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Financing through Bond Issues

and the Nexus with Economic Growth

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Abstract

This paper examines for the first time the relationship between the net issue values of aggregate bonds, as well as the different bond sectors separately, and economic growth. The other new feature of this study is the usage of quarterly data. Granger causalities are calculated for time series of 15 European countries, the USA, and Japan in order to test if there is a positive relationship between the development of bond markets and economic growth also for shorter time periods. The significant Granger causalities found show the following tendency: Economic growth is causal for net issue values of government bonds, and net issuance of corporate and financial institutions bonds are causal for economic growth. That finding is important for the future architecture of the financial sector, in particular in emerging markets and the new EU member countries.

Keywords: bond markets, economic growth, Granger causalities

JEL classification: E-44, O-16, O-40

1 Introduction

Bond markets are part of the financial sector of an economy. Past studies of a potential nexus between the financial sector and real economic growth have mainly focused on banks and share markets (e.g. Arestis/Demetriads/Luintel, 2001; Atja/Jovanovich, 1993, Bech/Levine, 2004; Berrer et al, 2004; Hahn, 2002; Harris, 19997; Levine/Zervos, 1998, Stockhammer, 2003) and delivered important results for the advancement of the financial architecture. Some authors (e.g. DeBondt, 2002; Favara, 2003; Wachtel, 2001) argue, however, that other sectors, such as the bond sector, are to be added to the conventional view of financial markets. Fink/Haiss/Hristoforova (2003, 2004) and deBondt (2002) were the first to examine causal relationships between the size of bond markets and economic growth. In contrast to these studies, we analyse the nexus between net issue volumes of aggregate bond markets as well as of the single bond sectors (public sector bonds, corporate bonds, financial institutions bonds) and economic growth. Furthermore quarterly data is used, the period under review is therefore shorter. This is interesting, as this allows for the first time to draw conclusions about whether the connections between bond markets and economic growth, which Fink/Haiss/Hristoforova /2003, 2004) found for longer time periods on the basis of annual data, do also exist for quarterly and shorter periods.

2 Theoretical Background

The most frequent line of argumentation to justify a positive relationship between the financial sector and economic growth is that a well-developed financial sector facilitates and fosters (through its institutions) investments which result in economic growth (Mooslechner, 2003). The single theories which deal with the nexus between the financial and the real sector differ in their basic assumptions, in the interpretation of the functions of the financial sector, and in the explanation of their relevance for economic growth. Neoclassical models postulate perfect markets. The financial sector itself plays only a subordinate role for the examination of determinants of economic growth. Modigliani/Miller (1958) share this view on a microeconomic level. Under the assumption of perfect capital and credit markets the cost of capital and company value are independent from the mode of financing. Under this view the

financial sector is of no relevance for the real economy. This paper, however, does not a priori exclude a nexus between the financial and the real sector.

The basis for the development of a financial sector with financial intermediaries and financial markets is asymmetric distribution of information, the cost of sourcing and processing of information, as well as transaction costs. Within the financial sector institutions emerge in order to reduce these costs and to make the allocation of resources more efficient in terms of both space and time (Metron/Bodie 1995; Levine 1997). At the same time, the approach of the new growth theory is also highly relevant[1]. According to it, the drivers of economic growth are, apart from the accumulation of production factors, to be found in the level of knowledge and organisation of a society. The financial sector is able to foster technological innovation and contribute to economic growth in a way which goes beyond a sheer increase in efficiency of accumulation of capital (Pagano, 1993; Graff, 2000). In a comprehensive examination the important functions of the financial sector are the hedging, diversification, pooling and trading of risks (Levine, 1991; King/Levine, 1993; Bencivenga/Smith, 1995; Levine, 1997; Levine/Zervos, 1998), the allocation of resources (Merton, 1987; Greenwood/Jovanovich, 1990; Levine, 1997), the exertion of corporate control and the monitoring of the management of company (Diamond, 1984; Holmström/Tirole, 1997; Levine 1997), and the mobilisation of savings (Sirri/Tuffano, 1995; Levine, 1997).

The channels of transmission to economic growth, which can be deducted from the above factors, are the accumulation of capital and the factor productivity. While the accumulation of capital is, also according to neoclassical theory, a function of the financial sector, New Growth Theory postulates that the financial sector can promote economic growth through a higher productivity of factors. Also to be mentioned here are increases in efficiency of the allocation of resources through processing of information and management supervision as well as the fostering of technological innovation. According to Wachtel (2001), the transmission channel of factor productivity is more important than the transmission channel of capital accumulation. He shows that countries with comparable amounts of capital invested show partly significant differences in economic growth. These differences can to some extent be explained by the abilities of the financial sector to effect rises in factor productivity. Bond markets and share markets are only part of the financial sector. Apart from them, banks are acting as financial intermediaries. Bank-oriented and securities-oriented systems are the two

[1] For more details compare e.g. in application to European Integration, Martin / Sanz (2003).

prototypes with regard to how the main tasks of the financial sector are fulfilled (Levine, 2002). According to empirical studies, financial systems show a combination of both types in practice. Their relative importance differs from economy to economy (Demirgüc-Kunt/Maksimovich, 2000; ECB, 2001; Bonin/Wachtel, 2002). From a theoretical point of view, much speaks in favour of the complementarity of the two systems. One example is the certification hypothesis by Booth/Smith (1986), according to which banks reduce information asymmetries by issuing securities. Also Hawkins (2002) postulates that banks are of major importance for the emergence and development of bond markets. They are important players in these markets and frequently hold large bond volumes.

Theories dealing with the capital structure of corporations and which, in contrast to Modigliani/Miller (1958), argue that the capital structure is important, mainly consider asymmetric information, agency costs, and the exertion of control over the corporation as the determinants of an optimal capital structure (Ross, 1977; Myers/Majluf, 1984; Jensen, 1986; Harris/Raviv, 1991). Conflicts between owners and management of a corporation result from the fact that managers usually do not have claims on the overall surplus of the corporation. That leads to fewer incentives to put a lot of effort into management. These inefficiencies can be reduced if the management is attributed a share in equity, which can be effected by keeping the equity share of management constant when at the same time increasing the proportion of debt capital. The common feature of models of the capital structure of corporations, which rest on the asymmetric distribution of information, is that there is a group of insiders with superior knowledge, such as the management. The choice of the capital structure can on the one hand be a signal to less well-informed groups, on the other hand it can contribute to a reduction in inefficiencies caused by asymmetric information (Harris/Raviv, 1991). According to the Lemons-Model by Akerlof (1970), the issue of shares is interpreted as a bad signal, since it can be concluded that the management possesses insider information so that the issuing price of shares might be above the true value (Myers/Majluf, 1984). Under-investment as a result of information asymmetry between badly informed investors and better-informed corporate insiders can be avoided if a form of financing other than equity is chosen. Internal financing is one way to avoid this problem.

