially in the early stages of development the size of the economy is expected to be positively related to bond market development (Eichengreen and Luengnaruemitchai 2006, 44-45).

Developmental stage of the economy The stage of development encompasses several explanations. More developed economies usually have more stable investment environments that encourage long-term financing and thus bond market lending. Heavy government involvement in the financial system that disturbs or discourages market lending is also more prevalent in less developed countries. The level of economic development (mostly measured in GDP per capita) is furthermore associated with better developed financial institutions, like creditor rights, corporate governance and rule of law. Figure A.1 depicts a scatter plot of bond market size relative to economic development in East Asia (Eichengreen and Luengnaruemitchai 2006, 46).

Exchange Rate Stability Exchange rate volatility makes it less attractive for foreign investors to invest in a bond market because it increases the exchange rate risks investor face. Additionally domestic corporations, that rely on trade, are more exposed by a volatile exchange rate. A stable exchange rate makes investments more attractive to foreign investors and is thus positively associated with bond market development (Eichengreen and Luengnaruemitchai 2006, 47-48).

Inflation High inflation is associated with an unfriendly investment environment in which both companies and investors face higher uncertainty. Bond market development is expected to be negatively related to high levels of inflation. Empirical research by Burger and Warnock (2006) found that in a large sample of economies stable inflation benefits the establishment of bond markets.

Interest Rate Spread, -Variability and -Level A high interest rate spread makes long-term investments less attractive as investors perceive a high risk that their purchasing-power of fixed long-term bonds may diminish in the future. The interest rate spread is thus negatively associated with bond market development. Similarly, a high interest rate variability has negative effects on investors' appetite for long-term fixed-rates bonds. Interest rate variability can also be related to low liquidity in the securities market, when

a small number of orders or participants may easily be moving the bond market. Finally, high interest rates also depress investment, make it harder for firms to service debt and are therefore negatively associated with bond market development (Eichengreen and Luengnaruemitchai 2006, 47) and (Bhattacharyay 2011, 7).

Large Firms There seems to be some sort of relationship between the amount of large companies in a economy and the debt market. Large firms are able to access the debt market more easily than smaller companies as they can issue on a "name" or reputation basis and are less likely to fail than smaller enterprises. Dickie and Fan (2005) find that a larger number of firms, that are listed in the Global Fortune 500, contributed to market development.

Pension System Another factor adding to bond market growth and development through a more diverse investor base is the type of pension system a country employs. Defined-benefit-schemes (DBS) are often not or only partially funded, instead they frequently go hand in hand with a pay-as-you-go method of financing. In contrast, defined-contribution-schemes (DCS) invest all the payments and are thus by definition fully funded. As bonds are less risky, volatile and more long-term oriented than stocks, the bond market is an attractive supplement for pension funds, especially as government bonds are often regarded as one of the safest assets in an economy. Dickie and Fan (2005) find that countries with a DCS tend to have bigger corporate bond markets (Dickie and Fan 2005, 8, 12).

In East Asia, the distribution of DCS and DBS pension systems are evenly matched (see table A.9). At a first glance there seems to be no clear relationship between countries that employ a DCS pension system and the stage of development of the corporate or public debt markets in the East Asian region. For example Korea uses a DBS system but has one of the most developed debt markets in the region. Indonesia in contrast has a DCS system but only a weakly established debt market. Possible additional explanatory variables are the size of the pensions contribution, which are very low in countries such as Indonesia and Thailand and high in Malaysia or Singapore. Or the levels of built-up assets for future pension benefits, that are high in Malaysia, Korea and Singapore, all countries with well established bond markets (see figure A.6) (Donghyun 2009, 9).

Fiscal Policy The most obvious determinant of the size of the government bond market is the fiscal policy conducted by a country. Traditionally government debt is constituting

the largest part of the government bond market, as countries finance their public debt primarily through the issuance of bonds. Section 2.2.1.1 already gave an overview of alternative, more inefficient ways, to finance government debt. As government debt is a major component of the government bond market the relationship is obviously positive. But it is also well explored in economic literature that government debt can raise interest rates and consequently crowd-out private investment, with possible negative effects on the private bond market (Brunner and Meltzer 1972; McCauley and Remolona 2000; Eichengreen and Luengnaruemitchai 2006).

2.3.2. Institutional Factors

Origin of legal system Legal traditions vary across East Asian countries. Different legal systems could provide some explanatory power of the uneven levels of bond market development in the region. La Porta et al. (1998) find that countries with a common law tradition have stronger protection of investor rights than countries with a civil law tradition. Stronger protection of investors also fosters the development of the financial markets in general and the securities market in particular. With weak investor rights, savers are also more likely to invest through the banking system instead of the bond market, since banks are more capable to enforce their claims in a weaker legal system. It is thus expected that legal systems may have an impact on bond market development. Empirical research by Eichengreen and Luengnaruemitchai (2006) was ambiguous whether this provides a strong relationship, especially in Asia.

Bond- and Bank Debt — Complement or Substitute? It has been mentioned already, that a corporation's finance decision basically consists of three options. Issuing equity is usually considered to pose the danger of costly dilution of capital. Therefore this option is not as often used as the option to finance through debenture capital. So the essential finance decision is one between bond- and bank debt. The empirical research of Eichengreen and Luengnaruemitchai (2006) was the first to mention a potential complementary relationship between the banking sector and the bond market. They showed that countries with a more developed and healthy banking system also had bigger bond markets. Both the banking system and the bond market tend to develop together (Eichengreen and Luengnaruemitchai 2006). It has been shown above how the banking sector can benefit from the existence of a liquid corporate bond market: It allows banks to move more towards an investment-banking-type model. As banks are

usually also handling the issuance of corporate bonds, the bond market may foster the banks' move towards a more fee-oriented business.

There is however academic research that suggests that the banking system and the bond market are potential substitutes. Rajan and Zingales (2003) argue that strong interest groups are an important factor in financial development and large established incumbents and rent-seekers can severely slow down or even reverse the process of financial development[5]. Dickie and Fan (2005) test this theory on 34 bond markets in developed and emerging countries, including several Asian countries. They propose that bond markets may take good lending business away and lead to a deterioration in lending quality for established financial intermediaries. Strong banking institutions may thus impede the development of a corporate bond market. Their findings indicate that countries with banking systems that are strongly concentrated have less developed corporate bond markets. Countries with low bank concentration[6] in East Asia are Japan, Korea, Malaysia and Thailand. Singapore, the Philippines and Vietnam have a high bank concentration.

A similar argument can be made with regard to the openness of an economy. With increasing openness entrenched interest groups and rent-seekers become less powerful due to international competition. It is consequently expected that more open economies also have larger bond markets, as banks and other interest groups will not be able to impede the development of a securities market as much as in a more closed economy. Openness is traditionally measured as the share of imports and exports of GDP (Eichengreen and Luengnaruemitchai 2006, 45).

Corporate Governance Whereas overall structural and macroeconomic factors are major determinants, the establishment of good corporate governance practices has often been seen as an important part of financial development. The AFC especially triggered the academic discussion on whether and how poor governance practices played a role in the crisis.

Corporate governance is mostly associated with stockholders and not as much with participants in the bond markets. Nevertheless, there are certainly spill-over effects between good practices towards owners (such as stakeholders) and creditors. A firm that is regarded as having good disclosure of information on the equity market is likely

[5]This is also mentioned and considered in Eichengreen and Luengnaruemitchai (2006).

[6]Bank concentration is measured as the share of the three largest banks' assets of total commercial bank assets.

to be able to provide good information to its creditors as well. This is underpinned by Byun (2007), who finds that firms with perceived better governance also face lower costs of debt capital in Korea. As a result it is likely that the establishment of good corporate governance structures fosters the establishment of debt markets.

Ananchotikul and Eichengreen (2009) test this hypothesis for emerging market economies, with Asia being a subsample. They find that corporate governance has a positive effect on the market capitalization of the private bond market, but not on the public bond market. Although the Asian subsample appeared at first to not support this hypothesis, this resulted solely from two outliers, Malaysia and the Philippines. For the rest of East Asia there seems to be a positive exogenous effect between corporate governance- and corporate bond market development. Research by Lin et al. (2012) comes to a different conclusion. They argue that firms under weak corporate governance conditions, especially firms that are largely under family control, try to avoid the monitoring of banks. Because monitoring is dispersed and thus not as efficient due to duplicated and dispersed costs in the bond market, firms rather engage in the debt market to bypass extensive auditing. According to this research, weak corporate governance has important influence on the firms' finance decision, which are more likely to issue in the debt markets.

Given that good corporate governance has both an exogenous and endogenous effect on financial development it is more likely for the positive effects of good corporate governance to outweigh the possible channels of avoiding monitoring and control as a determinant for bond market growth. But more research would be necessary to assert this proposition with more certainty.

In the East Asian region the development of corporate governance has been heterogeneous. According to calculations of the NLU corporate governance indicator[7] by Ananchotikul and Eichengreen (2009), there have been improvements in corporate governance in the decade after the AFC. But they moved at a slower pace in the Asian region than for example in Latin America. And within the East Asian region these improvements are unevenly distributed: The index has been rising in Hong Kong, Malaysia, the Philippines, Singapore and Thailand. It has been stagnating in Indonesia and Korea and actually declining in China (Ananchotikul and Eichengreen 2009, 152-153).

[7] This indicator consists of the availability of disclosed information by companies, the co-movement of stocks and a measure of how frequently poor cash-flow performance is being concealed.

Contract Enforcement and Rule of Law Bond markets seem to benefit from similar macroeconomic and institutional environments as banking systems. Creditor rights that are rigidly enforced and accompanied by a strong rule of law benefit market-based financial systems as they protect investors and provide certainty for bond owners. Burger and Warnock (2006) found in a large sample of economies that stable inflation, rigid creditor rights and a strong rule of law benefit the establishment of bond markets. They also found that countries with weaker creditor rights tend to rely more on borrowing in a foreign currency.

Structural factors in an economy, such as the prevalence of corruption can have an impact on market development as well. Issuers of debt may face a higher risk-premium when the likelihood of corruption is high; higher costs may in turn deter firms from issuing bonds. Similarly can civil liberty and economic freedom have a positive effect on competition and by this provide more competitive prices as well as a more certain investment environment (Khalid and Rajaguru 2010, 7).

Khalid and Rajaguru (2010) test the impact of several socio-economic factors on bond market development empirically. They included developed economies in their regression, but also had a separate sample with East Asian economies. Their results were uniform over all subsamples and showed that lower corruption and higher economic freedom and civil liberty had a positive effect on bond market development. Consequently, East Asian countries could foster bond market growth by enforcing corruption laws more rigidly and granting more economic freedom and civil liberty. Table A.5 depicts the world-ranks of East Asian countries regarding several indicators of doing-business, corruption and economic freedom. The countries that fare well in these indicators are in most cases countries with more developed bond markets. As the protection of investors, the orderly resolving of defaults, low corruption and economic freedom is positively associated with bond market development there is still plenty of room for several East Asian countries to improve. This is especially relevant for the countries of China, Indonesia, Thailand, the Philippines and Vietnam, which suffer from a lack of investor protection, relatively high corruption and lower economic freedom.

Government Commitment Another interesting finding by Dickie and Fan (2005) is that one of the most important contributing factors to bond market development is the outspoken commitment of governments to establish a corporate bond market. As governments have the capacity to shape financial infrastructure and the institutional

framework they perform an important role in building the debt market and preventing situations in which the corporate bond market is held hostage by a few large established institutions. Malaysia and Korea have been actively supporting the development of their respective bond markets. Malaysia created the Malaysian Provident Fund to manage the retirement savings and also established a national mortgage corporation for securitization of small loans. Korea's approach was more gradual, mostly consisting of government-provided credit guarantees for large industrial conglomerates (chaebols). These measures all facilitated the development of the local debt market (Dickie and Fan 2005, 5).

2.3.3. Determining Factors in East Asia

While most empirical research focuses on the determining factors of bond markets in developing countries, only Bhattacharyay (2011) conducted research specifically on the East Asian region. Other research, such as Ananchotikul and Eichengreen (2009), Dickie and Fan (2005), Eichengreen and Luengnaruemitchai (2006), used East Asia countries only as part of their bigger sample. As Bhattacharyay (2011) exclusively considered macroeconomic factors in his research, this thesis will extend the analysis to institutional factors and use a larger time period.

In order to determine the driving factors, a multivariate analysis is conducted using cross-sectional panel-data. The size of the East Asian bond markets is used as the dependent variable, whereas indicators representing the influence of macroeconomic and institutional factors are used as the independent variables. The next section describes the econometric method used to estimate the multivariate regression. The analysis itself can be found in chapter 4.

2.4. Methodology

This short section will give a quick overview of the most important econometric methods used in the empirical part of this thesis. It will also deal with the statistical problems faced and the appropriate solutions applied.

2.4.1. The GLS Estimator

The most basic estimator used in many econometric studies is the OLS(Ordinary Least Squares)-Estimator. One statistical assumption in the OLS model is that the errors are

"independent identically distributed" (this is abbreviated as "iid", in statistical terms $V(y) = V(u) = I * \sigma^2$). With panel data this assumption easily becomes problematic: Panel data consists of different entities (countries in this case) which errors are most likely not iid over the different sections. The GLS (Generalized Least Squares)-estimator provides a possibility to deal with this problem. Instead of assuming $V(y) = V(u) = I * \sigma^2$, we only have to assume that $V(y) = V(u) = V$, with V being a known positive definite matrix. As the variance matrix is in most cases unknown, GLS uses the sample to estimate a variance matrix and this matrix to estimate the coefficients. This method is termed "Feasible GLS", but is most commonly still simply called GLS. The GLS- is usually more consistent than the OLS-estimator but comes with a stronger assumption of the relationship between the regressors and residuals. While OLS assumes that the residuals are not correlated with the regressors ($E(X'u) = 0$), GLS assumes that no element of the regressors is correlated with any other element of the residuals ($E(X \otimes u) = 0$) (Wooldridge 2002, 49-57, 127-129, 143-162).

The next two subsections will deal briefly with statistical problems that will be faced in the empirical part of the thesis. The problems of heteroskedasticity, serial correlation and cross-sectional correlation.

2.4.1.1. Heteroskedasticity and Serial Correlation

Heteroskedasticity is present in a sample, when different sub-samples' error terms have different variances. In our case heteroskedasticity either means that different countries have different variances in their error terms, or the variance of the error term varies over time. Heteroskedasticity can have several underlying reasons, such as model-misspecifications and omitted variables. The presence of heteroskedasticity does not effect the consistency of the OLS- or GLS-estimator, but accounting for it provides a more efficient estimation. It also affects the estimation of standard errors and may thus lead to wrong inference when not being accounted for. As the major concern in this thesis is to test whether several factors have a significant influence on our dependent variables, hypothesis testing and the required unbiased standard errors are of a high concern (Wooldridge 2002, 125-128). To test for heteroskedasticity, a likelihood-ratio test between the model accounting for heteroskedasticity and a homoskedastic model is conducted (Wiggins and Poi 2003).

Serial correlation, also known as autocorrelation, is present when the error terms of a model are correlated. As with heteroskedasticity, the standard errors become biased

and lose robustness (Drukker 2003). Additional ways to deal with serial correlation are either to estimate the model including a lagged dependent variable or an autoregressive term (AR(1)) for the errors. While the GLS-estimator is theoretically appropriate to deal with serial correlation on its own, Beck and Katz (1995) show that the practically used feasible GLS-estimator may underestimate the variability of coefficients by up to 300 %. But Keele and Kelly (2006) also find that dynamic models that include a lagged dependent variable in the presence of high auto-correlation tend to underestimate the coefficients of the true underlying process. The statistical justification of which method to use thus relies on the specific encountered situation.

The theoretical justification of a dynamic model seems easy in the context of bond markets, as bonds usually have a maturity of over one year. Only a fraction of the debt matures in a given year and the other part is still outstanding in the following year. The lagged variable and the autoregressive error term would be capturing this outstanding debt.

To test for serial correlation in the first place the Wooldridge-test for serial correlation in panel data is conducted in this thesis (Wooldridge 2002, 282-283).

2.4.1.2. Cross-sectional Correlation

While heteroskedasticity and serial correlation are well explored in literature, recently more literature focused on common shocks and common unobserved components that panel data is likely to face. In such a case the error terms are correlated across the different panels. This is termed cross-section correlation or cross-section dependence. Under the assumption that a common factor, which is not observed and uncorrelated with the regressors, exists, the standard-estimator is not efficient (although still consistent) and standard errors biased, when cross-sectional dependence is not accounted for. The underlying source of such common shocks may be explained by common social norms, neighborhood effects and other genuinely interdependent effects (De Hoyos and Sarafidis 2006, 482-483). As the used panel data is of regional nature and there has been increased global and regional economic integration as well as active regional efforts to develop bond markets, it seems easy to explain possible cross-sectional effects in this particular case. To test for cross-sectional correlation the Pesaran test for cross-sectional dependence will be used as described in De Hoyos and Sarafidis (2006).

2.4.2. Data

We analyze panel data of the ten East Asian countries, which are involved in the regional initiatives to foster bond market development. The dataset was assorted out of various different sources. Most notably data from IFS (2012), Kaufmann et al. (2010) and World Bank (2012b) was used. A detailed overview is given in the appendix C, in table C.1. The dataset ranges over the period of 1995-2010 at best. Data availability for all countries and indicators is a serious impediment for many statistical methods. Balanced panel data[8] is available only for the period of 2000 to 2010 for the dependent variables. Data for all regressors is available continuously and balanced only for the period of 2002 to 2009, but varies for most groups of indicators.

Section 2.3 gave an overview of the theories on which macroeconomic or structural variables influence bond market development. Again, the availability of data is a major obstacle to test these theories in the East Asian region. Bhattacharyay (2011) was also limited by continuous data. We nevertheless extend Bhattacharyay's model by several, mostly institutional, variables. As noted above this inclusion of additional variables leads to a smaller period of a continuous and balanced sample, but will allow us to make broader conclusions in the end.

The most notable differences between the data used in Bhattacharyay (2011) are that we use a different data source for exchange rate variability and use the sum of exports and imports as a share of GDP as the openness indicator (instead of solely exports). Bhattacharyay's sample ranges from 1998 to 2008, the used continuous sample in this thesis ranges from 2000 to 2010, but pooled data is available from 1995 to 2010.

It should also be noted, that no series for government debt or fiscal policy was included in the analysis, as no sufficiently large time series was available. Eichengreen and Luengnaruemitchai (2006) used it to test for robustness of the results, Bhattacharyay (2011) did not include government debt or fiscal deficit as well.

Approach and Outline

The following chapter (3) will examine the state of the corporate- and government bond markets according to the dimensions of size and liquidity, the potential benefits of bond market development examined in section 2.2 and the state of regional integration. While

[8] Panel data is balanced when each indicator is available in every cross section (country in this case). (Wooldridge 2002, 250)

determining the current state of the market, three hypotheses of determinants will be formulated. Chapter 4 establishes the empirical model to find the most important determinants for bond market growth for East Asia. Along institutiona and macroeconomic factors the three hypotheses proposed are included Chapter 5 summarizes and concludes.

3. States of the Market

The East Asian bond markets came a long way since the Asian financial crisis. Whereas government debt was either primarily denominated in a foreign currency or held in the form of bank debt, sovereign bonds increasingly became a common instrument to finance government debt or to conduct monetary policy in the region since 1998. As the local bond markets developed, East Asian governments could finance their debt to a greater extent in their own currencies. The corporate bond market evolved as well. Virtually no corporate debt was issued in the lesser developed East Asian countries before the crisis, and in the more developed countries like Korea corporate debt was limited to state-owned-enterprises or large industrial conglomerates (like the Korean chaebol). Since then the corporate bond market became an alternative source of finance in many economies in the region. The growth rates of the market illustrate this development. From 1998 to 2011 the Government bond market grew by 500 % and the corporate bond market by 255 %, leading the market total of outstanding bonds to grow by 435 % in absolute terms. The three biggest economies of the region – China, Japan and Korea (CJK) also account for the major part of the market, roughly 95 % of the overall East Asian bond market (ABMI 2010c, 5).

Despite the rapid growth rates, the development has been uneven throughout the East Asian region. Bond market growth differed throughout countries, as well as their respective markets. The following sections will take a close look at the current state of the market as well as the development since the Asian financial crisis. The first two sections discuss the government- and the corporate bond market, regarding their size, their liquidity, the role they play in the economy and the implications for financial stability. The observations made in these two sections will lead to the formulation of three hypotheses that will be econometrically tested in the next chapter. The third section will examine the current state of regional integration as well as regional efforts to further develop the market.

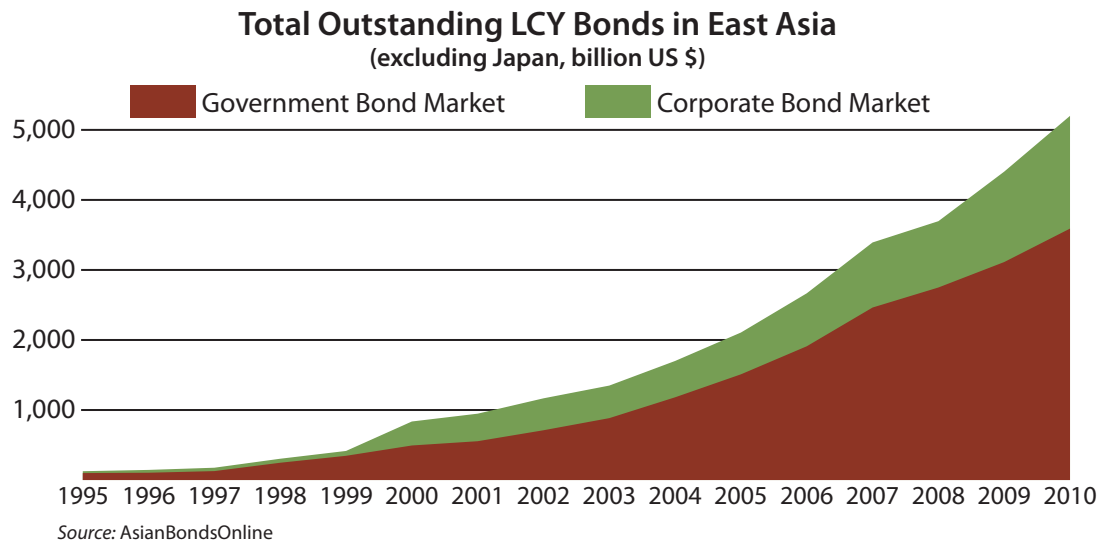


Figure 3.1.: Bond Market growth in East Asia, excluding Japan.

3.1. The Government Bond Markets in East Asia

The East Asian domestic bond markets grew rapidly in the last decade. The aim to establish a liquid and well-functioning government securities market, denominated in the local currency, has been advanced to an important target of financial development for Asian countries.

The market did indeed grow and develop remarkably during the last decade. Although the region had high rates of economic growth, the government bond market even outgrew GDP growth. From December 2000 to 2010 the LCY market grew by 255 % (13.5 % annualized) in absolute terms.

