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Keeping banks afloat: public lifelines during the financial crisis

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Abstract The extensive public support measures for the financial sector were key for the management of the financial crisis. This paper gives a detailed description of the measures taken by governments during the period 2008–2010 and attempts a preliminary assessment of the effectiveness of such measures. The geographical focus of the paper is on the European Union (EU) and the United States. The crisis response in both regions was largely similar in terms of both tools and scope. However, there are important differences, not only between the EU and the United States, but also within the EU (e.g. asset relief schemes).

Keywords Bank rescue measures · Crisis management · Capital injections · Government guarantees · Asset support

JEL Classification $E58 \cdot E61 \cdot G21 \cdot G38$

1 Introduction

In the recent financial crisis that started in 2007 and intensified after the bankruptcy of Lehman Brothers, risk aversion and mistrust between financial players led to the drying up of funding markets. In addition, concern over the solvency of financial institutions was severely affecting the confidence of depositors and revealed the weaknesses of deposit insurance schemes. Hence, in October 2008, governments around the world stepped in and adopted a series of extraordinary measures, which

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would have been unimaginable only months previously. Many countries increased the coverage of their deposit insurance schemes and moved away from co-insurance. They guaranteed newly issued bank bonds or announced blanket guarantees for all bank liabilities. They injected capital, in some cases to such an extent that they actually became the majority owners or squeezed out shareholders. They ring-fenced, swapped and transferred toxic assets, extended non-recourse loans and replaced private investors in illiquid markets. Governments pursued this policy partly through ad hoc measures, but increasingly by implementing explicit schemes, the US Troubled Assets Relief Program (TARP) being the largest (USD 700 billion) and most prominent.

In the course of the current global financial crisis, various authors have deliberated on its possible causes (see, for example, Blanchard 2008; Gorton 2008). One aspect that has until now hardly been assessed is crisis management, and in particular the support measures adopted by public authorities during the crisis.¹ This paper aims to fill this void by providing a systematic overview and a preliminary assessment of the measures adopted by governments and central banks.² The financial crisis has been a key challenge for policy-makers. The support of banks is seen as paramount for restoring stability of the financial system and for maintaining lending to the real economy. Hence, an assessment of what has been done to contain the crisis is warranted.

The objective of this paper is, therefore, to review the support measures adopted by categorising and describing them and to provide some initial considerations on their effectiveness. The geographical scope of the review is primarily focused on the EU and the United States, where support measures have been most prevalent. The structure of the remainder of the paper is as follows. Section 2 briefly sketches the institutional set up, to set the stage for the description and assessment of the public support measures. Section 3 gives a detailed description of the support measures employed (including the amounts extended and committed), ranging from deposit insurance enhancements to guarantee schemes, recapitalisation measures and asset protection schemes for the 2 year period starting in October 2008 up to October 2010. The paper thus essentially covers the first part of the crisis, which was a financial crisis, but not the sovereign crisis, which started in 2010 with the downgrade of Greece to sub-investment grade. Section 4 provides a discussion of the exit from the various support measures. Section 5 offers a preliminary assessment of the effectiveness of the measures, while Section 6 concludes by comparing the measures adopted in the EU and in the United States and briefly outlining further issues. An appendix gives a detailed overview of the support measures taken by the US Administration (Treasury, Federal Reserve System, and FDIC), thereby reflecting the prominence of the TARP.

2 General aspects

In this section, we outline general aspects of the institutional set-up for government measures.

¹ See Dewatripont and Freixas (2012) for a more formal review of bank resolution procedures.

² BIS (2009) also addresses this issue, but the present paper focuses on a larger sample of countries and, in addition to government measures, also covers measures adopted by central banks for individual institutions which can be categorised either as capital injections, liability guarantees or asset support schemes. Stolz and Wedow (2010) provide a more complete description of central bank measures.

2.1 Institutions involved, eligibility, and conditionality

The management of the support measures varied widely across countries, with the number of institutions involved differing from country to country. At one extreme, all measures were handled by a single institution (as in the case of Germany), while in other countries separate institutions were responsible for different measures. Typically, the measures were implemented by Ministries of Finance, but with the involvement of the national central bank and/or the supervisory authority.

The support measures usually applied to financial institutions operating in a country and to foreign subsidiaries with substantial domestic operations. Support was normally provided upon request from a financial institution, although, in a number of cases, banks were also instructed to accept government support (for example in the United States and France).

Similar conditions for all types of support measures were implemented in all countries and typically involved restrictions on dividend payments, regular reporting on business developments, restructuring requirements, government participation in banks' management, and restrictions on executive compensation. In addition, government support in some cases also entailed explicit targets for lending growth, with the objective of maintaining the supply of credit to the economy (for example in France, Ireland, and the UK).

2.2 Ad hoc measures vs. national schemes

At the outset, the financial turmoil manifested itself at the level of individual financial institutions, and governments, therefore, had recourse to ad hoc measures tailored to the needs of these institutions. As the crisis intensified, however, in October 2008 and it became apparent that interventions had to be extended to a larger number of banks, more comprehensive schemes were adopted in a number of countries. One of the first schemes was the Troubled Assets Relief Program, better known by the acronym TARP (outlined in Appendix 1). As the crisis deepened, other countries began to establish financial support schemes, for example the Financial Market Stabilisation Fund (SoFFin) in Germany on 17 October 2008. *The distinguishing feature of these schemes was that they established a more transparent system through which banks could obtain financial support.* More specifically, transparency was provided by the overall commitment of governments to support the financial system. Typically, the schemes also had specific criteria for eligibility, pricing, and the duration of support measures available under the schemes.

While ad hoc measures can be, and were, implemented rapidly and flexibly, the advantage of national schemes is threefold. First, national schemes are generally more transparent than ad hoc measures. The degree of transparency and accountability involved in support to the financial system is important and largely depends on the institutional framework. This was highlighted by the uncertainty caused in the United States by the decisions to intervene in the case of Bear Stearns and American International Group but not in that of Lehman Brothers (see Taylor 2009). Clarity of the support criteria signals to the wider public that the government stands ready to curb the crisis from spreading and is important to stabilise confidence. More generally, clear and transparent support measures for banks, combined with strict

conditions, may contribute to the success of banks' restructuring. In sum, the advantage of an explicit scheme resides in transparency regarding the institutions eligible, the volume of support available, the pricing and the duration.

Second, national schemes are less likely to distort competition within and across countries than ad hoc measures. There is a risk that support measures distort the level playing field. This may be the case both within a single country and across countries. This international dimension is particularly relevant for Europe, owing to its high degree of financial integration. To limit this danger, European countries agreed on a *concerted action plan*.³ They committed themselves to adhere to certain principles in their crisis response measures so that "the European Union as a whole can act in a united manner and avoid that national measures adversely affect the functioning of the single market and the other member States."⁴

Third, in the European context, approval of a particular measure by the European Commission (EC) may be simpler if it is part of a national scheme. In the European Union, national intervention requires approval by the EC, which aims to ensure that the measures do not distort competition.⁵ Each individual measure requires approval, while measures that are part of a scheme are typically subject to the scheme's approval. This represents a further advantage of explicit schemes over ad hoc measures. Generally, the EC assesses the eligibility of institutions, the volume of support and the pricing to ensure a level playing field. However, possible delays in the approval of government support measures may cause considerable concern over the effectiveness of the measures and the deterioration of the situation of the bank or banks under consideration. That said, approval by the EC was typically rapid. In a number of cases, however, considerable delays occurred when restructuring requirements entailed lengthy negotiations with the national authorities. This was an issue in particular for the few cases that involved support by several governments for the same institution, i.e. Dexia and Fortis. The EC extended approvals for capital injections for a period of 6 months, after which the decisions were to be reappraised, on the basis of a progress report (EC 2009). In August 2009, the EC clarified the framework for its examination of viability and restructuring plans of banks, which are to be submitted following the provision of state aid.⁶ In particular, the EC takes into account: (i) the

³ During an emergency summit in Paris on 12 October 2008, euro area heads of government agreed on a concerted European action plan. They decided to "complement the actions taken by the ECB in the interbank money market" and support fundamentally sound banks. The summit paved the way for a concerted and coordinated EU approach to (i) harmonising the provision of retail deposit insurance; (ii) issuing government guarantees for bank debt securities; (iii) making available funds for bank recapitalisations; and (iv) providing asset relief measures.

⁴ Declaration of the emergency summit of euro area heads of government in Paris on 12 October 2008. The declaration is available at http://www.eu2008.fr/PFUE/lang/en/accueil/PFUE-10_2008/PFUE-12.10.2008/ sommet_pays_zone_euro_declaration_plan_action_concertee.html.

⁵ EU countries providing State aid to a financial institution are obliged to submit a viability plan, or a more fundamental restructuring plan, to confirm or re-establish the individual banks' long-term viability without reliance on State support. The EC established criteria to delineate the conditions under which a bank may need to be subject to more substantial restructuring, and when measures are needed to cater for distortions of competition resulting from the aid. In addition to State aid control, the EC also has an important role in approving mergers that have an EU dimension.

⁶ The communication "The return to viability and the assessment under the State aid rules of restructuring measures in the financial sector in the current crisis" was published on 22 July 2009. The adoption of the Communication was finalised through its publication in the Official Journal.

past practice of the EC; (ii) the global scale of the present crisis; (iii) the systemic role of the banking sector for the whole economy; and (iv) the possible systemic effects arising from the need for a number of banks to restructure within the same period.

3 Adopted measures

This section discusses the various types of government measures used during the crisis. Each sub-section considers a different type of measure. It should be noted that these measures to support banks were typically used in combination. However, *the actual use of measures generally followed an observable sequence, whereby support was provided to banks on the liabilities side before the assets side of their balance sheets was relieved.* Hoggart and Reidhill (2003) argue that this is in line with the immediate objective of the authorities of restoring public confidence in order to avoid bank runs. Furthermore, *governments had recourse to* ad hoc *measures for individual banks when the crisis erupted, but shifted to setting up system-wide schemes, as the crisis persisted and intensified.* In this section, we first provide a broad quantitative overview of the support measures, before going on to consider the implementation of specific measures.