If a corporation has to rely on external funds, debt capital is cheaper, since it is less undervalued than shares. This fact is described by the Pecking Order Theory of financing by Myers (1984), according to which internal financing is to be preferred. If external funds

become necessary, debt capital is most favourable, followed by hybrid forms of financing, such as convertible bonds. Shares are the last option. Furthermore, theories which deal with the distribution of information among different economic subjects are very important for the explanation of determinants of the choice between different forms of debt capital (Leeland/Pyle, 1977). The cost associated which information asymmetries are usually higher with publicly issued bonds than with banks loans, as banks are believed to be able to perform the monitoring function more efficiently (Leeland/Pyle, 1977; Diamon, 1984). Chammanur/Fulgheri (1994) assume that banks have more efficient means of solving problems in times of financial crises. In particular for young enterprises, which strive for high growth and fast expansion, bank loans are an important source of financing, whereas the importance of bond financing increases in later stages of the life cycle of a corporation (Myers, 1977; Denis/Mihov, 2003). According to cost-oriented theories, the relative advantageousness of bond issues compared to bank loans increases with rising issue volumes in dependence of the information costs of the enterprise due to the high fixed costs of bond issues (Bhagat/Frost, 1986; Blackwell/Kidwell, 1988; Dnis/Mihov, 2003).

If the view is extended to a macro-economic level, the following can be observed: Investments are subject to cyclical fluctuations. The demand for debt capital first increases as an immediate result of a monetary shock, and then decreases again in the following recession. One possible explanation for this pattern could be that it is difficult for corporations to instantaneously adapt their production processes and reduce their expenditures (Christiano/Eichenbaum/Evans, 1996). This was not considered in previous models, which assumed that demand is immediately falling after a monetary shock (Christiano/Eichenbaum, 1992). Low interest rates would theoretically have to result in a rise in demand for debt capital. If one looks at the demand for debt capital in Germany over the past few years, it becomes obvious that the demand for debt capital declined in spite of falling interest rates. Also the euro area does not show a clear negative relationship between credit costs and credit growth in the 1980s (ECB, 2003b). That points to the fact that in times of weak growth and low inflation, a cut in interest rates alone cannot trigger demand for debt capital and will not lead to higher investment. The effects of an interest rate cut can fully unfold only if the earnings prospects of corporations improve (Knappe, 2003).

Also on a macro level, the cost caused by information asymmetries relevant to the choice of the mode of financing are an explanatory variable for the supply of and demand for debt

capital. Bernanke/Gertler/Gilchrist (1996) study the phenomenon of a "financial accelerator", which describes the aggravation of initially rather small shock-like influences on an economy. It takes the following development: If the assets of a corporation decrease as a result of shrinking revenues, the demand for external funds, which the corporation would need to continue its activities at the same level, increases. At the same time, also the cost of external funds rise. That results in the corporation taking up less external funds, in a reduction in investment, and consequently in the corporation continuing its activities at a lower level. That mechanism is particularly pronounced in corporations whose assets fall extraordinarily sharply due to an economic shock and whose agency costs rise. Mishkin (1991) examines the influence of agency costs on the supply of debt capital. Even though he analyses the supply of loans, major findings can be applied to other forms of debt capital. If interest rates rise, either due to an increase in demand for debt capital or due to a decrease in the supply of money, the extent of adverse selection increases as a result of higher uncertainties regarding to the distinction between different characteristics of borrowers. That leads to a further shortage in the supply of debt capital. As a result, investments and the overall economic activity go down. Stiglitz/Weiss (1990) point to the fact that an increase in interest rates can ex ante lead to a negative self-selection among borrowers. Ex post higher interest rates can also motivate borrowers with a lower risk of default to realise more risky investments. For this reason, banks ration loans and grant them on the basis of the information which they have on the corporations seeking to take out a loan.

Empirical evidence has produced the following results up to now: Kashyap/Lamont/Stein (1993) come to the conclusion that in times of more restrictive monetary policy, issues of short-term corporate bonds rise relative to loans granted by banks. According to them, that is an indication of the credit channel of monetary policy: A more restrictive monetary policy reduces the supply of bank loans and causes corporations to substitute loans for other forms of debt capital. Bernanke/Gertler/Gilchrist (1996) argue, however, that in times of economic downturns debt capital mainly flows to corporations with lower agency-costs. These have easier access to bond markets, whereas borrowers with a lower creditworthiness must to a larger extent rely on banks as intermediaries. This is reflected by an increase in the volume of issues of short-term corporate bonds relative to bank loans. If one looks at the nexus, which can emerge between bond markets and economic growth, the following aspects seem relevant: As source of financing, bonds compensate the fluctuations in the overall supply of

external funds. Even though bond financing is dependent on the economic cycle, it shows less pronounced cyclical patterns than bank loans (Davis, 2001).

Bond markets can constitute a transmission channel of monetary policy and perform an information function. The interest rate structures which emerge are determined by the development of bond markets, and are in turn a prerequisite for the development of derivatives. The later permit the hedging of financial risks and thus make markets more efficient. For individuals an efficient bond market can increase welfare, since the possibilities of diversification increase with a broader variety of investment alternatives. That leads to a higher incentive to invest savings into bonds and as a result the real sector has more capital at its disposal (Hering/Chatusripitak, 2000). As bond markets devlop, the cost of external debt financing may fall. Thus the potential for growth of corporations can be fostered and economic growth effects achieved (Thiel, 2001; De Bondt, 2000).

Apart from bonds of the private sector (i.e. corporations and monetary financial institutions, in particular banks), public sector bonds usually form a large and important part of national capital markets. Bonds are an alternative way of financing for the public sector, which at the same time fosters the development of efficient financial systems and capital markets (Turner, 2000; Claessesn/Klingebiel/Schmukler, 2003). Markets for public sector bonds can foster the development of other forms of financing, such as share financing, via positive externalities and in this way indirectly contribute to economic growth (Mihaljek/Scatigna/Villar, 2002). Furthermore the financing through bonds poses a transmission channel for monetary policy for the public sector. Public sector bonds can be used by investors for diversification purposes and the improvement of capital allocation, as they are secure and liquid investment instruments in portfolios. Efficient capital allocation is a transmission channel through which economic growth can be triggered (Gorton/Pennacchi, 1990; Foresi/Penati/Pennacchi, 1997). For this reason the net issue volume of public sector bonds will be included in the empirical study conducted in this paper.