3.1.1. Size and Liquidity

Given that GDP also grew rapidly in the East Asian region during the last decade, the size of the government bond market over GDP grew more modestly. Table 3.1 shows the government bond market as a share of GDP. The two biggest economies of the region, China and Japan, roughly doubled their outstanding government bonds. As did Korea, Malaysia, Singapore and Thailand. Vietnam, that started with virtually no government bonds outstanding in 2000 established bonds as a new instrument of government debt. The Philippines bond market peaked in 2004 and overall stagnated in the decade. Indonesia's market was the only market that actually shrank in the last decade, having less than half as many bonds outstanding in 2010 as in 2000. Hong

Kong's market was stagnant and peaked during the GFC when Hong Kong issued large amounts of government debt (Chen 2009).

Table 3.1.: LCY Government Bond Market as % of GDP in East Asia

Date	HK	CN	ID	JP	KR	MY	PH	SG	TH	VN
Dec 2000	8.2	16.6	35.4	84.3	25.7	38.0	31.1	26.6	22.8	0.3
Dec 2001	8.8	17.7	29.8	97.5	27.3	43.1	33.8	34.1	25.9	0.6
Dec 2002	9.2	22.9	26.2	111.9	26.8	44.0	36.9	35.8	32.0	0.8
Dec 2003	9.7	26.5	24.7	122.3	32.0	48.4	39.4	37.7	31.1	2.2
Dec 2004	9.5	31.0	21.9	135.3	39.9	46.1	40.9	37.9	32.6	3.5
Dec 2005	9.2	36.4	17.1	147.2	45.9	44.4	40.1	37.4	37.6	5.0
Dec 2006	8.9	38.9	18.8	148.4	49.2	43.6	36.6	37.2	39.3	8.3
Dec 2007	8.5	42.1	18.4	146.7	47.8	48.9	33.8	36.7	44.1	13.4
Dec 2008	9.4	42.5	14.3	149.8	45.2	42.1	32.2	39.0	42.9	15.0
Dec 2009	33.3	42.3	15.0	164.5	48.5	51.0	31.9	46.4	52.1	12.2
Dec 2010	38.9	39.6	13.1	168.3	47.3	58.2	31.3	43.6	54.4	13.6

Source: AsianBondsOnline (2012a)

Compared regionally, Japan's market of government debt accounts for over 75 % of the overall market. This results from it's large share of regional GDP as well as it's incredibly high amount of government debt. China, Japan and Korea together accounted for 95 % of the total market in 2010. When taking a look at liquidity, most markets fared well. Table 3.2 shows two measures of liquidity in the East Asian government debt markets.

Table 3.2.: Liquidity in the East Asian Government Bond Markets (2011)

	CN	HK	ID	KR	MY	PH	SG	TH	VN
Government Bid-Ask-Spread	4.00	4.70	32.90	0.70	3.30	5.30	3.80	3.30	33.50
Government Turnover Ratio	0.63	18.98	0.34	1.16	1.08	0.62	0.50	0.58	0.64

Source: AsianBondsOnline (2012a) and AsianBondsOnline (2011)

When comparing liquidity measures Korea overall has the most liquid markets with the lowest bid-ask-spreads of all countries in the East Asian region. This probably stems from the fact that Korea is the only country that managed to successfully establish a centralized trading of government bonds through the Korean Exchange (KRX). Even though China, Hong Kong, and most recently Singapore tried to establish such an exchange, Korea's is the only one that sees high volumes of trade. (ADB 2012a, Vol. 1, Part 1, p. 10)

Except for Vietnam and Indonesia the other markets overall also have liquid markets with only minor bid-ask-spreads. One particularity that stands out is the incredibly high turnover ratio of Hong Kong government bonds. This results because government bonds

are used in the Hong Kong exchange fund, which is used to actively manage the Hong Kong currency board. The low Chinese government bond turnover-ratio is probably due to the fact that Chinese banks are required to hold large amounts of reserves, as reserve requirements are an important tool for monetary policy by the PBC. Unfortunately the dataset does not include the Japanese government bond market.

Vietnam and Indonesia are the countries most lacking behind in bond market development. As the size of their markets, indicators of liquidity are remarkably low. Bid-Ask-Spreads are roughly 10 times higher than it's Malaysian counterpart. And Indonesia also has the smallest turnover ratio of the region. Even though historical data on government bond liquidity for most countries is only available since 2005, a modest improvement in turnover ratios throughout the region can be observed. Significant development of bid-ask-spreads could also be achieved in the Philippines, that stood at 47.5 in 2000 and was down to 5.3 in 2011. Indonesia's spread also closed down from 100 points in 2000 but increased again after reaching a low of 16.9 in 2006. (ADB 2006, 30)

The investor base in government bonds consists primarily of long-term oriented institutions. Figure 3.2 denotes the investor profile for six East Asian countries. The major participant in most markets are banks, especially in the Chinese market, where over 70 % of the investors are local banks. Except for Indonesia, which issues a large amount denominated in US dollar, roughly 70 to 80 % of the market is made up by long-term oriented institutions. As these investors tend to hold their assets until maturity, liquidity in the secondary market is potentially low.

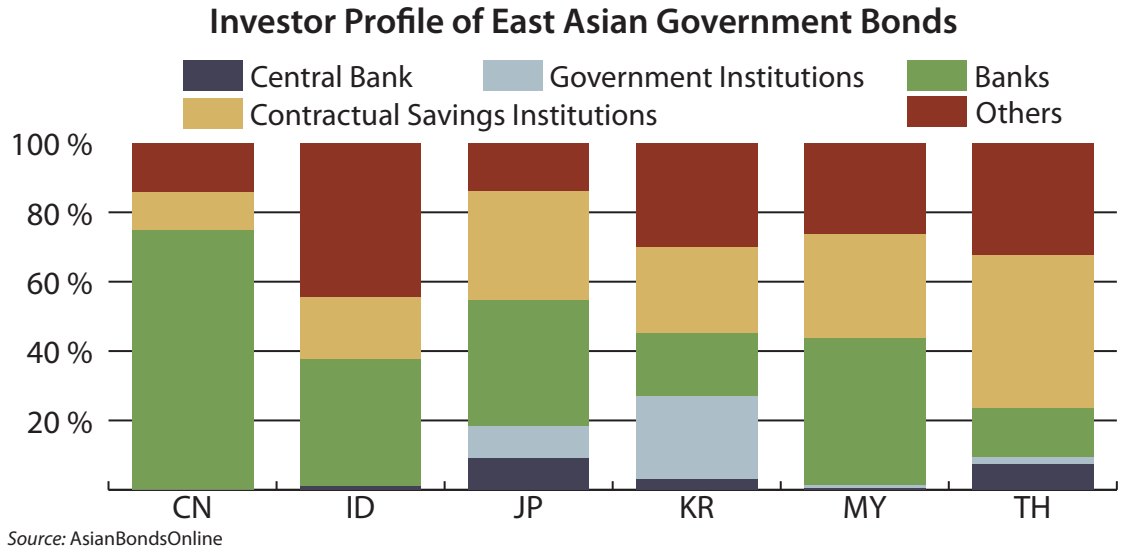


Figure 3.2.: Investor Profile of East Asian Government Bonds

Overall government bond liquidity improved in the region. But although transaction costs decreased over the last decade, turnover-ratios only developed modestly. As most investors in government debt, such as local banks and pension funds, follow a buy-and-hold strategy, liquidity in the secondary market can still be improved.

3.1.2. Yield Curve Development

Section 2.2.1.2 showed that government bond markets are believed to have several spill-over effects on the overall economy, the most important spill-over effect beeing an established yield curve. When such a yield curve exists in an economy investors can gain information on how the market percepts future interest rates and prospects of growth. In order to have a reliable yield curve that provides valuable information to investors it is necessary for governments to issue bonds on several different maturities. For yields to be meaningful sufficient liquidity in the markets is also necessary, otherwise obscurities in the yield curves, such as sudden jumps on a particular maturity, may occur.

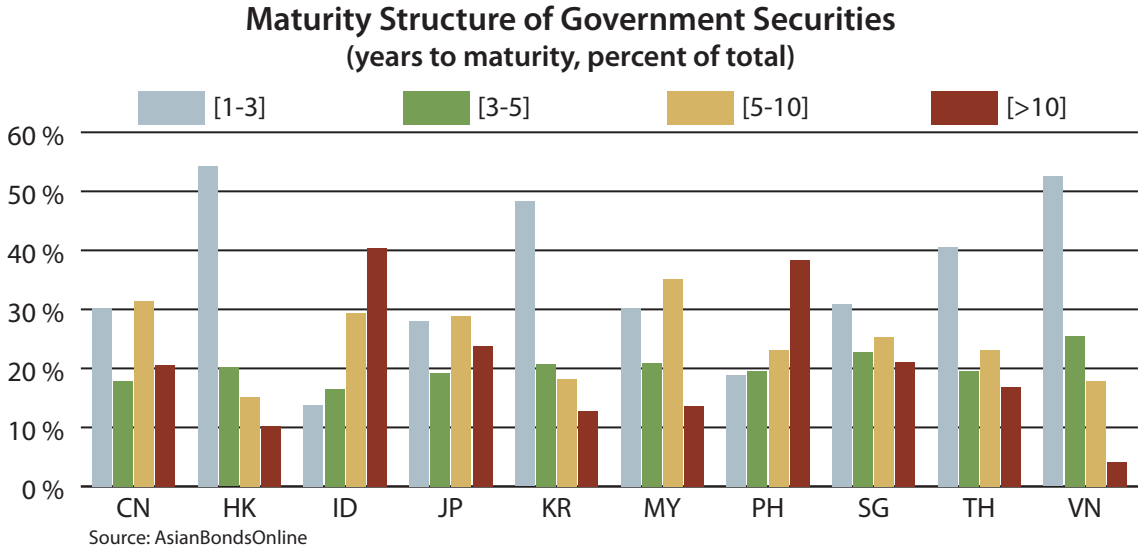
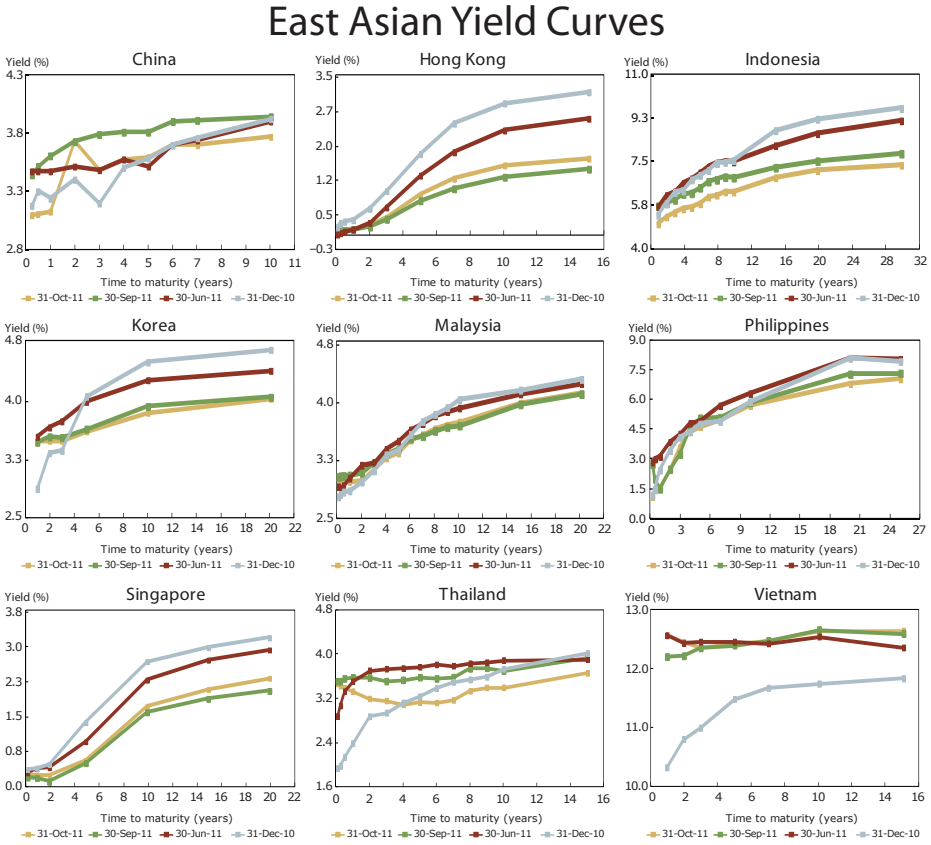


Figure 3.3.: Maturity Structure of Government Securities as of September 2011

Figure 3.3 depicts the maturity profile of government securities. It reveals how East Asian governments finance themselves. For most countries the focus lies on short-term finance. Korea and Malaysia issued only about 13 %, Hong Kong only about 10 % of their debt with a maturity over 10 years. Since the liquidity in these markets is higher than in most other East Asian markets, this should not impede the establishment of a yield curve. Vietnam issued not even 3 % with this maturity. Taking into consideration

that the Vietnamese market is not yet very liquid this should provide an opportunity for the development of a more efficient yield curve in the country.

Overall every country in the region managed to establish a yield curve, although low levels of liquidity remain an issue in some maturities and economies. Figure 3.4 depicts the yield curves of countries in the East Asian region. The yield curves of China and the Philippines experienced the obscurity of jumps in the the covered year. With sufficient liquidity, the yield curves should smooth and provide more stable and reliable information to investors.



Source: AsianBondMonitor November 2011

Figure 3.4.: Yield Curves in East Asia

The benefits of such a curve on the economy seem to not to be distributed evenly. The benefits of a yield curve as a predictor diminish in countries that are very small or have close financial linkages to economies like the United States. This could be the case when a country has a form of currency peg or managed floating to the US Dollar. Mehl (2006) finds that the domestic yield curves of Korea, Malaysia, Philippines and Singapore generally have at least at one horizon (short-, medium- or long-term) some

predictive content on growth or inflation. He also finds that the US yield curve has an influence on domestic growth in these economies[1] and, except for the case of Singapore and Korea, has a causal relationship with the domestic yield curve (Mehl 2006). Since the study had to deal with the fact that the domestic yield curves in Asia had not been fully established in 2006 and there had been issues with lacking liquidity in those markets, the positive effects of the Asian yield curves is expected to be even more significant today. Since then government bond markets have deepened and yield curves developed in the East Asian region. Today the East Asian yield curves, except for a few cases of certain maturities, are able to provide valuable information to investors in the region.

Hypothesis I: The development of the government debt markets has positive externalities on the corporate bond market

As we will determine the major factors of corporate bond market growth in East Asia (chapter 4), the hypothesis that the development of government bond market has a positive effect on the development of the corporate bond market will be tested.

3.1.3. Monetary Sterilization

The biggest part of the overall tremendous growth in the East Asian bond markets can be attributed to a stellar rise in outstanding government securities. The government bond market has continuously outgrown the corporate bond market (as can be seen in figure 3.1). To assess the overall state of the government bond market a few important questions come to mind: Why did the government debt markets grow so rapidly over the last decade, even managing to outgrow the already high GDP growth? And why did government debt double in countries like Korea and Singapore, even though these countries had a positive budget balance for most of the decade? This section will show that the sterilization efforts of East Asian central banks were responsible for a large part of bond market growth in East Asia.

It is argued, that a large part of East Asia's government bond market growth was driven by the sterilization efforts of central banks when accumulating foreign exchange reserves. These sterilization efforts were necessary to not succumb to high inflation rates induced by persisting capital inflows into the region. Capital kept flowing into

[1] Which certainly stems from the fact that many Asian countries rely heavily on exports to the United States.

East Asia (except for a short period during the global financial crisis) because central banks avoided the appreciation of exchange rates and instead built up massive foreign exchange reserves. To avoid inflation, most of these foreign exchange accumulations were sterilized by the purchase of government securities or issuance of central bank bills. All these attempts drove government bond market growth in the region. But continuous sterilization efforts can have serious negative effects on the economy.

Since the AFC, East Asian countries have built up substantial foreign exchange reserves (as can bee seen in table A.3). To a certain extent, this build-up served the purpose of insuring against another event like the AFC. But by now, there is a large consensus that the amount of exchange reserves is well beyond what is considered common or plausible to avert another crisis. Park and Estrada (2009) even came to the conclusion that East Asian foreign exchange reserves are excessive. One major effect of this build-up is that the appreciation of many Asian currencies has been mitigated. Large amounts of capital inflows (often aggravated by low exchange rates) induce a rise in liquidity in the domestic financial system. As this can lead to inflation in consumer or asset prices, central banks often face a potential conflict with their policy objective of a stable or managed exchange rate. They overcome this dilemma by draining liquidity from the domestic financial system. Löffler et al. (2012, 8) state that no later than 2001, all central banks in the region had to deal with superfluous liquidity in their domestic financial systems, due to the accumulation of foreign exchange reserves.

In section 2.2.1.1 we mentioned three different ways for central banks to cope with excessive liquidity in the financial system: By either increasing reserve requirements of domestic banks, by using the market-based instruments of issuing central-bank bills themselves or by coordinating with the government to sell government securities.

Table A.4 gives an overview of the instruments used in East Asia to sterilize the accumulation of foreign exchange reserves. Except for China, most central banks have resorted to open market operations as the primary technique of their choice. China uses a combination of bank reserve management and central bank bills to manage the monetary base instead. Indonesia and the Philippines also resort to such a combination, but overall favor market-based instruments (Löffler et al. 2012).

As all bonds that are issued either directly by the government, the local governments or the central bank, are listed as government bonds, the efforts of sterilization have effectively driven a large part of government bond market issuance in East Asia.

Hypothesis II: Sterilization efforts are driving bond market growth in EA

As we will determine the major influences on bond market growth in East Asia in chapter 4, the hypothesis that central banks' sterilization efforts were an important factor in government bond market growth will be tested.

Korea is an example of a central bank issuing primarily bonds in order to sterilize liquidity. Figure 3.5 depicts the development of the market. The market for monetary stabilization bonds, that are issued by the Bank of Korea in order to manage the money supply, grew slower (235 % from 2001 to 2011) than the overall government bond market (332 % from 2001 to 2011). But the market for stabilisation bonds still accounted for a third of the market in 2011 (down from 40 % 10 years earlier) and hence is still a major factor in the overall market. The reversal of capital flows and the extensive use of fiscal policy during the global financial crisis have certainly contributed to this recent development.

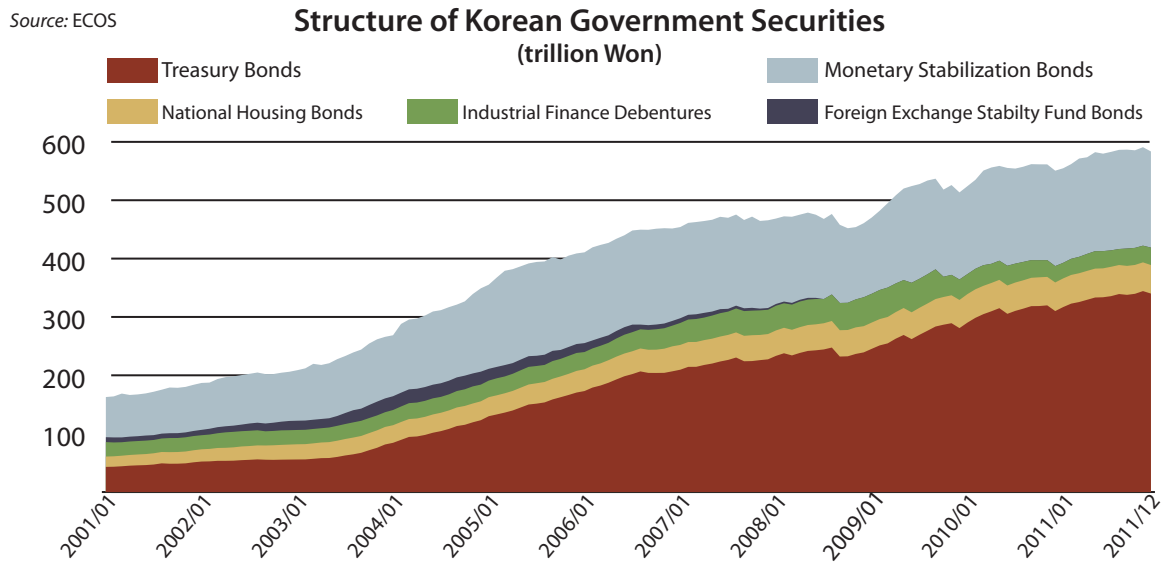


Figure 3.5.: Korean Government Securities by Type

As mentioned, China uses a combination of measures for monetary sterilization. Greenwood (2008, 209) shows that the reserves of banks deposited at the People's Bank of China (PBC) and the issued stabilization bonds are roughly the same as China's foreign exchange reserves. Since the markets for central bank bills have been a major part of overall government securities growth, it is necessary to assess what implications these development have on the economy.

Costs and Benefits of Sterilization Bonds

The immediate benefits of sterilizing the accumulation of foreign exchange reserves are clear: On the one hand the build-up of reserves is insuring the countries' currencies against a sudden depreciation. That the reserves of East Asian countries are considered to be excessive, has already been mentioned. On the other hand the intervention in the foreign currency market keeps the East Asian currencies from appreciating. This gives the exporting sector in the region a competitive edge. Without sterilization these policies would lead to inflationary pressure, that could have damaging effects on the economy.

The growth of the government bond market can have external effects on the economy. It has already been shown, that an established yield curve can have positive effects on the economy. Nyawata (2012) however notes that these benefits can only be reaped when primarily treasury bonds (T-bills) are used for sterilization. As this is only one way of sterilizing, the usage of T-bills requires either an already well-developed market (so that large amounts of selling do not impact the market) or close cooperation between the government and the central bank. As most markets were only little developed in East Asia when central banks had to begin their sterilization efforts, countries like Korea resorted primarily to the use of central bank bills and China to bank reserves. Singapore's government managed to coordinate with the Monetary Authority of Singapore (the central bank) and used T-bills for sterilization (Löffler et al. 2012).

Although the issuance of T-bills or central bank bills contributed notably to the growth and development of the East Asian government bond market, there are a number of downsides to this development. First and foremost, it should be mentioned that the underlying reserve accumulation leads to a miss-allocation within the domestic economies as well as the global economy. Because the accumulation impedes domestic spending and instead directs it towards the foreign exchange reserves. Additionally, it results in a miss-allocation of global trading patterns and favors the domestic export sector at the cost of domestic demand (Greenwood 2008, 210).

Mohanty and Turner (2006, 49) also note that there may be negative externalities by the rapid growth of virtually risk-free government securities. The large supply of these papers could crowd-out private sector issuance and thus dampen the growth of the corporate debt capital market. In countries where there is only little initial public debt, the issuance of T-bills could, in contrast, have a positive effect on the economy.

With the AFC, the fact that regional investments were flowing overseas and were being

recycled back into the region came under scrutiny. And the theory that the development of the East Asian bond market can be a possible solution for this problem was advanced (see for example Corbett (2010, 95)). In part the government bond markets in East Asia did not grow because investors suddenly started to invest heavily within the region instead of overseas. But because central banks actually sterilized the assets that were recycled back into the economy. It should be considered that the massive growth of regional debt markets has partially been driven by central banks. In this case the growth of the government local bond market does not express the solution to a problem, but becomes a symptom. The critique remains valid, that private savings that are invested in a functioning regional bond market would be more profitable for the region than the public savings (foreign exchange reserves) that are invested in low-yield foreign assets. As foreign exchange reserves are usually only invested in highly liquid and low-risk assets it is casted into doubt whether the sterilization is profitable overall.