Table 1 gives an overview of the support measures adopted. The table includes primarily data on all support measures taken by governments in response to the worsening of the crisis *after* the collapse of Lehman Brothers, mainly from 1 October 2008 onwards. Support measures are classified according to three main categories: (i) guarantees for bank liabilities; (ii) recapitalisation measures (capital injections); and (iii) measures to provide relief from legacy assets (asset support). Table 1 distinguishes between the amounts that governments committed themselves to providing (shown in brackets) and the amounts that were actually extended to financial institutions. Table 1 also shows the amounts committed and extended under national schemes and outside such schemes (i.e. ad hoc measures). The total commitment in terms of GDP is the sum of the commitments of national schemes across the three categories (or the actual amount spent in the absence of explicit commitments) plus the actual amounts spent outside national schemes.

Regarding the implementation of the measures, some conclusions can be drawn. The take-up rate, i.e. the rate at which measures were extended relative to the committed amounts within national schemes, was considerable lower, albeit with an increasing take-up rate in the period 2008–2010. It should be noted that there were significant differences between countries and that the volume and use of liability guarantees in absolute figures were far higher than the volume and use of capital injections. Furthermore, it seems that the largest part of the financial support was targeted to a relatively small number of institutions (see Fig. 1). Indeed, according to publicly available data, between 37 % and 63 % of the support extended under capital, guarantee and asset protection schemes was absorbed by the largest three recipient institutions. In the case of each individual support measure, the three largest recipients accounted for 3 % to 9 % of total euro area banking assets.

Country	Capital injectior	_	Liability guarantees		Asset support		Total commitment as % 2008 GDP	Deposit insurance
	Within Schemes	Outside Schemes	Guaranteed issuance of bonds	Other guarantees, loans	Within Schemes	Outside Schemes		
Europe total	132.4 (360)	114.1	769.7 (1,876)	232 (10)	250.9 (224)	297.8	23 %	
EU total	132.4 (350)	114.1	769.7 (1,836)	232 (10)	209.7 (183)	297.8	24 %	
Euro area	94.7 (271)	75.9	545.9 (1,388)	229 (-)	209.7 (183)	80.0	24 %	
АТ	5.8 (15)	0.6	15.9 (75)	(-) 0	(-) -	I	32 %	100,000
BE	(-) -	19.9	28.7 (–) ^a	(-) 8.06	(-) -	16.8	45 %	100,000
CY	(-) -	Ι	- (3)	(-) 0	(-) -	Ι	18 %	100,000
DE	29.6 (40)	24.8	158.8 (400)	75 (-)	172.7 (40)	39.3	25 %	50,000
ES	10.7 (99)	1.3	59.4 (100)	(-) 6	19.3 (50)	2.5	24 %	100,000
FI	- (4)	I	$-(50)^{\mathrm{a}}$	(-) 0	(-) -	I	29 %	50,000
FR	8.3 (21) ^a	3	$124.7 (320)^{a}$	(-) 0	(-) -	Ι	18 %	70,000
GR	3.2 (5)	I	27.8 (55)	(-) 0	4.4 (8)	I	28 %	100,000
E	22.9 (50)	7	67.9 (154)	(-) 0	13.3 (35)	I	132 %	100,000
IT	$4.1 (12)^{a}$	I	$-(-)^{a}$	(-) 0	- (50)	I	4 %	103,291
ΓΩ	(-) -	2.5	2.2 (-)	4.5 (-)	(-) -	Ι	25 %	100,000
MT	(-) -	I	(_) -	(-) 0	(-) -	I	I	100,000
NL	10.2 (20)	16.8	$55(200)^{a}$	50 (-)	(-) -	21.4	52 %	100,000
PT	- (4)	I	5.5 (16)	(-) 0	(-) -	Ι	12 %	100,000
SI	(-) -	Ι	- (12)	(-) 0	(-) -	Ι	32 %	Unlimited
SK	$-(1)^{a}$	I	$-(3)^{a}$	(-) 0	(-) -	Ι	1	Unlimited
Other EU	37.8 (79)	38.3	223.7 (448)	2.8 (10)	(-) -	217.8	22 %	
BG	(-) -	I	(-) -	(-) 0	(-) -	I	I	50,000
CZ	(-) -	I	(_) -	(-) 0	(-) -	I	I	50,000
DK	35(13) ^a	66	30 (=)		Ĵ	I	22 0/	100.641

Other guarantees, W. loans loans cc 20 (-)	(thim (1 - 1)) = (1 - 1)	Outside Schemes		
0 (-) 2.3 (5) 0 (-) 0 (-)		1 1		
2.3 (5) - (0 (-) - (0 (-) - ($\widehat{1}$ $\widehat{1}$ $\widehat{1}$	I	I	50,000
(-) 0	$\widehat{}$		7 %	45,252
0 (-)		I	27 %	50,000
		I	I	100,000
0 (5) - ($\widehat{}$	I	3 %	50,000
0 (-)	$\widehat{}$	I	I	50,000
0.5 (-) - (Î	I	49 %	47,465
0 (-)	Î	217.8	25 %	54,511
0 (-) 41	.2 (41)	I	14 %	
0 (-) 41	.2 (41)	I	13 %	66,388
) - (-) 0	$\widehat{}$	I	15 %	227,273
26.7 (534) 40	(1,148)	74.9	30 %	
0 (-)	$\widehat{}$	I	97 %	Unlimited
26.7 (534) 40	(1.148)	74.9	26 %	190,680
$\begin{array}{c} 0 & (-) \\ 0.5 & (-) \\ 0.5 & (-) \\ 0 & (-) \\ 0 & (-) \\ 0 & (-) \\ 0 & (-) \\ 0 & (-) \\ 0 & (-) \\ 26.7 & (534) \\ 0 & (-) \\ 26.7 & (534) \\ 0 & (-) \\ 0 & ($	$\begin{array}{c} (1, 148) \\ (1, $			

explicitly setting up a scheme i.e. direct government support e.g. local governments as in the case of BayemLB receiving support by the state of Bavaria. The capital injection outside a maximum of assets bought by NAMA. The amount used will likely to be lower given the planned haircuts on the assets. The commitment of Ireland indicated under liability guarantees is denotes that the scheme has aiready expired. Usage of guarantees includes only issued bonds but not guaranteed interbank loans. Outside schemes are support measures used without scheme by the Netherlands consists of the purchase of the Dutch part of ABN AMRO from Fortis by the Dutch government. The asset protection commitment in Ireland is the predicted the coverage of the Eligible Liabilities Guarantee (ELG) scheme as of end-Q3 2010. Spain has a capital injection program, but did not commit a specified amount of funds. For the US, numbers in brackets show commitments under TARP and for government sponsored entities. Also note that in some cases an allocation of commitments to specific measures was not feasible. In the case of Germany, up to €80 bn. are assigned to capital injections and asset support without indicating a exact figure for each measure National authorities; Bloomberg; ECB calculations

Table 1 (continued)



The subsequent sections provide a more detailed description of the measures in the chronological order in which they were generally adopted.⁷

3.1 Enhanced deposit insurance

Deposit insurance schemes were among the first measures used to quell the impact of the financial turmoil that intensified after the collapse of Lehman Brothers. In Europe, before the crisis, EU legislation stipulated a minimum level of deposit insurance of EUR 20,000, with an optional coinsurance element of 10 %. However, as this deposit coverage proved insufficient to calm depositor concerns, the limit was raised in October 2008 to a minimum of EUR 50,000, which rose to EUR 100,000 at the end of 2010.⁸ In addition, EU countries agreed to speed up the repayment of guaranteed deposits in an effort to enhance the effectiveness of deposit insurance.

One of the main events that led to the raising of the minimum level of deposit insurance was the unilateral move by Ireland in September 2008 to provide a blanket guarantee for *virtually all* bank liabilities (including retail, corporate, and interbank deposits).⁹ This blanket guarantee was sizeable: it amounted to about EUR 485 billion. The introduction of such a blanked guarantee raised concerns over a competitive advantage for Irish banks.¹⁰ The Irish blanket guarantee, combined with the

⁷ As this paper focuses the order in which the different measures were generally adopted, it does not provide information on the dates at which specific schemes or individual measures were taken. Instead, the interested reader is referred to other papers that give details on the timing of support measures (e.g. Petrovic and Tutsch (2009). "National Rescue Measures in Response to the Current Financial Crisis", ECB Legal Working Paper No. 8, July). Furthermore, the Fed provides a timeline on its website (http://www.newyorkfed.org/research/global_economy/IRCTimelinePublic.pdf).

⁸ Agreement on 7 October 2008 at the Ecofin meeting of EU ministers of finance: http://www.consilium. europa.eu/uedocs/cms_data/docs/pressdata/en/ecofin/103250.pdf

⁹ Liabilities covered include all retail and corporate deposits (to the extent not covered by existing deposit protection schemes in Ireland or any other jurisdiction); interbank deposits; senior unsecured debt; covered bonds; and dated subordinated debt (lower Tier 2).

