

The Trilemma of Financial Stability^{*}

By

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Abstract

The financial stability trilemma states that a stable financial system, an integrated financial system and national financial stability policy are incompatible. Any two of the three objectives can be combined but not all three; one has to give. This paper develops a model to underpin this trilemma.

As a stable financial system is desirable and financial integration is ongoing, the viability of national financial stability policies within the European Union comes into question. The ECB has set the first steps towards a European policy with the publication of a Financial Stability Review and the provision of liquidity to the banking system (general lender of last resort support) to stabilise markets in the 2007/8 financial crisis. However, individual lender of last resort support and possible recapitalisation of ailing banks are still in the realm of national central banks and finance ministries. The trilemma suggests that the stability of the financial system could not be assured if a financial crisis, involving one or more of the emerging pan-European banks, were to happen.

JEL codes: F33, G28, H41.

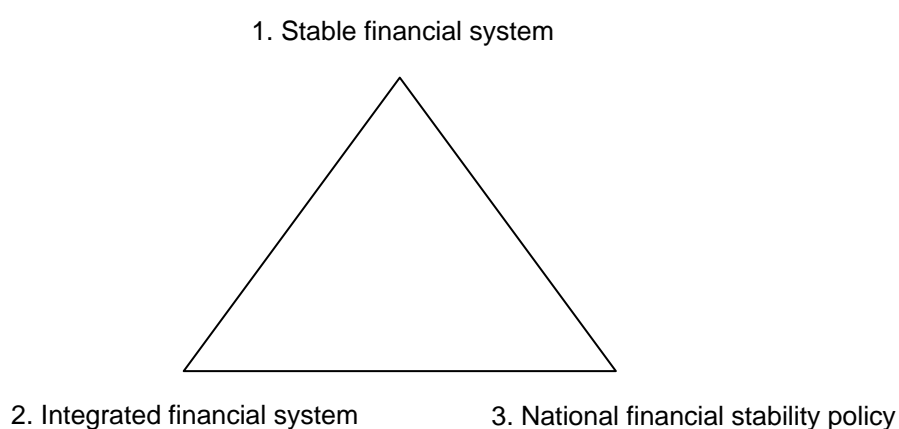
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1. Introduction

Sometimes a simple idea helps us to see more clearly a complex problem. We put forward the idea of the trilemma of financial stability. The financial stability trilemma states that (1) a stable financial system, (2) an integrated financial system and (3) national financial stability policy are incompatible. Any two of the three objectives can be combined but not all three; one has to give. Figure 1 illustrates the financial stability trilemma. While this trilemma could be analysed at the global level (e.g. Eatwell and Taylor, 2000), we apply it to the financial system in the European Union.

Figure 1. The trilemma in financial stability



The classical trilemma in economics relates to monetary policy. It states that (1) a fixed exchange rate, (2) capital mobility and (3) national independence in monetary policy cannot be achieved at the same time. The theoretical underpinning for the monetary policy trilemma is provided by the Mundell-Fleming model (Mundell, 1963). On the financial policy side, Thygesen (2003) and Schoenmaker (2005) suggest the possibility of a trilemma as financial integration is ongoing in the EU. However, they do not provide a theoretical underpinning of the financial stability trilemma. The lack of a rigorous underpinning is related to the lack of a clear and consensus definition of financial stability. There are alternative definitions of financial stability in the literature (De Bandt and Hartmann, 2002). Moreover, it appears to be difficult to model financial stability. A first recent attempt is made by Goodhart, Sunirand and Tsomocos (2006).

Central banks combine the tasks of monetary stability and financial stability. It is fair to say that central bank practices, as well as the academic literature, on monetary stability is far more advanced than those on financial stability. The central bank practice of inflation targeting is supported by well-developed forecasting models. In the literature, the monetary policy trilemma is built on the Mundell-Fleming model of an open economy under capital mobility. The logical conclusion of the monetary trilemma is drawn with the establishment of a supranational institution, the European Central Bank

(ECB) in 1998. Even a strong form of coordination of national policies within the Exchange Rate Mechanism (ERM) appeared to be insufficient to keep exchange rates fixed. The exchange rate crisis of September 1992 brought this message home to politicians.

The aim of this paper is to explore the foundations of the financial stability trilemma. The first two components of the trilemma introduce (1) a stable and (2) integrated financial system. First, we discuss the alternative definitions of a stable financial system. These definitions focus on the capacity of financial markets to clear financial imbalances and the capacity of financial institutions to provide financial services (e.g. credit) without major disruptions. Next, we review the degree of integration in the EU. The wholesale financial markets appear to be fully integrated. In addition, cross-border banks are emerging in Europe (De Haan, Oosterloo and Schoenmaker, 2009).