By giving out central bank bills or by issuing T-bills to be sterilized, either the central bank or the government itself has to pay a coupon for the issued bonds. These are the public costs that arise from the holding position of foreign exchange reserves. These are called the "costs of carry". Since the central bank in return is also investing its exchange reserves in secure high-liquidity foreign assets, the yields of these assets can offset the costs of carrying (Mohanty and Turner 2006, 44-46). As an example Figure 3.6 shows the spread between the yield on US T-bills and the government securities[2] for China, Japan and Korea.

As can be seen the yield spread for both the Chinese and Korean central bank bills are positive. This indicates that the central bank will have a balance sheet loss from issuing central bank bills and in turn holding US T-bills as foreign exchange reserves. For Korea, this also shows that a managed exchange rate and capital mobility is colliding with the interest of an independent monetary policy (i.e. setting interest rates). As China has imposed capital controls independent monetary policy should not conflict with the policy of a fixed exchange rate. Japan's yield spread is about zero in the short-term indicating only little costs of carrying. A prolonged spread on domestic interests payed to sterilize and the income from foreign assets can weigh heavily on a central bank's balance sheet and may thus impose high public costs. Table A.4 indicates the years in which East Asian central banks had to take losses on their balance sheets.

Independent central banks usually try to avoid losses because they avoid to be in

[2]Central Bank Bills have, as T-bills usually a very similar yield as government securities.

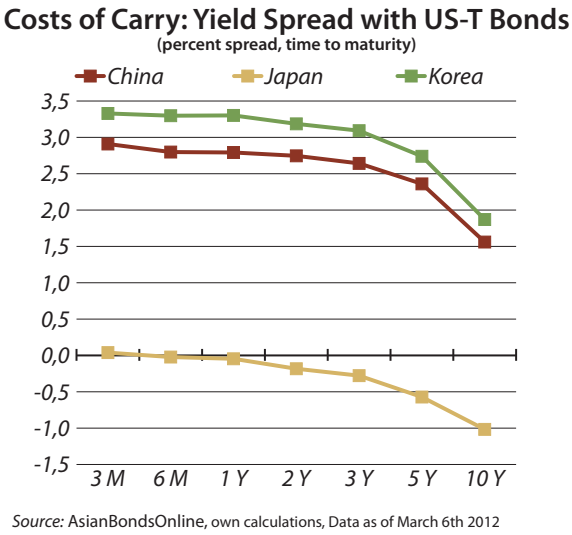


Figure 3.6.: Exemplary Costs of Carry

need of a recapitalization from the government. As it could have substantial impact on the independence of a central bank, because it constitutes a source of conflict between the government and the central bank and damages the central bank's reputation. By needing new capital ultimately the independence of a central bank can be challenged by such losses. (Löffler et al. 2012, 1, 12)

Another threat of balance sheet losses comes through the possibility of appreciation of the domestic currency. By the revaluation of foreign exchange assets, the central bank would suffer a loss that could be a substantial part of GDP. All these losses eventually have to be be borne by the public: Either directly, when the government pays coupons for the sterilized government securities. Or indirect, when the central bank has to be recapitalized (Mohanty and Turner 2006). Nyawata (2012) argues that it is less hurtful when the losses are borne directly by the government. East Asian central banks had to take losses several times in the last decade, as can be seen in Table A.4. Löffler et al. (2012) cite the example of the Bank of Korea:

> For instance during the period from 2004 to 2007 the Bank of Korea accumulated interest rate losses of roughly 0.5 percent of GDP. In the same period the revaluation adjustment account increased to a book loss of 1.7 percent of GDP. The revaluation account records valuation gains and losses accruing during a predefined period until the gains/losses are realized. (Löffler et al. 2012, 16)

This example shows, that the growth of the government securities market by the issuance

of monetary stabilization bonds can be a burden to the economy. When the governments or the central banks decide to unwind the sterilized liquidity, the suppressed inflation may start to emerge. The result could be a similar scenario as Malaysia in the mid-1990s: Increased liquidity induces rapid credit growth and inflationary pressure. These developments could additionally be exaggerated by inflows of hot money that anticipate an appreciation of the exchange rate (Greenwood 2008, 212-213).

Central bank bills and government bonds used to sterilize currency interventions have greatly shaped the East Asian bond market. They are responsible for a large amount of the growth in these securities and they pose the risks of losses to governments. They also skewed the maturity structure towards short-term bonds. Central banks issue short-term bonds more favorably for sterilization, as it is easier to unwind sterilization by letting the bonds mature and because it is more costly to issue longer term bonds (due to a higher long-term interest rate). A part of the skewing towards short-term maturity that was observed in Figure 3.3 thus can be explained by monetary sterilization.

Also Hong Kong's sudden jump in outstanding government bonds over GDP in 2009/2010 can be attributed to the coordinated efforts of the Hong Kong Monetary Authority and the Hong Kong government to sterilize liquidity that was induced to avoid an appreciation of the Hong Kong Dollar (Chen 2009). That most central banks in the region used bonds to conduct monetary policy shows that the government securities market did not only develop quantitatively but also developed qualitatively in the last decade. It shall however again be mentioned, that these sterilization methods can also turn out to be a burden on the East Asian economies.

3.1.4. Financial Stability

While the usage of government securities has the least disturbing effects on the economy, it still can be a source of financial instability in the region. Two forms of financial instability are of importance when dealing with the government bond market, possibly unsustainable macroeconomic policies and flaws in the structure of international financial markets.

Unsustainable Macroeconomic Policies

The first potential source of financial instability at hand is excessive government debt that would manifest itself in the government bond market. The only country in East

Asia with massive public debt is Japan. In a global context, only Zimbabwe has a higher public debt to GDP ratio. Nevertheless Japan is able to pay only a very small yield on its government bonds. The persisting political influence in the Japanese postal savings system is the major determinant for this circumstance. The postal savings system was primarily used to channel savings towards economic development projects and served as a "second budget" for the Japanese government. Since the Japanese government bond market grew rapidly in the last two decades the postal savings system remains of crucial importance to Japanese policy-makers. Although there has been persisting pressure for reform of the postal savings system, the Japanese government debt would quickly become unsustainable when yields would rise due to a reform (Amyx et al. 2005).

This dependence represents a form of financial repression as described in section 2.2.1.1. As actors are forced to hold low-yielding government assets instead of investing them more efficiently, the economy is suffering a welfare-loss. Additionally, the artificially low yield of Japanese government bonds is keeping the Japanese government from being forced to reform its public finances and lower its public debt to sustainable levels.

Another potentially destabilizing macroeconomic policy is the persisting build-up of foreign exchange reserves and the accompanied sterilization of excess liquidity. It has already been shown that these policies can cause high losses to the economy, potentially threaten central bank independence, disturb domestic financial markets and skew the economy towards investing instead of consuming. Mobility of capital, in the long run, is incompatible with the objective of prolonged reserve accumulation and sovereign monetary policy (Mundell 1963). Sterilization is hence only postponing the adjustment of the domestic price level or the exchange rate (Greenwood 2008, 214). Sterilization can eventually be impossible to achieve when balance sheet losses become unmaintainable. The unwinding of sterilization and the readjustment of the economy can have wide-ranging negative effects on economic growth in the domestic economy. This is certainly a threat to East Asian economies. And with the maturing of central bank bills (to unwind sterilization measures), which usually have a very short maturity, growth in the government bond market is dampened. In this sense, we can make certain predictions about future government bond market growth. When central banks in the region start to unwind sterilization and stop to further accumulate foreign exchange reserves, they will not roll over sterilization bonds anymore. This will be releasing bottled up liquidity into the financial markets and will certainly cause a receding government bond market[3].

[3]In order to inject liquidity, the PBC has already started to unwind some of its sterilization measures.

Original Sin

An issue with government debt for developing countries is the problem termed "original sin", it describes "a situation in which the domestic currency cannot be used to borrow abroad or to borrow long term, even domestically." (Eichengreen and Hausmann 1999, 3). As the Japanese Yen is one of the five currencies that dominate the international markets Japan is naturally free of original sin, but the other East Asian countries may all suffer from original sin. With the increasing internationalization of the Chinese Yuan, China may also be redeemed. Two major empirical works on original sin have been published: Eichengreen et al. (2005) is the original empirical application of the original sin hypothesis, it covers the timespan from 1993 to 2001. Hausmann and Panizza (2011) updated their previous research for the period up to 2008. Table A.2 depicts the results of Eichengreen et al. (2005) for the periods before and after the AFC[4]. As can be seen, Japan is the least effected country by original sin, whereas most other East Asian countries have nearly all their public debt denominated in a foreign country. Prior to the AFC, even Singapore, a major financial center, was not able to issue debt in its own currency. This led to the currency and maturity mismatches experienced during the AFC. After the crisis, the effects of original sin started to recede, as can be seen in Table A.1. This trend occurred internationally, with an even stronger effect on Asian than Latin American countries. Nevertheless, developing countries still find it hard to finance themselves internationally without exposure to either a maturity- or currency mismatch. According to Hausmann and Panizza, the only country that has been redeemed from original sin in Asia is Thailand. It is able to finance more than 15 % of its public debt internationally in its own currency (Hausmann and Panizza 2011, 32). But looking at data from foreign holdings in LCY bond markets, both Malaysia and Indonesia were able to convice foreign investors to buy domestically denominated government securities. A fourth and even a third of government bonds were held by foreigners in Malaysia and Indonesia respectively (see Figure A.3).

Instead of financing internationally, the majority of Asian countries increasingly relied on their domestic markets for finance. This could as well mean redemption from original sin, because with the opening-up and integration of capital markets it gets harder to distinguish between foreign and domestic debt. Since all actors are participating in the

From July 2010 to June 2012 central-bank-bills and -bonds outstanding decreased by 63 %.

[4]OSIN1 and OSIN3 are indicators to estimate the degree of original sin. Zero means that there is no external funding in foreign denominated securities and loans. One depicts that there is solely funding in a foreign currency. For a detailed description see Eichengreen et al. (2005).

same market and the ultimate holder of debt cannot be definitely identified (Panizza 2008). But Hausmann and Panizza (2011) find that this is not case. They identify that instead of being able to convince foreign investors to participate in the domestic markets, developing countries became increasingly abstinent and borrowed less in the international markets and accumulated large amounts of foreign exchange reserves in order to decrease the possibility of a currency mismatch.

Additionally, when resorting to external finance, Asian countries have to borrow mostly short-term when using the local debt markets. As was shown, the maturity structure of many East Asian countries is dominantly short-term oriented. Only Indonesia and the Philippines were borrowing over 40 % of their debt in a horizon over 10 years[5]. Korea, Hong-Kong and Vietnam even had to finance about half of their debt with a maturity of one to three years. A part of this can be explained by the short-term nature of monetary sterilization policies, but this may also continue to indicate that many Asian countries still face the danger of a maturity mismatch. As Eichengreen (2004) notes "original sin" is a structural characteristic of international markets that can not be avoided by domestic actors or policies.

3.1.5. Summary

Until the break-out of the global financial crisis (GFC), the growth of East Asian bond markets was primarily driven by the sterilization efforts of central banks. The market grew by 242 % between 2001 and September 2007 (20 % annualized). With the global financial crisis, the reversal of capital flows reduced the need for sterilization. As the economy was suffering from a massive reduction in world trade, fiscal policy was used to support the economy. This led to a boost in bond market growth. In absolute terms the LCY government bond market grew by 52 % between September 2007 and 2010 (15 % annualized). In the wake of the GFC, the market shrank in terms of size to GDP in China, Indonesia and the Philipines.

The overall state of development in the market can be assessed quite positively. All East Asian countries managed to establish a domestic local currency bond market for their government securities. Although there remains potential for market development (for example by trying to skew the issuance of government bonds into longer-term maturities), the experience of the global financial crisis shows that East Asian countries were

[5]Indonesia only started to switch it's maturity structure to long-term finance in mid 2010 and has been issuing US-dollar denominated debt for this maturity

able to use the domestic bond market to finance fiscal policies smoothly. East Asian markets also started to be liquid enough to establish a benchmark yield curve that can have positive externalities on the economy. But room for the development of market liquidity still remains in the whole region.

With reasonable liquidity in the market central banks are also able to use the government bond market to fine-tune the monetary supply (except for Indonesia and China who still resort heavily to reserve requirements as a tool of monetary policy). The major downside of government bond market growth is that a large part has been induced by central bank's efforts to sterilize the liquidity resulting from the accumulation of foreign exchange reserves in the region. As most countries (with the most notable exception of China) have been using market-based techniques for sterilization this drove the growth of government securities. The downside of these sterilization bonds is that they could impose sizable costs on the economy and threaten central bank independence. Sterilization efforts may thus become a source of financial instability in the region.

Japan is the only country facing the problem of excessive government debt, a special form of financial repression is preventing these unsustainable debt levels to cause serious problems. As there seem to be more efficient capital allocations in the Japanese economy the policy of holding postal savers captive buyers of government bonds certainly leads to a welfare loss in Japan. With the exception of Japan, excessive debt is no problem in the region. Another possible source of instability is the problem of original sin for many East Asian countries. Next to Japan, only Malaysia and Indonesia were able to borrow in their own currency from foreign investors. As long as the countries in the region have large saving rates this may not be a source of instability.

The development of the regional government bond market is assessed positively in the last decade, although there remains potentials for further developing market liquidity. There are numerous potential beneficial externalities to the economy. The major potential burden comes with the immense sterilization efforts of East Asian central banks. With a widening yield-spread between the US, EU and Asia, this may increasingly effect the Asian economies.

3.2. The Corporate Bond Markets in East Asia

Whereas the East Asian government bond markets grew rapidly over the last decade, corporate bond market growth has been more modest. The following sections will ana-

lyze how the corporate bond market, its liquidity and its role in financial intermediation in East Asia developed over the last decade. As concerns for financial stability are a major driving force of governments' attempts to develop the corporate bond market, the last section will review the experiences of the global financial crisis, that was the first major test to East Asian corporate bond markets.

3.2.1. Size and Liquidity

In absolute size the market grew by 95 % from December 2000 to December 2010 (annualized 6.9 % growth). As GDP also grew rapidly in this period, the ratio of the corporate bond market to GDP actually declined from 21.4 % in 2000 to 17.6 % in 2010. The corporate bond market thus was not able to mimic the rapid development of the government bond market on a regional level.

Table 3.3.: Corporate Bond Market as % of GDP.

Date	CN	HK	ID	JP	KR	MY	PH	SG	TH	VN
Dec 2000	0.3	27.6	1.4	24.0	48.8	35.2	0.2	20.9	4.5	0.0
Dec 2001	0.3	29.2	1.1	23.3	54.2	41.1	0.1	30.4	4.9	0.0
Dec 2002	0.6	32.4	1.2	21.7	53.2	34.2	0.1	29.6	5.1	0.0
Dec 2003	0.8	35.4	2.3	19.8	47.9	36.6	0.3	30.5	7.7	0.0
Dec 2004	1.3	37.6	2.6	18.4	42.3	31.5	0.7	30.6	7.3	0.0
Dec 2005	2.8	38.8	2.1	17.5	42.1	33.0	1.0	28.8	8.1	0.0
Dec 2006	3.8	41.8	1.8	16.6	45.1	33.0	1.7	28.9	11.1	0.0
Dec 2007	4.3	38.8	2.0	16.8	50.8	35.9	2.2	28.8	11.0	0.5
Dec 2008	5.6	33.3	1.5	17.3	55.0	35.5	2.7	29.0	11.0	0.7
Dec 2009	9.1	35.4	1.6	19.0	62.5	42.4	4.4	27.8	13.2	1.2
Dec 2010	10.6	34.0	1.8	18.8	63.1	40.4	4.3	27.9	12.9	1.8

Source: AsianBondsOnline (2012a)

The development of the market has also been very diverse withing the region. Table 3.3 shows the development as a share of GDP in the respective markets. Whereas China's, Korea's and Thailand's market grew rapidly, Japan's market declined significantly while the markets in the rest of the region only outgrew GDP modestly.

A major obstacle to the development of the East Asian corporate debt markets is the lack of sufficient liquidity in the secondary markets. Bonds usually have the fundamental benefit of being tradable securities. Investors who need immediate liquidity could theoretically sell their bonds in the secondary market instead of holding them until maturity. This requires an established secondary market with sufficient liquidity. East Asian countries were able to establish such a market for government securities.

Even though there remains room for further enhancing liquidity in these secondary government debt markets, participants in the market can count on sufficient liquidity. In contrast to the government securities market, the East Asian countries were not able to mimic this development in the secondary markets for corporate debt.

Table 3.4.: Liquidity in the East Asian Corporate Bond Markets (2011)

	CN	HK	ID	KR	MY	PH	SG	TH	VN
Corporate Bid-Ask-Spread[1]	6.90	28.10	70.00	1.70	8.20	52.90	19.00	9.90	103.10
Corporate Turnover Ratio	1.23	0.13	0.11	0.08	0.18	0.12	-	-	0.04

[1] Spreads for primary issuance.
Source: AsianBondsOnline (2012a) and AsianBondsOnline (2011)

The two indicators for the East Asian government and corporate bond markets can be seen in table 3.4. Bond turnover ratios are – with the exception of China – significantly larger in the government bond market and particularly small in the corporate market. The indicators show that the corporate debt markets lack breadth – only a small fraction of bonds is being actively traded. Asian institutional investors instead prefer a buy-and-hold strategy which leads to poor liquidity in these markets and a large liquidity-premium. The bid-ask-spreads are already high for primary issues in the corporate bond markets, and still higher than off-the-run government bond bid-ask-spreads (not in table). There is also a lot of heterogeneity throughout the market. Whereas Vietnam, Indonesia and the Philippines are at the lower end of the liquidity spectrum, China, Korea and Malaysia are the most liquid markets in the region. But the lack of liquidity is still a pressing issue in the whole region. This is why according to the ADB Bond Market Liquidity Survey 2011, participants throughout the East Asian corporate debt markets think that the diversification of the investor base is one of the most important issues in the development of the market. As "in many cases corporate bond liquidity is limited to the months immediately following issuance" (AsianBondsOnline 2011, 12).

A major reason for this lack of liquidity is the absence of a diverse and active investor base in the East Asian markets. Detailed data about the investor base is scarce for the corporate bond market in the region, but it is dominated by banks, pension- and insurance funds, that hold securities mostly until maturity. In China, banks account for over 50 % of the investment in the corporate bond market; insurance and other funds account for another 40 % of the market. In Korea, the investor base is far more diverse, banks account for only 21 % of the investor base and pension- and insurance funds for another 32 % (ADB 2011).

In the last decade there has been only little improvement in liquidity. Although

liquidity data over the last decade in the corporate bond market is patchy at best, turnover ratios have been stagnant throughout the region at a very low level, except for China. This is a serious issue for the market. The lack of liquidity significantly reduces the efficiency of the market, as investors have to price-in a liquidity-premium. Consequently, yields are increased and possible issuers crowded out. An increase in liquidity, especially through the diversification of the investor base is the most important challenge that East Asian corporate bond markets face.

Another aspect of the corporate bond market is the maturity of securities. Issuers face certain costs of issuance and have to oblige to given reporting criteria for participation in the public debt market. As these costs are fixed, they diminish relative to the maturity and volume of the bond. Issuing short-term debt is from this perspective more costly than issuing long-term debt. Bank finance is also a potent substitute for short-term lending and the bond markets are most efficient at providing large volumes of long-term finance (as in theory risk can be transfered easily by selling the bond). Figure 3.7 shows the distribution of bond maturity in East Asia. Again, a high degree of heterogeneity can be observed. Many markets are especially short-term oriented. In Hong Kong, Korea, Thailand and Vietnam over 40 % of all corporate debt is short-term. Notable amounts of long-term bonds are only issued in China, Malaysia and Singapore. Malaysia's market is the market skewed most towards longer maturities. This probably results from their large Islamic bond market and the long-term orientation of Islamic investors.

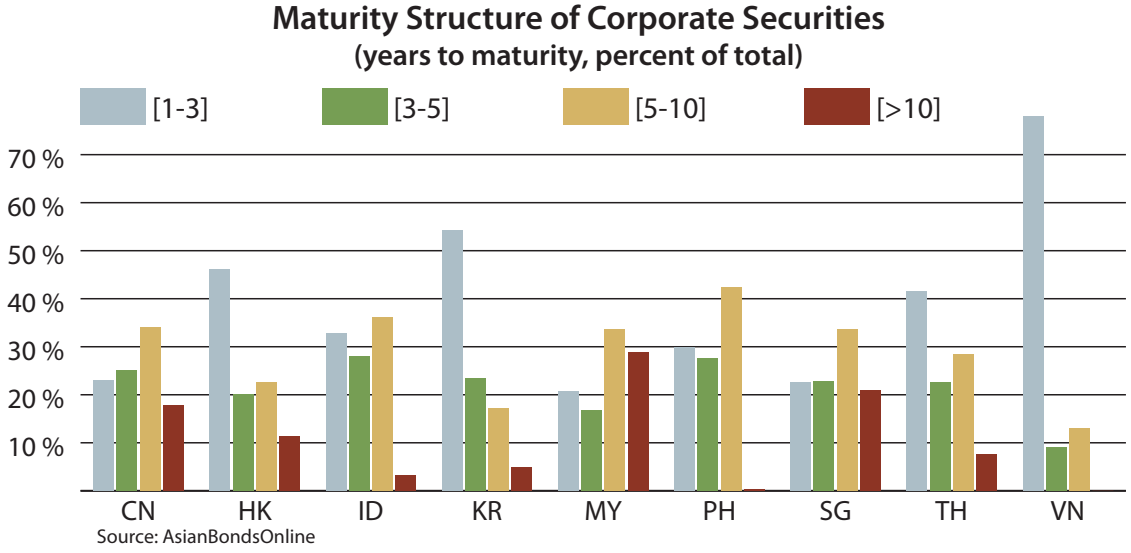


Figure 3.7.: Maturity Structure of East Asian Corporate Bonds

Finally figure A.5 gives an overview of credit rating distribution among internationally

rated corporate issuers[6]. The distribution is heavily skewed towards the investment grade level. This shows that only highly regarded and established firms are able to rely on the corporate bond market. Lower rated firms tend not to issue public debt.

3.2.2. Financial Intermediation and the Corporate Bond Market

Literature on Financial Intermediation in East Asia

As the vivid academic discussion, whether financial intermediation in general has a positive effect on economic growth, has recently been backed by empirical research, the question arises if the positive link between growth and financial development also holds for the East Asian region.

The little existing empirical literature for Asia and the East Asian region has been in line with both expectations from economic theory and empirical results for the rest of the world. Habibullah and Eng (2006) find a strong link between financial sector and real economy growth for Asian developing countries prior to the AFC[7]. Fase and Abma (2003) come to similar conclusions. Estrada et al. (2010) conducted the most recent study and not only find that increased financial intermediation and sophistication has a positive effect on per capita growth, but that the impact is relatively higher for Asian countries than for other developing countries. They also find that the structure of finance (the ratio of equity, credit and the bond market) does not seem to be important, but rather financial deepening as a whole. The positive reinforcing relationship between financial sector development and economic growth has found to be diminishing over the course of economic convergence (Fung 2009). Estrada et al. (2010) find that this effect led to a declining positive impact of financial sector development on economic growth in Asia. They conclude that markets have to switch gradually from mostly mobilizing savings into more efficiently distributing capital and managing risk. Financial development is thus still incomplete in Asia. And this finding also implies that sound financial institutions play a more vital role in this later stage of development, as they allow a more efficient distribution of capital. Recent empirical research has increasingly focused on the importance of sound and supporting institutions to guarantee and foster

[6]Note that the data covers the emerging Asian region, and does include issuances from India and Pakistan but not Japan.