¹⁰ Anecdotal evidence showed that depositors in the UK reacted to the increased coverage in Ireland by transferring money out of UK banks into the UK branches of Irish banks.

experience of depositor runs on Northern Rock, the failed UK bank, led other countries to reform their own deposit insurance schemes. In the UK, until October 2007 deposit insurance covered 100 % of the first GBP 2,000 and 90 % of the next GBP 33,000. The run on Northern Rock led the UK government to guarantee the bank's remaining deposits on concerns that these events could also trigger runs on other banks. The experience of Northern Rock also played a role in the move away from co-insurance. Table 1 shows that deposit insurance has been raised beyond EUR 50,000 in the majority of countries and, in a number of cases, blanket guarantees have been issued for retail deposits (e.g. Germany). In the case of the United States, deposit insurance was raised to USD 250,000 in October 2008. While originally intended as a temporary increase, it has been made permanent on July 21, 2010.¹¹ In addition, the FDIC offered full coverage of non-interest bearing deposit transaction accounts, regardless of their dollar amount, under the *Transaction Account Guarantee, which was part of the Temporary Liquidity Guarantee Program* (TLGP).¹²

3.2 Guarantees on bank bonds

Apart from increasing deposit insurance, the provision of government guarantees on bank bonds was among the first measures implemented in support of banks. Table 1 shows that several countries committed large amounts to guaranteeing bank bond issues. The usage of government guarantees was slow to materialise (Fig. 2). While a number of debt guarantee schemes were available from early October 2008, issuance had only gained momentum by mid-November. Notably, Europe and the euro area led the way in this issuance and still accounted for the majority of all outstanding government-guaranteed debt in October 2010. Despite the increasing volumes, the take-up rate is still low. In Finland and Italy, for instance, schemes have been implemented, but no bank has so far made use of them. In other countries, few banks applied and the amounts issued are low. In the United States, guarantees on bonds are offered under the Debt Guarantee Program, which is also part of the TLGP managed by the FDIC. Banks could choose to opt out of one or both of the programmes offered under the TLGP. The generally sluggish take-up may be explained by several factors, including: (i) pricing (see below); (ii) the perceived high degree of competition between financial and non-financial issuers in the corporate bond markets; (iii) the potential for stigma effects; (iv) the conditions of the guarantees (for example, restrictions on remuneration); and (v) decreased medium-term funding needs, owing to ongoing deleveraging by banks and the general slowdown in demand for credit.

One major factor limiting the issuance of guaranteed bonds was the cost entailed by doing so. First, the cost of issuing long-term debt—be it guaranteed or not—was expensive given the market sentiment during the crisis; it was becoming increasingly expensive vis-à-vis short-term funding sources, as the yield curve steepened.¹³

¹¹ See http://www.fdic.gov/news/news/press/2010/pr10161.html for more information.

¹² The participation fee for the Transaction Account Guarantee consisted of a 10 basis point annual rate surcharge on non-interest-bearing transaction deposit amounts over USD 250,000.

¹³ While banks seemed unconcerned about short-term roll-over risk, there is anecdotal evidence that some banks were concerned about the roll-over risks they would face in issuing government-guaranteed bonds at the time the guarantee expired (after 1 to 3 years in some countries and up to 5 years in others).



Fig. 2 Volume of outstanding government-guaranteed bank bonds by region (EUR billions), Oct. 2008 to Oct. 2010. Sources: Bloomberg and ECB calculations

With regard to the pricing of guarantees, banks were typically asked to pay a market-based fee linked to the bank's credit risk, plus a margin. Australia, Canada, and New Zealand relied on bank ratings to determine the market-based fee, while Europe relied on banks' CDS spreads as the basis for their pricing. In addition, while the term structure of the guaranteed debt was the sole determinant of the fee in the United States, it was only one of the determinants of the pricing in the Netherlands and New Zealand (See Reserve Bank of Australia 2009).

Given that CDS spreads, which often formed the basis for the calculation of guarantee fees, were at historically high levels during the crisis, government-guaranteed bonds were expensive funding source. The market also required a relatively high liquidity premium on guaranteed bank debt, over government debt. Finally, the pricing of bonds was based on the respective government spreads, which also increased, thereby giving rise to further reasons for the reluctance to use government-guaranteed debt (Fig. 3). The rise in these spreads was largely mirrored by government-guaranteed bank bonds (Fig. 4). Levy and Zaghini (2010) detect a significant tiering of issuance spreads paid by banks from different countries. More specifically, differences in spreads were largely due to country-specific effects. As a consequence, "weak" banks from "stronger" countries had cheaper access to funding than "strong" banks from "weaker" countries. This represented an important competitive disadvantage for banks located in countries with higher spreads.

Although the uptake of government guarantees by banks was sluggish, this source of funding represented a significant part of banks' total funding in the securities market. Figure 5 shows the issuance and maturity of senior bank debt in the euro area over the period October 2008 to October 2010. In some months, the issuance of guaranteed bonds represented more than half of the total issuance of bonds. Figure 6 displays the cumulated issuance and maturity of bonds in the euro area, the UK and the US over the period October 2008 to October 2010. It shows that the availability of government guarantees helped banks in all three regions to roll over their maturing debt.



Fig. 3 Euro area sovereign bond spreads (percentage points over 10-year German bond). Sources: Datastream and ECB Calculations

Table 2 presents *bond-specific characteristics of bank debt guaranteed by governments and issued since October 2008.* It shows that the duration and size of bond issues varied widely both within and across countries. The mean maturity at issuance was around 3 years in most countries, but the span of actual maturities at issuance



Fig. 4 Government-guaranteed bank bond yields (percentage points). Sources: Bloomberg and ECB calculations





ranged from 17 months in the case of Germany to 46 months in that of the Netherlands. In the European Union, the term structure of the guaranteed debt was initially limited to a maximum of 3 years but was subsequently raised in a number of countries as debt matured. However, guarantees on debt with a maturity of 3 to 5 years were



Country	Total Issuance, bn EUR	No. of Issuers	No. of Bonds	Av. Size, bn. EUR	Av. Maturity, in months	Median Res. Maturity, in months
Austria	22.2	7	34	0.7	53.9	29
Australia	124.8	24	378	0.3	43.3	21
Belgium	2.3	3	7	0.3	36.6	10
Germany	248.5	11	60	4.1	16.7	15
Denmark	39.4	41	200	0.2	24.9	30
Spain	56.9	44	150	0.4	38.3	20
France	150.9	3	34	4.4	37.9	21
Greece	15.9	5	13	1.2	30.0	31
Ireland	70.3	13	209	0.3	27.6	28
Luxembourg	0.8	2	6	0.1	20.0	12
Netherlands	54.2	7	46	1.2	45.5	28
New Zealand	7.9	9	28	0.3	42.2	22
Portugal	5.0	7	7	0.7	40.4	15
Sweden	26.2	6	108	0.2	33.9	15
UK	167.7	15	195	0.9	30.2	14
US	234.6	45	211	1.1	33.4	17
Total/Average	1227.7	242	1686	0.7	34.4	18

Table 2Maturity and volume of government-guaranteed bonds issued between October 2008 and October2010

Bloomberg and ECB calculations

Residual Maturity as of 31 October 2010. Euro amounts based on the exchange rate prevailing on the 1 October 2008. Total for column 1 to 3 and average for column 4 and 5. Includes already matured bonds

granted only in exceptional circumstances. The increase in the maximum maturity was partly justified by the slow take-up of guarantees, as banks cited the short maturity offered in their jurisdictions as the main reason for not taking advantage of this form of support.

In addition to maturity restrictions, some countries also put restrictions in place that limited the overall amount of government-guaranteed debt relative to the total outstanding amount of senior unsecured debt (for example, the United States). The median residual maturity shows that, in October 2012, about half of all guaranteed bonds were set to mature within the following 18 months.

3.3 Recapitalisations

As the financial turmoil persisted, write-downs owing to credit-rating downgrades had a severe impact on banks' capital. In addition, as the economic environment deteriorated, banks also faced losses on their credit portfolios and the risk weights on performing assets increased, putting further pressure on banks' capital positions. As it became clear that the banks were not only confronted with liquidity strains, but also with solvency problems, several governments began to complement the guarantees previously offered with direct capital injections into banks. Capital injections were mostly made through the acquisition of preferred shares or other hybrid instruments, which fulfilled the conditions for Tier 1 capital.¹⁴

The focus on preference shares as the main tool to inject capital was primarily driven by the objectives of bolstering the capital position of banks, while at the same time leaving bank ownership in the private sector and ensuring the priority of public sector claims. These objectives were met, insofar as preference shares do not carry voting rights but do give their holders priority over ordinary shareholders in the payment of dividends and during liquidation. With regard to their inclusion in regulatory capital, only non-cumulative preferred stock can be included as an element of Tier 1 capital (see Basel Committee on Banking Supervision 2005). Even if it can be counted as regulatory capital, concerns remain about whether raising capital through preference shares truly amounts to de-leveraging, given that this form of capital does not provide the same loss-absorbing feature as common equity.¹⁵ Also markets were increasingly focused on higher quality capital definitions, such as tangible common equity, which exclude preferred shares. This is likely to have been one reason for the interest in converting preferred shares into ordinary shares.¹⁶ Another reason as the high cost attached to preferred shares (see below).

Table 1 shows that countries with recapitalisation schemes typically also implemented guarantee schemes. While the take-up rate for recapitalisations was higher than for guarantees, it was still relatively low. Capital injections were less common in the euro area than in the United States. Figure 7 shows that the total volume of US capital injections amounted to EUR 287 billion at its peak in June 2009, while recapitalisations reached EUR 121 billion in the euro area. Within the European Union, the UK government injected the largest volume of capital, which peaked at about EUR 40 billion. *A further important aspect is the varying level of involvement in banks that received capital injections*. In a number of cases, banks became de facto nationalised, when governments obtained majority stakes in them, or were nationalised outright. As a case in point, the German government even organised a shareholder squeeze-out to take full control of Hypo Real Estate, after having granted more than EUR 100 billion in guarantees to the bank.

With respect to the *pricing of the capital injections*, most countries in Europe appeared to have followed the ECB's advice and set the cost of their preference shares at levels that encouraged an early exit by the banks. Typically, banks paid a sizeable fixed coupon on the preferred shares. The coupon generally consisted of three elements: (i) the government bond yield, as a benchmark for the relevant minimum risk yield and the government's funding cost; (ii) a premium to reflect the credit risk of the financial institution concerned, based for example on the CDS spread; and (iii) a fee for the operational costs, in line with the recommendations of the Eurosystem (EC 2009).¹⁷

¹⁴ Some countries included an option to convert preferred shares into ordinary shares, for example the Netherlands in the case of ING.

¹⁵ In the words of the Royal Bank of Scotland CEO, "preference shares are just a disguised form of leverage".

¹⁶ To strengthen its capital position, Citigroup converted USD 25 billion of preferred shares into common equity at the end of July 2009, thereby increasing the US government's stake in the bank to 34 %. Before that transaction took place, almost all of the non-government holders of preferred shares had agreed to convert their holdings into common equity.