Where are we now on (3) the policy side of the trilemma? The prime central bank instruments to manage a financial crisis include the provision of liquidity to the markets (general lender of last resort) and the provision of liquidity to individual institutions (individual lender of last resort). The first function is done at the supranational level. The ECB is able to provide liquidity to the market. In the 2007/8 financial crisis, the ECB has successfully managed to keep the interbank market liquid. So, the integrated markets, at least the money markets, are managed at the supranational level, in line with the trilemma. The second function is still done at the national level. Individual lender of last resort operations and possible recapitalisations of banks are in the realm of national authorities (national central banks and ministries of finance). As cross-border banks are emerging, we are confronted by the trilemma. So given that we have (2) integrated banks and (3) national financial stability policies, we will not have (1) a stable financial system. Is a financial crisis, involving one or more of these emerging pan-European banks, necessary to make people realise the incompatibility of national policies with integrated financial institutions and stability of the financial system?

The central policy question in this paper is not new. In the early discussions on EMU, Folkerts-Landau and Garber (1992) posed the question "The ECB: A Bank or a Monetary Policy Rule?". They criticised the draft Statute of the ECB for not including the maintenance of a stable financial system as an explicit objective and only admitting limited banking functions.

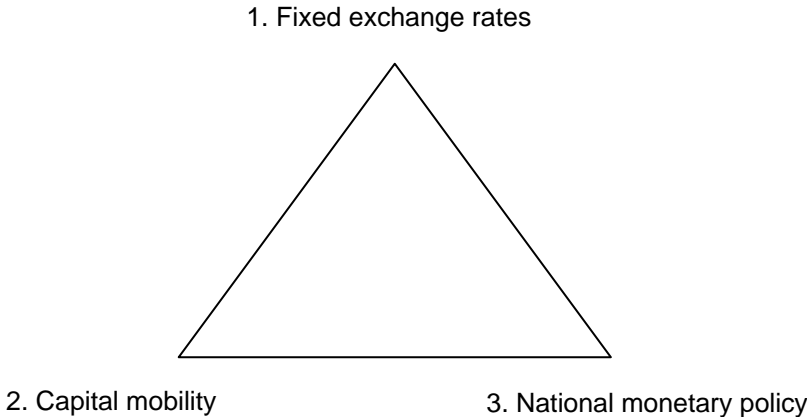
The paper is organised as follows. Section 2 discusses the components of the trilemma. Both the monetary policy and financial stability trilemma are analysed. Section 3 provides a basic model of the financial stability trilemma. Section 4 analyses some examples of financial stability management in the EU. Section 5 discusses the policy challenges. Section 5 concludes.

2. The trilemma decomposed

2.1. Monetary policy

To understand the working of the trilemma, it may be useful to explore first the classical trilemma in monetary economics. The monetary policy trilemma is based on the standard *IS-LM* model with an open economy, the so-called Mundell-Fleming model (Mundell, 1963; Fleming, 1962). Assuming perfect capital mobility and fixed exchange rates, the slightest interest rate differential causes infinite capital flows. Suppose a central bank tightens monetary policy by increasing its domestic interest rate. Portfolio holders worldwide shift their wealth to take advantage of the new higher rate. Foreigners try to buy domestic assets, tending to cause the exchange rate to appreciate. This forces, in turn, the central bank to intervene to hold the exchange rate constant. The central bank buys foreign money in exchange for domestic money, reversing the initial monetary tightening. This process comes to an end when the domestic interest rate is back at the foreign interest rate.

Figure 2. The monetary policy trilemma



It follows that a country cannot pursue (3) an independent monetary policy under (1) fixed exchange rates and (2) perfect capital mobility. Interest rates cannot move out of line with those prevailing in the world market. Any attempt at independent national monetary policy leads to capital flows and a need to intervene until interest rates are back in line with those in the world market. Figure 2 depicts the monetary policy trilemma. The following simple equation gives the relationship between the domestic interest rate i_d and the foreign interest rate i_f :

$$i_d = i_f \tag{1}$$

The monetary policy trilemma is thus built on an arbitrage relationship between domestic and foreign interest rates. Any deviation from world interest rates would put pressure on the fixed exchange rate.

2.2. Financial stability

Moving to the financial stability trilemma (see figure 1), we have the incompatibility of (1) a stable financial system, (2) an integrated financial system and (3) national financial stability policy. The trilemma states that one of these objectives has to give.

Stable financial system

We first need to define a stable financial system. Financial stability is closely related to systemic risk, which is defined as the risk that an event will trigger a loss of economic value or confidence in, and attendant increases in uncertainty about, a substantial portion of the financial system that is serious enough to quite probably have significant adverse effects on the real economy (Group of Ten, 2001). De Bandt and Hartmann (2002) provide an extensive discussion of the concept of systemic risk. A key element is that a considerable number of financial institutions or markets are affected by a systematic event. In this paper, we take the recent definition of the ECB (2006, p.7): “Financial stability can be defined as a condition in which the financial system – comprising of financial intermediaries, markets and market infrastructures – is capable of withstanding shocks and the unraveling of financial imbalances, thereby mitigating the likelihood of disruptions in the financial intermediation process which are severe enough to significantly impair the allocation of savings to profitable investment opportunities”.