3 Empirical study

In order to examine the nexus between and financial sector and economic growth, two main designs have been used up to now in the relevant literature: cross-country analysis and time series analysis (Blum/Federmair/Fink/Haiss, 2002). Whereas cross-country analyses usually test the a priori assumption that the financial sector influences economic growth, time series analyses open the possibility to examine causalities, with the most frequently used method being Granger causality tests (Granger, 1969). In order to test hypotheses that variables are Granger causal for others, vector-autoregressive models (VAR-models) are used. A variable y_1 is causal for y_2 if y2 can be estimated more efficiently if information from the process y_1 is taken into account. If y_1 is causal for y_2 and if y_2 is causal for y_1, one speaks of a feedback system. However, the tests on Granger causality imply that the time series examined are stationary, as otherwise the Spurious Regression Problem could emerge (Granger/Newbold, 1974). It says that correlating trends can be interpreted wrongly as economic relationships between the variables if the time series examined are not stationary.

In order to test for stationarity, unit root tests like the Augmented Dickey Fuller Test (ADF Test) or the Phillips-Perron Test (PP Test) can be used (Dickey/Fuller, 1979; Phillips/Perron, 1988; Eckey/Kosfeld/Dreger, 2001). Cointegration is not relevant in the context of this study, as net issue volumes of bonds are usually stationary as the first difference of the amount outstanding. Conintegration, however, implies non-stationarity of the time series examined.

The empirical study is conducted for the following countries: Belgium, Denmark, Germany, Finland, France, Italy, the Netherlands, Norway, Austria, Portugal, Sweden, Switzerland, Spain, the United Kingdom, the USA, and Japan. The time series are in USD, deflated, and if necessary seasonally adjusted. For more details on data sources and definitions please see the annex. The time series are being tested for stationarity and for each country four VAR models are being estimated:

Table 1: VAR-Models

GDP first differences	Net issue volumes of aggregate bonds (aggregate of bonds of all 3 sectors)
GDP first differences	Net issue volumes of public sector bonds
GDP first differences	Net issue volumes of corporate bonds
GDP first differences	Net issue volumes of financial institutions bonds

The net issues contain national as well as international issues in order to fully record the issues by issuers of a certain nationality. In the VAR models it is tested for Granger causality. Fink/Haiss/Hristoforova (2003, 2004) examine the relationship between the size of bond markets and economic growth and find Granger causalities running from bond markets to economic growth as well as feedback relationships, which rest on Vector Error Correction Models (VEC Models). The time series examined run from 1970 to 2000 to 1951 to 2000, depending on the country. Fink/Haiss/Hirstovorova (2003, 2004) point out that the usage of shorter time intervals, such as in the case of quarterly data as used in this study, opens the possibility to either confirm the results found by the authors or reject them for other periods of time and data frequencies. This study is therefore a continuation of this approach.

The time period examined in this paper is shorter, it runs from Q1 1994 to Q1 2003 in all countries. Due to the usage of quarterly data, the number of observations per time series is roughly comparable to the number of observations per time series in the study by Fink/Haiss/Hristovorova (2003, 2004). Compared to Fink/Haiss/Hristoforova (2003, 2004), who find Granger causalities running from bond markets to economic growth for the majority of the countries examined, the study presented here finds significant Granger causalities of net issue volumes of aggregate bonds for economic growth only in Switzerland (compare Table 5 in the annex). There is evidence for bicausality in Japan for net issues of aggregate bonds and economic growth. The significant causalities in the study show the following tendency (compare Table 9 in the annex): The net issue volumes of corporate bonds and financial institutions bonds are predominantly causal for economic growth, with the coefficients of lagged bond variables being negative in the equation describing economic growth in the case of corporate bonds in France and the financial institutions bonds in Finland and Portugal. That means that there is, up to a certain extent, a negative relationship between net issue volumes

and economic growth in the US. Economic growth is causal for public sector bonds in Belgium, Denmark, Finland, Japan, Portugal, and the United Kingdom.

Table 2: Results

Aggregate bonds:	Switzerland	$A_t \rightarrow W_t$	(0,031)	
	Japan	$A_t \Leftrightarrow W_t$	(0,043; 0,045)	
Public sector bonds:	Belgium	$A_t \leftarrow W_t$	(0,013)	
	Denmark	$A_t \leftarrow W_t$	(0,016)	
	Finland	$A_t \leftarrow W_t$	(0,026)	
	Japan	$A_t \leftarrow W_t$	(0,009)	
	Portugal	$A_t \leftarrow W_t$	(0,003)	
	UK	$A_t \leftarrow W_t$	(0,019)	
Corporate bonds:	France	$A_t \rightarrow W_t$	(0,082)	(-)
	USA	$A_t \rightarrow W_t$	(0,092)	
Financial institutions bonds:	Finland	$A_t \rightarrow W_t$	(0,092)	(-)
	Portugal	$A_t \rightarrow W_t$	(0,013)	(-)

The empirical results in no way rejects theories which found positive effects of bond markets and financing through bond issues on economic growth. These have been shown by Fink/Haiss/Hristovorova (2003, 2004) over a longer period of time. This study shows that in the case of a shorter time period examined and the usage of quarterly data the relationship becomes less pronounced. The Granger causalities running from net issue volumes of corporate bonds (Table 7) and financial institutions bonds (Table 8) to economic growth and the causalities running from economic growth to net issue volumes of public sector bonds (Table 6) can be interpreted in the following way: For the period examined, the public sector incurs debts mainly in those countries in which significant causalities were found in perception of the ability to incur debt. Increasing economic growth and increasing ability to incur debt provide the prerequisites for issuing larger volumes of bonds.