[7]The countries include Indonesia, South Korea, Malaysia, Philippines, Singapore and Thailand among some other South-Asian countries. But it seems to be reasonable to side with Estrada et al. (2010, 43): "It would take a leap of faith to view a banking boom characterized by reckless lending and rapidly deteriorating quality of investment as financial development."

the functioning of the finance-growth nexus (Spratt 2009, 50-51).

Empirical research that deals with the specific effects of bond market development is scarce internationally and non-existent for Asian countries. But international evidence hints that bond market development can have an overly positive effect on the economy. Fink et al. (2003) find a bi-directional causality between bond- and real economy growth in Japan and supply-leading evidence for many other developed countries. A later study by Fink et al. (2009) finds no significant effects of financial development on developed European countries but a highly positive effect of financial intermediation growth in European accession countries. Bond market development also seems to have an outstanding growth enhancing effect in these emerging countries, even more important than other sources of finance. Further research for the East Asian region would be necessary, but it can be expected that bond market development would have a similarly positive effect on economic growth.

Capital Structure and the Bond Market in East Asia

Although East Asian corporate debt markets grew over the last decades, a closer look shows that relative to other sources of finance, bond market growth has been far more modest. Credit provided by the banking sector, together with equity, remained the most important source of finance in most East Asia countries. Bank credit was actually significantly outgrowing the economy in China, Hong Kong, Korea and Vietnam and significantly declined only in Indonesia, the Philippines and Thailand in the last decade (see table A.6 for detailed numbers). This indicates that bank-finance is still the most important form of finance for corporations in East Asia[8].

In contrast to bank debt, corporate bond market growth was more heterogeneous throughout the region (see table A.7 for detailed numbers). Markets that were already fully or partially functioning before the AFC, such as Hong Kong, Korea, Malaysia and Singapore, outgrew GDP by about 25 % in the last decade. Very small and non-existent markets, specifically the markets in China, the Philippines, Thailand and Vietnam kick-started their development. Most notably, China's and Thailand's corporate markets grew amazingly fast in the last decade. Japans corporate bond market declined in the last decade, probably signifying the still ongoing process of deleveraging in the economy. Indonesias market remained below 2 % of GDP almost throughout the entire decade,

[8] Although banking institutions increasingly turned to households as new clients for credit in many countries, such as China or Korea.

but as credit provided by the banking sector in Indonesia receded, the corporate bond market increased in relative importance.

These figures all show that bond finance remains only a small fraction of overall finance. It is mainly used by large established firms and has not yet nearly reached the same importance as in Europe or the United States. It has nevertheless been argued that East Asia has transitioned from the financing patterns prior to the AFC into a new market-based form of finance. For example, Rethel (2010) notes that "the role of banks as sources for new funds declined, at the same time as that of capital markets increased". This is only true for the largest and safest cooperations in East Asia. Rethel's conclusion is drawn upon aggregated data that depicts the domestic financing profile (see figure A.4). These numbers are computed by relating total bonds outstanding, bank debt and market capitalization. But this means that this figure depicts the financing profile of society as a whole and not specifically the financing patterns of cooperations. As has been shown (in section 3.1.3) total bonds outstanding have been heavily influenced by central banks' sterilization efforts of foreign exchange accumulation. These central bank bonds, as well as ordinary government debt, are skewing the financing profile towards bond markets.

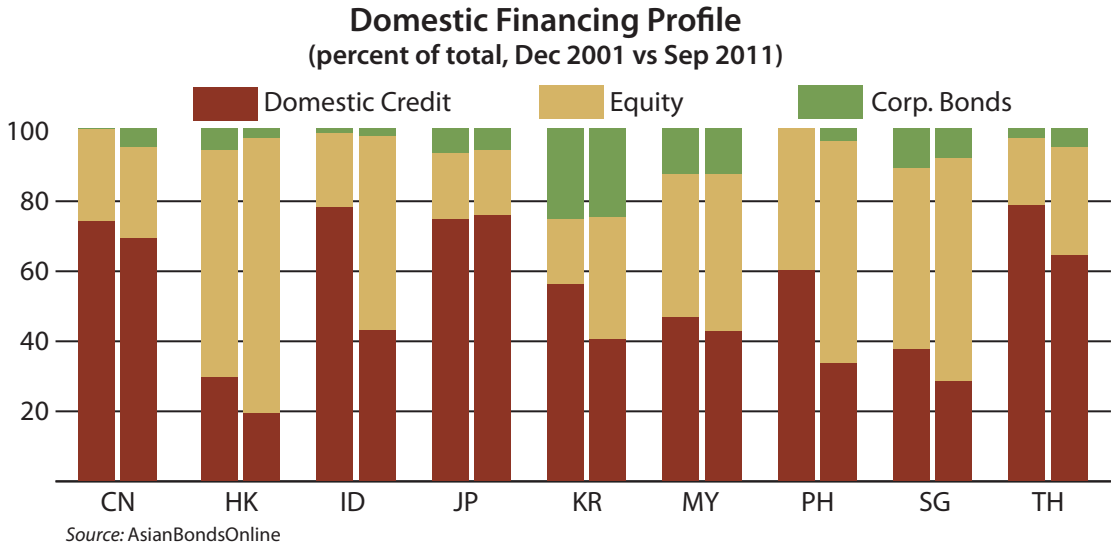


Figure 3.8.: Domestic Financing Profile, only accounting for Corporate Bonds

Figure 3.8 represents the same data, but without taking government bonds into account. This should give a more accurate picture of the importance of the corporate bond market[9]. The figure shows how heavily the large amount of outstanding govern-

[9]To depict an entirely correct corporate financing profile from macroeconomic data only the bank debt

ment debt skewed the importance of Japan's bond market. It also highlights the relative importance of the corporate bond market in Korea. This could partly be attributed to the chronically weak equity market (the so-called Korea Discount), that makes it more attractive to finance through bonds.

East Asia's Corporate Bond Market

The overview of the domestic financing profile of East Asian countries revealed, that no fundamental transformation in financing patterns towards bond markets has occurred in East Asia over the last decade. Although corporate bond markets have expanded rapidly, they were not able to outgrow regional economic growth despite plenty of reform efforts of governments and regional institutions. When compared, the regional corporate bond market was 21.35 % of regional GDP at the end of 2000, by September 2011 it even declined slightly to 17.56 % of GDP.

Despite rapid growth in some markets, the share of the market in most countries remained stable over the last decade. Japan's market declined, whereas China's market grew extraordinarily fast, especially in the last seven years. Vietnam and Thailand saw a little more modest, but still significant growth in their respective corporate debt markets. Korea's market managed to rebound after the market slumped in the wake of the 2003 credit-card crisis and grew rapidly in the last seven years, discovering even new highs of issuance volumes. The other ASEAN-5 countries, as well as Hong Kong saw stagnating or only moderately growing market volumes.

The Japanese corporate bond market is a special case in the East Asian region. It is the only market that has been shrinking over the last decade as a share of the Japanese GDP. A study by the Japan Securities Dealers Association (2010) finds several reasons for this development: Most importantly a combination of an environment with surplus liquidity and only little demand for external long-term funds in the private sector. At the same time the banking sector is being supported by various government measures that leads to a situation in which bank-lending is even cheaper than the issuance of corporate bonds. In such a situation Japanese firms increasingly use bank-debt for finance and only use the corporate bond market to roll-over their long-term debt instead of actively seeking new funding (Japan Securities Dealers Association 2010, 3-5).

The fastest growing market for corporate debt is the Chinese market. It especially

issued exclusively to the corporate sector as well as the equity raised by IPOs should be accounted. This however is beyond the scope of this thesis.

took off after the liberalization of the bond market that was marked by the introduction of the Medium-Term-Note (MTN) programme in 2005. MTNs are similar to corporate bonds, but with a shorter maturity and they can be issued more easily by borrowers. And by Chinese regulation, they did not have to be guaranteed by a bank and neither be approved by a regulatory commission, in contrast to ordinary corporate bonds in China. In 2008, this regulation was liberalized once again. Since then enterprises do not need mandatory bank guarantees for bonds anymore and are able to issue medium term debt more easily. The previous existing quotas for total corporate bond debt have also been removed. This liberalization drove the rapid growth in the Chinese corporate bond market (Jianxin 2009).

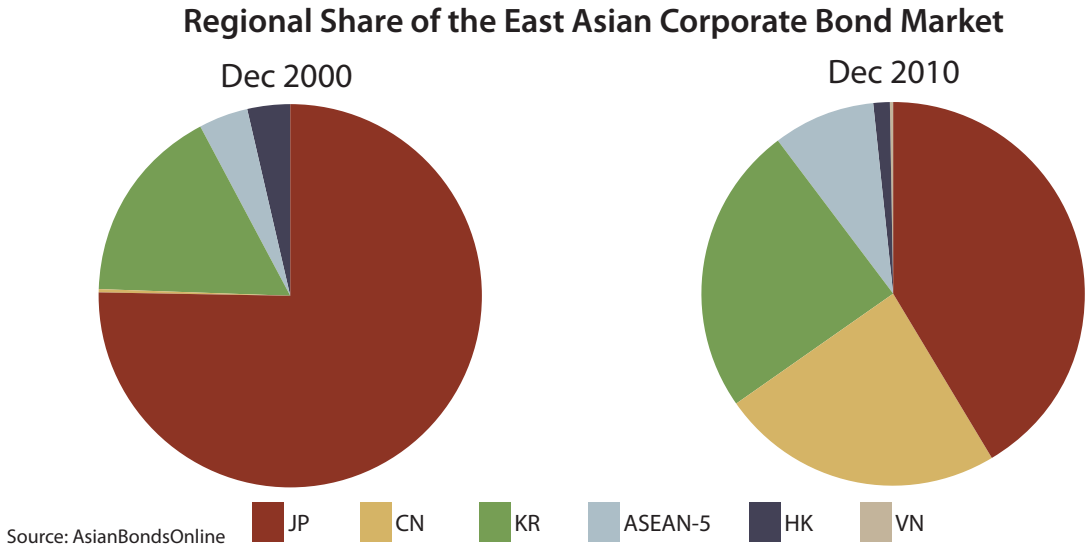


Figure 3.9.: Share of regional corporate bond market

While the Japanese economic activity was only slowly developing, and its bond market shrinking as a share of GDP, the fastest growth occurred in China and Korea. As the effects canceled each other out, the overall regional share of the CJK (China-Japan-Korea) countries remained roughly the same at about 90 % of the whole market. Figure 3.9 shows the change in the regional share of the market. While the CJK countries are not as dominant in the corporate bond market as they are in the government bond market (where their share is 95 % of the regional market), they still accounted for 88 % of the market in 2010. The rapid growth of the Korean and Chinese market was even offsetting the Japanese decline in market share.

But as China's and Korea's corporate bond markets grew rapidly in the last years, why did the remaining East Asian markets stagnate or develop only inertly in relation to

economic activity as a whole? Felman et al. (2011) analyze structural as well as supply and demand factors in order to answer this question for the ASEAN-5 economies. They found supply- and demand-side issues constraining the faster development of corporate bond markets.

After the AFC, firms became cautious again, the region's investment rate plummeted and increased only partially during the boom in the mid-2000s. The rational for decreased investment had different dimensions: Firms had to reduce their leverage, faced lower returns and greater uncertainty and had a perception that doing business was not as easy as prior to the AFC. Simultaneously, investors were more reluctant to lend money, instead investing their money in seemingly more safe options, mainly abroad. Companies, in turn, increasingly used their own internal cash generation to fund projects. Enterprises with international ties also heavily relied on their parent corporations for funding (Felman et al. 2011, 7-8, 29).

This surplus of savings over domestic investment is not only limited to the corporate sector but is equally present in the government sector. There it takes the form of current account surpluses and foreign exchange reserves as official investments. However in the wake of the GFC a certain reversal of this trend can be observed.

3.2.3. Financial Stability – The Experiences of the Global Financial Crisis

Whether or not the East Asian corporate bond market would be able to play the role of a "spare tire" remained doubtful for the first decade after the AFC. As has been shown, only government bond markets were able to be established in sufficient size and structure throughout the region. The global financial crisis (GFC) that started in 2008 was thus the first crucial test for the East Asian corporate debt markets. The effects of the crisis on East Asian countries was mostly transmitted through the channels of international trade inside the region. Stable, domestically induced growth dampened these effects and Asian countries were quickly able to rebound from the crisis. The impact of the GFC is by no means comparable with the events of the AFC, instead it has had a similar effect as the burst of the dot-com bubble in 2001 on the East Asian economies (Emmers and Ravenhill 2010, 1-3).

Nevertheless, the GFC challenged the East Asian countries' financial systems. Global deleveraging, -instability and a reversal of global financial flows, resulting in outflows

from the East Asian countries, put the financial system under serious stress. In this situation the corporate bond market could have played the often cited role of a "spare tire". But at first, it could not. At the heights of the GFC, with the collapse of Lehman, the East Asian debt markets were, as in many other economies, clogged up and illiquid as trading ceased in many markets and securities. But East Asian bond markets soon started to function again and showed that they can serve as an alternative source of finance in the economy. Already before the GFC, East Asian firms were able to borrow in their own currencies as opposed to the years preceding the AFC. As of today the LCY corporate debt markets continue to be a source of finance, even in times when local and international banks are deleveraging (Felman et al. 2011; Chan et al. 2012).

When taking a look at Figure 3.10 it can be seen that in the middle of the GFC Asian bond markets started to grow rapidly. Table A.8 also shows that many more firms issued bonds during the crisis than did before the crisis. Felman et al. (2011) see two major reasons for this development. Although Asian banks' liquidity and risk-exposure was never in doubt, they still followed the Western banks and started to reduce the credit issued in order to reduce their leverage. This actually led to negative corporate credit growth in 2009. Firms started to substitute the missing bank-lending by issuing bonds instead. Simultaneously demand overseas for Asian securities grew rapidly (Felman et al. 2011, 15-18). At the first stage of the GFC in 2008 and early 2009, East Asian countries faced intensive capital outflows that reversed later and were followed by large capital inflows starting in 2009 (Shim 2012, 8).

Three major factors made the East Asian bond market attractive. On the one hand a lot of international liquidity exists after Western central banks initiated various programs to improve investment in their respective economies. On the other hand East Asian assets have become more attractive as macro fundamentals improved over the last decade and the region proofed to be robust to external shocks and the global engine for economic growth (Felman et al. 2011). Additionally, interest rate differentials widened after the GFC due to different rates of economic growth and thus drew more investors towards emerging markets (Turner 2012).

Another interesting aspect is that the market base of debt markets changed during the crisis. As can be seen in table A.8, in the immediate wake of the GFC East Asian bond issuers turned towards domestic investors and curbed being rated by international rating agencies. From 2009 onwards, internationally rated bonds returned to pre-crisis levels. Simultaneously, the overall amount of bond issuers increased dramatically: from

2007 to 2008 the number of bond issuers grew by roughly 50 %, whereas 2009 that amount doubled again. 2009 also represents the peak in the breadth of the market base. This shows that although market growth may have been modest in the years before the crisis, bond market debt became an option for many firms during the crisis.

Hypothesis III: The global financial crisis had a positive effect on corporate bond market growth

As we will determine the major factors of corporate bond market growth in chapter 4, the hypothesis that the period of the global financial crisis marked also a period of stronger bond market growth, will be tested.

Nevertheless, obstacles still remain in the debt markets. As already mentioned, immediately after the Lehman collapse the bond market effectively shut down. Although it rebounded quickly this shows that East Asia is neither immune to international shocks nor that liquidity is sufficiently high so that markets would be able to absorb such an external shock. The second remaining problem showed itself in the aftermath of the crisis. Only large corporations with a high credit rating were able to fund themselves through the debt market. Enterprises with a low rating were not able to use the bond market as easily as high rated companies. This reflects both structural weaknesses still persistent in the East Asian debt markets, and a general flight to quality in times of crisis (Felman et al. 2011, 17).

Overall the experiences of the GFC have to be assessed positively. Although there are still several impediments to well-established markets and many prospects for the development of the East Asian corporate debt markets, the experience of the GFC showed that the bond markets could function as a spare tire and thus cushion external shocks[10]. Although corporate bond market growth has been approximately at par with GDP growth in the region, markets still managed to develop. The development of regional markets has primarily been of qualitative nature and resulted in quantitative growth during the GFC. As the sovereign-debt crisis persists in Europe, the East Asian bond markets continue to play a vital role in the region's financial system: Curbed European bank lending in Asia is substituted by bond issuances regionally (Park (2012) examines the Korean case).

[10] I join here the opinion of Felman et al. (2011), whereas Turner (2012) and Spiegel (2009) are more pessimistic in assessing this development.

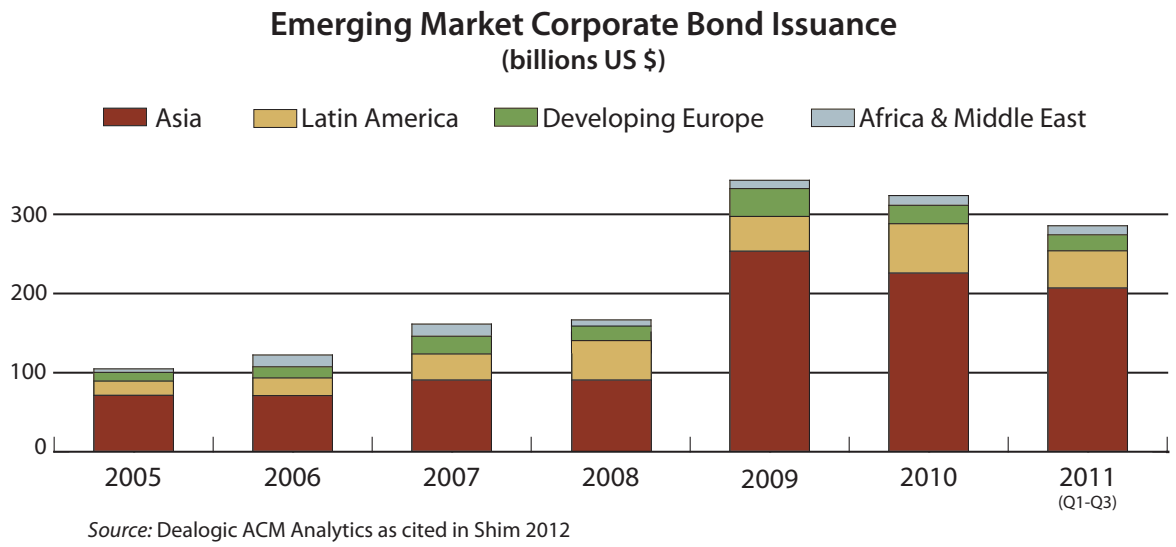


Figure 3.10.: Emerging Market's Corporate Bond Issuance

Although there remains plenty of room for further development, the overall experiences of the GFC shed a very positive light on corporate bond market development. Given that the GFC presented itself primarily as an external crisis, transmitted to East Asia through the channel of international trade, it remains to be seen whether the debt markets can play the same role in a crisis originating from within the region itself.

3.2.4. Summary

The development of the corporate bond market has been a primary target of East Asian policymakers. The corporate debt market is believed to be an efficient financial intermediator that mobilizes and distributes savings efficiently in an economy. It may also fulfill the role of a spare tire in case the banking sector cannot provide loans to the private sector in times of crisis.

The market grew rapidly in absolute terms, but lacked behind overall growth of economic activity in the region. Growth is also distributed very heterogensouly in the region. Japan remains the largest market but it shrunk as a share of GDP. China's market grew most rapidly, even overtaking the fast growing Korean market in 2011 in absolute size. The lack of liquidity especially in secondary markets remains a major issue in all markets.

Despite the fast growth of corporate debt, equity- and bank-finance remain the most important source of finance in East Asia. As banks in East Asia followed their Western

counterparts and deleveraged in the wake of the global financial crisis, corporate bond issuance jumped suddenly, despite the crisis. This experience hints that the corporate debt market did for the first time play the role of a spare tire. But whether it may also fulfill this role during a crisis originating from within the region remains doubtful.

3.3. Financial Integration and Regionalism in the East Asian Bond Markets

As East Asian bond markets grew rapidly in the last decade, the region could also potentially benefit from integrating their respective markets. Foreign and regional investors could provide additional liquidity in the markets and would open up the possibility of regional risk- and consumption-sharing. In order for markets to be integrated, actors should face equal access and rules, and be treated equally (see section 2.2.3).

3.3.1. Financial Openness and Integration

Recently, more academic literature has focused on the costs and benefits of financial integration in general. And although there has been some recent empirical research on the integration in bond markets and the participation of foreign investors in these markets, there is not yet a clear assessment whether foreign participation in the debt market has overly positive effects, due to the lack of data (Daniel 2008). Foreign participation in the East Asian bond markets has grown (as can bee seen in figure A.3), but still not as quickly as in other emerging market regions, like the CEE countries (Peiris 2010, 5).

Openness in East Asia

As has been shown above (section 2.2.3) one of the major conditions for financial integration is that countries allow foreign capital to actually move in or out the market freely. It is distinguished between between de facto and de jure openness.

De jure capital account openness is commonly measured an index compiled by Chinn and Ito. The findings of this index for Asia indicate an increasing openness in the period prior to the AFC but a receding openness after the crisis (Chinn and Ito 2008). As Patnaik and Shah (2010, 4) note, the more recent progress of openness may not have been reflected in this measure due to a change in the measure's definition.[11] De jure

[11]It could also be added that since the index is actually normalized to the two extreme cases (the most

openness is very diverse in the region. While Japan, Hong Kong and Singapore are fully open to foreign investors, Thailand and China are far more closed, with the other East Asian countries lying between those two extremes (Aizenman et al. 2008).

De facto capital account openness is naturally hard to measure. Patnaik and Shah (2010) constructed an index based on the gross financial flows in the balance of payments to measure de facto openness. They find that Asia overall continued to increase the de facto capital account openness after the AFC.

Financial Integration in the Debt Capital Market

There exists a vast amount of literature that assesses the state of integration in the East Asian financial markets. Because most of this research is focusing on equity or currency markets, only little academic literature covers both the Asian countries and their bond markets. The existing research is also exclusively limited to the government bond markets.

Table 3.5 depicts an overview of major academic research on integration in the East Asian bond markets. Research on the integration of equity markets in East Asia usually found that there is a certain degree of integration (Yu et al. 2007b). For the East Asian bond markets there is only limited indication for advanced financial integration. Common cointegration models mostly find no or only weak integration among the bond markets. And there are only weak signs of an increased degree of integration more recently.

closed country is 0, the most open is 100), I would rather suggest, that other regions were outpacing Asia in de jure liberalization, no actual reversal had to occur for these results.