Following the long-standing practice of the Bank for International Settlements, the ECB definition distinguishes the following dimensions of a financial system: institutions, markets, and infrastructures. This allows us to analyse these dimensions separately, although in practice these dimensions are interrelated (e.g. the recent problems on the interbank market are related to worries about the liquidity and solvency of the banks operating in that market). For reasons of space, we concentrate on markets and institutions. It should be noted that developments in the area of infrastructures are also on the move.²

Using the ECB definition of financial stability, we take the following elements:

- The capacity of financial markets to clear financial imbalances without major disruptions; and
- The capacity of financial institutions to provide financial services (notably the allocation function from savings to investments) without major disruptions.

Integrated financial system

The financial system consists of various market segments. Table 1 summarises the degree of integration in the different market segments, as reported by the ECB (2008b). It appears that the

² At the launch of the euro in 1999, the ECB and the participating national central banks (NCBs) established an integrated wholesale payment system, TARGET, by interlinking the national real time gross settlement systems of the participating national central banks (NCBs). This system has recently been upgraded and has become more centralised (TARGET2). As settlement systems are still very fragmented around Europe, the ECB is building an integrated system for securities settlement, TARGET2-Securities (ECB, 2008a).

money market and bond markets are close to full integration. Equity markets show clear signs of increasing integration. The degree of integration of the interbank and capital market related activities of banks is also increasing. Retail banking activities remain fragmented. This overview indicates that the different wholesale markets are more or less integrated, while the picture on banking remains mixed.

Table 1. Integration of various market segments

Market segment	Degree of integration
Money market	High degree
Bond markets <ul style="list-style-type: none"> • government bonds • corporate bonds 	Considerable degree Considerable degree
Equity markets	Increasing integration
Banking markets <ul style="list-style-type: none"> • interbank/wholesale activities • capital market related activities • retail banking activities 	Increasing integration Increasing integration Fragmented

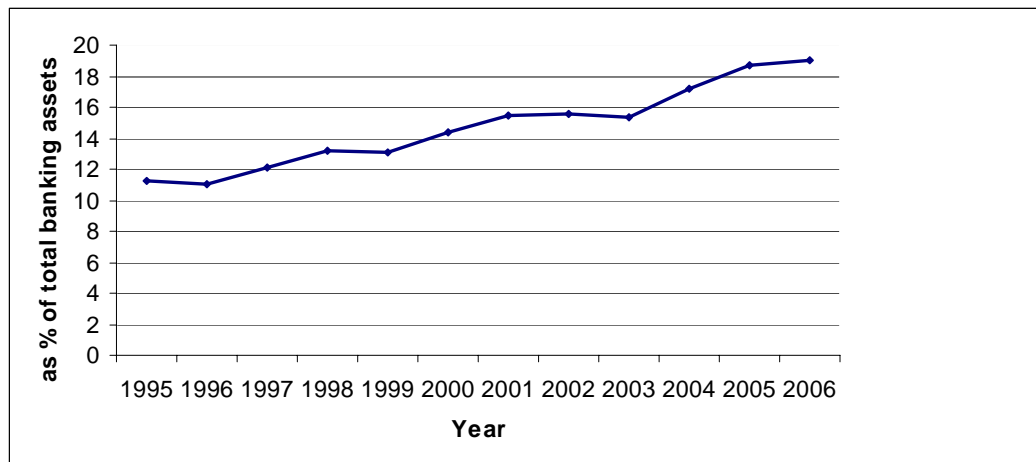
Source: ECB (2008b)

Although the activities of banks can be separated into different categories, we need to look for banks as a whole for financial stability purposes. How integrated are these banks? It is interesting to consider the findings from a mapping exercise of EU banking groups by the ECB. While the number of the groups included in the analysis increased only slightly - from 41 to 46 between the years 2001 and 2005 - the consolidated assets of the sample as a whole increased from around 54% to 68% of overall consolidated EU banking assets (Trichet, 2007). This indicates that EU banks with significant cross-border activity hold a sizable - and rising - share of total EU banking assets. To investigate cross-border penetration in Europe in more detail, Schoenmaker and Oosterloo (2005) focus on the cross-border activities of large banks as small- and medium-sized banks tend to be more domestically oriented. As illustrated in the Appendix, the top 25 of European banks conduct on average 55 percent of their business at home ($h = 0.55$) and 25 percent in the rest of Europe ($e = 0.25$).

Turning to the overall banking system, De Haan, Oosterloo and Schoenmaker (2009) take the degree of cross-border penetration as a measure of financial integration. This measure is defined as the assets of banks from other EU Member States as a percentage of the country's total banking assets. Average cross-border penetration in the EU has gradually increased from 11 percent in 1995 to 19 percent in 2006 (Figure 3). However, the degree of cross-border penetration is very uneven across the EU Member States. While the banking systems of the new Member States (NMS-10) are dominated

by foreign banks (average cross-border penetration of 60 percent), average cross-border penetration in the EU-15 is only 17 percent in 2006.

Figure 3. Cross-border penetration in European banking, 1995-2006



Note: Share of assets from EU countries measured as a percentage of total banking assets. The share is calculated for the EU-25.