In the case of a positive coefficient of the lagged bond variables in the equation describing economic growth, the following interpretation is possible for the causalities of net issue volumes of corporate bonds and financial institutions bonds for economic growth: Increasing issue volumes lead to economic impulses, which can result in an increase in growth. In the case of negative coefficients structural effects and substitutions between different forms of financing (e.g. via bank loans or stock issuance) can be possible explanations. Substitution between bond issues and bank loans was emphasised by Davis (2001) in his analysis of "Multiple Avenues of Intermediation, Corporate Finance and Financial Stability". It is therefore possible that in the relatively short period examined, bond financing grew in periods of slow growth took increasingly place through forms of financing other than bonds. This is to be seen in contrast to the significant causality of net issues of corporate bonds for economic growth in the US. Corporations in the euro area satisfy the largest part of their financing needs via loans, whereas in the US only about half of the financing needs of corporations are met by loans (ECB, 2003a; ECB, 2004).

4 Conclusion

The results of this paper show that the *causalities of bond market for economic growth* (supply-leading approach) found by Fink et al (2003) over a longer study period with annual data in many countries on an *aggregate level* (all bond sectors summed up), are not robust if the study period is shorter and if quarterly data is used. On a *sectoral level* there is some evidence for *causalities running from economic growth to public sector bonds* (demand leading approach). Causalities run from corporate bonds and financial institutions´ bonds to economic growth. Except for in the US there are also opposite tendencies to a certain extent between the net issue volumes of bonds and economic growth, however. Possible explanations could be structural and substitution effects.

In particular in the euro area these results can give new impulses for further measures, since in this area corporate bonds are on the rise, but are, compared to the USA, still of minor importance for corporate financing (ECB, 2004). Also in the new EU member countries, impulses can be expected for the development of financial markets, which are still rudimental in the bond sector (Bonin/Wachtel, 2003; Haiss/Marin, 2002, 2003). Options for a further development of the paper at hand are studies of the interactions (i.e. substitution,

complementarity, parallelism) between bank loans, bonds, and shares on an aggregate and sectoral basis respectively as well as the analysis of the relationship to economic growth. The supposed substitution and structural effects could in this way be analysed quantitatively. This would be another point where future research seems promising.

5 Literature

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6 Annex

6.1 Data and VAR-Models

The source of the *bond data* is the Bank for International Settlements (BIS). In their International Financial Statistics the BIS also publishes the Securities Statistics. International as well as national bonds are included in this statistic (on the Internet: http://www.bis.org/statistics/secstats.htm, retrieved on 3 February 2004). The BIS defines the terms international and national bonds as follows:

Table 3: BIS Bond Definitions

	Issues by domestic institutions	Issues by foreign institutions
In domestic currency		
• Directed at domestic investors	National	International
• Directed at foreign investors	International	International
In foreign currency	International	International

The BIS aggregates data of different providers into time series which are arranged according to different criteria such as sector (public sector bonds, corporate bonds and financial institutions bonds) or nationality of the issuer. For this paper data on international and national bonds, arranged on the basis of the nationality of the issuers, was used. In their Securities Statistics the BIS provides time series which contain quarterly data on the amount outstanding and the net issue values of international and national bonds. The national and international net issues published by the BIS in their Securities Statistics are being summed up (arranged according to the nationality of issuers) in order to record the issues of issuers of a certain nationality as completely as possible. That is done for the aggregate of all bonds as well as for the bonds of the different sectors. The result is time series which contain the sum of international and national net issues by issuers of a certain nationality. All the data

published in the BIS Securities Statistics is in USD. Net issues are calculated as the new issues minus redemptions made. The BIS converts new issues of international bonds which are not denominated in USD from other currencies into USD by using the exchange rate at the time of the announcement of the issue. Redemptions are converted into USD by using the average exchange rate of the respective quarter. Net issues of national bonds are being calculated by the BIS as changes in the amount outstanding, which are being converted from national currencies into USD by using the average exchange rates of the respective quarter. All bond data are being deflated using the GDP deflator.

In this study *economic growth* is represented by the first differences of the real GDP. Time series which contain the GDP of the countries studied are being published in the International Financial Statistics (IFS) of the International Monetary Fund (IMF) (on the internet: http://ifs.apdi.net/imf/about.asp, retrieved on 10 March 2004). GDP deflators for the different countries as well as the quarterly average exchange rates, which permit the conversion of EUR and other national currencies into USD, were taken from the same source. Time series containing the nominal GDP are being deflated and converted into USD by using the average exchange rate of the respective quarter. That is the most appropriate method to obtain comparability with net issue data in USD.

Table 4: The Estimated VAR Models

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
Belgium	Aggregate bonds	W_t	-0,014	-0,688	-0,300	-0,500		0,016	0,427	0,320	
			(0,012)	(0,740)	(0,658)	(0,600)		(0,196)	(0,200)	(0,235)	
			(0,235)	(0,361)	(0,652)	(0,412)		(0,936)	(0,042)	(0,186)	
		A_t	0,004	0,030	0,171	0,138		0,078	0,058	-0,077	
			(0,003)	(0,176)	(0,156)	(0,142)		(0,047)	(0,048)	(0,056)	
			(0,205)	(0,865)	(0,284)	(0,341)		(0,105)	(0,231)	(0,178)	
	Public sector bonds	W_t	0,004	-0,534	-0,082			0,084	0,415		
			(0,008)	(0,526)	(0,501)			(0,182)	(0,194)		
			(0,638)	(0,312)	(0,873)			(0,645)	(0,041)		
		A_t	0,006	-0,459	0,126			0,146	0,134		
			(0,003)	(0,186)	(0,179)			(0,064)	(0,068)		
			(0,050)	(0,020)	(0,488)			(0,030)	(0,060)		
	Corporate bonds	W_t	0,005	-0,055				0,149			
			(0,007)	(0,095)				(0,180)			
			(0,530)	(0,572)				(0,412)			
		A_t	0,014	0,051				0,270			
			(0,013)	(0,176)				(0,331)			
			(0,318)	(0,776)				(0,421)			
	Financial institutions bonds	W_t	0,003	-0,721				0,131			
			(0,007)	(0,605)				(0,177)			
			(0,652)	(0,242)				(0,465)			
		A_t	-0,001	0,056				0,037			
			(0,002)	(0,171)				(0,050)			
			(0,722)	(0,747)				(0,464)			