¹⁷ See http://www.ecb.europa.eu/pub/pdf/other/recommendations_on_pricing_for_recapitalisationsen.pdf



In addition, besides an overall limit given by the commitments to a specific measure, some jurisdictions also established individual limits for the support of banks.¹⁸

In a few cases, the initial conditions of the recapitalisation measures were later adjusted. For instance, on 17 April 2009, the US Treasury exchanged its USD 40 billion of cumulative preferred shares in AIG for non-cumulative ones.¹⁹ On the same day, it injected another USD 29.8 billion of capital, in the form of preferred shares, into AIG.

Given that recapitalisations aimed to provide Tier 1 capital on a temporary basis, recapitalisation measures often included an exit strategy. Different exit options were envisaged: (i) the recapitalisation scheme could have an expiry date; (ii) the shares could include a call option allowing the bank to repurchase the shares at a given price after a certain period of time; (iii) the dividend payable on the shares (usually preferred shares) could be fixed at such a level that banks had an incentive to buy back the shares/convert them to ordinary shares as soon as possible; and (iv) as in the US plan, a step-up clause could be included, which led to an increase in the dividend rate upon the expiry of a certain period.

While under the first option the government set criteria for the redemption of the capital injected, the other options left the decision to redeem capital to the banks. When coordinated across countries, the first avenue had the advantage that redemptions followed a simultaneous pattern. This simultaneous approach avoided a possible competitive disadvantage for banks that returned public funds while other banks still had recourse to public capital. However, an important caveat of this approach was that the timing of the exit may not have adequately fitted the individual situation of all banks and may thus simply not have been feasible.

¹⁸ For example in Germany, the maximum limit for recapitalisations was set at EUR 10 billion for individual institutions. In the United States, the FDIC imposed a limit on debt guaranteed under the Debt Guarantee Program equal to 125 % of the institution's senior unsecured debt.

¹⁹ On 17 April, the US Treasury exchanged its Series D Fixed Rate Cumulative Preferred Shares for Series E Fixed Rate Non-Cumulative Preferred Shares, with no change to the Treasury's initial investment amount. In addition, in order for AIG to fully redeem the Series E Preferred Shares, it had an additional obligation to the Treasury of USD 1.6 billion, to reflect the cumulative unpaid dividends due to the Treasury on the Series D Preferred Shares as of the exchange date.

The approach in the European Union was to provide banks with the incentive to return public funds promptly. In addition, uniform exit arrangements were a central consideration under the EC's approval process of government support measures to financial institutions. Therefore, the EC stipulated that the pricing conditions should be set so that it is in the banks' interest to repay capital to the government as soon as the crisis abated while, at the same time, paying due regard to the market situation of each institution. The key incentive was given by a sufficiently high entry price level. In line with ECB recommendations, this price consisted of several components, among which bank-specific risk-based spreads figured prominently. The spreads were calculated on the basis of a pre-turmoil average. In order to reflect the under-pricing of risk in the pre-turmoil period, an add-on factor was included. This add-on factor and the risk-based spread should largely reduce any competitive distortions. In addition, the pricing also took the level of subordination of the type of capital chosen into account. The calculation set a pricing corridor for preferred shares and other hybrid instruments with an average of 7 %, and for ordinary shares with an average of 9.3 %. As a consequence of the pricing mechanism, the competitive distortions caused by government capital injections could be expected to be very limited. In fact, a decline in risk-based spreads below the level of the component used for the pricing would make private funding cheaper if and when markets calmed. The pricing mechanism thus already contained an in-built exit arrangement.

The EC also recommended step-up and redemption clauses to further boost incentives to return government funds. Step-ups were implemented through an increase over time in the coupon payments on preferred shares. In the case of ING, the step-up was linked to the dividend payments on ordinary shares, which provided an incentive to retain profits, to bolster capital and to repay government capital early. Redemption clauses took the form of a call option on the debt, which permitted the issuer to redeem the capital at any time. Overall, the exit arrangements in place in the European Union aimed to strike a balance between providing incentives for an early exit and paying due regard to banks' individual circumstances (see Section 4 for a more detailed discussion).

3.4 Asset support

The uncertainty about the value of some classes of assets held by banks contributed to the reluctance to lend in the interbank market. The related write-downs subsequently decreased banks' capital and prevented them from extending credit to the private sector. Therefore, cleaning up balance sheets became a core part of the rescue efforts. However, the problem of pricing these toxic assets correctly also made the task of removing them from balance sheets complex and difficult. Hence, while it was also clear from previous banking crises that cleaning up balance sheets was essential to speed up the recovery process (for example, the Asian crisis, referred to in Lindgren et al. 1999), *systematic* asset support measures only slowly became part of the policy tool kit. In contrast, ad hoc asset support measures formed part of some of the earliest rescue operations (for example, the Maiden Lane transaction for Bear Stearns and asset guarantees provided to WestLB and SachsenLB).

In general, asset support schemes may either take the form of *asset removal schemes* (which transfer the assets to a separate institution, such as a so-called bad bank) or *asset insurance schemes* (which keep the assets on the banks' balance sheet). Based on past

experience, the Eurosystem considered the specific criteria that determine which of these schemes is the preferred option. Criteria in favour of the asset removal model include (i) a high degree of uncertainty regarding the banks' future asset quality; (ii) concentration of impaired assets in a few institutions within the financial system; and (iii) circumstances in which a "clean break" for the participating institutions could be deemed most appropriate, despite the higher upfront costs. In contrast, criteria in favour of the asset insurance model are (i) a high incidence of hard-to-value assets, such as asset-backed securities, among the impaired assets; and (ii) circumstances in which consideration of the state of public finances would favour schemes with a cost profile that puts less pressure on the government fiscal position in the short term.

However, the choice between an asset removal scheme and an asset insurance scheme is extremely challenging in a situation where the quality of banks' assets is likely to deteriorate further. This uncertainty was probably one reason why many schemes combined elements of both types and can thus be categorised as *hybrid* schemes. Such schemes often involved asset transfers, financed by means of public sector guaranteed loans, and sophisticated arrangements for risk-sharing between the governments and participating banks.

Some countries had implemented asset support measures even before the crisis intensified in October 2008. The earliest steps in this direction were ad hoc measures forming part of rescue restructurings. For instance, in the second quarter of 2008, the Federal Reserve System (Fed) facilitated the merger of JP Morgan Chase and Bear Stearns by providing a senior loan to a *bad bank* LLC, Maiden Lane, to fund the purchase of a portfolio of mortgage-related securities, residential and commercial mortgage loans, and associated hedges from Bear Stearns (see also Appendix 1). Another example of an early ad hoc measure was the merger of Merrill Lynch and Bank of America (BofA), when the US government agreed to share the losses that BofA might incur on mortgage-related assets inherited from Merrill Lynch.²⁰ However, following the release of the results of the Supervisory Capital Assessment Program, the ring-fencing arrangement was abandoned without having been implemented, and BofA paid an exit fee to the US authorities involved in the support package (US Treasury, Fed, and FDIC) in September 2009. To deal with its largest financial institution, the United States entered into a similar loss-sharing arrangement with Citigroup under the Asset Guarantee Program, which is part of the TARP and targets systemically important institutions.²¹

 $[\]frac{1}{20}$ It was agreed on 16 January 2009 that BofA would assume the first USD 10 billion of losses on a pool of USD 118 billion of toxic assets and that the United States government would assume the next USD 10 billion, as well as 90 % of all further losses, with Bank of America being responsible for the remaining 10 % of such further losses.

²¹ Under this loss-sharing arrangement, Citigroup assumed the first USD 39.5 billion of losses on an asset pool of USD 301 billion, while the US Treasury assumed 90 % of a second loss tranche of USD 5 billion and the FDIC 90 % of the third loss tranche of USD 10 billion. In the emergence of even higher losses, the Federal Reserve System would have extended a non-recourse loan to cover the rest of the asset pool, with Citigroup being required to repay 10 % of such losses to the Federal Reserve immediately. A summary of the terms of the loss sharing arrangement is available at http://www.citigroup.com/citi/press/2009/ 090116b.pdf?ieNocache=345. The fee for the loss coverage consisted of USD 7.059 billion of 8 % cumulative perpetual preferred stock (USD 4.034 billion corresponding to the Treasury and USD 3.025 billion to the FDIC) and a warrant to the Treasury to purchase 66,531,728 million shares of common stock at a strike price of USD 10.61 per share.

Recognising the need to offer asset relief to smaller banks too, on 23 March 2009 the US Treasury—in conjunction with the FDIC and the Fed—launched its Public-Private Investment Program (PPIP).²² The PPIP was a bad-bank scheme, which allowed banks to move eligible toxic assets (loans and securities), or legacy assets as they are called in the United States, into bank-specific funds. These funds were financed in such a way that the public shared the risk and profits with private sector participants.²³ The prices of the assets were determined in auctions.²⁴ As of 24 March 2010, the United States Treasury had spent a total of about USD 30.4 billion on legacy securities under the PPIP, of which one third was an equity investment and two thirds a debt investment.²⁵ With regard to the legacy loans program, a pilot sale was conducted in August 2009.

In Europe, the asset protection measures followed largely the same pattern as in the United States. The back-up facility for ING is an example of an asset guarantee measure (van Wijnbergen and Treur 2011). Other early examples of asset guarantees in Europe include two German Landesbanks. SachsenLB received guarantees on a portfolio of securities of EUR 17.5 billion. A first loss tranche of up to EUR 2.75 billion was guaranteed by the state of Saxonia and a second tranche of up to EUR 6.4 billion by Landesbank Baden-Württemberg. This asset *insurance* measure contrasts with the asset *removal* transaction under which WestLB transferred a portfolio of assets of EUR 23 billion to an SPV in March 2008 and received EUR 5 billion from its owners, i.e. savings banks and the state of North Rhine-Westphalia. The guarantees were extended by another EUR 4 billion in June 2009.