Source: De Haan, Oosterloo and Schoenmaker (2009).

Summing up, banks are also becoming more integrated within the EU. In particular, large systemically important banks have sizeable cross-border activities.

National financial stability policy

The prime central bank instruments to manage a financial crisis are the provision of liquidity to the markets (general lender of last resort) and the provision of liquidity to individual institutions (individual lender of last resort). Public funds may also be needed to resolve a crisis. The prime ministry of finance instrument is the recapitalisation of individual institutions in difficulties.

3. Modelling the trilemma

3.1 Financial markets

We start with the financial markets angle of the financial stability trilemma. To be written.

Goal: preserve capacity of financial markets to clear imbalances

Policy instrument: providing liquidity to the banking system as a whole (general LOLR) by CB

Model:

- Model of interbank market with role of central bank to clear the market.

3.2 Financial institutions

The financial stability dimension of financial institutions is related to their capacity to provide financial services without major disruptions. In this context, a minor bank failure (e.g. Barings) would pose no systemic problem, while the failure of a large, systemic, bank may cause a major disruption of the financial system. The objective is to protect the stability of the financial system and to minimise potential harmful economic impacts of failures at the lowest overall collective cost. The objective is not to prevent bank failures. We use the model of Freixas (2003) to formalise this problem. The policy instrument in this model is a contribution of funds t by the central bank to provide liquidity (individual LOLR) to an illiquid bank or by the government to recapitalise an insolvent bank.

The Freixas-model considers the ex post decision whether to refund or to liquidate a bank in financial distress.³ The choice to continue or to close the bank is a variable x with values in the space $\{0, 1\}$. Moreover, θ denotes the social benefits of a refunding and C its costs. Among other things, the benefits of a refunding may include those derived from maintaining financial stability and avoiding contagion. If the direct cost of continuing the bank activity is denoted by C_c and the cost of stopping its activities by C_s , we only deal with the difference, $C = C_c - C_s$. The case $C < 0$ is obviously possible, but is a case where continuing the bank's operations is cheaper than closing it down, so that continuation is preferred and the refunding decision is simplified. In this situation private sector solutions are possible and the central bank can play the role of 'honest broker'.

The optimal decision for the authorities will be to maximise:

$$x^*(\theta - C)$$

so that x^*

$$\begin{cases} x^* = 1 & \text{if } \theta - C > 0 \\ x^* = 0 & \text{if } \theta - C < 0 \end{cases} \quad (2)$$

This simple model shows that a bank will be refunded whenever the total benefits of an intervention are larger than the net costs. In the case of refunding, the authorities will contribute C .

In the multi-country setting, Freixas (2003) considers the case where the mechanism is set in such a way that the bank is refunded only if a sufficient contribution from the different countries can be collected. This is an interpretation of improvised co-operation: the different countries meet to find out

³ In the case of a recapitalisation, the rescue would involve sacking the pre-existing management and writing down shareholder value to zero.

how much they are ready to contribute to the refunding, denoted by t . If the total amount they are willing to contribute is larger than the cost, the bank is refunded. The decision is:

$$\begin{cases} x^* = 1 & \text{if } \sum_j (t_j - C_j) > 0 \\ x^* = 0 & \text{if } \sum_j (t_j - C_j) < 0 \end{cases} \quad (3)$$

and the j -country objective will be to maximise:

$$x^* (\theta_j - t_j)$$

This game may have a multiplicity of equilibria, and, in particular, the closure equilibrium $t_j = 0, x^* = 0$ will occur provided that for no j we have:

$$\theta_j - \sum_j C_j > 0$$

that is, no individual country is ready to finance the refunding by itself. Obviously, if this equilibrium is selected, the policy is inefficient as banks will almost never be refunded.

The fact that in most cases the closure equilibrium will occur can be explained by the fact part of the externalities fall outside the home country. We assume that the country with the highest social benefits of a refunding is the home country. The home country may not be prepared to meet the costs of refunding a failing bank in its entirety. The problem becomes more acute for large banks in small countries. The cost relative to the fiscal budget may be large in small countries, so the home country simply cannot bear the full burden alone (Dermine, 2000). We group the countries as follows: the home country denoted by H , all European countries denoted by E , and all countries in the world denoted by W . The social benefits can then be decomposed into the social benefits in the home country ($h \cdot \theta = \theta_h$), the rest of Europe ($e \cdot \theta = \theta_e$) and the rest of the world ($w \cdot \theta = \theta_w$):

$$\sum_{j=1}^W \theta_j = \theta_h + \sum_{j \in E} \theta_{e,j} + \sum_{j \notin E} \theta_{w,j} \quad (4)$$

In this equation h , e and w are indexes for the social benefits (i.e. externalities caused by the possible failure of a financial institution) in the home country, the rest of Europe and the rest of the world. The sum of h , e and w is 1.