Table 3.5.: Literature Overview: Integration in the East Asian Government Bond Markets

Citation	**Countries**	**Method**	**Results**
Calvi (2010)	CH, HK, ID, JP, MY, PH, SP, KR, TW, TH	co-integration	no cointegration, no difference between periods before/after ABF introduction
		granger causality	no short term relationship, high relationship between ASEAN and US market
		comparison with EU	EU gov bond highly cointegrated (due to EMU)
		granger causality EU	higher integration after EMU
Yu et al. (2007a)	CH, HK, ID, JP, MY, PH, SP, KR, TW, TH	cross-country return dispersion	falling return dispersions, recent uptrend
		Haldane and Hall Kalman filter	increased integration during 1990s, no improvement since 2003
		dynamic cointegration	weak cointegration
		market cycle synchronization	synchronized market cycles in the region
		beta convergence	small but improving beta
		dynamic conditional correlation	low level of correlation, time varying
Bae and Kim (2011)	HK, JP, KR, SP	yield curve model	higher global than regional influence on yields; HK, JP, SP regional dominating
Johansson (2008)	CH, KR, MY, TH	VECM-MVGARCH model	long-run cointegration, small short-term spillovers; time varying
Borensztein and Loungani (2011)	HK, ID, JP, MY, PH, SP, KR, TH	bilateral debt holdings	no bilateral preference for Asian debt
		home bias	higher home bias for bonds in Asia

Would markets be integrated, investors would hold a more regionally distributed bond portfolio than when they face impediments or country specific asymmetric information. This is termed *home bias*. Borensztein and Loungani (2011) find that Asian investors have a higher home bias than global investors, even after accounting for the effects of exchange rate volatility. They also find that investors seem not to have an "Asia-specific" preference for government debt, but invest globally instead.

Calvi (2010) compared the degree of integration in East Asia with the European Union. The degree of financial integration in the EU has already been high in the past but increased significantly after the introduction of the monetary union. This coincides with the findings of Bhattacharyay (2011), indicating that exchange rate volatility plays a significant negative role in the process of financial integration in the bond markets.

Overall, the state of integration in the East Asian bond markets seems to be weak. East Asia appears less integrated than other regions, for example the CEE countries. Asian investors in government debt also prefer to hold their domestic government debt instead of spreading risks in order to smooth consumption. Although there seemed to be an upward trend in financial integration before the AFC, this tendency has ceased. As of today there is only minor empirical evidence, that integration in the government bond market is increasing significantly. Instead of being integrated regionally, East Asia is mostly integrated globally.

The major obstacle for regional investors in the East Asian bond market is that they face many impediments that prevent them from having equal access to the regional markets: Only few bonds are rated internationally; instead the majority is rated by domestic rating agencies that do not have a common regional framework. Similarly, East Asian countries all have their distinctive domestic regulatory frameworks, that may even be based upon different traditions of law. This all increases the information costs for international and regional investors and impedes equal market access. Some countries in the region lack transparent institutions, which makes it even harder for outside investors to properly assess the situation. Regional harmonization of national rules and regulations or the harmonization into a common offshore market are possible solutions to this problem (Black and Munro 2010; Scott 2007).

3.3.2. Financial Stability

There is even less research on the effects of foreign participation and financial integration in the East Asian bond markets on financial stability than on financial integration

in general. Potential downsides of financial integration are the possibility of sudden reversals of capital flows or increased volatility, due to foreign participation.

Empirical research by Johansson (2008) on the volatility of the East Asian bond markets shows that volatility levels are unevenly distributed between the countries, but volatility levels seem to be correlated and thus regional in nature. Similarly Peiris (2010) finds that increased foreign participation in the LCY bond markets usually does not lead to an increased volatility in bond-yields in emerging markets. But his findings also indicate that volatility increased in Korea while it decreased in Malaysia with increased participation[12]. Whether financial integration in the bond markets leads to volatility and potential financial instability thus remains to be seen.

As was shown above, the experience of the GFC actually showed, that foreign participation was a major factor in substituting bank finance with bond finance. When the primary investor class in East Asian corporate bonds was curbing investment foreign investors contributed liquidity and thus helped to prevent a credit squeeze in the region.

3.3.3. Regionalism in the East Asian Bond Market

In the East Asian region two initiatives developed that specifically aim to foster bond market development and the establishment of a regional debt market. While the Asian Bond Market Initiative targets supply-side issues the Asian Bond Fund targets the demand-side.

The Asian Bond Market Initiative

The Asian Bond Market Initiative (ABMI), established by the 6th conference of the ASEAN+3 finance ministers in August 2003 in Manila, targets supply side issues of the bond market. It consists of six working groups, that conduct detailed studies on market development and possible development strategies and works out proposals for the establishment of market infrastructure: credit guarantee institutions, a clearing and settlement-mechanism, rating-agency and the creation of new debt instruments. The participation in these working groups is managed on a voluntary basis and usually consists of members of ministries of the individual countries. (Park and Wyplosz 2010, 76)

[12]The reason behind this is suspected to be market characteristics and/or foreign investor specifics. The fact that Malaysia has a special market for Islamic finance that is particularly attractive for foreign investors and Islamic finance dismisses speculative trading could be a possible conclusion for Malaysia.

The activities of the ABMI focused at first at the generation of reports to resolve the key issues impeding bond markets in East Asia, but progress was stagnant. In 2005 a new road map was launched adding two new studies, one about the harmonization of Asia's regulatory framework in Asian Bond Standards, that would be similar to global standards. And one about the issuance of bonds denominated in a basket of currencies (in order to circumvent original sin). As actual progress continued to stagnate and the working groups have been reorganized in 2006 a new road map was launched in 2008. This plan created four task forces that focused on the demand and supply of LCY bonds and on the improvement of bond market regulation and infrastructure. (Park and Wyplosz 2010, 77)

The task forces and working groups meet about every two months and consist of mid-level bureaucrats and government officials, and officials from government agencies (such as central banks, ministries of finance and so on). In between meetings these participants stay in phone and email contact and carry out research at home. In the long run this process results in proposals, guidelines and policy recommendations. But the ABMI has no means or authority on it's own to implement policies or to even initiate research. Instead the pace is left to the individual participating countries and the ABMI is supported by the Asian Development Bank (ADB). The only way to promote the implementation of the developed guidelines and proposals is through a process of "self-assessment". These assessments are brief documents showing the progress since the last semiannual meeting. Beside this kind of peer pressure no other instruments of fostering the implementation exist for the ABMI (Grimes 2009, 177-179).

The ABMI also comprises of technical assistance, liquidity support and demonstration projects. Again the ABMI has no means by itself. They are carried out by officials of other ASEAN+3 governments or by institutions like the ADB. Grimes (2009, 180) notes that "Japanese MOF officials have been particularly enthusiastic about providing technical assistance and funding policy-relevant research under the auspices of ABMI."

The actual results of the ABMI have been scarce compared to it's long period of existence. As new achievements nearly stopped after some initial momentum, the pace picked up again after the GFC. The most notable achievements consist of the implementation of the AsianBondsOnline website, the establishment of the Asian Bond Market Forum, the implementation of a credit guarantee facility, and most recently the release of a comprehensive ASEAN+3 Bond Market Guide.

To spread information about the ABMI the AsianBondsOnline website was launched

in May 2004. This website is a vital organ and contains the most comprehensive easy-to-use and free research and data on the East Asian bond markets. It also hosts the Asia Bond Monitor, a free quarterly report on the most recent developments in the region's bond markets. As the ABMI itself does not have any infrastructure or means itself, the website is run in cooperation with the ADB (ASEAN+3 2004).

As progress nearly came to a halt, pace picked up again in the wake of the GFC. In September 2010 the ASEAN+3 Bond Market Forum (ABMF) was established "as a common platform to foster standardization of market practices and harmonization of regulations relating to cross-border bond transactions in the region" (ABMI 2010a). The forum consists of quarterly meetings of ASEAN+3 officials, as well as international experts, including international financial institutions such as Citibank, Deutsche Bank, HSBC, J.P. Morgan and SWIFT (The Society for Worldwide Interbank Financial Telecommunication) (ADB 2012a, vi). In 2010 the first results of two task forces were presented in the form of two reports. One report about the harmonization of bond standards in ASEAN+3 (ABMI 2010c), and a feasibility study on the implementation of a regional settlement intermediary (ABMI 2010b).

In November 2010 the Credit Guarantee and Investment Facility (CGIF) was established with the aim to "promote financial stability and to boost long-term investment in the ASEAN+3 region" (CGIF 2012). The CGIF is backed by a capital of USD 700 million, USD 570 million from the ASEAN+3 countries[13] and USD 130 million from the ADB. The facility allows ASEAN+3 issuers of investment-grade rating to apply for a credit guarantee in return to the payment of a fee to the CGIF. In case of the non-payment by the issuer the CGIF pledges to pay the bond holder for the remaining tenor of the bond instead. The facility aims to make Asian bonds more attractive to prudent institutional investors (such as pension funds) that invest only in the least-risky asset classes. By providing a guarantee more bonds can become attractive for such investors. The most recent achievement of the ABMI is the release of the ASEAN+3 Bond Market Guide. The two volume guide, that has more than 1500 pages in total, summarizes the regulatory and institutional differences in the ASEAN+3 markets and gives the most comprehensive and in-depth overview yet. It aims to provide investors with the necessary information to invest in these markets and it is also a baseline study for further harmonization and standardization of bond market regulations across the region (ADB

[13] China and Japan both contributed 200 and Korea 100 million USD, the remaining 70 million were committed by the ASEAN countries.

2012a).

Critical Assessment Overall the success of the ABMI has to be assessed sceptically. There have been only little to no concrete results. Instead several guides have been published, all highlighting the importance of further steps to be taken, but collective action has been scarce at best. A recent technical assistance report claimed that "[m]uch has been achieved since the ABMI was launched. The volume of outstanding bonds denominated in local currency in emerging East Asia has grown sharply from less than $1.0 trillion at the end of 2001 to $5.2 trillion by the end of 2010.3" (ADB 2012b, 1).

While these numbers certainly are impressive, the role of the ABMI in the growth of the bond markets is negligible. Mizen and Tsoukas (2010) estimated that the ABMI had no significant effect on the probability of firms to issue bonds. Rather throughout the different periods and samples firm-specific characteristics have been most important. While government bond markets grew (which also comes at a certain cost) and a yield-curve was established, corporate bond markets still are lacking behind. Also the harmonization and standardization of the regulatory framework has not yet went further than an initial stock-taking and some prepared proposals. As Keith Mullin, editor at the International Financing Review notes that no institutional progress was made since the establishment of the ABMI: "really nothing much has happened since then". And with the recent release of the monstrous ASEAN+3 Bond Market Guide, he rightfully asks: "nine years on, all we get is a guide?"(IFR 2012) So even though the ABMI has gathered renewed momentum recently, it's actual results have been scarce. Bond markets have been developing more nationally than regionally and the establishment of a regional market is still a long road ahead.

The Asian Bond Funds

While the ABMI targets the supply-side of bond market development, the Asian Bond Funds (ABF) target demand-side issues. The Asian Bond Funds consists of two funds that were established by the Executives' Meeting of East Asia and Pacific Central Banks and Monetary Authorities (EMEAP). EMEAP consists of the central banks of Australia, China, Hong Kong SAR, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand. It thus represents the major participants of the ASEAN+3 bond market initiative and Australia and New Zealand. The funds aim to foster bond market development and liquidity by reinvesting a portion of the region's

foreign exchange reserves back into the region (BIS 2003).

The first fund (ABF 1) was established in June 2003. In this first step the EMEAP countries invested USD 1 billion in dollar-denominated sovereign debt in the region, with the exception of the markets of Japan, Australia and New Zealand. Then intention of the fund is to provide governments with an incentive to issue benchmark debt, foster private investment and the development of a yield-curve. Due to the low volume of the fund and it's buy-and-hold nature, there was little to no effect on liquidity in the dollar denominated debt markets (Grimes 2009, 184-185).

The second bond fund (ABF 2) was launched in December 2004 and formally implemented in July 2005. It aims to provide market access to investors and an easy investment opportunity with low costs of management. It consists of a more sophisticated structure than the ABF 1 and aims to target local currency denominated bonds in the same countries as the ABF 1. It consists of 9 different funds: the Pan Asian Index Fund (PAIF) is a passively managed fund that is traded in Hong Kong and Japan and is thus open to investors all over the world. It is denominated in US-dollars and invests in the eight countries' local-currency bond markets. It is tracked as the "iBoxx Pan Asia Index". As the ABMI, EMEAP has no independent institutional means, the fund is managed by the Bank of International Settlements (BIS). The other eight single-market funds are national local-currency bond funds that should gradually be established and opened up to foreign investors. The half of the ABF 2's initial capitalization of USD 2 billion is invested in the PAIF while the other half is distributed through the national bond-funds (Ma 2005).

This intention to open up markets to investors outside the EMEAP countries is an important aim of the ABF 2. The eight individual national bond funds and the PAIF were thus designed to be open to international investors. While the PAIF was traded at the Hong Kong exchange right after being launched, the establishment and liberalization of the national bond funds (the so called phase two of the ABF 2) proceeded at a much slower pace. Countries were encouraged to open their bond funds, but were able to move at the pace of their desire. By 2008 only Singapore, Malaysia and Hong Kong had opened their national bond funds (Johansson 2008, 103). But with renewed momentum after the GFC the second phase of the ABF 2 was able to be completed in May of 2011, with China being the last country to open it's bond fund to foreign investors (EMEAP 2011).

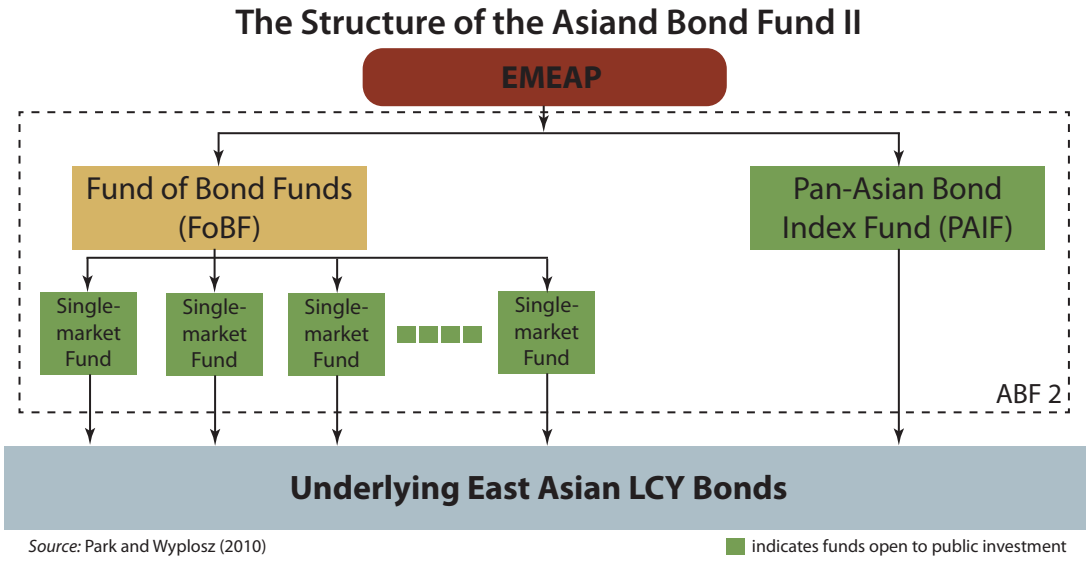


Figure 3.11.: Structure of the Asian Bond Fund 2

Critical Assessment As the ABF 2 had the intention of providing an actractive transparent and low-cost investment opportunity to foreign investors it's size is an important indicator of it's success. Whereas the ABF 2 started out with USD 2 billion. It size was roughly at USD 3 billion by the end of 2007 (Grimes 2009, 186) and climbed to USD 4.2 billion by May 2011 (EMEAP 2011). Although this indicates that the ABF 2 was growing at about the same pace as East Asian bond markets in general the outside investment in the fund is still at low levels and it is unlikely that it had a significant impact on market liquidity (Grimes 2009, 186).

Apart from providing liquidity the ABF aimed at opening up markets. As with the ABMI countries could proceed at their own speed in establishing and opening up their national bond-funds. This second phase of the ABF took six years to complete. But nevertheless this can be regarded as the biggest success of the ABF 2. As the EMEAP countries were establishing their respective national funds they encountered several impediments that often were removed afterwards. This learning-by-doing approach combined with "peer encouragement" was able to reduce market impediments. For example Thailand and Malaysia granted non-resident investors the exemption of withholding tax, the Philippines removed the documentary stamp duty, Malaysia liberalized it's foreign exchange regime on the eve of launching ABF 2 and the ABF 2 was the first foreign institutional investor in China that gained direct access to it's inter-bank bond market (Ma 2005, 29-30).

3.4. Summary – The State of the Market

Bond market growth has been very diverse throughout the region. The rapid expansion of government debt was primarily driven by the need of central banks to sterilize excessive liquidity that resulted from a combination of capital inflows and the reluctance of East Asian countries to appreciate their currencies. Potential sources of financial risks are central banks balance sheet losses due to sterilization and excessive government debt in Japan. Corporate bond market growth was more modest and along the line of economic growth until 2009. No major change in the capital structure of East Asian firms occurred as equity- and bank-finance remain the primary sources of capital. With banks deleveraging, corporate bond market growth picked up and substituted the lack of bank finance in the aftermath of the global financial crisis, acting as a spare tire. Overall China, Japan and Korea account for over 90 % of the regional bond market.

Liquidity improved in the whole region but remains poor in both government- and corporate bonds' secondary-markets. The major obstacle is that markets are dominated by investors that hold their securities until maturity. A diversification of the East Asian investor base is the most pressing task. Regional investors do not manage to provide such an extension in the investor base, as regional bond markets face only a small degree of integration. The diverse institutional- and regulatory framework, as well as high transaction- and settlement costs impede regional integration.

4. Determinants of Bond Market Growth

This chapter analyzes the endogenous determinants of government as well as corporate bond market development econometrically. We start out by estimating the determinants of bond market development in multivariate models similar to Bhattacharyay (2011) and Eichengreen and Luengnaruemitchai (2006). Some of the macroeconomic- and institutional factors described in section 2.3 will be tested empirically in these models for the East Asian region. After comparing our findings with the existing literature, we set out to test the three hypothesis that were advanced in the previous chapter:

1. Developed government bond markets have positive effects on the development of corporate bond markets.

2. Central banks' sterilization efforts drive government bond market growth.

3. The corporate bond market took the role of a spare tire during the global financial crisis.

The government- and corporate bond markets are dealt with separately. The first section starts with the government-, the second with the corporate bond market, the third summarizes the results.

4.1. Government Bond Market

A first look at the data indicates that the Japanese panel is a massive out-lier, having a larger government bond market than any other East Asian country at any point in time. We thus estimate all the following models including a dummy variable (Japan) for the Japanese panel.

4.1.1. Bhattacharyay's Model

As a first step we estimate the model also used by Bhattacharyay (2011). When testing for heteroskedasticity and serial correlation the null hypothesis of no serial correlation and homoskedasticity has to be rejected at the 1 % level. The Pesaran test for cross-sectional correlation also indicates cross-sectional dependence but only at the 5 % level.

Bhattacharyay (2011) found that only the size of the economy and the interest rate spread were significant in the model accounting for heteroskedasticity. In the model accounting for serial correlation no signficant relationships were being found. Table B.1 indicates our estimation results for the same model[1].

As we found heteroskedasticity, cross-sectional- and serial correlation we estimate our model taking these properties into account[2]. Table 4.1, column 1 shows the estimation results. In contrast to all other models the size of the economy becomes insignificant when adding the serial-correlation-correcting term. The potential reason for this is a spurious regression between size of the economy and the government bond market, as both variables have a clear upward trend. Openness and interest rate spread are both significant but have an unexpected sign, openness being negatively and the interest rate spread being positively related to bond market size. The size of the banking system has the expected sign and is highly significant. Exchange rate stability is significant in all models but our model that is taking all three statistical problems into account, but the sign is negative, indicating a negative relationship between exchange rate stability instead of the expected positive one. The Japanese dummy-variable is highly significant in all estimated models.

When comparing the results of the estimation with the results by Bhattacharyay (2011), we find that variables in our estimation are more likely to be significant, but do in many cases not coincide with what was expected from theory. For Bhattacharyay the size of the economy was significant in one out of three regressions, similarly we find it to be significant and positive when not including an autocorrelated error-term (see table B.1 in the appendix). As noted above this relationship could also be the result of spurious regression rather than a genuine relationship. The stage of development and the size of the banking system is also positive and significant. These findings are in line with our theoretical assumptions. Instead of being positively related, openness and

[1] The specification difference in Bhattacharyay (2011) and our model is that here another variable for exchange rate stability and the additional Japan-dummy variable is being used.

[2] Estimations with OLS, GLS without cross-sectional- and without serial correlation can be found in the Appendix.

exchange rate stability is negatively related to bond market development. Similarly a higher interest rate spread is also having a positive, instead of the expected negative effect.

4.1.2. Adding Institutional Factors

After estimating Bhattacharyay's model, that consists mainly of macroeconomic factors, in a next step we add several institutional factors. At first we estimate these factors separately. Tests indicate serial correlation and heteroskedasticity at the 1 % level, but no cross-sectional correlation. Column 2 of Table 4.1 shows the results of the regression.

Corruption and regulatory oversight have the expected significant positive effect on government bond market development. Interestingly the indicator of a government's rule of law is highly significant but has a negative sign. This would imply that governments with weaker rule of law have bigger government bond markets. Another interesting finding is that countries with a defined-contribution pension systems have smaller government debt markets than countries with a defined-benefit system. The influence of high government commitment to foster bond market growth is highly significant and positive related to market development. Bank concentration is the only variable that clearly is not significant.

As a next step the combined model of macroeconomic and institutional factors is being estimated. Again the null hypothesis of cross-sectional independent error terms can not be rejected. And the test for serial correlation and heteroskedasticity is statistically significant at the 1 % level. Column 3 of Table 4.1 gives the estimated coefficients of the combined model.

All the results from the separate estimation of the new components stay significant and no sign-switching occurs in the combined estimation. Bank concentration is still insignificant. With regard to the macroeconomic factors from the first estimated model, a few changes occur. GDP per capita, an indicator of economic development, becomes insignificant. Openness becomes less significant and switches it's sign to the expected positive relationship. Exchange rate variability becomes significant at the 5 % level, but asserts a negative effect on bond market development. The size of the banking systems remains to be a highly signficant positive determinant of bond market size.