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
Denmark	Aggregate bonds	W_t	0,006 (0,009) (0,528)	-0,624 (0,385) (0,115)				-0,176 (0,170) (0,308)			
		A_t	0,004 (0,004) (0,281)	0,031 (0,165) (0,852)				0,023 (0,073) (0,759)			
	Public sector bonds	W_t	0,004 (0,010) (0,661)	0,119 (0,615) (0,848)				-0,129 (0,179) (0,473)			
		A_t	-0,002 (0,003) (0,433)	-0,041 (0,164) (0,806)				0,120 (0,048) (0,016)			
	Corporate bonds	W_t	0,005 (0,010) (0,599)	-0,130 (0,258) (0,619)				-0,105 (0,184) (0,571)			
		A_t	0,014 (0,007) 0,059)	-0.086 (0,187) (0,649)				0,046 (0,134) (0,730)			
	Financial institutions bonds	W_t	0,006 (0,009) (0,508)	-0,366 (0,222) (0,109)				-0,177 (0,170) (0,305)			
		A_t	0,007 (0,007) (0,322)	0,060 (0,170) (0,725)				-0,050 (0,130) (0,705)			

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
Germany	Aggregate bonds	W_t	-0,011 (0,014) (0,452)	0,582 (0,616) (0,352)				0,170 (0,180) (0,353)			
		A_t	0,011 (0,004) (0,004)	0,423 (0,160) (0,013)				-0,005 (0,047) (0,909)			
	Public sector bonds	W_t	-0,012 (0,013) (0,370)	0,761 (0,662) (0,259)				0,104 (0,185) (0,580)			
		A_t	0,013 (0,004) (0,001)	0,271 (0,179) (0,141)				-0,052 (0,050) (0,308)			
	Corporate bonds	W_t	-0,001 (0,010) (0,944)	0,041 (0,076) (0,593)	-0,046 (0,075) (0,548)			0,092 (0,187) (0,627)	0,234 (0,185) (0,218)		
		A_t	0,060 (0,023) (0,015)	-0,032 (0,181) (0,864)	0,067 (0,179) (0,710)			-0,220 (0,446) (0,625)	-0,621 (0,443) (0,172)		
	Financial institutions bonds	W_t									
		A_t									

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}	
Finland	Aggregate bonds	W_t	0,0003	0,257	-0,178			0,085	0,257			
			(0,008)	(0,283)	(0,282)			(0,180)	(0,180)			
			(0,689)	(0,371)	(0,371)			(0,641)	(0,166)			
		A_t	0,003	-0.085	-0,233			0,160	-0.003			
			(0,004)	(0,152)	(0,152)			(0,097)	(0,097)			
			(0,499)	(0,578)	(0,136)			(0,109)	(0,977)			
	Public sector bonds	W_t	-0.000	0,374	0,004			-0.011	0,127			
			(0,008)	(0,247)	(0,225)			(0,194)	(0,207)			
			(0,963)	(0,141)	(0,985)			(0,956)	(0,545)			
		A_t	0,008	0,007	0,055			0,337	0,143			
			(0,005)	(0,155)	(0,129)			(0,122)	(0,129)			
			(0,155)	(0,963)	(0,279)			(0,001)	(0,279)			
	Corporate bonds	W_t	0,009	-0,158				0,123				
			(0,008)	(0,121)				(0,175)				
			(0,272)	(0,202)				(0,488)				
		A_t	0,013	0,053				-0,163				
			(0,011)	(0,175)				(0,254)				
			(0,258)	(0,762)				(0,526)				
	Financial institutions bonds	W_t	0,007	-0,805				0,088				
			(0,007)	0,464				(0,175)				
			(0,338)	0,092				(0,618)				
		A_t	0,001	0,076				-0,038				
			(0,003)	(0,172)				(0,065)				
			(0,744)	(0,660)				(0,565)				

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}	
France	Aggregate bonds	W_t	0,002 (0,008) (0,843)	0,103 (0,400) (0,817)				0,259 (0,177) (0,153)				
		A_t	0,014 (0,003) (0.000)	-0,152 (0,167) (0,371)				-0,028 (0,068) (0,680)				
	Public sector bonds	W_t	0,005 (0,010) (0,624)	-0.119 (0,394) (0,764)				0,292 (0,199) (0,152)				
		A_t	0,022 (0,005) (0,000)	-0,248 (0,191) (0,292)				0,157 (0,096) (0,112)				
	Corporate bonds	W_t	0,012 (0,008) (0,163)	-0,302 (0,168) (0,082)				0,202 (0,172) (0,249)				
		A_t	0,018 (0,008) (0,028)	0,445 (0,158) (0,008)				-0.039 (0,161) (0,811)				
	Financial institutions bonds	W_t	0,003 (0,007) (0,660)	0,365 (0,238) (0,136)				0,263 (0,170) (0,132)				
		A_t	0,002 (0,005) (0,704)	0,123 (0,170) (0,474)				-0,107 (0,122) (0,388)				

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
Italy	Aggregate bonds	W_t	0,000 (0,007) (0,956)	0,023 (0,190) (0,903)				0,048 (0,181) (0,792)			
		A_t	0,011 (0,006) (0,066)	-0,002 (0,171) (0,991)				0,124 (0,162) (0,450)			
	Public sector bonds	W_t	0,001 (0,006) (0,933)	0,007 (0,183) (0,969)				0,049 (0,181) (0,790)			
		A_t	0,007 (0,006) (0,224)	-0,140 (0,171) (0,417)				0,153 (0,169) (0,373)			
	Corporate bonds	W_t	0,003 (0,007) (0,700)	-0,034 (0,056) (0,548)				0,046 (0,180) (0,801)			
		A_t	0,038 (0,020) (0,073)	0,465 (0,157) (0,006)				-0,116 (0,501) (0,819)			
	Financial institutions bonds	W_t	0,001 (0,007) (0,900)	-0,020 (0,152) (0,897)				0,049 (0,181) (0,789)			
		A_t	0,010 (0,007) (0,136)	0,406 (0,155) (0,013)				-0,007 (0,184) (0,972)			

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
Japan	Aggregate bonds	W_t	0,040 (0,021) (0,069)	-2,183 (1,017) (0,043)				0,219 (0,196) (0,275)			
		A_t	0,019 (0,004) (0,000)	-0,088 (0,189) (0,646)				0,096 (0,036) (0,015)			
	Public sector bonds	W_t	0,040 (0,027) (0,150)	-1,492 (0,943) (0,128)				0,244 (0,215) (0,268)			
		A_t	0,028 (0,005) (0,000)	-0,066 (0,193) (0,734)				0,125 (0,044) (0,009)			
	Corporate bonds	W_t	0,001 (0,012) (0,945)	0,091 (0,754) (0,905)				0,105 (0,209) (0,621)			
		A_t	0,008 (0,003) (0,033)	-0.064 (0,213) (0,768)				-0,110 (0,059) (0,075)			
	Financial institutions bonds	W_t	0,007 (0,012) (0,550)	-0,711 (0,440) (0,120)				0,108 (0,196) (0,586)			
		A_t	0,008 (0,005) (0,121)	-0,231 (0,184) (0,223)				0,122 (0,082) (0,153)			