Proposition 1. *In a setting of improvised co-operation, the efficiency of the refunding scheme depends on the size of h . When the total social benefits are close (or equal) to the social benefits of*

the home country ($h \rightarrow 1$), the home country refunds the entire financial institution, provided that refunding is the optimal strategy. National financial stability policies will produce an efficient outcome. Otherwise ($h < 1$), the home country only deals with the social benefits within its territory and the closure equilibrium occurs for sufficiently low levels of h , even when refunding is the optimal strategy. National financial stability policies will produce an inefficient outcome.

This proposition clearly states that when integration in Europe increases ($e \uparrow$ and $h \downarrow$), national financial stability policies will not produce a stable financial system. Cross-border banks in difficulties will be closed, even when it is optimal to refund these problem banks to maintain financial stability. The model pinpoints the public good dimension of collective refunding and shows why improvised co-operation (*ex post* negotiations) will lead to underprovision of refundings. The outcome of our model is consistent with Schinasi (2007). Applying the theory on ‘economics of alliances’, he examines decision-making in a group of countries. Schinasi (2007) also concludes that the provision of shared financial stability public goods results in an equilibrium that is sub-optimal from a European perspective, even though each country views its own decision as optimal and has no incentive to change its resource allocation decision if other countries maintain theirs.

Goodhart and Schoenmaker (2008) extend the Freixas-model to explore *ex ante* mechanisms for burden sharing to overcome the co-ordination failure. While burden sharing in the case of an international banking crisis is a general problem (e.g. Eatwell and Taylor, 2000), we confine our search to solutions for the European setting.

In the model of burden sharing, the European countries (E) share the burden according to a pre-specified key denoted by k with $\sum_{j=1}^E k_j = 1$, while countries outside Europe ($W - E$) do not participate in the scheme. The contribution will become for the European countries and non-European countries respectively:

$$\begin{cases} t_j = k_j \cdot C & \forall j \in E \\ t_j = 0 & \forall j \notin E \end{cases} \quad (5)$$

The European countries will maximise:

$$x^*(\theta_j - (k_j \cdot C)) \quad \forall j \in E$$

We assume that there is a collective vote of all involved countries: they jointly decide to rescue or to close the bank. In the particular case that the share of a country’s contribution to the costs is fully

aligned with that country's benefits ($k_j / \theta_j \quad \forall j \in E$ is a constant), every country will vote in the same way. The decision in (2) will become:

$$\begin{cases} x^* = 1 & \text{if } \sum_{j=1}^E \theta_j - C > 0 \\ x^* = 0 & \text{if } \sum_{j=1}^E \theta_j - C < 0 \end{cases} \quad (6)$$

If the social benefits in the home country and other European countries are larger than the total costs, the involved countries vote in favour of refunding. So the underprovision of refunding would be reduced and come closer to the optimal solution of equation 2.

Proposition 2. European co-ordination improves the efficiency of the refunding policy for positive values of e . If a bank's activities outside Europe are negligible ($(h + e) \rightarrow 1$), we get an optimal decision for refunding, even for low values of h . A European financial stability policy will produce an efficient outcome. Only when a bank's activities outside Europe are large ($(h + e) < 1$), the closure equilibrium occurs, even when refunding is the optimal strategy. National or European financial stability policies will produce an inefficient outcome.

Proposition 2 demonstrates that European co-ordination is useful when cross-border business of banks (e) is non-negligible. In that case, co-ordination will improve the efficiency of the refunding policy as both the externalities in the home country (h) and other European countries (e) are incorporated in the decision-making. Only truly international banks with sizeable business outside Europe (w) will pose a problem leading to socially insufficient refundings.

4. Examples

4.1. Markets

It may be instructive to illustrate the working of our model of the financial stability trilemma with some examples. In the 2007/8 financial crisis, there were severe problems in the wholesale interbank markets. Surplus banks became unwilling to lend to deficit banks because of worries about their solvency related to losses on sub-prime mortgages. The ECB was pro-active and provided short-term funds to deficit banks and absorbed funds from surplus banks. The ECB provided liquidity through its instrument of open market operations (OMO). This is the so-called general lender of last resort function. The ECB's policy was successful in stabilising the euro-area interbank market. But markets were not stabilised at the EU-wide level. The ECB and the Bank of England followed different policies and did not coordinate. Fearful of overreliance on central bank funds by banks (moral hazard), the Bank of England did not provide extra liquidity. Liquidity shortages in the UK interbank market caused