Several different, more systematic approaches have been set up in Europe. For instance, the UK authorities implemented an asset insurance scheme, participation in which depended on the outcome of stress tests conducted by the Financial Supervisory Authority for the three largest banks. While Barclays was allowed to opt out, the UK entered into loss sharing arrangements with Royal Bank of Scotland (RBS) and Lloyds.²⁶

 $^{^{22}}$ Using USD 75 to 100 billion of TARP capital and capital from private investors, the PPIP intended to generate USD 500 billion in purchasing power to buy toxic assets, with the potential to be expanded to USD 1 trillion over time. The eligible assets of each bank that wished to participate in the PPIP would have been moved into a bank-specific fund.

²³ The US Treasury and private capital provided equity financing, and the FDIC provided a guarantee for debt issued by the Public-Private Investment Funds to fund the asset purchases. The Treasury provided 50 % of the equity capital for each fund, but private managers retained control of asset management subject to rigorous oversight by the FDIC. To reduce the likelihood of the government overpaying for the assets, the price of the loans and securities purchased under the PPIP was established by private sector investors competing with one another.

²⁴ One concern was that the banks selling assets were also able to bid for them. Hence, critics charged that the government's public-private partnership—which provided generous loans to investors—was intended to help banks acquire, rather than sell, troubled securities and loans, using the leverage provided by the PPIP. The fear was that instead of helping price discovery, the PPIP could let banks use taxpayers' money to make bids at above the current market prices for the assets. If those bids eventually turned out to have been too high and the cash flows never materialised, then the taxpayer would ultimately pay the bill.

²⁵ The equity and debt investments may be incrementally funded. Hence, the number given represented the Treasury's maximum obligation.

²⁶ Under the original agreement of February 2009, RBS and Lloyds agreed to put GBP 325 and 260 billion of assets into the schemes, respectively. The arrangements specified a first loss tranche of GBP 42 and 25 billion, respectively, which the banks themselves were to bear, the government agreeing to cover 90 % of any further losses. In November 2009 Lloyds terminated the agreement before it could be implemented, while the terms of the agreement with RBS were adjusted (the first loss tranche was increased from GBP 42 to 60 billion and the asset pool was reduced from GBP 325 to 282 billion).

However, Lloyds terminated the agreement with the government before the arrangement could be implemented (see Section 4). On 14 April 2009, Ireland revealed its plans for a National Asset Management Agency (NAMA). NAMA began acquiring assets from the five major Irish banks in March 2010. The book value of the assets it had acquired by 23 August 2010 was EUR 27.2 billion, which were acquired at considerable discounts.²⁷ NAMA finally ended up buying loans with a nominal value of EUR 74 billion. In contrast to the UK, the eligible assets (land and development loans) were removed from the balance sheets of Ireland's major banks.

The German government revealed its plans for a bad-bank scheme in mid-May 2009, and the Federal Parliament approved the measures on 2 July 2009. While the proposal foresaw the transfer of assets into bank-specific SPVs, it was a hybrid scheme, as banks were shielded from losses only temporarily and ultimately had to bear all losses on the transferred assets.²⁸ Besides this so-called SPV scheme, a consolidation scheme was set up. This second scheme differed insofar as banks could transfer entire business areas to a liquidating institution, which was supervised by SoFFin. By October 2010, the SPV scheme had not been used, but a consolidation scheme has been set up for WestLB and HRE.²⁹

The features of asset removal schemes varied considerably across countries. Table 3 compares the features of the US, German and Irish schemes. For instance, the eligible asset classes varied widely from one scheme to another, as did the nature of participation, which was voluntary in Germany and the United States, but mandatory in Ireland. Furthermore, the pricing mechanisms differed: prices were established by auction in the United States, while they were determined by auditors in Germany and Ireland.

The potential risks were high for the public, as the amounts committed to asset relief measures were large (see Table 1). The United States and the United Kingdom implemented asset relief schemes under which they could face losses of about EUR 115 and EUR 220 billion, respectively. The German and Irish schemes could cost the taxpayer up to EUR 190 billion and EUR 90 billion, respectively, if fully implemented. These amounts accounted for a large part of the high commitments, in terms of GDP, in these countries. However, these losses would only materialise in the unlikely case that the underlying asset pools become worthless. If the assets retain part of their value, the ensuing loss for the public would be smaller. Also, if the bank that benefited from the asset relief measures also received support in the form of capital and/or liability guarantees, losses for the taxpayer would only materialise for one side of the balance sheet.

4 Exit from government measures

In early 2010, partly on account of the strains on future fiscal positions, a debate started on exit strategies from public support measures. This debate was being conducted simultaneously at the global and the EU level. However, the discussion

²⁷ NAMA paid €13 billion for the loans, representing an average discount of 52.3 %.

²⁸ For more details on the scheme, see Stolz and Wedow (2010).

²⁹ See http://www.aa1.de/ and http://www.fms-wm.de/en/.

	US ^a	Germany ^b	Ireland
Assets are moved to	Public-private investment fund (PPIF) for each participating bank	SPV for each participating bank	National Asset Management Agency (NAMA)
Manager	Private investor	Participating bank	NAMA
Eligible assets	Legacy loans and securities (estimated purchasing power of USD 500 billion–1,000 billion)	Structured securities (estimated exposure of EUR 180–190 billion)	Loans secured on development land and property under development; property- backed exposures (estimated exposure of EUR 80–90 billion)
Participation	Voluntary ^c	Voluntary	Mandatory
Pricing	Auction	Auditors	Auditors
Assets are exchanged for	Cash, as assets are sold to the funds	Government- guaranteed bonds issued by the SPV	Government bonds
Length	Maturity of transferred assets	Maturity of transferred securities (maximum 20 years)	Maturity of transferred loans
Loss sharing	The PPIFs are financed in such a way that the public shares risk and profits with the private sector participants: the US Treasury and private capital provides equity financing, and the FDIC provides a guarantee for debt issued by the PPIFs to fund the asset purchases	Banks ultimately bear all losses	At the time of transferral, banks bear a loss amounting to the difference between the book value and the assessed value. However, if NAMA ultimately makes a loss, the Irish Government intends that a levy should be applied to recoup the shortfall

Table 3 Comparison of the asset removal schemes in the United States, Germany, and Ireland

^a Public-Private Investment Program

^b SPV scheme

^c While participation in the PPIP is in principle voluntary, the FDIC has hinted that authorities might put pressure on banks to sell assets if the scheme does not take off as planned

of exit strategies should not be confused with their implementation. At that juncture, strains on the financial sector had alleviated, but the sustainability of the improvement in the financial stability outlook remained partly reliant on existing support measures. Until the recovery proved to be firmly established, especially as regards private sector investment and job creation, the risk of setbacks in the improvement of private sector earnings and income prospects remained significant. The possibility could not be ruled out, therefore, of a premature or disorderly exit from the existing public sector support measures triggering further financial instability. In particular, when the sustainability of public finances were to be called into question before the recovery proved to be self-sustaining, an adverse trade-off emerged between further deterioration of public sector finances and the potential for a renewed episode of financial instability. It should be added that the progressive intensification of market concerns about sovereign credit risks within the euro area in April and in early May 2010 also put pressure on the operating environment of banks. In some countries, these developments led to an increase in government support rather than its withdrawal.³⁰ At the same time, there were also risks associated with late exits. These included the risk of creating excessive strains on public finances, distorting competition and creating moral hazard that comes with downside protection—including the possibility of encouraging excessive risk-taking. However, a premature exit could also increase moral hazard concerns because of the potential signal that the public is willing to share losses without benefiting from gains. The right timing is thus crucial for a successful exit. Exit strategies also need to be coordinated, preferably at the global level, in order to avoid negative cross-border spillover effects. However, any exit could be complicated by the fact that a sub-set of institutions have become relatively more reliant on support than others. To mitigate this problem, it would be useful if credible alternative schemes to deal with such institutions, including asset support measures, were put in place before any exit. The following sub-sections focus on specific aspects related to individual measures.

4.1 Exit from enhanced deposit insurance

In the European Union, the discussion on exit from deposit guarantees revolved around a coordinated reform of deposit insurance schemes, which would in essence consist of an increase in the insurance limits, but also faster payouts in the event of insolvency. Table 1 shows that insurance ceilings were raised and, in a number of countries, unlimited deposit insurance was granted and in the meantime ended in most countries. The Irish blanket guarantee covering virtually the whole liability side of the balance sheet of Irish credit institutions matured on 29 September 2010. To attenuate the effect of the closure, the coverage of the government guarantee scheme for bonds was extended.³¹ With regard to the United States, the initially temporary deposit insurance limit of USD 250,000 per depositor has been made permanent.

4.2 Exit from guarantees on bank bonds

The potential for a market-based exit was built into schemes with a fixed price for the government guarantee: improving market conditions raise the price of issuing government-guaranteed bonds relative to non-guaranteed bonds. The market-based exit could be sped up by increasing the prices. To this end, in the EU, for the

³⁰ As part of the economic stabilisation programme in Greece, a Financial Stability Fund was established with the task to provide capital support to banks. In addition, the Greek government introduced a facility which guaranteed up to EUR 15 billion of new loans with up to 3 years and up to EUR 8 billion of lending to banks of special zero coupon bonds of the Greek state (see IMF 2009d).

³¹ The extended guarantee scheme (the so called Eligible Liabilities Guarantee (ELG) Scheme) covered deposits that were not covered by deposit insurance, senior unsecured CDs and CPs and other senior unsecured bonds and notes. The key point was that the blanked guarantee covered all liabilities including subordinated bonds, while the modified ELG did not guarantee subordinated bonds or asset covered securities. The ELG, however, was still broader than other European guarantee schemes since it covered short-term deposits including interbank deposits.

extension of a guarantee scheme beyond 30 June 2010 to be approved by the European Commission, the fee for a government guarantee was required to be higher than under the pricing formula recommended by the ECB in October 2008.