Table 4.1.: Determinants of the Government Bond Market

VARIABLES	(1) gov_bond_gdp	(2) gov_bond_gdp	(3) gov_bond_gdp
gdp_ppp	-0.0111		1.995
	(0.686)		(1.542)
gdp_capita_ppp	11.89***		4.955
	(0.640)		(4.243)
openness	-0.0669***		0.0514**
	(0.00568)		(0.0215)
i_spread	0.371***		2.857***
	(0.143)		(0.679)
bank_credit	0.196***		0.168***
	(0.0122)		(0.0336)
xr_stability	-0.326		-7.832**
	(0.983)		(3.492)
japan	42.56***	121.5***	108.0***
	(3.059)	(24.85)	(15.28)
corruption		-6.138**	-12.92***
		(3.046)	(3.721)
law		-11.44***	-26.65***
		(4.172)	(4.761)
regulatory		15.76***	22.96***
		(4.461)	(5.277)
bank_concentration		-4.447	7.317
		(4.767)	(5.901)
pension_dc		-8.829**	-13.01***
		(3.459)	(2.304)
gov_commit		27.62***	37.11***
		(3.393)	(2.993)
Constant	-88.23***	27.38***	-110.0***
	(18.56)	(4.129)	(34.45)
Observations	100	80	80
Panels (countries)	10	10	10

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

(1) GLS-estimator with panel-specific AR1 and cross-sectional dependent errors

(2) & (3) GLS-estimator with panel-specific AR1 and heteroskedastic errors

4.1.3. Hypothesis 2 — Sterilization

As a final step we add the variable indicating sterilization efforts of central banks to the three estimations of Table 4.1. The results are shown in Table 4.2. The variable for sterilization is based on Aizenman and Glick (2009), who use it to estimate a sterilization coefficient for three East Asian countries, and indicates the relationship of domestic credit and foreign reserve inflows. It is calculated as:

$$Sterilization = \frac{ReserveMoney - ForeignAssets}{ReserveMoney}$$

The numerator of the fraction is also called net domestic credit assets. As national currencies vary through different countries it is denominated by the domestic monetary base. "Positive values of net foreign reserve accumulation by the central bank correspond to foreign reserve inflows. Negative values of net domestic credit correspond to reductions in domestic assets held by the monetary authorities" (Aizenman and Glick 2009, 780). These reductions aim to sterilize the purchase of foreign exchange reserves. As was shown above this can be achieved by issuing central bank bills, increasing bank reserve requirements or selling government bonds. When using the variable in the regression we expect the sign to be negative, as central banks reduce their domestic assets when sterilizing foreign exchange reserves (negative sign of variable) which should have a positive influence on the development of the government bond market. Put another way: the higher the amount of sterilized foreign assets in an economy the lower is the sterilization coefficient as the monetary base is being reduced by the central bank. The coefficient is negative in most East Asian countries, so to exert a positive effect on bond market development the sign of the variable has to be negative [3].

Table 4.2 depicts the three models with the added sterilization variables. The sterilization variable is highly significant and with the expected positive influence on bond market development in all three specifications. It is thus convincing to conclude that sterilization efforts of East Asian central banks are a major determinant of government bond market growth.

While no changes occur in sign and significance-level for the institutional factors in the final specification. The macroeconomic determinants experience some changes. While the size of the economy was insignificant in the former model specifications it becomes

[3] As $(RM - FA)/RM$ is equal to $1 - FA/RM$ the usage of the level of foreign assets with respect to the monetary base would come to the same results in the regression, but with inverted signs (and of course a shifted intercept).

significant after sterilization was added. Openness, that had an odd negative influence on bond market development, now exerts a positive influence, but is only slightly insignificant. The interest rate spread still has a positive effect, but did become nearly statistically insignificant. Exchange rate stability also did become insignificant in the final model.

4.1.4. Discussion and Economic Interpretation

The results of the regressions confirms that most of the expected determinants exert an influence on government bond market growth. The majority of our results are in line with Eichengreen and Luengnaruemitchai (2006) and Bhattacharyay (2011). It is found that the size of the economy, the size of the banking system, corruption, the quality of the regulatory framework and the outspoken government commitment are important determinants of government bond market development. The openness of an economy exerted only little influence in our East Asian samples. Exchange rate stability also seemed insignificant in our final specification.

The most controversial findings, that are not in line with our theoretical expectations, are the negative impact of defined-contribution pension-systems and stronger rule of law. We expected both variables to be positively related with bond market development. A possible explanation is that governments that have a stronger rule of law and more sustainable pension-systems[4] also have more sustainable public finances and exert less influence on their exchange rates. In this case the effect of these variables on the government bond market would be negative. The positive effect of these variables would nevertheless persist in the corporate bond market.

The fact that institutional factors were robust through-out all changes in model specifications may hint that institutional factors have a more important influence on bond market growth than plain macroeconomic factors. As these influences may also be a proxy for the omitted variable of government-debt and fiscal policy, a highly significant influence on the corporate bond market would be needed to back this interpretation.

The high significance and the expected negative sign of the sterilization variable leads to the conclusion that our second hypothesis can be accepted: Sterilization efforts of the foreign reserve build-up by East Asian central banks is a major driving force in the East

[4] Assuming that defined-benefits pension systems are more prone to reform due to time-inconsistency problems of policy-makers.

Table 4.2.: Sterilization and the Government Bond Market

VARIABLES	(1) gov_bond_gdp	(2) gov_bond_gdp	(3) gov_bond_gdp
gdp_ppp	11.02***		4.388***
	(2.084)		(1.282)
gdp_capita_ppp	-12.81***		-4.021
	(3.470)		(3.582)
openness	0.0545***		0.0279*
	(0.0150)		(0.0151)
i_spread	0.262		1.135*
	(0.210)		(0.600)
bank_credit	0.138***		0.111***
	(0.0472)		(0.0304)
xr_stability	-3.813**		-3.214
	(1.655)		(3.138)
sterilization	-6.685***	-4.624***	-4.625***
	(0.577)	(0.665)	(0.713)
japan	75.47***	129.9***	117.8***
	(7.667)	(10.58)	(12.03)
corruption		-10.84***	-13.54***
		(2.518)	(3.074)
law		-13.87***	-19.39***
		(2.708)	(3.553)
regulatory		17.95***	25.41***
		(3.201)	(4.333)
bank_concentration		-9.214**	-3.413
		(3.725)	(5.306)
pension_dc		-11.29***	-8.931***
		(2.412)	(2.137)
gov_commit		15.09***	23.05***
		(3.340)	(2.995)
Constant	-190.5***	25.14***	-83.42***
	(46.73)	(2.853)	(26.01)
Observations	80	70	70
Panels (countries)	10	10	10

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

(1) GLS-estimator with panel-specific AR1 and cross-sectional dependent errors

(2) & (3) GLS-estimator with panel-specific AR1 and heteroskedastic errors

Asian government bond market.

4.2. Corporate Bond Market

After analyzing the determinants of government bond market growth this section estimates the effect of macroeconomic and institutional factors on the East Asian corporate bond market.

4.2.1. Bhattacharyay's Model

We start again by estimating the model used by Bhattacharyay (2011). When testing for heteroskedasticity and serial correlation we can reject the null hypothesis of no serial correlation at the 2 % and homoskedasticity at the 1 % level. The Pesaran test for cross-sectional correlation also indicates cross-sectional dependence at the 1 % level. Taking these into account we estimate the model with cross-sectional correlation and an added AR(1) term. As with the government bond market, the regressions that use OLS or account solely for heteroskedasticity or cross-panel correlation can be found in the apendix (tables B.4 - B.6).

Bhattacharyay found that the size of the economy, the stage of economic development and economic openness have a positive influence on bond market development. Interest rate spread had the expected negative influence. Exchange rate stability had an unexpected negative sign, as did bank credit.

In our model specification we find the stage of economic development to be a significant positive factor, but except for this we have different findings. The size of the economy and its openness is significant and negatively related to corporate bond market development in our estimation, this is not expected and also contrary to the findings of Eichengreen and Luengnaruemitchai (2006). The size of the banking system together with exchange rate stability is positively associated with the size of the corporate bond market as is expected from economic theory. The interest rate spread has no significant influence. All other significant variables were significant at the 1 % level.

4.2.2. Adding Institutional Factors

As a next step we add institutional factors. Again we estimate them separately in a first step and combine macroeconomic and institutional factors together in a separate

model afterwards. We start out testing the separate model of institutional factors and find cross-sectional correlation and heteroskedasticity at the 1 % and serial correlation at the 2 % level. Column 2 in table 4.3 shows the results of the regression.

We find the rule of law, the regulatory framework and the dummy variable for outspoken government commitment to be highly significant at the 1 % level and with the expected sign. Bank concentration exerts a very weak positive influence at the 10 % level that is oposite to the expectation of entrenched interest groups. The variables capturing corruption and the type of pension system are insignificant.

In the next step the macroeconomic and institutional factors are being combined into the full model. Per capita GDP as a measure of economic development, the interest rate spread and exchange rate stability an the dummy of outspoken government commitment are all significantly related to corporate debt market development at the 1 % level and with the expected sign. Bank credit is, as anticipated, positively associated but only at the 10 % level. Corruption is as expected negatively related but significant only at the 5 % level. These findings are all in line with the theory depicted above. The size of the economy and the quality of the regulatory framework is negatively related to corporate bond market development, which is contrary to what was expected from theory.

In contrast to the findings of the government bond market the revealed picture is not as clear and several reversals of signs did occur when combining the two different separate models. Additionally some variables loose their significance in the full model. This indicates that the influence of the determinants may not be as clear and robust as the results of the government bond market. As can be seen in Table B.5 the introduction of the autoregressive term to overcome serial correlation makes the coefficient for corruption insignificant and causes a switching of signs of the bank concentration coefficient for the separate model. Similarly openness, the rule of law and the type of pension system become insignificant and bank credit nearly insignificant positive in the full model (Table B.6).

Nearly all varying results occur after the autoregressive error-term in order to deal with serial correlation was added. In this process the regression loses degrees of freedom in two different ways: by adding a new coefficient for each panel and by the loss of an observation in each panel due to the panel-specific auto-regression term. With already 14 coefficients in the regression prior to this procedure, we are left with only 57 degrees of freedom after the inclusion of the term. Although theoretically sufficient, the coefficients are very prone to be over-fitted. The sudden reversal of signs or change in a coefficient's

significance hint that this may be the case in this specification. In order to deal with serial correlation in other ways it was also tested to introduce a lagged dependent variable. But this led to even more insignificant results. As the data is highly autocorrelated the lagged variable is likely to cause the other explanatory variables to be underestimated (Keele and Kelly 2006).

The coefficients of the pension system, rule of law and openness are significant in all other three specifications but the last estimation. Similarly is bank credit negative in all three estimations (but highly significant in only two), while reversed signs only in the autoregressive estimation. While the interest rate spread is negative but insignificant it suddenly becomes highly significant after the massive loss in degrees of freedom. Likewise did the regulatory system exert no influence in any but the last regression. From a statistical point of view this casts the results of the autoregressive estimation for the corporate bond market into doubt. Similarly to Bhattacharyay (2011) the interpretation of the results is thus based on all estimations of the full model, but the statistical problems of either serial-correlation or a very small degree of freedom have to be kept in mind.

4.2.3. Hypothesis 1 — Spill over Effects of the government bond market

As a next step the two hypothesis advanced in the previous chapter will be tested. We start out with the first hypothesis that an advanced government bond market has positive externalities on the corporate bond market. This hypothesis is tested by adding the variable that depicts the size of the government bond market. To have positive externalities we expect it to have a positive sign. Table 4.4 shows the results of the estimation.

The government bond market seems not to have any positive externalities. Instead in all three equations the sign of the coefficient is negative but statistically significant in only two estimations. To test for robustness a lagged government bond market variable was included in the equation and, because Japan is a massive outlier in government debt, the Japanese dummy was added. Additionally we conducted the estimations without the auto-regressive term as it reduces the degrees of freedom massively. Regardless of the changes, the estimations (not listed) came to the same results: A larger government bond market did never have a significant positive effect on the corporate bond market,

but had an insignificant or negative influence in all cases. We thus can convincingly reject the proposed hypothesis. Instead a 1 % increase in government debt decreased the size of the corporate bond market by 0.1 to 0.2 percent. The economic discussion will follow after the test of the last hypothesis.

4.2.4. Hypothesis 3 — A spare tire?

The third hypothesis suggests that the corporate bond market acted as a spare tire during the global financial crisis. As East Asian banks followed their western counterparts and deleveraged, firms increasingly turned towards the bond market. And the high yield in the East Asian region attracted foreign investors that could meet the demand for funds. In order to test for this hypothesis a dummy variable is added that takes the value of one for the period starting with 2008. Table 4.5 shows the results of the estimation. In all three estimations the dummy variable is significant and with the expected positive sign. Corrected for other institutional or macroeconomic factors, the corporate bond market grew by about 2 to 2.4 % of GDP in the period after the global financial crisis.

Note that this regression was conducted without the panel specific auto-regressive term in the equation. The results of the estimation with the lagged dependent variable can be found in the appendix (Table B.7). As with the model that combined macroeconomic and institutional factors, the introduction of the auto-regressive term leads to contradicting results. Out of three estimations one coefficient is positive significant, one negative significant and another insignificant. The problems of over-fitting due to a loss in degrees of freedom was described above. Additionally the autoregressive term may be reducing the influence of the shock variable, as the shock feeds into the second period after the first appearance due to the lagged error term. This would overestimate the autoregressive coefficient and underestimate the effect of the dummy variable. To fully capture the effect of the period after the global financial crisis the regression was estimated without the auto-regressive term. Nevertheless the possible problems due to serial-correlation of the error terms have to be kept in mind.

Although the results of the regression were convincing that the corporate bond market increased specifically in the period of the global financial crisis, we still have to be careful when accepting the proposed hypothesis. The added autoregressive term led to contradictory results and showed that the results may not be very robust. Despite our results suggesting that the corporate bond market took the role of a spare tire, still more research is necessary to find more robust estimates.

Table 4.3.: Determinants of the Corporate Bond Market

VARIABLES	(1) corp_bond_gdp	(2) corp_bond_gdp	(3) corp_bond_gdp
gdp_ppp	-2.742***		-2.237***
	(0.0607)		(0.358)
gdp_capita_ppp	12.44***		12.49***
	(0.212)		(1.068)
openness	-0.0304***		0.00135
	(0.00131)		(0.00652)
i_spread	0.00425		-0.362***
	(0.0192)		(0.0926)
bank_credit	0.0307***		0.0158*
	(0.00112)		(0.00940)
xr_stability	1.840***		2.935***
	(0.118)		(0.701)
corruption		-0.466	-2.457**
		(0.661)	(1.051)
law		7.954***	0.0820
		(0.433)	(0.999)
regulatory		4.844***	-2.440**
		(0.537)	(1.225)
bank_concentration		1.702*	1.401
		(0.978)	(1.186)
pension_dc		2.871	1.570
		(2.871)	(1.344)
gov_commit		19.78***	16.26***
		(3.336)	(1.312)
Constant	-23.99***	6.115***	-42.59***
	(1.892)	(0.714)	(10.02)
Observations	110	80	80
Panels (countries)	10	10	10

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

(1), (2) and (3) GLS-estimator with panel-specific AR1 and cross-sectional dependent errors

Table 4.4.: Testing Hypothesis 1: Externalities of the Government Bond Market?

VARIABLES	(1) corp_bond_gdp	(2) corp_bond_gdp	(3) corp_bond_gdp
gdp_ppp	-2.415***		-1.622**
	(0.141)		(0.691)
gdp_capita_ppp	12.33***		14.04***
	(0.355)		(1.201)
openness	-0.0261***		-0.0181
	(0.00314)		(0.0135)
i_spread	0.153***		-0.281
	(0.0562)		(0.257)
bank_credit	0.0426***		0.0898***
	(0.00261)		(0.0159)
xr_stability	0.315		0.897
	(0.313)		(1.529)
gov_bond_gdp	-0.105***	-0.00372	-0.201***
	(0.0124)	(0.0146)	(0.0305)
corruption		0.397	-4.600**
		(0.615)	(1.860)
law		5.310***	-1.256
		(0.628)	(1.972)
regulatory		6.489***	2.457
		(0.832)	(1.878)
bank_concentration		-0.667	-0.112
		(1.251)	(2.376)
pension_dc		8.677***	4.859**
		(1.999)	(2.091)
gov_commit		10.42***	16.69***
		(2.172)	(1.475)
Constant	-30.21***	6.365***	-72.89***
	(3.883)	(1.315)	(15.78)
Observations	110	80	80
Panels (countries)	10	10	10

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

(1), (2) and (3) GLS-estimator with cross-sectional dependent errors

4.2.5. Discussion and Economic Interpretation

The results of the regressions for the corporate bond market are not as easily interpretable as the results of the government bond market. When relying solely on the OLS- or the GLS-estimator without specifically accounting for serial correlation we come to clearer results than when introducing either a lagged dependent variable or an autoregressive term. As the estimation that accounts for serial correlation is also more prone to be over fitted due to the loss of an entire period and the introduction of new coefficients it is ambiguous which regression to prefer.

When comparing the two different results, the following results seem to be robust: In line with Eichengreen and Luengnaruemitchai (2006) it is found that the stage of economic development, the interest rate spread, exchange rate stability and the level of corruption are major determinants of corporate bond market development. We also find, similarly to Dickie and Fan (2005), that outspoken government commitment seems to be an important factor. We find no significant influence of bank concentration on the development of the corporate debt market in East Asia.

Contrary to expectations the size of the government bond market seems not to be positively related to the size of the corporate bond market. This means that the proposed hypothesis of positive spill-over effects of the government bond market has to be rejected for East Asia. Instead there seem to be negative externalities. A possible economic interpretation is that government debt may crowd out private borrowers. McCauley and Remolona (2000, 56) state regarding the government bond market: "It is important to realise that bigger is not always better. In the case where the supply of government debt is determined by deficits, any benefits from the government bond as a pricing benchmark and hedging instrument can be lost if the government crowds out private borrowing". Governments with higher debt may also resort to financial repression more easily, impeding the development of a corporate bond market.

Another contradictory but robust finding arises with the economy's size. While Bhattacharyay (2011) and Eichengreen and Luengnaruemitchai (2006) find that the size of the economy is an important factor, we have to conclude that the size of the economy is negatively related to corporate bond market development in East Asia.

There are several ambiguous results due to contradictory outcomes from the regression that includes the autoregressive term. Any conclusion from these results has to be made very cautiously as they come from a regression with serial correlation in the error terms and were vindicated by an estimation with a very small sample size but with a large

Table 4.5.: Testing Hypothesis 3: GFC as a determinant of the Corporate Bond Market?

VARIABLES	(1) corp_bond_gdp	(2) corp_bond_gdp	(3) corp_bond_gdp
gdp_ppp	-4.911***		-1.835***
	(0.345)		(0.583)
gdp_capita_ppp	22.03***		13.77***
	(0.398)		(1.453)
openness	-0.0940***		-0.0520***
	(0.00510)		(0.0102)
i_spread	-2.604***		-0.621***
	(0.121)		(0.240)
bank_credit	-0.122***		-0.0694***
	(0.00206)		(0.0136)
xr_stability	17.92***		11.70***
	(0.900)		(2.129)
gfc	2.023***	2.449***	2.423**
	(0.332)	(0.921)	(0.986)
corruption		-15.20***	-8.732***
		(1.875)	(2.250)
law		18.24***	8.583***
		(1.131)	(2.309)
regulatory		11.31***	4.485*
		(1.552)	(2.531)
bank_concentration		-9.771***	-10.85***
		(1.610)	(2.207)
pension_dc		4.120***	4.674***
		(0.948)	(1.144)
gov_commit		15.11***	7.842***
		(0.967)	(1.863)
Constant	-22.30**	9.964***	-46.99***
	(8.674)	(1.333)	(14.11)
Observations	110	90	90
Panels (countries)	10	10	10

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

(1), (2) & (3) GLS-estimator with cross-sectional dependent errors

number of coefficients:

It is found that bank credit has a negative influence on corporate debt market development. Despite theory expecting and Eichengreen and Luengnaruemitchai (2006) finding an opposite effect, this could mean that the corporate bond market takes the role of a substitute rather than a complement in East Asia. The experiences of the global financial crisis support this view.

Contrary to theory and to Bhattacharyay (2011) it is found that openness seems negatively related to the corporate bond market.

Surprisingly the regulatory framework is most likely not exerting a positive influence. While the variable's coefficient is insignificant in most of the regression it even has a negative influence in the AR-regression. But, in line with economic theory, the rule of law and a defined-contribution pension system have a positive effect on the corporate bond market.

The third hypothesis, that the corporate bond market took the role of a spare tire can be cautiously accepted. It was found that the size of the corporate bond market increased by about 2 to 2.4 % in the period after the global financial crisis.

4.3. Summary of Results

This chapter examined the determinants of bond market development in the East Asian region. A similar approach to Bhattacharyay (2011) was taken, but additional institutional variables considered as potential factors in East Asian bond market development. Additionally three hypothesis were tested that were introduced in the analysis of the current state of the market. While many theoretical expectations were confirmed by the multivariate analysis, several contradictory results emerged. Some determinants seem to particularly have different effects on the government- or corporate bond market. Table 4.6 gives an overview of expectations from theory and empirical findings in both markets.

Size of the Economy The size of the economy was anticipated to have a positive influence on the level of bond market development in East Asia due to a more easily achieved effective scale. We could only validate this theory for the government bond market. In the corporate bond market smaller economies seem to have bigger corporate bond markets.

Developmental stage of the economy A more developed economy (measured as GDP per capita) was expected to have a positive influence on bond market development. This theory could only be confirmed for the corporate bond market. The variable became insignificant for the government bond market when institutional variables, such as the rule of law and corruption were added. As more developed countries tend to have better institutions supporting their economy this result does not conflict with theory. Eichengreen and Luengnaruemitchai (2006) came to the same finding.

Exchange Rate Stability A more stable exchange rate was assumed to attract foreign investors and thus spur bond market development. Again this was only found to be a significant factor for the corporate bond market. The government bond market was not affected by more stable exchange rates. This could indicate more appetite of foreign investors in corporate- rather than East Asian sovereign bonds.

Interest Rate Spread As high interest rate spreads make long-term investments such as bonds less attractive, they are negatively associated with bond market development. This was found to be the case for the corporate bond market. The government bond market was, contrary to theory, positively related to the interest rate spread.

Pension System The type of pension system a country employs is also expected to have an impact on the bond market, as defined contribution schemes systems tend to build up assets and defined benefits pension plans are often financed with a pay-as-you-go method. Again we find different results for the corporate or the government bond market. A positive relationship with the corporate debt market is found, but this relationship seems not to be very robust. The government bond market tends to be smaller in countries with a DCS pension system. A possible explanation is that countries with more sustainable pension system also may have stricter fiscal policies or less need to cross-finance a pay-as-you-go DBS scheme.

Bond- and Bank Debt — Complementary or Substitute? Whether bank and bond market debt constitute a complement or a substitute has not been fully determined in theory yet. While entrenched interests of banks could impede bond market development banks could as well benefit from securitization and fee-based investment banking. Two variables were included to test these theories for the East Asian region. Bank concentration is expected to indicate the influence and power of the banking system. The

entrenched interests of a concentrated banking system is associated to be negatively related to bond market development. Contrary to the findings of Dickie and Fan (2005) no signficiant relationship was found in either market.

The second variable is the size of the banking system. As banks benefit from similar institutions as bond markets and also can benefit from a developed debt market a positive relationship is expected. But again entrenched interests could also imply a negative relationship as a bigger, more powerful banking system may constrain the development of the bond market. While a weak negative effect of amount of bank credit on the corporate bond market, a positive influence on the government bond market is found.