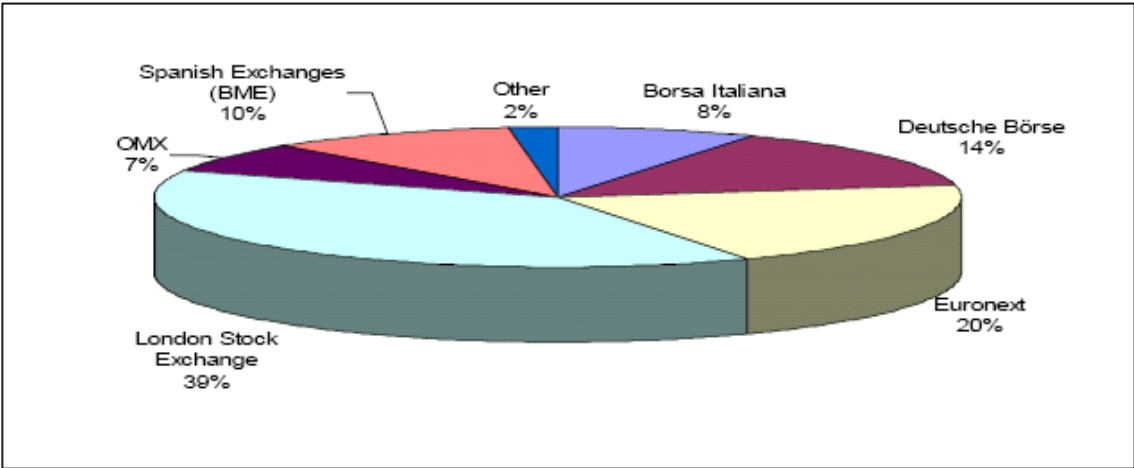
severe funding problems for Northern Rock culminating in a bank run on retail deposits in September 2007. The Bank provided a massive lender of last resort loan to keep Northern Rock afloat and the UK government subsequently nationalised Northern Rock.

This episode illustrates clearly the public good property of financial stability. The major UK retail banks obtained liquidity through their affiliates in the euro-area and did not experience funding problems. So these banks could 'free ride' on the generous provision of liquidity by the ECB. But national UK banks, like Northern Rock, had no access to the euro-area liquidity and were left with the illiquid UK interbank market.

On October 19, 1987, the US stock market crashed, with the S&P 500 stock market index falling about 20 percent. The crash showed the vulnerability of the trading systems as they were not capable of processing so many transactions at once. Uncertainty about information contributed to a pull back by investors from the market. Another factor contributing to the crash were *margin calls* to securities traders (and their customers) that accompanied the large price changes. When securities traders buy securities with borrowed money, they have to deposit a margin with the clearinghouse to cover the credit risk of the clearing house. As the value of securities declined, the clearinghouse called for extra margin. While necessary to protect the solvency of the clearinghouse processing the trades, the size of the margin calls reduced market liquidity as securities traders had drawn on their working capital to meet these margin calls and subsequently had difficulties to continue trading. The Federal Reserve stepped in by providing highly visible liquidity support through massive open market operations. More importantly, the Federal Reserve also encouraged banks to extend liquidity support to securities traders (brokers and dealers). The extension of credit by banks to securities firms was key to their ability to meet their clearing and settlement obligations and to continue to operate in these markets (Brimmer, 1989).

Who will do what in case of a crash of the equity markets in the EU? The ECB could, similar to the Federal Reserve in 1987, step in to provide general liquidity support to the equity markets based in the euro-area. Again the United Kingdom would not be reached by the ECB. Consistent with London's position as financial centre of Europe, the London Stock Exchange counts for 39% of the total EU stock turnover (see Figure 4).

Figure 4. Market share of EU stock exchanges by stock turnover (2006 figures)



Source: De Haan, Oosterloo and Schoenmaker (2009)

4.2. Institutions

Nordea is active in Scandinavian countries and Baltic states/Poland. ($h = 0.28$) and ($e = 0.72$)

UniCredit active in Western Europe (Italy, Germany and Austria) and New Member States. ($h = 0.42$) and ($e = 0.55$)

Figure 5. Division of assets of Nordea (2007 figures)

Countries	Geographical division of Nordea's assets	Market share in national market
Nordic countries	99%	
• Denmark	26%	16%
• Finland	32%	33%
• Norway	13%	14%
• Sweden	28%	13%
New Member States	1%	
• Estonia	-	10%
• Latvia	-	10%
• Lithuania	-	7%
• Poland	-	2%
Total	100%	-

Source: Nordea, Annual Report 2007.

Figure 6. Division of assets of UniCredit (2007 figures)

Countries	Geographical division of UniCredit's assets	Market share in national market
Western Europe	86%	
• Italy	42%	
• Germany	25%	
• Austria	12%	
• Other	7%	
New Member States	11%	
• ??	-	
• ??	-	
• ??	-	
• Other	-	
Rest of the World	3%	-
Total	100%	-

Source: UniCredit, Annual Report 2007.

These hypothetical examples illustrate possible coordination problems between EU countries to manage financial stability, if and when a large cross-border bank would get in difficulties. These examples also illustrate the near impossibility of New Member States (EU-12) to manage the stability of their financial system at the national level. The New Member States are only host to the major banks (mainly coming from Western Europe) in their territory and are dependent on the action (or lack of it) of the respective home country authorities of these banks to preserve the stability of their national financial system.

5. Policy challenges

5.1. Policy options

The financial stability trilemma states that (1) a stable financial system, (2) an integrated financial system and (3) national financial stability policy are incompatible. Any two of the three objectives can be combined but not all three; one has to give. Policy-makers have to decide which one to give up. In the context of global integration, Summers (1999) lists the following policy options:

1. Abolish financial stability policy. Government intervention creates moral hazard and make the financial system unstable. Free bankers (e.g. Dowd, 1996) therefore argue to abolish rescues by the central bank or ministry of finance.
2. Resist further integration. Financial integration facilitates the propagation of shocks across national financial systems. Segmenting national markets and ring-fencing local operations of banks (subsidiaries) would help to contain the propagation of shocks.