Examining the data, it seems that euro area banks had already started to replace the issuance of guaranteed bonds by the issuance of non-guaranteed ones, as the issuance of government-guaranteed bonds declined significantly in the summer and autumn of 2009, while the issuance of non-guaranteed bonds revived (see Fig. 6). In 2010 however, the issuance of guaranteed bonds increased again owing to the renewed financial market tensions.

In October 2009, the largest issuer of government-guaranteed bonds, the French agency SFEF, ceased issuing such bonds. Overall, more than EUR 100 billion of guaranteed bonds issued by SFEF were outstanding in October 2010. In the United States, the debt guarantee program was extended by 6 months until the end of October 2009. At the time, the fees were raised for debt issued after 1 April 2009 and for debt with a maturity beyond 30 June 2012.³² This effectively, initiated the exit from the debt guarantee program. The program was succeeded by a 6-month emergency guarantee facility, which expired at the end of April 2010. The fee for debt issued under the emergency facility amounted to at least 300 basis points, but could be raised depending on the risks associated with the issuing entity.

4.3 Exit from recapitalisations

From a broad perspective, there are two approaches for the exit from government recapitalisations. First, the government sells its stake to the private market. This occurred in only two cases until October 2010. The Swiss government sold its EUR 4 billion stake in UBS to institutional investors in August 2009, and the US government sold stocks acquired in Citigroup in several transactions beginning in May 2010. Second, the bank repays the government. There are several alternative and typically complementary options available to raise capital in order to return the government capital. The main strategy, followed by several French banks (see below) and by Lloyds TSB and ING, was to raise capital in private markets. This strategy was complemented by retaining earnings, the sale of business units, deleveraging, and also by converting Tier 2-type capital of private investors into ordinary shares.

While the exit from guarantee schemes was only being discussed during the period 2008–2010, the exit from recapitalisation actually started. Figure 8 shows the amount of capital repaid in Europe and the United States. Clearly, US banks led the way by returning capital as early as end of March 2009. The total amount repaid by US banks until October 2010 was EUR 147 billion, which represents 64 % of the capital injected. Initially, mostly smaller US banks started repaying government capital. Only after the outcome of the stress tests undertaken by the US authorities did larger banks receive permission to reimburse the US Treasury, which explains the repayment wave observed in June 2009.

As regards Europe, Lloyds TSB was the first bank to issue new shares to raise the necessary capital to return EUR 4.4 billion to the government in June 2009. This was followed by the sale of EUR 4 billion of UBS shares held by the Swiss government in

³² See http://www.fdic.gov/regulations/resources/TLGP/faq.html



Fig. 8 Capital repayment since October 2008 (EUR billions). Source: ECB

August 2009. Several French banks also repaid the capital injections received from the government. BNP Paribas, Société Générale, Crédit Agricole and Crédit Mutuel all returned the capital received from the government at the end of October 2009. These repayments amounted to more than half of the total amount of public capital injected in banks in France. The initiative of the French banks paved the way for other euro area banks.

Two factors seem to determine which banks repay early. First, *banks that were forced to accept capital injections tend to repay faster.* Capital injections were imposed on several large US banks which would otherwise not have applied for government support. Similarly, the French government made the first capital tranche for banks obligatory, and several banks opted out when they were later offered a second tranche. Figure 8 shows that while US banks were the first to return capital, the US injections took place considerably later than in Europe. This implies that the period of government support was considerably shorter for some of the largest US banks than for European banks.

Apart from when capital injections have been obligatory, *early repayment is also more likely in the case of well-performing banks*. Favourable earnings facilitate the raising of new capital in the market and the retaining of earnings to repay government support. Figures 9 and 10 show that banks with an above-median stock market performance often did not need capital injections in the first place. However, if they did receive them, they tended to return capital faster. Striking exceptions to that rule are UBS and Lloyds TSB, which underperformed their peers in terms of their stock prices. In the case of UBS, the government triggered the exit by selling its stake to an investor, realising a substantial return on its investment.³³ UBS itself might not have repaid at the time, as its depressed stock price might not have adequately compensated its shareholders for the dilution of ownership. The reason why Lloyds TSB

 $^{^{33}}$ The Swiss government converted a note that gave it a 9.3 % UBS stake and immediately sold the 332.2 million shares at 16.50 Swiss france each, a 1.4 % discount on the stock's closing price on the day before the transaction. However, the deal generated a net return of more than 30 % over a period of around 8 months.



a with public capital injections

Fig. 9 Stock prices for euro area large and complex banking groups, as of November 2009. a With public capital injections. b Without public capital injections. Sources: Bloomberg and ECB calculations

returned government capital is likely to have been the demand by the EC for it to shed business areas, something that Lloyds wished to avoid.

Overall, events seem to suggest that the incentives set by governments to induce early repayment were effective for well-performing banks. It should be clear that an early exit was generally possible for those banks that were less affected by the financial crisis or that managed to achieve a quick turnaround. However, the remaining banks with government support found it substantially harder to reimburse the government. In fact, the incentive to repay early proved largely ineffective for banks that could not raise capital in private markets or retain earnings. For these banks, the options to seek repayment were more limited and rather required deleveraging and/or the sale of business units. Ultimately, repayment, if any, from these banks needed or



a with public capital injections



Jul-07 Oct-07 Jan-08 Apr-08 Jul-08 Oct-08 Jan-09 Apr-09 Jul-09 Oct-09 **Fig. 10** Stock prices for global large and complex banking groups, as of November 2009. **a** With public capital injections. **b** Without public capital injections. Sources: Bloomberg and ECB calculations

will need considerably more time. It should also be noted that banks that finance repayment by deleveraging may reduce their lending activities, thereby potentially contributing to credit constraints for the real economy.

In addition, the Swiss example shows that governments can also pursue exit proactively through the sale of their stakes. However, this requires a sufficient increase in stock prices to protect the taxpayers' interest and markets that are capable of absorbing the large government stakes.

4.4 Exit from asset support

Most of the asset support was granted through ad hoc measures tailored to individual institutions. Schemes were rare and were only set up in a later stage of the financial

crisis (Ireland, Germany, United States). They normally specified an enrolment window during which eligible financial institutions could sign up. After the enrolment window passed, the scheme was closed and could not be accessed any more.

As asset support is granted for the life of the underlying assets, asset support measures are generally self-liquidating. It should be noted, however, that owing to the long maturity of the underlying assets, asset support measures are in place for a considerable time.

In principle, asset support measures can be terminated prior to the maturity of the underlying assets. In the case of asset removal measures, the asset manager-be it a private investor (e.g. under the PPIP in the United States) or a public agency (e.g. the NAMA in Ireland)—can sell the assets when market prices improve. This was observed for the Maiden Lane schemes, which the Fed started to auction off in January 2012. With regard to the German schemes, the wind-up of assets is also under way but will still take considerable time. In the case of asset insurance measures, where the assets are ring-fenced and stay on the financial institution's balance sheet, the financial institution could terminate the guarantee arrangement. Early exits of this kind have so far been rare. For instance, RBS announced its exit from its asset insurance scheme in October 2012. Some banks also withdrew from measures that were announced, but not yet implemented. In the United States, following the release of the results of the Supervisory Capital Assessment Program, BofA announced that it did not plan to move forward with the asset insurance measure agreed earlier with the US Treasury, the Fed, and the FDIC. Hence, the ring-fencing arrangement was abandoned without having been implemented, and BofA paid an exit fee of USD 425 billion to the authorities involved in September 2009 in return for the implicit protection already provided since the announcement of the asset insurance agreement. In the UK, Lloyds exited in November 2009 from its March 2009 agreement with the government to share losses on a GBP 260 billion pool of assets as, owing to improved market conditions, it was able to raise enough capital to cover the potential losses on its portfolio. Lloyds paid the government an exit fee of GBP 2.5 billion.

In sum, exit from asset support is less complex than entry. The exit has, however, not yet progressed as much as capital repayments.

5 Preliminary assessment of the measures adopted

The unparalleled nature of the response to the financial crisis discussed so far makes an assessment clearly desirable. Since the counterfactual is unobservable and the implementation process was still ongoing in 2010, the effectiveness of the measures taken is difficult to judge with precision at this stage. Acknowledging these limitations, this section nevertheless offers a preliminary assessment of the effectiveness of the measures. This assessment is made with reference to the objectives stated in the declaration of the emergency summit of euro area heads of government in Paris on 12 October 2008, i.e. (i) safeguarding financial stability; (ii) promoting a timely return to normal market conditions; (iii) restoring the provision of credit and lending to the economy; (iv) restoring the long-term viability of the banking sector; and (v) containing the impact on public finances and preserving taxpayers' interests. 5.1 Safeguarding financial stability and promoting a timely return to normal market conditions

The measures were successful in averting a further escalation of the crisis in late 2008. Initial empirical evidence suggests that government support measures have been effective in reducing banks' default risk, which is reflected by patterns in CDS spreads (see Bank for International Settlements 2009). More specifically, the analysis by the BIS suggests that capital injections seem to have been more effective than debt guarantees and asset purchases in reducing banks' CDS spreads. However, the elevated levels of interbank money market spreads (see Fig. 13) and banks' CDS spreads, as well as the depressed level of bank stock prices reflect continued pessimistic investor sentiment towards the banking sector (see Figs. 11 and 12). While the positive developments in these indicators since March 2009 indicated a cautious return of confidence in the market, the volatility in CDS spreads and in stock prices in 2010 reflected the renewed financial market tensions owing to sovereign risk concerns. The 3-month euro spreads over market overnight interest rates, a measure of credit risk, show similar developments (see Fig. 13).

Moreover, the financial rescue measures appear to have led to significant crossborder spillovers (see International Monetary Fund 2009c). Particularly after the default of Lehman Brothers, policy announcements of support measures in the United States can be seen to have had a positive effect on, inter alia, the euro area, once financial conditions had stabilised.