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
Nether-lands	Aggregate bonds	W_t	-0,017 (0,019) (0,364)	-0,042 (0,460) (0,928)	0,650 (0,454) (0,163)			0,065 (0,189) (0,732)	0,317 (0,187) (0,100)		
		A_t	0,022 (0,008) (0,007)	0,157 (0,184) (0,401)	0,056 (0,181) (0,760)			0,070 (0,075) (0,361)	-0,113 (0,074) (0,139)		
	Public sector bonds	W_t	0,003 (0,007) (0,668)	-0,030 (0,344) (0,931)				0,188 (0,181) (0,305)			
		A_t	0,007 (0,004) (0,084)	-0,094 (0,177) (0,600)				0,112 (0,112) (0,236)			
	Corporate bonds	W_t									
		A_t									
	Financial institutions bonds	W_t	-0,003 (0,014) (0,847)	0,137 (0,298) (0,649)				0,195 (0,180) (0,287)			
		A_t	0,040 (0,008) (0,000)	0,031 (0,173) (0,857)				0,146 (0,104) (0,171)			

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
Norway	Aggregate bonds	W_t	0,010 (0,013) (0,432)	-0,058 (0,482) (0,905)				-0.073 (0,177) (0,683)			
		A_t	0,016 (0,005) (0,002)	-0.069 (0,173) (0,694)				-0.056 (0,063) (0,386)			
	Public sector bonds	W_t	0,012 (0,011) (0,256)	0,470 (0,302) (0,130)				-0,090 (0,170) (0,600)			
		A_t	-0,005 (0,007) (0,440)	-0,242 (0,195) (0,223)				0,834 (0,110) (0,450)			
	Corporate bonds	W_t	0,013 (0,013) (0,306)	-0,101 (0,175) (0,568)				-0,099 (0,182) (0,590)			
		A_t	0,030 (0,013) (0,026)	0,101 (0,181) (0,581)				-0,138 (0,188) (0,467)			
	Financial institutions bonds	W_t	0,015 (0,012) (0,208)	-0,128 (0,108) (0,245)				-0,081 (0,172) (0,641)			
		A_t	0,048 (0,019) (0,017)	-0,060 (0,175) (0,732)				-0,291 (0,280) (0,387)			

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
Austria	Aggregate bonds	W_t	-0,000	0,492				0,161			
			(0,013)	(0,584)				(0,177)			
			(0,980)	(0,405)				(0,369)			
		A_t	0,017	0,056				0,040			
			(0,004)	(0,171)				(0,052)			
			(0,000)	(0,743)				(0,446)			
	Public sector bonds	W_t	0,011	-0,112				0,162			
			(0,011)	(0,401)				(0,178)			
			(0,356)	(0,781)				(0,370)			
		A_t	0,017	0,146				0,036			
			(0,005)	(0,174)				(0,077)			
			(0,002)	(0,408)				(0,640)			
	Corporate bonds	W_t	0,009	0,166				0,123			
			(0,008)	(0,250)				(0,186)			
			(0,269)	(0,511)				(0,512)			
		A_t	-0,003	0,091				0,060			
			(0,006)	(0,181)				(0,135)			
			(0,610)	(0,618)				(0,661)			
	Financial institutions bonds	W_t	-0,008	0,911				0,208			
			(0,012)	(0,476)				(0,171)			
			(0,484)	(0,065)				(0,232)			
		A_t	0,017	-0,031				0,030			
			(0,004)	(0,179)				(0,064)			
			(0,000)	(0,863)				(0,641)			

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
Portugal	Aggregate bonds	W_t	0,024 (0,015) (0,122)	-0,622 (0,297) (0,045)	-0,079 (0,282) (0,782)			0,025 (0,186) (0,895)	0,451 (0,171) (0,013)		
		A_t	0,034 (0,009) (0,001)	-0,162 (0,178) (0,371)	0,076 (0,169) (0,654)			0,113 (0,112) (0,318)	0,165 (0,102) (0,118)		
	Public sector bonds	W_t	0,004 (0,010) (0,663)	-0,234 (0,280) (0,411)	0,082 (0,250) (0,750)			0,006 (0,191) (0,976)	0,413 (0,198) (0,046)		
		A_t	0,027 (0,006) (0,000)	-0,431 (0,171) (0,018)	-0,086 (0,153) (0,578)			0,283 (0,117) (0,002)	0,373 (0,121) (0,005)		
	Corporate bonds	W_t	0,022 (0,134) (0,109)	-0,284 (0,181) (0,130)	0,092 (0,186) (0,625)	-0,370 (0,182) (0,052)		-0,002 (0,202) (0,993)	0,312 (0,191) (0,114)	0,338 (0,204) (0,109)	
		A_t	0,027 (0,016) (0,095)	-0,075 (0,218) (0,733)	-0,165 (0,223) (0,465)	0,424 (0,218) (0,063)		0,231 (0,242) (0,348)	0,454 (0,229) (0,058)	-0,256 (0,245) (0,305)	
	Financial institutions bonds	W_t	0,038 (0,014) (0,010)	-0,333 (0,116) (0,007)	-0,174 (0,129) (0,189)			-0,298 (0,182) (0,111)	0,200 (0,164) (0,234)		

		A_t	0,029 (0,020) (0,162)	0,097 (0,171) (0,574)	0,492 (0,191) (0,015)			0,064 (0,268) (0,813)	0,120 (0,243) (0,625)		