3. Move power to supranational institutions. The logical conclusion of financial integration is to cede more power from national to supranational institutions. Thus, Eatwell and Taylor (2000) argue to establish a World Financial Authority.

Abolish financial stability policy

There are various consequences of government intervention. First, government-induced intervention may have a detrimental impact on incentives of market participants (moral hazard). Why should market participants be careful if they are protected against possible negative outcomes of their actions? Second, government intervention may lead to bureaucracy (red tape) restricting the activities of financial institutions. Some academics consider government failure to be a bigger problem than market failure. For instance, adherents of free banking challenge the justification for any form of government regulation of the financial system, arguing that there is nothing special about financial services that should make this sector an exception to the general rule of free trade (see, for instance, Dowd, 1996). A policy of *laissez-faire* for the financial sector is optimal as government intervention undermines the market forces that make the financial system safe.

Goodhart (1988) argues that such a free banking system would be unstable and prone to systemic crises. The non-profit central bank emerged as the body that intervened and acted as lender of last resort in times of crisis to stabilise the financial system.

Resist further financial integration

A second policy option is to resist further integration and reverse the current level of integration. There seems to be no need to reverse the integration of financial markets, as the ECB is able to stabilise financial markets, at least within the euro-area. But for financial institutions, some would argue to reinforce local control (and possibly ring fence the operations). To maintain direct control over systemically important operations from banks headquartered in another EU country, the authorities would then require these banks to establish locally incorporated subsidiaries instead of branches.

Such an approach would have two drawbacks. First, it would partly reverse the process of financial integration and forego the benefits of integration. It would violate the Internal Market Programme, which is meant to reap to benefits of integration *inter alia* through the freedom of establishment. In particular, the Second Banking Directive allows banks headquartered in one country to establish operations through branches or subsidiaries in other EU countries. Second, it could be questioned whether it is feasible to run a bank as a collection of stand-alone subsidiaries. Kuritzikes, Schuermann and Weiner (2003) point out that internationally active financial institutions have centralised risk and capital management units using the so-called 'hub and spoke' organisational model. The spokes being responsible for risk management within business lines, while the hub provides centralised oversight of risk and capital at the group level. Furthermore, a full separation into separate subsidiaries will not be effective because of reputation risk. Market participants consider the creditworthiness of large, complex financial institutions as a whole and do not look at the individual entities.

Move power to supranational institutions

A third and final policy option is to take the financial stability trilemma to its logical conclusion and move powers for financial stability policy to a supranational institution. In the case of monetary policy, this route is taken with the establishment of the ECB. Eatwell and Taylor (2000) distinguish three phases of international collaboration: i) cooperation (national authorities exchange information and establish division of responsibilities); ii) coordination (common standards and procedures); and iii) control (an international authority has policymaking, surveillance and enforcement responsibilities). It could be argued that we are currently moving from the first to the second phase. Financial supervisors and central banks are meeting in the so-called level 3 supervisory committees to set common guidelines. In addition, financial supervisors, central banks and finance ministries of the EU have recently signed an upgraded Memorandum of Understanding (MoU) on cross-border financial stability (published on the website of the signatories). Nevertheless, these committees and the MoU are a form of legally non-binding coordination. National authorities are expected to coordinate, but still have the full legal power to conduct national financial stability policy.

The financial stability trilemma tells us that the authorities cannot ensure the stability of the financial system, given the current level of advanced financial integration combined with national financial policies. In other words, we are still short of a supranational institution for financial stability policy.

5.2. Policy instruments

In order to maintain financial stability, public authorities should have a structure in place to i) identify potential vulnerabilities in an early stage and take precautionary measures, and ii) undertake actions to reduce the costs of disturbances and restore financial stability after a period a financial distress (De Haan, Oosterloo and Schoenmaker, 2009). On the first, the publication of a financial stability review and financial supervision are the prime preventive policy instruments. The financial stability review periodically reviews the possible risks and vulnerabilities of the financial system. Its publication aims to raise awareness in the financial industry and the larger public. Financial supervision is more narrowly aimed at the soundness and stability of individual financial institutions. Stability of individual banks contributes to, but cannot guarantee, the stability of the financial system. On the second, lender-of-last resort (LOLR) operations to support markets (general LOLR) or individual banks (individual LOLR) and recapitalisation of banks are the prime crisis management instruments.

The financial stability trilemma suggests that these instruments should be managed at the supranational level. Table 7 illustrates the current state of play for the various policy instruments. Since December 2004, the ECB publishes a Financial Stability Review. At the outset, there was discussion within the ECB about the appropriate level: the EU level (because of the EU Internal Market for financial services) or the euro-area level (because of the euro currency). The ECB decided to examine the stability of the financial system at the euro-area level. De Haan, Oosterloo and Schoenmaker (2009) argue that it would be useful to extend the analysis to the EU-level. In addition, NCBs (both inside and outside the euro-area) keep on publishing their Financial Stability Reviews. As

argued earlier, financial supervision is still done at the national level, with some elements of cooperation and coordination. Vives (2001) and Schoenmaker and Oosterloo (2008) argue for a supranational financial body. Such a supranational body could in tandem with national supervisors establish a European System of Financial Supervisors.