The extraordinary measures adopted by central banks have eased the pressure in the money market, but they did not fully resolve it (see CGFS 2008). Given that the tensions in the money market are a symptom of a wider systemic weakness, this is unsurprising. As Taylor (2009) points out, central bank operations to address the tensions in the money market can only be fully successful when their cause is liquidity concerns, not when the underlying concern is counterparty credit risk. Given that at least part of the term spread was due to liquidity concerns, central bank action



Fig. 11 CDS spreads of large and complex banking groups in the euro area (basis points). Sources: Bloomberg and ECB computations



Fig. 12 Stock prices of large and complex banking groups in the euro area (index = 100 on 2 June 2007). Sources: Bloomberg and ECB computations

is an important element in the return to normal market conditions. From a more general perspective, the provision of liquidity ensured that banks' funding constraints and perceived liquidity and counterparty risks did not result in a collapse of the system.

Yet, while successful in the short run, there is a risk that such measures may have potentially harmful effects on financial stability in the longer run because of adverse incentive effects (see Section 4.3 below). In addition, the IMF loss figures published in the April 2010 Global Financial Stability Report and the ECB (2010) loss estimates contained in the June 2010 Financial Stability Review suggest that banks on both sides of the Atlantic faced additional write-downs on their securities portfolios and, increasingly, on their loan books owing to the severe downturn in the real economy. Hence, the detrimental solvency-liquidity spiral was likely to persist: as asset prices



Fig. 13 Spread between the Euribor and the Eonia swap rate (basis points). Sources: Bloomberg and ECB computations

tumble and loan quality deteriorates, banks face further write-downs, which reduce capital. With every twist of this spiral, more capital is burned and government capital injections may prove to be fruitless (see de Grauwe 2008). Up until 2010, banks were successful in matching write-downs with capital increases (see Fig. 14). Yet, the struggle to raise capital and to decrease leverage may leave little scope for extending new loans to the real economy. If this supply-side effect is more pronounced than the contracting loan demand, adverse feedback effects may further depress real economic activity (see Section 4.2 below).

5.2 Restoring the provision of credit and lending to the economy

The impact of the measures on the provision of credit to the non-financial sector is more difficult to assess, particularly when it comes to separating possible credit supply restrictions from the observed decline in the demand for loans. Credit continued to grow for several months into the crisis, albeit on a downward trend. However, during 2007, outstanding credit contracted both in Europe and in the United States: Figs. 15 and 16 show that, starting in the last quarter of 2008, annual growth of credit to the private sector sharply decreased and monthly flows of credit even turned negative, both in the euro area and in the United States. While year-on-year loan growth picked up again in both regions, it left negative territory in the United States just at the end of the period October 2008–October 2010. Bank lending surveys (BLSs) complement this picture on lending with information on lending conditions.

The euro area BLS, conducted by the ECB, shows that both credit demand and credit supply factor were behind the decline in credit growth. Banks tightened credit standards significantly since the onset of the crisis mostly in reaction to the deteriorating economic outlook. Yet, with the exception of loans to households for house purchase, from April 2009, euro area BLS results showed that the speed, with which banks tightened their credit standards abated, compared with the second half of 2008. The most important driving forces for the net tightening in the euro area continued to



Fig. 14 Capital raised versus losses (EUR billions, 1 July 2007–23 June 2010). Sources: Bloomberg and ECB calculations



Fig. 15 Loan growth in the euro area (annual percentage changes and monthly flows; seasonally and working day adjusted; not corrected for the impact of securitisation). Source: MFI statistics and ECB computations

be expectations regarding general economic activity and the industry or firm-specific outlook. With respect to the bank-specific factors, the picture remained mixed. While banks' liquidity position continued to contribute to an easing of credit standards, the cost of their capital position and their ability to access market financing contributed to a tightening of credit standards. Therefore, bank balance sheet constraints were seen as a key factor weighing on the supply of bank credit.



Fig. 16 Loan growth in the United States (annual percentage changes and monthly flows; seasonally adjusted) Source: Federal Reserve System and ECB computations

Hence, the euro area BLS results pointed to persistently hampered access to wholesale funding of banks despite government support, although it started to become less constrained. Banks reported that their access to wholesale funding had eased in response to governments' announcements and the introduction of recapitalisations and guarantees, although it continued to be hindered. As regards access to funding in the money market, a majority of banks reported that market access, in particular to the very short-term money market, was unrestricted. At the same time, there was little improvement in the access to securitisation. Finally, several banks responded that the financial turmoil increased the costs related to their capital position and had an impact on their lending policy.

Some countries have made government support conditional on banks' commitment to lend to the private sector. The UK BLS showed that such conditions were successful: net tightening dropped to zero as banks were forced to loosen their standards owing to the binding lending commitments attached to government support.³⁴ *However, such requirements for banks to support domestic lending activity may have undesired incentive effects*: banks may withdraw funds from their foreign subsidiaries to support their domestic business. This may have potential systemic consequences at the global level and lead to banks' withdrawing from cross-border lending. In addition, the pressure to convert the proceeds of capital injections into further lending increases leverage for shareholders. This ultimately leads to a risk of further losses and write-downs when the economy deteriorates.

With regard to the US, Li (2010) also confirms that capital injections helped to maintain the lending activity of supported banks. More specifically, banks with below median Tier 1 capital ratios increased bank loan growth by an annualised rate of 6.4 %. However, he also shows evidence that the allocation of TARP capital was not always driven by economic considerations but by political connections.

5.3 Restoring the long-term viability of the banking sector

Public interventions risk distorting competition and, possibly even more importantly, incentives, by rewarding bad behaviour ex post. For instance, while increased deposit insurance appears to have played a role in quelling depositor fears and thus in limiting the extent of the crisis, the longer-term issues concerning deposit insurance and particularly blanket guarantees should not be ignored. The literature has shown that more generous deposit insurance increases the likelihood of future crises (see Barth et al. 2001; Demirgüç-Kunt and Detragiache 2002 and Hoggarth et al. 2005). The evidence in Völz and Wedow (2011) suggests that market discipline for banks that received capital support is less stringent. Dewatripont and Freixas (2012) argue that public capital injections distort a bank's cost of capital given that bankruptcy is no longer an option and if the bank maintains the right to issue publicly insured debt.

In order to contain moral hazard in the future, governments have therefore been careful to limit public support to illiquid, but solvent and viable institutions. It must

³⁴ Political pressure on UK banks to step up lending, in particular to small enterprises, was mounting during the financial crisis. The Chancellor of the Exchequer, Alistair Darling, met with the CEOs of Royal Bank of Scotland and Barclays to discuss their lending practices at the end of July 2009. The Chancellor said that he was "extremely concerned about what the banks are doing for small companies".

be stated, however, that assessing the long-term viability of financial institutions during a systemic crisis is a complex and difficult task and, in most cases, rapid decisions were required to avert the collapse of single institutions which threatened the stability of the financial system as a whole.³⁵ A further measure that has been proposed to limit moral hazard is *the replacement of the incumbent management*. This was also an issue in the financial crisis, given that the management of numerous government-supported banks remained in their positions.

Another critical issue that must be addressed to avoid repetition of the current crisis is the regulation and supervision of large and complex financial institutions. A specific characteristic of the ongoing crisis is that it is primarily a crisis of large financial institutions. The systemic threat posed by such banks has made public support necessary to safeguard the stability of the financial system. However, the order of magnitude of these measures, highlighted in Table 1, points to a new challenge for ensuring financial stability. A number of banks have already reached a size at which government support is no longer a viable option (see Völz and Wedow (2011). The failure of the Icelandic or Irish banks showed that institutions can reach a size that overwhelms a government's support capabilities. As a consequence, declarations of no support in the future for such institutions may lack credibility and concerns about a time inconsistency problem will become more serious (see Kydland and Prescott (1977) and Dewatripont and Freixas (2012)). In order to address the moral hazard issues that may arise, they need to be explicitly addressed. Current proposals in academic circles and recent regulatory reform efforts comprise a wide array of ideas that are potentially complementary. First, capital surcharges for systemically relevant institutions are being implemented. Second, structural reforms such as the separation of commercial and investment banking activities are being implemented.³⁶ Third, the need for an orderly mechanism to close and wind down large banks and for enhanced early intervention has been recognised. More specifically, this has become an issue in the United States, where the prompt corrective action (PCA) mechanism could not be equally applied to large and complex financial intermediaries without causing damage to the financial system. Fourth, measures to reduce the interconnectedness of such players through e.g. stricter rules on large exposures and market infrastructure (e.g. the establishment of central counterparties) are being implemented.

Finally, from the perspective of financial supervision, a holistic view of the financial system as a whole (so-called "macro-prudential supervision") is warranted. Supervisory institutions have increasingly become aware that the monitoring of system-wide developments, alongside the supervision of individual institutions, has become paramount. In addition, the crisis, and more specifically the failure of

³⁵ In this vein, the IMF (2009a) recommended in its April 2009 GFSR that supervisors who were in the process of evaluating the viability of banks looked into a whole range of aspects, such as write-downs and available capital, funding structures, business plans and risk management processes, the appropriateness of compensation policies and the strength of management.

³⁶ In the US, the so called Volcker rule that forbids commercial banks to engage in proprietary trading is being implemented through the Dodd Frank Act. In the UK, the Vickers Report endorsed by the government recommends that retail banks be ring-fenced from investment banking activities. Finally, in the EU, the Liikanen Report combines elements of both proposals by requesting mandatory separation of proprietary trading and other high-risk non-client-related activities from the deposit taking institutions (subject to certain thresholds) whilst prohibiting certain trading activities.

some large banks that had been active across several European borders, has underlined the importance of *enhancing cross-border cooperation*, both for micro and macro-prudential supervision.