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
Sweden	Aggregate bonds	W_t	0,000	0,258	0,397			0,036	0,216		
			(0,007)	(0,441)	(0,438)			(0,205)	(0,207)		
			(0,961)	(0,563)	(0,373)			(0,864)	(0,306)		
		A_t	0,003	0,002	-0,021			0,133	0,125		
			(0,003)	(0,192)	(0,191)			(0,090)	(0,090)		
			(0,297)	(0,990)	(0,912)			(0,149)	(0,176)		
	Public sector bonds	W_t	0,017	0,232	0,319			-0,016	0,188		
			(0,006)	(0,278)	(0,193)			(0,193)	(0,191)		
			(0,787)	(0,411)	(0,934)			(0,934)	(0,334)		
		A_t	-0,002	0,177	0,202			0,140	0,140		
			(0,034)	(0,148)	(0,146)			(0,103)	(0,102)		
			(0,560)	(0,241)	(0,178)			(0,185)	(0,178)		
	Corporate bonds	W_t	-0,099	0,004				0,194			
			(0,364)	(0,015)				(0,184)			
			(0,788)	(0,781)				(0,298)			
		A_t	0,134	0,995				-0,332			
			(0,689)	(0,029)				(0,348)			
			(0,847)	(0,000)				(0,347)			
	Financial institutions bonds	W_t	0,003	0,167				0,140			
			(0,007)	(0,323)				(0,204)			
			(0,619)	(0,608)				(0,496)			
		A_t	0,003	0,488				-0,026			
			(0,004)	(0,488)				(0,119)			
			(0,458)	(0,015)				(0,831)			

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
Switzer-land	Aggregate bonds	W_t	-0,018 (0,011) (0,109)	1,473 (0,527) (0,009)	-0,029 (0,521) (0,995)			0,018 (0,168) (0,915)	0,279 (0,165) (0,102)		
		A_t	0,012 (0,004) (0,008)	0,005 (0,195) (0,979)	0,065 (0,193) (0,738)			-0,030 (0,062) (0,634)	-0,046 (0,061) (0,456)		
	Public sector bonds	W_t	0,003 (0,008) (0,714)	0,028 (0,225) (0,903)				0,121 (0,188) (0,524)			
		A_t	0,018 (0,006) (0,003)	-0,224 (0,164) (0,182)				0,154 (0,136) (0,267)			
	Corporate bonds	W_t	0,002 (0,007) (0,782)	0,052 (0,081) (0,525)	-0,104 (0,083) (0,222)	-0,032 (0,084) (0,706)		0,334 (0,205) (0,871)	0,276 (0,195) (0,168)	0,321 (0,196) (0,114)	
		A_t	0,012 (0,109) (0,534)	-0,236 (0,203) (0,255)	-0,142 (0,210) (0,504)	0,098 (0,211) (0,645)		0,274 (0,516) (0,600)	0,437 (0,490) (0,380)	0,303 (0,493) (0,544)	
	Financial institutions bonds	W_t	0,004 (0,008) (0,667)	-0,012 (0,272) (0,965)				0,123 (0,191) (0,525)			
		A_t	0,012 (0,005) (0,030)	0,066 (0,176) (0,710)				-0,079 (0,124) (0,529)			

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
Spain	Aggregate bonds	W_t	0,016 (0,011) (0,141)	-0,556 (0,365) (0,137)				0,111 (0,172) (0,524)			
		A_t	0,026 (0,005) (0,000)	-0,126 (0,162) (0,443)				0,073 (0,076) (0,348)			
	Public sector bonds	W_t	0,008 (0,008) (0,340)	-0,295 (0,308) (0,346)				0,115 (0,175) (0,518)			
		A_t	0,014 (0,005) (0,005)	0,061 (0,170) (0,724)				0,096 (0,097) (0,328)			
	Corporate bonds	W_t	0,005 (0,007) (0,529)	-0,067 (0,129) (0,608)				0,132 (0,177) (0,462)			
		A_t	0,011 (0,009) (0,208)	0,501 (0,154) (0,002)				-0,141 (0,212) (0,512)			
	Financial institutions bonds	W_t	0,012 (0,010) (0,217)	-0,203 (0,162) (0,220)				0,104 (0,174) (0,556)			
		A_t	0,028 (0,010) (0,008)	0,417 (0,166) (0,017)				0,083 (0,178) (0,643)			

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
UK	Aggregate bonds	W_t	0,023 (0,013) (0,087)	-0,629 (0,434) (0,157)				0,353 (0,163) (0,038)			
		A_t	0,027 (0,005) (0,000)	0,044 (0,175) (0,805)				0,070 (0,066) (0,297)			
	Public sector bonds	W_t	0,006 (0,005) (0,189)	-0,173 (0,239) (0,474)				0,315 (0,164) (0,064)			
		A_t	0,002 (0,003) (0,569)	0,257 (0,165) (0,130)				0,279 (0,113) (0,019)			
	Corporate bonds	W_t	0,015 (0,008) (0,068)	-0,196 (0,132) (0,149)				0,256 (0,163) (0,126)			
		A_t	0,029 (0,009) (0,004)	0,412 (0,158) (0,014)				-0,055 (0,195) (0,780)			
	Financial institutions bonds	W_t	0,001 (0,009) (0,929)	0,129 (0,219) (0,560)				0,269 (0,177) (0,139)			
		A_t	0,036 (0,008) (0,000)	0,112 (0,191) (0,951)				-0,006 (0,154) (0,970)			

Country	Bond sector	Dep. var.	C	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	W_{t-1}	W_{t-2}	W_{t-3}	W_{t-4}
USA	Aggregate bonds	W_t	0,004 (0,002) (0,102)	0,137 (0,101) (0,184)				0,237 (0,164) (0,157)			
		A_t	0,012 (0,003) (0,001)	0,223 (0,161) (0,176)				0,084 (0,260) (0,750)			
	Public sector bonds	W_t	0,006 (0,002) (0,001)	0,080 (0,067) (0,244)				0,268 (0,163) (0,111)			
		A_t	0,001 (0,004) (0,763)	0,426 (0,164) (0,014)				-0,154 (0,297) (0,702)			
	Corporate bonds	W_t	0,004 (0,002) (0,009)	0,106 (0,061) (0,092)				0,237 (0,160) (0,149)			
		A_t	0,007 (0,004) (0,118)	0,301 (0,160) (0,069)				0,219 (0,422) (0,607)			
	Financial institutions Bonds	W_t	0,004 (0,002) (0,142)	0,075 (0,082) (0,368)				0,221 (0,172) (0,210)			
		A_t	0,018 (0,005) (0,001)	0,295 (0,168) (0,090)				0,213 (0,355) (0,552)			