On crisis management, the ECB has the means to provide general LOLR to markets. In the 2007/8 financial crisis, the ECB has shown that it is capable to preserve the stability of financial markets in an efficient and effective way. But individual LOLR operations and possible recapitalisations of banks are in the realm of national authorities (Padoa-Schioppa, 2000). The MoU on cross-border financial stability provides for voluntary cooperation among national authorities and the ECB. Goodhart and Schoenmaker (2008) and Pauly (2008) argue for burden sharing rules among national governments. Such burden sharing would provide a strong form of coordination. The alternative, a supranational body with taxing powers, is beyond the realm of political reality in the foreseeable future.

Finally, we have so far discussed the various policy instruments in turn. But these instruments are part of an integrated framework. The fiscal competence to deal with banking crises is interrelated with the banking supervisory function. It is not possible to move on one of these without the other.

Figure 7. Current state of play for the various policy instruments

Instruments	National	Cooperation	Coordination	Supranational
Preventive policy				
• Financial stability review	X			X
• Financial supervision	X	X	X	
Crisis management				
• General LOLR				X
• Individual LOLR	X	X		
• Recapitalisation	X	X		

Summing up, financial stability of markets is maintained at the supranational level. The ECB is doing that at the euro-area level. Although a further move towards EU-wide financial markets may be necessary, this situation is more or less in line with the trilemma. Financial stability of institutions is maintained at the national level with some elements of cooperation and coordination. The trilemma suggests that this latter situation is not 'stable'.

6. Conclusions

To be written

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Appendix. Cross-border banks

Table XX shows the top 25 banks in Europe, representing nearly half of the assets of the European banking system assets. As small- and medium-sized banks tend to be predominantly domestically oriented, we focus on the cross-border activities of large banking groups. Following Schoenmaker and Oosterloo (2005), we divide the assets in assets in the home country (*h*), in the rest of Europe (*e*) and in the rest of the world (*w*). The assets of this top 25 range from € 300 to 1,500 bn. The average minimum capital requirement (calculated as the regulatory minimum of 4% of risk weighted assets) of this group of large banks is € 12.6 bn. These banks conduct on average 55 percent of their business at home ($h = 0.55$) and 25 percent in the rest of Europe ($e = 0.25$).

Table XX. Top 25 European banks (2006 figures)

Bank (Country)	Minimum capital in € bn	Assets		
		in € bn	h (%)	e (%)
1. HSBC (UK)	28.5	1,412.9	30	14
2. Royal Bank of Scotland (UK)	23.8	1,298.9	68	7
3. Crédit Agricole (France)	20.9	1,380.6	77	13
4. Santander Central Hispano (Spain)	19.1	833.9	36	47
5. BNP Paribas (France)	18.5	1,440.3	66	23
6. Barclays Bank (UK)	17.7	1,485.8	41	20
7. UniCredit (Italy)	16.9	823.3	26	70
8. HBOS (UK)	16.4	880.9	85	8
9. ING Bank (Netherlands)	13.5	895.0	38	32
10. Société Générale (France)	11.4	956.9	63	18
11. ABN AMRO Bank (Netherlands)	11.2	987.1	29	43
12. Deutsche Bank (Germany)	11.0	1,126.2	18	47
13. Banco Bilbao Vizcaya Argentaria (Spain)	10.1	411.9	80	2
14. Rabobank Group (Netherlands)	9.9	556.3	61	19
15. Fortis Group (Belgium)	9.6	674.7	62	30
16. Lloyds TSB Group (UK)	9.3	512.1	97	2
17. Commerzbank (Germany)	9.1	608.4	73	21
18. Crédit Mutuel (France)	8.9	482.7	93	5
19. UBS (Switzerland)	8.5	1,491.2	9	31
20. Groupe Caisse d'Epargne (France)	8.4	539.7	94	1
21. Nordea Group (Sweden)	7.4	346.9	30	70
22. Groupe Banques Populaires (France)	6.5	305.3	75	10
23. Credit Suisse Group (Switzerland)	6.3	781.5	13	32
24. Danske Bank (Denmark)	6.0	367.4	67	33
25. Dexia (Belgium)	5.3	566.7	56	35
Average top 25 banks	12.6	846.7	55	25

Source: Goodhart and Schoenmaker (2008).

Notes: Banks are ranked according to minimum capital, which is calculated as the regulatory minimum of 4% of risk weighted assets (as of year-end 2006). Home is defined as a bank's assets in its home country (denoted by *h*); rest of Europe is defined as a bank's assets in other European countries (denoted by *e*); rest of world is defined as a bank's assets outside Europe (figures not shown). The three categories add up to 100%.