Rule of Law, Corruption and the Regulatory Framework Rigidly enforced contracts, low levels of corruption and a strong regulatory framework are expected to provide the basis for the development of a functioning bond market. In line with this theory we find a negative effect of corruption on both markets. A more advanced regulatory framework had similarly positive effects on the government market, but no significant relationship with the corporate debt market could be found. A stronger enforcing of contracts and rule of law had a weakly positive relationship with the corporate but a negative effect on the government bond market. A possible explanation of this result is that countries with stronger rule of law might also have stricter fiscal policies, leading to less government debt.

Government Commitment Dickie and Fan (2005) found that the outspoken commitment of governments to rapidly develop their domestic bond markets is an important factor. Similarly we found the dummy variable to have the expected positive effect in both markets.

Hypothesis I: Externalities of the Government Bond Market The first hypothesis proposed suggested that a developed government bond market would provide externalities to the economy and also foster the development of a corporate bond market, for example by providing a benchmark yield curve. To test this hypothesis the size of the government bond market was added in the multivariate analysis of the corporate market. The results showed that East Asian countries with larger government bond markets had smaller corporate bond markets. A 1 % increase in government debt decreased the size of the corporate bond market by 0.1 to 0.2 percent. A possible explanation is that government debt might crowd out private debt or that governments with higher

government debt may also impede bond market development by more easily resorting to financial repression.

Hypothesis II: Monetary Sterilization The second hypothesis suggested that the growth of government debt in the region was heavily driven by the sterilization efforts of East Asian central banks. The assumption was tested by including the net domestic credit assets scaled by the reserve money of each economy. The variable is based upon the estimations of a sterilization coefficient by Aizenman and Glick (2009). It was found that sterilization is a highly significant driving force of government bond market growth in the East Asian region.

Hypothesis III: The Global Financial Crisis The third hypothesis advanced that the East Asian corporate bond market took the role of a spare tire during the period of the global financial crisis. To test the thesis a dummy was included in the regression for the period of the global financial crisis. The variable was highly significant and suggests that the bond market grew about 2 to 2.4 % of GDP specifically due to the effects of the crisis.

Table 4.6.: Overview of Empirical Determinants of East Asian Bond Markets

	Theory	Government	Corporate
Bank Credit	+ / -	+	- (ambig)
Exchange Rate Stability	+	insig	+
GDP per capita	+	insig	+
Interest Rate Spread	-	+	-
Openness	+	+	- (ambig)
Size of the Economy	+	+	-
Bank Concentration	-	insig	insig
Corruption	-	-	-
DC Pension System	+	-	+ (ambig)
Government Commitment	+	+	+
Regulatory Framework	+	+	insig (ambig)
Rule of Law	+	-	+ (ambig)
GFC-Dummy	+		+
Government Bond Market	+		-
Sterilization	+	+	

5. Conclusion

This thesis started out analyzing the current state of the government- and corporate bond markets in terms of size, liquidity, the role that markets play in the economy, as well as their integration and regionalism. It then proceeded to use an empirical model to analyze panel-data to find the major endogenous driving forces of bond market development in the region. The questions answered are:

- What are the potentials of developing and integrating domestic bond markets?
- What is the state of development and integration in the East Asian bond markets (government and corporate)?
- What are the determinants of bond market growth in East Asia? How can the uneven speed and progress in the regional development of the East Asian bond markets be explained?

5.1. Government Bond Market

Potentials of Bond Market Development

An overview of the potentials of the development of the government bond market in academic literature showed that:

- The government bond market is the most versatile and least disturbing form of government finance. As it is a market-based form of finance, it exerts the least disturbances on the capital market as long as rates are truly determined by markets and market-participants are not forced to hold government securities. (See 2.2.1.1)
- With an established government bond market, monetary authorities have additional and less costly tools at their hand to control liquidity in the financial sector. (See 2.2.1.1)

- With sufficient government benchmark securities and liquidity in the market, a yield curve is established that provides additional information for investors and has positive effects on the economy. (See 2.2.1.2)

- Government finance through bond markets is not as prone to cause inflation and thus increase financial stability, but developing countries may still find it hard to finance themselves in their own currency, which might expose them to a currency mismatch and hence foster financial instability. (See 2.2.1.3)

The Asian financial crisis of 1997 was *the* crucial event that started to accelerate national and regional efforts to establish a developed government bond market.

State of the Market

Since then the bond markets in the East Asian region grew rapidly. While the government bond market was virtually non-existent in some countries, it became the major source of finance for all countries in the region. Markets' liquidity also improved throughout the region during the last decade. Despite these fast developments, large differences between the region's markets remain. While in 2010 Japan had government bonds outstanding worth 168 % of GDP the size of Vietnam's market accounted only for a little over 13 %. Liquidity varies similarly: the bid-ask-spread is nearly 50 times larger in Vietnam than in Korea. (See 3.1.1)

Monetary Policy With established government bond markets, monetary authorities in the region were able to use the market to steer liquidity in the financial system. Except for China, all countries primarily use market-based instruments to conduct monetary policy. The massive build-up in foreign exchange reserves in the region also led to superfluous liquidity in the financial system that was successfully sterilized by issuing central bank bonds (China used bank's reserve requirements). These sterilization efforts massively drove the rapid growth in the government bond market (See 3.1.3). This hypothesis was also confirmed by the empirical estimations (See 4.1.3).

Yield Curve Development All countries in the region managed to establish a yield curve by issuing bonds in major benchmark-maturities. But differences remain, especially due to missing liquidity in some maturities. This can result in sudden spikes in the yield curve and limits the information-content for investors (See 3.1.2). Economic

theory suggests that the establishment of a yield curve could have spill-over effects on the economy and on the corporate bond market. The results of the estimation showed that there might be no such effect on the East Asian corporate bond market. (See 4.2.3)

Financial Stability Overall, the establishment of government bond markets seems to have contributed to financial stability. While only Japan faces the risk of large amounts of government debt, debt burdens remain low in the rest of East Asia. The problem of original sin might persist but has been rapidly dampened by the establishment of the local currency bond markets. The only risks on financial stability might be the costs that central banks face due to the need to sterilize excess liquidity, caused by the build-up of foreign exchange reserve; and the fact that in the long run foreign exchange accumulation is incompatible with capital mobility and sovereign monetary policy, which could dampen government bond market growth. (See 3.1.4)

5.1.1. Determinants of Government Bond Market Growth

An empirical model was used to analyze panel-data to find which endogenous determinants had significant impact on the development in the East Asian bond markets. Several possible determinants were tested. It was found that the size of the economy, the size of the banking system, corruption, the quality of the regulatory framework and the outspoken government commitment are important determinants of government bond market development. The openness of an economy exerted only little influence and exchange rate stability also seemed insignificant in our final specification (See 4.1). Additionally, the hypothesis was tested that sterilization efforts of monetary authorities contributed to bond market growth. The sterilization indicator was found to be highly significant in all model specifications, backing the hypothesis. (See 4.1.3)

5.2. Corporate Bond Market

Similar to the government bond market, it was found that the development of the corporate bond market has positive effects on the economy. It was found that:

- A corporate bond market allows capital to be distributed within the economy more efficiently. Safe and established firms are able to finance themselves less costly through the bond markets. This allows banks to put capital to use more efficiently. (See 2.2.2.1)

- Bond finance also allows banks and corporations to borrow long-term and in any currency. By this, potential currency- and maturity mismatches in the region are mitigated and financial stability is fostered. The bond market could also play the role of a spare-tire in case banks are reducing lending. (See 2.2.2.2)

As with the government bond market, the Asian financial crisis revealed the costs of not having a developed bond market and marked a turning point in the efforts to develop the local bond markets.

5.2.1. State of the Market

While corporate bond markets developed fast in East Asia, they grew more modestly than their government counterparts. Again the development is very diverse throughout the region. The markets in China, Korea and Thailand grew most rapidly, stagnated in Indonesia and even declined in Japan. A major obstacle in the whole region is insufficient liquidity. Bid-ask-spreads are low in Korea and China and very high in Indonesia and Vietnam. Liquidity and trading is mostly limited to the primary markets. This seems to be the result of an investor base that is dominated by buyers who hold securities until maturity. (See 3.2.1)

Financial Intermediation While the corporate bond markets grew and developed in the region, the growth was still far more modest than that of government bond markets. As other forms of finance also grew steadily, the banking system remained the major form of finance in the region. The capital structure did not change significantly throughout the region. (See 3.2.2)

Spare Tire Theory In the decade after the Asian financial crisis, it remained unclear whether the East Asian corporate bond market could play the role of a spare tire. The global financial crisis led to a deleveraging in the East Asian banking system. In turn, the corporate bond market picked up, playing the role of a substitute (See 3.2.3). This experience was as well tested empirically and could be confirmed within certain limits. It was found that the corporate bond market grew in average 2 to 2.4 % due to the global financial crisis. (See 4.2.4)

5.2.2. Determinants of Corporate Bond Market Growth

The results of the empirical analysis of corporate bond market determinants came to more ambiguous results than the assessment of the government bond market. Robust determinants are the stage of economic development, the interest rate spread, exchange rate stability, the level of corruption and outspoken government commitment (See 4.2). The hypothesis that positive spill-over effects of the government bond market exist could not be confirmed. Instead, government debt may crowd out private investors, as an increase in the size of the government bond market decreased the size of the corporate bond market by 0.1 % to 0.2 % (See 4.2.3). In line with our hypothesis, the global financial crisis led to growth in the East Asian corporate bond market of 2 % to 2.4 %. (See 4.2.4)

5.3. Integration

The prospects of integrating the bond markets in East Asia were found to be an increase in liquidity due to increased market and a broader investor base, the possibility to smooth consumption, share risks and enhanced macroeconomic discipline due to participation of foreign investors. But international and regional integration might also be a source of financial instability as the financial system may become more fragile, institutional weaknesses can cause capital miss allocation and sudden capital reversals could exaggerate existing problems or crises. (See 2.2.3)

An overview of academic literature revealed that the state of integration in the East Asian bond markets is weak at best. East Asia seems less integrated than other developing regions, like the CEE countries. The major obstacles that remain are different regulatory frameworks, rating standards and in some cases the lack of transparent institutions. (See 3.3.1)

5.4. Regionalism

Despite two major regional initiatives being founded that target the development of the East Asian bond markets, the results of this regional cooperation are scarce, and progress nearly came to a halt before the global financial crisis. The actual development of the region's bond markets in this period was almost exclusively local and the regional initiatives exerted only little influence. The crisis sparked renewed interest and led to the

creation of the Credit Guarantee and Investment Facility (CGIF), the establishment of the Asian Bond Market Forum (ABMF) and the final opening-up of the national Asian Bond Funds.

The major achievements of the Asian Bond Market Initiative are the CGIF, a regional forum and several guides on the East Asian bond markets. But the actual impact of them on the market seem to be minimal. The Asian Bond Fund established a fund of East Asian bonds that is open for investment to outside investors. With the establishment of national sub-funds, countries opened up their bond markets to foreign investors. Even though this process of opening-up nearly came to a halt, momentum was renewed in the wake of the global financial crisis. By May 2011, all national bond funds were open for investments of foreigners. Despite the various efforts of the regional initiatives, the major obstacles of different regulations and rating standards remain. (See 3.3.3)

5.5. Concluding Remarks

The Asian financial crisis of 1997/98 was *the* decisive turning point in the development of bond markets in the region. Countries experienced that they were too reliant on the banking system and on the inflow of short-term foreign capital. The development of the region's local bond markets provided a way to overcome this source of financial instability and to diversify the region's financial system.

A lot has happened since then. In sheer size the East Asian bond markets exploded. This development was especially led by the government bond markets. It has to be stressed that a large part of the East Asian bond markets consists of central bank bills that were used to sterilize liquidity that resulted from a continuous foreign exchange reserve build-up. When this reserve accumulation becomes a burden to the economy the rapid growth in the government bond markets may come to a halt and reverse[1].

Rapid development occurred also in some corporate bond markets. Whereas the Chinese corporate bond market was virtually non-existent in 2000, it now accounts for over one fourth of the corporate bonds in the whole region. But bond market development does not only involve quantitative growth. Instead, it is of major importance to provide the institutions and infrastructure in order to facilitate growth. While the East Asian

[1]With the PBOC struggling to inject liquidity into the Chinese financial system it set out to not renew outstanding bills in late 2012. From July 2010 to June 2012 central-bank-bills and -bonds outstanding decreased by 63 %. This set liquidity free worth approximately CNY 2822 billion (USD 448 billion). As long as capital is flowing out of China this trend is continuing. This kind of reversal could happen to every country in East Asia.

bond markets grew in the last decade they developed qualitatively as well.

But neither quantitative nor qualitative development is completed or sufficient in all markets. The major obstacles remains insufficient liquidity and the weak investor base that holds securities until maturity. Liquidity could be greatly increased by further integrating regional markets. However, integration and harmonization has so far been left to the individual states and is still moving slowly.

While the Asian financial crisis was the event that kick-started the development in the debt markets, the global financial rejuvenated the dynamics of development. But the crisis was also the first major test: could the markets play the desired role of substituting for bank-lending? The East Asian bond markets clearly passed this test. In this situation qualitative development of the market allowed the corporate debt markets to play the role of a spare tire and consequently led to quantitative growth. While this certainly is a huge success, it remains to be seen whether the markets can play the same role when a crisis originates from within the region itself. But it seems clear that it will be crucial to further develop, integrate and harmonize the markets in the region.

A. Appendix

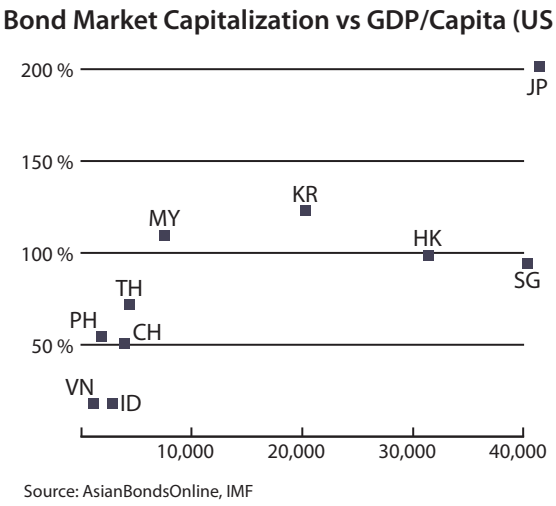


Figure A.1.: Bond Market Development relative to Economic Development

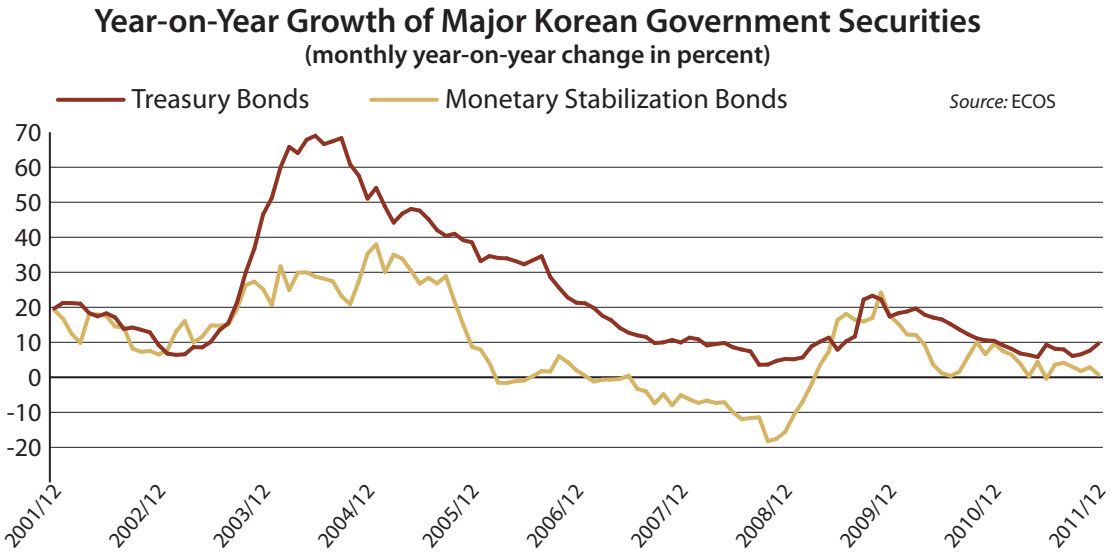


Figure A.2.: Korean Government Bond Market YoY-Growth by Type

Table A.1.: Original Sin in Asia

	OSIN 1		OSIN 3	
	MEAN	MED	MEAN	MED
1993	1	1	1	1
1994	1	1	0,99	1
1995	1	1	0,99	1
1996	1	1	0,97	1
1997	1	1	0,99	1
1998	1	1	0,98	1
1999	0,99	1	0,96	1
2000	0,99	1	0,95	1
2001	0,99	1	0,94	1
2002	0,99	1	0,96	1
2003	0,99	1	0,97	1
2004	0,99	1	0,97	1
2005	0,98	1	0,97	0,99
2006	0,98	1	0,96	0,99
2007	0,96	1	0,92	0,93
2008	0,95	1	0,91	0,95

Source: Hausmann and Panizza (2011)

Table A.2.: Original Sin in Asian Countries

	OSIN 1 1993-1998	OSIN1 1999-2001	OSIN 3 1993-1998	OSIN 3 1999-2001
China	1	1	1	1
Indonesia	0,98	0,99	0,94	0,98
Japan	0,64	0,53	0	0
Korea	1	1	1	1
Malaysia	1	1	0,99	1
Philippines	0,99	1	0,98	0,99
Singapore	0,97	0,94	0,96	0,7
Taiwan	1	0,99	1	0,54
Thailand	1	0,99	1	0,54

Source: Eichengreen et al. (2005)

Table A.3.: Foreign Exchange Reserves billion US $

World Rank	Country	Foreign Exchange Reserves (est)
1	CN	3,316.00
2	JP	1,063.00
5	TW	418.40
8	KR	320.10
9	HK	288.80
11	SG	248.70
13	TH	202.20
18	ID	136.20
20	MY	129.60
27	PH	72.30
63	VN	16.76

Data as of 31. Dec. 2011 (JP as of 2010)
Source: CIA (2012)

Table A.4.: Market Based Instruments as Share of Total Instruments

	CN	HK	ID	KR	MY	PH	SG	TH	TW
2000		-	64	89	79	61	94	76	70
2001		-	67	88	84	48	94	92	79
2002	7	-	72	86	85	54	94	94	83
2003	8	-	68	88	88	63	95	95	87
2004	18	-	76	91	92	64	95	95	87
2005	31	-	65	89	92	71	95	96	88
2006	42	-	64	86	91	49	95	96	88
2007	39	-	62	84	91	55	95	97	86
2008	34	-	67	82	92	63	94	97	88
2009	31	-	59	87	99	68	93	98	88
2010	29	-	31	89	97	75	93	98	87

Highlighted cells indicate balance sheet losses of central banks.
Source: Löffler et al. (2012)

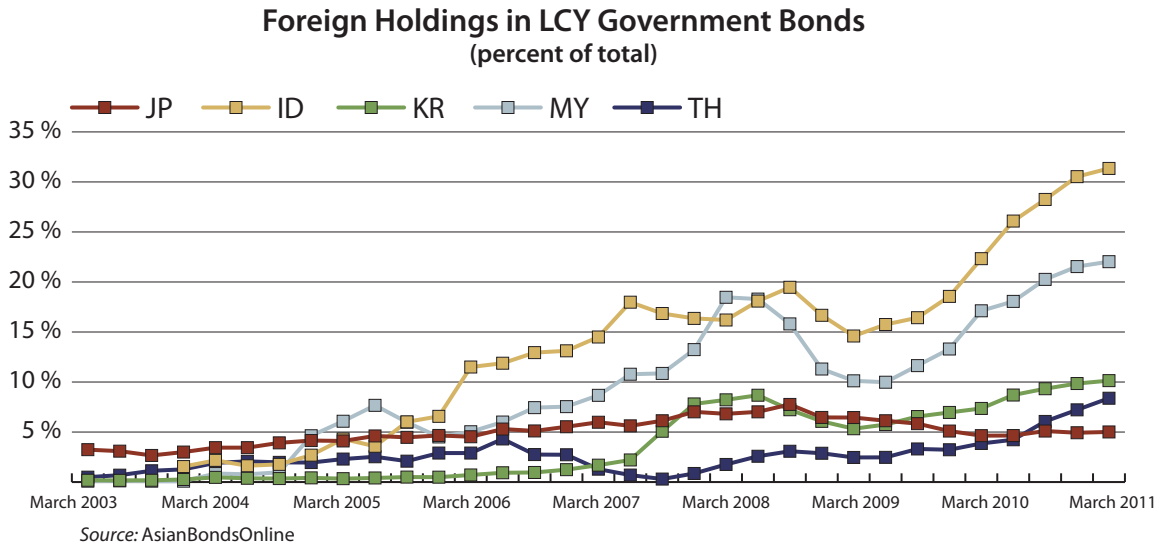


Figure A.3.: Foreign Holdings in LCY Government Bonds

Table A.5.: Selected World Ranks of Structural Indicators (2011)

Economy / Rank	Ease of Doing Business[1]	Protecting Investors[1]	Enforcing Contracts[1]	Resolving Insolvency[1]	Corruption Perception[2]	Economic Freedom[3]
Singapore	1	2	12	2	5	1
Hong Kong	2	3	5	16	12	2
Korea	8	79	2	13	43	31
Thailand	17	13	24	51	80	60
Malaysia	18	4	31	47	60	53
Japan	20	17	34	1	14	22
China	91	97	16	75	75	138
Vietnam	98	166	30	142	112	136
Indonesia	129	46	156	146	100	115
Philippines	136	133	112	163	129	107
United States	4	5	7	15	24	10
Germany	19	97	8	36	14	26

[1] *Source:* World Bank (2011)
[2] *Source:* Transparency International (2011)
[3] *Source:* Heritage Foundation (2011)

Table A.6.: Domestic Credit provided by the Banking Sector (% of GDP)

Country Name	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
China	100.72	113.11	119.33	119.67	123.00	143.46	151.88	140.37	134.30	133.48	127.78	120.80	145.08	146.39
Hong Kong	163.01	146.32	137.01	136.00	138.46	142.51	146.07	146.66	142.75	134.50	125.37	124.57	167.79	199.00
Indonesia	59.55	59.93	62.07	60.68	54.47	52.39	49.20	49.62	46.20	41.66	40.58	36.77	36.98	36.53
Japan	276.47	298.40	309.92	308.91	299.41	307.22	317.35	311.18	318.66	308.54	297.24	299.64	328.41	326.50
Korea	59.33	67.03	72.18	74.70	79.32	86.04	88.68	84.62	88.34	96.42	98.44	109.39	109.37	103.18
Malaysia	163.35	162.13	150.11	138.37	146.53	143.64	139.85	127.48	122.41	119.03	113.40	114.95	137.40	132.22
Philippines	78.54	63.28	58.93	58.34	56.06	55.09	54.34	53.98	47.25	48.25	48.35	47.44	48.71	49.23
Singapore	70.03	85.80	83.78	77.89	92.04	74.74	80.16	72.38	62.13	62.60	69.63	77.19	90.72	85.73
Thailand	177.58	176.75	155.78	138.27	128.57	127.78	130.75	124.53	119.18	108.96	131.58	130.50	137.01	135.48
Vietnam	21.24	21.97	28.92	35.15	39.73	44.79	51.80	61.93	71.22	75.38	96.19	94.53	123.01	135.79

Source: World Bank (2012a, FS.AST.DOMS.GD.ZS)

Table A.7.: Corporate Bond Market as % of GDP.