6.2 Overview of Tests for Granger Causality

Table 5: Net Issues Aggregate bonds

	Model	P-value for the rejection of the null hypothesis	
		A_t is not Granger causal for W_t	W_t is not Granger causal for A_t
Belgium	VAR (3)	0,579	0,143
Denmark	VAR (1)	0,115	0,750
Germany	VAR (1)	0,352	0,904
Finland	VAR (2)	0,532	0,268
France	VAR (1)	0,817	0,680
Italy	VAR (1)	0,903	0,450
Japan	VAR (1)	0,043	0,015
Netherlands	VAR (2)	0,372	0,282
Norway	VAR (1)	0,905	0,386
Austria	VAR (1)	0,401	0,446
Portugal	VAR (2)	0,130	0,170
Sweden	VAR (2)	0,560	0,163
Switzerland	VAR (2)	0,031	0,635
Spain	VAR (1)	0,137	0,348
UK	VAR (1)	0,157	0,297
USA	VAR (1)	0,184	0,750

Table 6: Net Issues Public Sector Bonds

	Model	P-value for the rejection of the null hypothesis	
		A_t is not Granger causal for W_t	W_t is not Granger causal for A_t
Belgium	VAR (2)	0,545	0,013
Denmark	VAR (1)	0,848	0,016
Germany	VAR (1)	0,259	0,308
Finland	VAR (2)	0,330	0,026
France	VAR (1)	0,764	0,112
Italy	VAR (1)	0,969	0,373
Japan	VAR (1)	0,138	0,009
Netherlands	VAR (1)	0,930	0,236
Norway	VAR (1)	0,130	0,450
Austria	VAR (1)	0,781	0,640
Portugal	VAR (2)	0,593	0,003
Sweden	VAR (2)	0,185	0,167
Switzerland	V AR (1)	0,903	0,267
Spain	VAR (1)	0,346	0,328
UK	VAR (1)	0,474	0,019
USA	VAR (1)	0,244	0,702

Table 7: Net Issues Corporate Bonds

	Model	P-value for the rejection of the null hypothesis	
		A_t is not Granger causal for W_t	W_t is not Granger causal for A_t
Belgium	VAR (1)	0,572	0,421
Denmark	VAR (1)	0,619	0,730
Germany	VAR (2)	0,717	0,307
Finland	VAR (1)	0,210	0,526
France	VAR (1)	0,082	0,811
Italy	VAR (1)	0,548	0,819
Japan	VAR (1)	0,905	0,075
Netherlands	VAR (1)		
Norway	VAR (1)	0,568	0,467
Austria	VAR (1)	0,511	0,661
Portugal	VAR (3)	0,153	0,150
Sweden	VAR (1)	0,781	0,347
Switzerland	VAR (3)	0,467	0,638
Spain	VAR (1)	0,608	0,512
UK	VAR (1)	0,149	0,780
USA	VAR (1)	0,092	0,607

Table 8: Net Issues Financial Institutions Bonds

	Model	P-value for the rejection of the null hypothesis	
		A_t is not Granger causal for W_t	W_t is not Granger causal for A_t
Belgium	VAR (1)	0,242	0,464
Denmark	VAR (1)	0,109	0,705
Germany			
Finland	VAR (1)	0,092	0,565
France	VAR (1)	0,136	0,388
Italy	VAR (1)	0,897	0,972
Japan	VAR (1)	0,120	0,152
Netherlands	VAR (1)	0,649	0,171
Norway	VAR (1)	0,245	0,307
Austria	VAR (1)	0,065	0,641
Portugal	VAR (2)	0,013	0,876
Sweden	VAR (1)	0,608	0,831
Switzerland	VAR (1)	0,965	0,529
Spain	VAR (1)	0,220	0,643
UK	VAR (1)	0,560	0,970
USA	VAR (1)	0,368	0,552

Table 9: Causality Patterns

Country	Bond sector	Causality pattern			
		Causality in both directions	Causality from net issues to economic growth	Causality from economic growth to net issues	No statistically significant causalities
Belgium	Aggregate bonds				♦
	Public sector bonds			♦	
	Corporate bonds				♦
	Financial institutions bonds				♦
Denmark	Aggregate bonds				♦
	Public sector bonds			♦	
	Corporate bonds				♦
	Financial institutions bonds				♦
Germany	Aggregate bonds				♦
	Public sector bonds				♦
	Corporate bonds				♦
	Financial institutions bonds				
Finland	Aggregate bonds				♦
	Public sector bonds			♦	
	Corporate bonds				♦
	Financial institutions bonds		♦		

Country	Bond sector	Causality pattern			
		Causality in both directions	Causality from net issues to economic growth	Causality from economic growth to net issues	No statistically significant causalities
France	Aggregate bonds				♦
	Public sector bonds				♦
	Corporate bonds		♦		
	Financial institutions bonds				♦
Italy	Aggregate bonds				♦
	Public sector bonds				♦
	Corporate bonds				♦
	Financial institutions bonds				♦
Japan	Aggregate bonds	♦			
	Public sector bonds			♦	
	Corporate bonds			♦	
	Financial institutions bonds				♦
Netherlands	Aggregate bonds				♦
	Public sector bonds				♦
	Corporate bonds				
	Financial institutions bonds				♦

Country	Bond sector	Causality pattern			
		Causality in both directions	Causality from net issues to economic growth	Causality from economic growth to net issues	No statistically significant causalities
Norway	Aggregate bonds				♦
	Public sector bonds				♦
	Corporate bonds				♦
	Financial institutions bonds				♦
Austria	Aggregate bonds				♦
	Public sector bonds				♦
	Corporate bonds				♦
	Financial institutions bonds		♦		
Portugal	Aggregate bonds				♦
	Public sector bonds			♦	
	Corporate bonds				♦
	Financial institutions bonds		♦		
Sweden	Aggregate bonds				♦
	Public sector bonds				♦
	Corporate bonds				♦
	Financial institutions bonds				♦

Country	Bond sector	Causality pattern			
		Causality in both directions	Causality from net issues to economic growth	Causality from economic growth to net issues	No statistically significant causalities
Switzerland	Aggregate bonds		♦		
	Public sector bonds				♦
	Corporate bonds				♦
	Financial institutions bonds				♦
Spain	Aggregate bonds				♦
	Public sector bonds				♦
	Corporate bonds				♦
	Financial institutions bonds				♦
UK	Aggregate bonds				♦
	Public sector bonds			♦	
	Corporate bonds				♦
	Financial institutions bonds				♦
USA	Aggregate bonds				♦
	Public sector bonds				♦
	Corporate bonds		♦		
	Financial institutions bonds				♦