Country Name	Dec 2000	Dec 2001	Dec 2002	Dec 2003	Dec 2004	Dec 2005	Dec 2006	Dec 2007	Dec 2008	Dec 2009	Dec 2010
China	0.3	0.3	0.6	0.8	1.3	2.8	3.8	4.3	5.6	9.1	10.6
Hong Kong	27.6	29.2	32.4	35.4	37.6	38.8	41.8	38.8	33.3	35.4	34
Indonesia	1.4	1.1	1.2	2.3	2.6	2.1	1.8	2	1.5	1.6	1.8
Japan	24	23.3	21.7	19.8	18.4	17.5	16.6	16.8	17.3	19	18.8
Korea	48.8	54.2	53.2	47.9	42.3	42.1	45.1	50.8	55	62.5	63.1
Malaysia	35.2	41.1	34.2	36.6	31.5	33	33	35.9	35.5	42.4	40.4
Philippines	0.2	0.1	0.1	0.3	0.7	1	1.7	2.2	2.7	4.4	4.3
Singapore	20.9	30.4	29.6	30.5	30.6	28.8	28.9	28.8	29	27.8	27.9
Thailand	4.5	4.9	5.1	7.7	7.3	8.1	11.1	11	11	13.2	12.9
Vientam	0	0	0	0	0	0	0	0.5	0.7	1.2	1.8

Source: AsianBondsOnline (2012a)

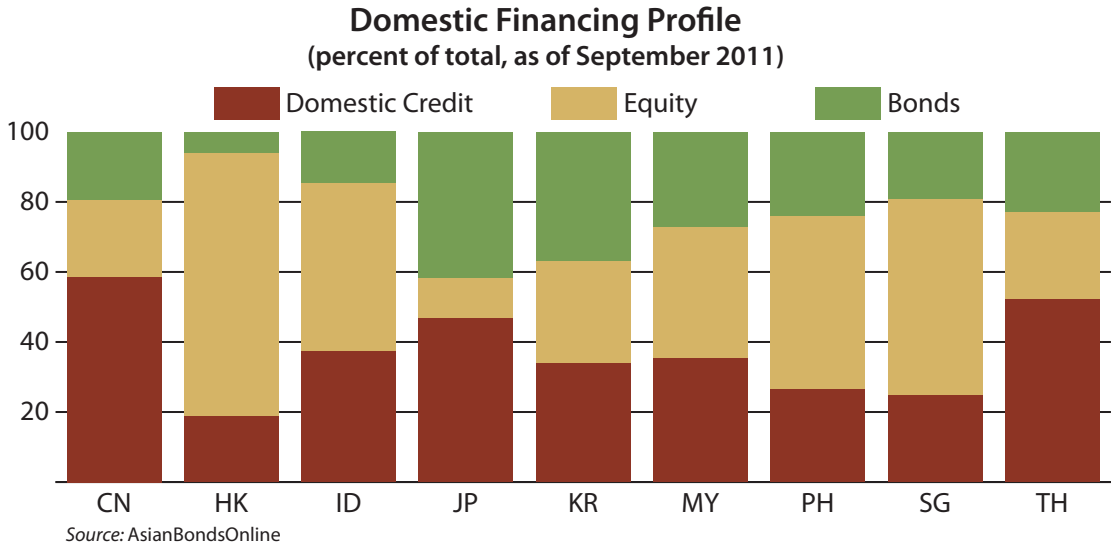


Figure A.4.: Domestic Financing Profile, for society as a whole

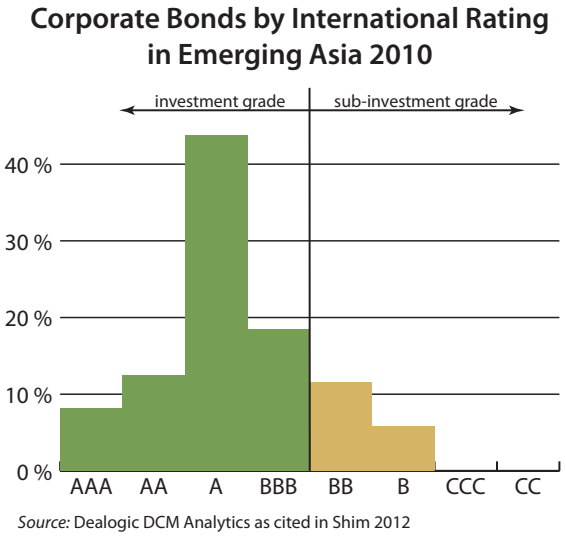


Figure A.5.: Internationally Rated Corporate Bonds in Emerging Asia by Rating

Table A.8.: Internationally / Locally Rated Bonds in Emerging Asia

	2005	2006	2007	2008	2009	2010	2011 (Q1-Q3)
Internationally Rated	15,226	13,378	6,206	4,147	11,628	10,455	12,451
Locally Rated / Unrated	56,150	57,591	84,423	121,940	241,850	215,177	194,571

Source: Shim (2012)

Table A.9.: Pension Systems in East Asia (2011)

	Public DBS	Public DCS	Private DCS
China		x	
Hong Kong			x
Indonesia		x	
Japan	x		
Korea	x		
Malaysia		x	
Philippines	x		
Singapore		x	
Thailand	x		
Vietnam	x		

Source: OECD (2012)

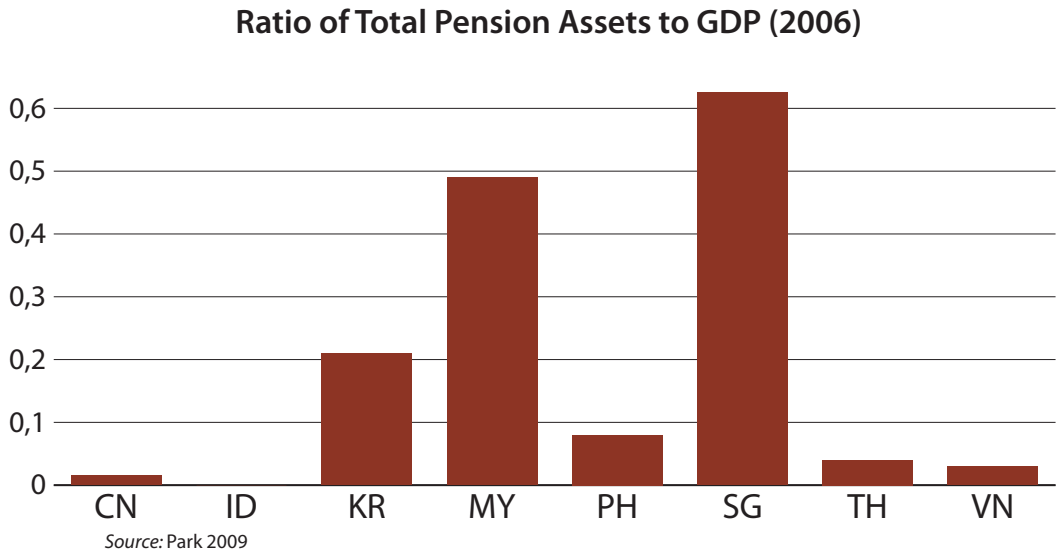


Figure A.6.: Ratio of Pension Assets to GDP

B. Appendix – Regressions

Table B.1.: Macroeconomic Determinants of the Government Bond Market

VARIABLES	(1) gov_bond_gdp	(2) gov_bond_gdp	(3) gov_bond_gdp	(4) gov_bond_gdp
gdp_ppp	6.032***	7.372***	1.930***	-0.0111
	(2.046)	(1.224)	(0.356)	(0.686)
gdp_capita_ppp	2.269	3.615**	4.404***	11.89***
	(2.882)	(1.774)	(0.489)	(0.640)
openness	0.0237	0.0295	-0.0131**	-0.0669***
	(0.0322)	(0.0199)	(0.00556)	(0.00568)
i_spread	0.329	1.498*	-0.921***	0.371***
	(1.305)	(0.792)	(0.216)	(0.143)
bank_credit	0.0565	0.0360	0.124***	0.196***
	(0.0440)	(0.0310)	(0.00873)	(0.0122)
xr_stability	-19.99***	-19.89***	-22.31***	-0.326
	(6.048)	(3.882)	(0.698)	(0.983)
japan	68.59***	74.18***	57.62***	42.56***
	(10.85)	(11.10)	(1.853)	(3.059)
Constant	-154.9***	-208.7***	-55.02***	-88.23***
	(49.21)	(27.34)	(8.439)	(18.56)
Observations	136	136	110	100
Panels (countries)		10	10	10
	OLS	GLS HET	GLS CSD	GLS CSD PSAR1

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

(OLS) OLS-estimator, (GLS) GLS-estimator, (HET) heteroskedastic errors

(CSD) cross-sectional dependent errors, (PSAR1) panel-specific AR1 process

Table B.2.: Institutional Determinants of the Government Bond Market

VARIABLES	(1) gov_bond_gdp	(2) gov_bond_gdp	(3) gov_bond_gdp	(4) gov_bond_gdp
corruption	-30.40***	-25.20***	-18.62***	-7.594***
	(8.002)	(6.363)	(1.620)	(1.681)
law	-12.22*	-11.00*	-20.06***	-3.441
	(7.094)	(6.071)	(1.329)	(2.478)
regulatory	39.37***	32.30***	37.39***	2.361
	(6.840)	(5.810)	(1.784)	(2.395)
bank_concentration	26.68**	17.80**	8.482***	18.10***
	(10.39)	(8.420)	(1.960)	(2.614)
pension_dc	-4.188	-4.324	-8.055***	-8.790***
	(3.860)	(2.637)	(1.810)	(2.630)
gov_commit	29.00***	28.29***	29.49***	22.09***
	(4.031)	(3.298)	(0.800)	(1.277)
japan	132.9***	128.1***	130.8***	35.47***
	(7.129)	(8.658)	(1.950)	(6.087)
Constant	-3.444	4.288	12.18***	12.95***
	(8.308)	(6.606)	(2.202)	(1.942)
Observations	100	100	90	80
Panels (countries)		10	10	10
	OLS	GLS HET	GLS CSD	GLS CSD PSAR1

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

(OLS) OLS-estimator, (GLS) GLS-estimator, (HET) heteroskedastic errors

(CSD) cross-sectional dependent errors, (PSAR1) panel-specific AR1 process

Table B.3.: Determinants of the Government Bond Market

VARIABLES	(1) gov_bond_gdp	(2) gov_bond_gdp	(3) gov_bond_gdp
gdp_ppp	3.276	2.639**	1.995
	(2.300)	(1.267)	(1.542)
gdp_capita_ppp	7.681	8.917***	4.955
	(6.090)	(3.165)	(4.243)
openness	0.0944***	0.0796***	0.0514**
	(0.0358)	(0.0207)	(0.0215)
i_spread	3.353**	3.488***	2.857***
	(1.368)	(0.713)	(0.679)
bank_credit	0.174***	0.199***	0.168***
	(0.0486)	(0.0283)	(0.0336)
xr_stability	-8.137	-11.61***	-7.832**
	(5.291)	(2.969)	(3.492)
corruption	-31.92***	-26.05***	-12.92***
	(7.683)	(4.009)	(3.721)
law	-27.73***	-24.65***	-26.65***
	(7.244)	(4.077)	(4.761)
regulatory	34.72***	25.52***	22.96***
	(7.568)	(4.423)	(5.277)
bank_concentration	27.29***	22.62***	7.317
	(10.00)	(6.281)	(5.901)
pension_dc	-13.25***	-10.91***	-13.01***
	(4.078)	(2.153)	(2.304)
gov_commit	39.82***	36.87***	37.11***
	(4.879)	(2.955)	(2.993)
japan	117.1***	104.8***	108.0***
	(12.37)	(9.939)	(15.28)
Constant	-194.8***	-183.1***	-110.0***
	(45.20)	(22.82)	(34.45)
Observations	100	100	80
Panels (countries)		10	10
	OLS	GLS HET	GLS HET PSAR1

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

(OLS) OLS-estimator, (GLS) GLS-estimator, (HET) heteroskedastic errors

(CSD) cross-sectional dependent errors, (PSAR1) panel-specific AR1 process

Table B.4.: Macroeconomic Determinats of the Corporate Bond Market

VARIABLES	(1) corp_bond_gdp	(2) corp_bond_gdp	(3) corp_bond_gdp	(4) corp_bond_gdp
gdp_ppp	-2.673**	-1.812***	-4.569***	-2.742***
	(1.161)	(0.645)	(0.329)	(0.0607)
gdp_capita_ppp	20.36***	14.67***	21.79***	12.44***
	(1.565)	(1.243)	(0.384)	(0.212)
openness	-0.0898***	-0.0382***	-0.0890***	-0.0304***
	(0.0171)	(0.0136)	(0.00515)	(0.00131)
i_spread	-1.206**	-0.734**	-2.629***	0.00425
	(0.562)	(0.338)	(0.106)	(0.0192)
bank_credit	-0.105***	-0.0530***	-0.122***	0.0307***
	(0.0169)	(0.0132)	(0.00196)	(0.00112)
xr_stability	13.86***	6.976***	16.90***	1.840***
	(3.245)	(2.114)	(0.838)	(0.118)
Constant	-73.86**	-59.40***	-29.05***	-23.99***
	(28.27)	(14.10)	(8.062)	(1.892)
Observations	133	133	110	110
Panels (countries)		10	10	10
	OLS	GLS HET	GLS CSD	GLS CSD PSAR1

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

(OLS) OLS-estimator, (GLS) GLS-estimator, (HET) heteroskedastic errors

(CSD) cross-sectional dependent errors, (PSAR1) panel-specific AR1 process

Table B.5.: Institutional Determinants of the Corporate Bond Market

VARIABLES	(1) corp_bond_gdp	(2) corp_bond_gdp	(3) corp_bond_gdp	(4) corp_bond_gdp
corruption	-20.43***	-10.16***	-15.90***	-0.466
	(4.417)	(3.036)	(1.809)	(0.661)
law	24.83***	17.88***	19.60***	7.954***
	(4.261)	(3.069)	(1.105)	(0.433)
regulatory	10.31***	3.951*	11.23***	4.844***
	(3.651)	(2.314)	(1.521)	(0.537)
bank_concentration	-2.529	-2.229	-5.948***	1.702*
	(5.649)	(3.423)	(1.138)	(0.978)
pension_dc	4.025*	3.590**	2.774**	2.871
	(2.220)	(1.429)	(1.341)	(2.871)
gov_commit	14.68***	17.29***	14.80***	19.78***
	(2.169)	(1.780)	(0.983)	(3.336)
Constant	5.195	6.406***	8.554***	6.115***
	(4.148)	(2.451)	(1.165)	(0.714)
Observations	99	99	90	80
Panels (countries)		10	10	10
	OLS	GLS HET	GLS CSD	GLS CSD PSAR1

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

(OLS) OLS-estimator, (GLS) GLS-estimator, (HET) heteroskedastic errors

(CSD) cross-sectional dependent errors, (PSAR1) panel-specific AR1 process

Table B.6.: Determinants of the Corporate Bond Market

VARIABLES	(1) corp_bond_gdp	(2) corp_bond_gdp	(3) corp_bond_gdp	(4) corp_bond_gdp
gdp_ppp	-2.472**	-2.323**	-2.206***	-2.237***
	(1.190)	(1.003)	(0.545)	(0.358)
gdp_capita_ppp	21.67***	17.11***	16.46***	12.49***
	(3.302)	(2.904)	(1.272)	(1.068)
openness	-0.0449***	-0.0296**	-0.0443***	0.00135
	(0.0164)	(0.0149)	(0.00986)	(0.00652)
i_spread	-0.550	-0.324	-0.558*	-0.362***
	(0.449)	(0.309)	(0.300)	(0.0926)
bank_credit	-0.0684***	-0.0305	-0.0551***	0.0158*
	(0.0215)	(0.0191)	(0.0136)	(0.00940)
xr_stability	15.47***	11.62***	10.51***	2.935***
	(2.703)	(2.441)	(2.156)	(0.701)
corruption	-17.59***	-14.19***	-10.21***	-2.457**
	(3.643)	(3.068)	(2.364)	(1.051)
law	16.27***	11.97***	7.513***	0.0820
	(4.019)	(3.674)	(2.405)	(0.999)
regulatory	-3.641	-1.832	2.544	-2.440**
	(3.738)	(2.989)	(2.467)	(1.225)
bank_concentration	0.631	0.790	-6.177***	1.401
	(5.876)	(4.550)	(2.050)	(1.186)
pension_dc	4.060**	3.641**	4.219***	1.570
	(2.014)	(1.541)	(1.185)	(1.344)
gov_commit	6.353**	10.62***	8.008***	16.26***
	(2.437)	(2.055)	(1.865)	(1.312)
Constant	-108.0***	-77.81***	-64.41***	-42.59***
	(24.79)	(21.77)	(11.50)	(10.02)
Observations	99	99	90	80
Panels (countries)		10	10	10
	OLS	GLS HET	GLS CSD	GLS CSD PSAR1

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

(OLS) OLS-estimator, (GLS) GLS-estimator, (HET) heteroskedastic errors

(CSD) cross-sectional dependent errors, (PSAR1) panel-specific AR1 process

Table B.7.: Testing Hypothesis 3: GFC as a determinant of the Corporate Bond Market?

VARIABLES	(1) corp_bond_gdp	(2) corp_bond_gdp	(3) corp_bond_gdp
gdp_ppp	-2.844***		-9.367***
	(0.0481)		(3.123)
gdp_capita_ppp	13.52***		21.53***
	(0.188)		(2.986)
openness	-0.0349***		0.0136*
	(0.000904)		(0.00709)
i_spread	-0.00842		-0.327
	(0.0119)		(0.251)
bank_credit	0.0311***		-0.000186
	(0.000711)		(0.0131)
xr_stability	1.797***		-0.241
	(0.0781)		(1.078)
gfc	-0.112***	1.122**	-0.267
	(0.0313)	(0.439)	(0.588)
corruption		3.469***	0.557
		(1.215)	(1.002)
law		6.683***	-0.961
		(0.672)	(0.943)
regulatory		1.539	-3.844***
		(1.378)	(1.094)
bank_concentration		2.604*	9.979***
		(1.329)	(2.146)
pension_dc		3.949***	-12.33*
		(1.502)	(7.090)
gov_commit		19.33***	23.09***
		(1.526)	(4.179)
Constant	-29.58***	5.878***	67.52
	(1.715)	(1.231)	(58.67)
Observations	110	80	80
Panels (countries)	10	10	10

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

(1), (2) & (3) GLS-estimator with panel-specific AR1 and cross-sectional dependent errors

C. Appendix – Data

Table C.1.: Used Data Sources

Indicator	Source	Description and Comments
Reserve Money	IFS (2012)	national currency unit; IDN from 2001, JP, MY, PH and TH from 2009 monetary base used instead of reserve money
Foreign Assets	IFS (2012)	national currency unit
Sterilization	IFS (2012)	Sterilization = (Reserve Money - Foreign Assets)/Reserve Money
GFC Dummy		1 since 2008
GDP (PPP)	World Bank (2012b)	current international $, [NY.GDP.MKTP.PP.CD]
GDP per capita (PPP)	World Bank (2012b)	current international $, [NY.GDP.PCAP.PP.CD]
Interest Rate Spread	World Bank (2012b)	lending rate minus deposit rate, [FR.INR.LNDP]
Bank Credit	World Bank (2012b)	Domestic credit provided by banking sector (% of GDP), [FS.AST.DOMS.GD.ZS]
Openness	World Bank (2012b)	Imports+Exports as Share of GDP, [NE.IMP.GNFS.ZS + NE.EXP.GNFS.ZS]
Corruption	Kaufmann et al. (2010)	Estimate of governance
Law	Kaufmann et al. (2010)	Estimate of rule of law
Regulatory	Kaufmann et al. (2010)	Estimate of regulatory framework
Exchange Rate Stability	Aizenman et al. (2008)	Exchange Rate Stability
Bank Concentration	Beck et al. (2010)	Assets of three largest banks as a share of assets of all commercial banks.
Government Bond per GDP	AsianBondsOnline (2012a)	% of GDP, EOY
Corporate Bond per GDP	AsianBondsOnline (2012a)	% of GDP, EOY
Pension DC	OECD (2012)	1 for defined contribution scheme
Government Commitment		dummy, 1 for KR, MY and SGP

List of Abbreviations

ABF	Asian Bond Fund
ABMI	Asian Bond Market Initiative
ADB	Asian Development Bank
AFC	Asian Financial Crisis
BIS	Bank for International Settlements
CGIF	Credit Guarantee and Investment Facility
CJK	China, Japan, Korea
DBS	Defined Benefit Scheme
DCS	Defined Contribution Scheme
EMEAP	Executives' Meeting of East Asia and Pacific Central Banks and Monetary Authorities
Fed	Federal Reserve Bank
GFC	Global Financial Crisis
GLS	Generalized Least Squares
IPO	Initial Public Offering
LCY	Local Currency Unit
MTN	Medium Term Note
OLS	Ordinary Least Squares
PAIF	Pan Asian Index Fund
PBC	People's Bank of China
T-bill	Treasury Bill

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Abstract

Since the Asian financial crisis in 1997, the East Asian region started to focus on the development of its bond markets. This thesis tracks the potential benefits of bond market development and integration and analyzes the current state of development, integration and regionalism in the East Asian bond markets. Subsequently, a multivariate model is used to determine which endogenous economic factors drove development in the East Asian government- and corporate bond markets. It is found that, despite rapid development, the markets are still very heterogeneous in terms of size and liquidity. Aside from several macroeconomic and institutional factors, growth in the government bond market was driven by monetary authorities' sterilization efforts; corporate bond markets grew particularly during the global financial crisis; and government debt may crowd out corporate debt in the region.

Zusammenfassung

Seit der Asienkrise 1997 arbeiten die Staaten Ostasiens an der gezielten Entwicklung ihrer Anleihemärkte. Diese Arbeit untersucht den aktuellen Stand der Entwicklung, der Integration und des Regionalismus in den ostasiatischen Unternehmens- und Staatsanleihemärkten. Weiters werden mittels eines multivariaten Modells die wichtigsten Faktoren bestimmt, die die Entwicklung der ostasiatischen Anleihenmärkte beeinflussten. Trotz des rapiden Wachstums seit der Asienkrise blieben die Märkte sehr unterschiedlich entwickelt und kaum integriert. Die multivariate Analyse findet zahlreiche makroökonomische und institutionelle Faktoren, die sich auf die Entwicklung der Märkte auswirken. Weiters zeigt die empirische Untersuchung, dass (1) das Wachstum in den Staatsanleihemärkten insbesondere auf die Sterilisationsmanahmen der Zentralbanken zurückzuführen ist, (2) das Volumen der Unternehmensanleihen besonders im Verlauf der globalen Finanzkrise stieg und (3) dass es crowding-out-Effekte der Staatsanleihen auf die Unternehmensanleihen in Ostasien gab.

Lebenslauf

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