5.4 The impact on public finances and the public cost

The various measures in support of the financial system are exerting considerable pressure on public finances. According to IMF (2009b) estimates, the immediate impact averages 5.75 % of GDP for the G-20 countries and may rise when taking into account central bank liquidity provisions and guarantees, which do not require upfront financing. At the same time, calculating the direct costs of the crisis is challenging. For example, the US Treasury has received substantial dividend payments on the capital injections made under the TARP. However, if banks that have received capital injections were to default, the losses would probably be high, potentially amounting to the full investment made, despite the seniority of preference shares.³⁷ In May 2010, the US Treasury estimated that total projected lifetime costs of TARP will be USD 105.4 billion. The profitability of the different measures taken by the Fed varies greatly. The investments in government-sponsored enterprise (GSE) securities and in mortgagebacked securities guaranteed by GSEs have contributed to the interest income of the Federal Reserve System Open Market Account (SOMA). In addition, the credit line to AIG has earned USD 2.2 billion of interest income from January 2009 until March 2010. The outcome with respect to the consolidated limited liability companies (LLCs) is similar: the Fed has earned USD 4.4 billion on the Commercial Paper Funding Facility (CPFF) and USD 4 billion on the Maiden Lane LLCs.³⁸

Costs may also emerge indirectly through an increase in sovereign borrowing costs. It should be noted that banks bear part of the cost, for example through increased fees to rebuild deposit insurance funds. Given the sharp increase in the number of failed banks and their assets, losses can be expected to rise significantly in subsequent years. The FDIC estimates that the costs of failed and assisted banks will amount to USD 100 billion by the end of 2013. As a consequence of the already depleted resources of the deposit insurance fund, the FDIC ordered banks to prepay insurance premiums amounting to USD 45 billion by December 2009. This prepayment represents an additional burden to banks which reduces their liquidity and the funds available for lending. With regard to the EU, data on failed institutions and the associated costs across countries is scarce. Typically, large EU banks have been rescued by governments and, in a few instances, sold off to other financial institutions. In the few cases for which data have been published, the amounts are already sizeable. For instance, in November 2012, the Finance Ministry of North-Rhine-Westphalia estimated the cost of WestLB's failure to amount to EUR 18 billion. Yet, considerable uncertainty remains regarding the eventual cost of the support measures adopted.

The various measures taken to support the financial sector had a significant direct impact on a number of countries' government deficits. The impact on government

³⁷ The Treasury lost its full USD 2.3 billion investment in CIT when CIT defaulted. This was the first loss to arise from TARP.

³⁸ These estimates are taken from the Federal Reserve System Monthly Report on Credit and Liquidity Programs and the Balance Sheet published in June 2010. Profit and losses refer to the period from the inception of the facilities until the end of the first quarter of 2010.

debt largely depends on the government borrowing that is required to finance the rescue operations.³⁹ Potential fiscal risks are sizeable for all countries that have established a guarantee scheme, as it may negatively affect market perceptions of their creditworthiness. In addition, the economic downturn and the sizeable fiscal packages adopted to counter the recession aggravate the overall impact on public debt.⁴⁰ Given the size of the commitments assumed during the current crisis, the credibility of the guarantees may be called into question if governments become unable or unwilling to pay (see Hoggarth and Reidhill 2003). In fact, partly as a result of the substantial government guarantee, rating agencies have downgraded a number of euro area countries (e.g. Ireland).

6 Conclusion and outlook

A key issue for the management of the crisis has been the extensive public support measures for the financial sector. This paper gives a detailed description of the measures governments used in the EU and the United States. In addition, this paper presents a first attempt to shed some light on the effectiveness of these measures.

As regards the measures used, *the crisis responses in the United States were largely similar to those in the EU*. First, they employed broadly the same tools (government guarantees, capital and liquidity injections and asset protection). Second, apart from their scope, they were also similar in size: the amounts committed by the US Treasury and the FDIC in support of the financial sector represent 26 % of GDP in the United States, which compares with 24 % in the European Union and 24 % in the euro area.⁴¹ Like the EU, the United States relied on a mix of ad hoc measures for individual institutions and schemes addressing the wider needs of the

³⁹ Recapitalisations of banks and other financial institutions through purchases of new equity at market prices are recorded as financial transactions without any (immediate) impact on the government deficit/surplus. Recapitalisations, loans and asset purchases increase government debt if the government has to borrow to finance these operations. Government securities lent or swapped without cash collateral in temporary liquidity schemes are not counted as government debt; neither are government guarantees, which are contingent liabilities in national accounts. Interest and dividend payments, as well as fees received for securities lent and guarantees provided, improve the government budget balance. More details of the statistical recording of public interventions to support the financial sector are provided in Box 1 in A. van Riet (editor), "Euro area fiscal policies and the crisis", ECB Occasional Paper No. 109, April 2010.

⁴⁰ The support measures had adverse impacts on the public debt positions of a number of euro area countries. Another important factor for the severe deterioration of public finances was the activation of automatic stabilisers—that is the loss of tax revenue and higher government expenditure outlays that ordinarily results from weaker economic activity—as a consequence of the marked contraction of economic activity that followed the collapse of Lehman Brothers. Because the structural fiscal imbalances of a number of euro area countries were sizeable before the financial crisis erupted, fiscal deficits in those countries to stimulate their economics following the agreement in December 2008 of the European Economic Recovery Plan. This fiscal stimulus came close to matching the impact on deficits of automatic stabilisers. More information on the impact of the financial crisis on fiscal positions is provided in A. van Riet (editor), "Euro area fiscal policies and the crisis", ECB Occasional Paper No. 109, April 2010.

⁴¹ These numbers exclude measures targeted at non-financial institutions and measures taken by the Federal Reserve System, the ECB, the BoE and other national central banks within their monetary policy framework. See Stolz and Wedow (2010) for a more detailed discussion of central bank measures.

financial system. Also, monetary policy actions and bank rescue measures have been becoming more and more intertwined (examples of this being the asset purchase program in the UK and in the US).

However, there were also important differences. A key difference was the sizeable repayments of capital by US banks. This may be partly attributed to the fact that capital injections were a requirement in the United States, while, in the EU, capital support was typically voluntary.

Within the EU, sizeable differences in crisis responses emerged. These differences partly reflected the magnitude of the problems faced by each banking system, the degree to which the banking systems were exposed to bad assets and, potentially, budgetary restrictions, which imposed constraints on commitments. More specifically, a number of EU countries set up schemes to address the problems in the financial system, while many others relied on ad hoc measures for individual institutions. Given the wide range of approaches in the EU, the United States naturally lied somewhere in between. A possible case in point is the widening of deposit insurance to USD 250,000 in the United States, which appears high by EU standards, but is dwarfed by the unlimited insurance granted by some EU countries.

Going forward, the crisis raised considerable doubts as to the effectiveness of market discipline (see de Grauwe 2008) and underlined the need for reform of regulation and supervision of the financial system. The reform process in both regions is ongoing. Efforts are being directed at improving the existing regulatory rules, designing new supervisory tools and enhancing the supervisory structure. With respect to the supervisory infrastructure, a key development in the EU was the establishment of the European Systemic Risk Board as an independent body. The ESRB is responsible for conducting macro-prudential oversight of the EU's financial system as a whole and which is supported analytically and logistically by the ECB. With respect to improving the regulatory rules, a reform package is currently being prepared by the Basel Committee on Banking Supervision as a cornerstone of the financial regulatory reform. It aims at improving the quality, consistency and transparency of capital for credit institutions as well as developing a framework for liquidity risk. These proposals will improve the quality of capital, especially the socalled Tier-1 capital, which is of utmost importance for loss-absorption on a going concern basis. Furthermore, a non-risk-based leverage ratio will be introduced as a supplementary measure to the Basel II risk control framework, with the objective to curb excessive balance sheet growth. In order to mitigate the inherent pro-cyclical nature of financial activities, the Basel proposals also contain capital buffers and forward-looking provisioning. Finally, the proposals also include a global minimum liquidity risk requirements enabling credit institutions to withstand a short-term liquidity stress and ensure longer-term stability.

In addition, policy-makers must find viable *exit strategies from the support measures and address the particular issues raised by systemically important banks.* The financial crisis has demonstrated the need to subject systemically important financial institutions to regulatory and supervisory requirements, commensurate to the risks they pose to the financial system and the real economy. To that end, regulatory reform initiatives aim at introducing additional prudential measures, for instance through capital surcharges or contingent

capital instruments, more intrusive supervision, and/or the introduction of bank levies. Finally, the events have underlined the need for an efficient bank rescue mechanism. In particular, the crisis involving Fortis and Dexia, the Icelandic bank failures, and Lehman Brothers highlight the need for further improvement of the *cross-border rescue framework* (CEPR (2010)).⁴²

Appendix 1. The support measures in the United States

This appendix describes the measures taken by the Treasury, the FDIC, and the Federal Reserve System in response to the current financial crisis. With respect to the Fed, it describes the non-standard measures in support of specific institutions.

Description of measures

The crisis response of the US Administration consists of four large building blocks: (i) The Treasury's Troubled Asset Relief Program (TARP); (ii) The FDIC's Temporary Liquidity Guarantee Program; (iii) measures targeted at the Government Sponsored Entities, which are administered by the Treasury and the Fed; and (iv) the Fed's unconventional measures. Table 4 gives an overview of the various programs (including the committed and disbursed amounts), which are described in more detail below.

TARP/financial stability program

The Troubled Assets Relief Program (TARP) was established under the Emergency Economic Stabilization Act of 3 October 2008 (EESA) with the specific goal of stabilizing the US financial system and preventing a systemic collapse. TARP has a volume of USD 700 billion and is run by the Treasury's new Office of Financial Stability. The measures taken under TARP encompass capital injections, loans and asset guarantees and target both the financial and non-financial sector. Originally, the mandate of TARP was to purchase or insure "troubled" assets of financial institutions. This mandate, however, has been flexibly adjusted and extended as needs have arisen. The scope was first extended in mid-October 2008 to allow for capital injections and in November 2008 to allow for the support of the automobile industry. These amendments are reflected in the establishment of several programs under TARP. Table 5 gives an overview of the objectives of the programs. Some of these programs have stringent rules for participation, a narrow choice of instruments and strict conditions (e.g. CPP and the Consumer and Business Lending Initiative Investment Program implemented under TALF). Others have been designed to provide the Treasury with a high degree of flexibility (e.g. AGP, TIP and SSFI), which has been used to tailor their application to specific institutions. Under the umbrella of the Financial Stability Plan, the Treasury's new extended crisis management strategy, some of the programs set up under TARP have been extended (e.g. the Consumer and Business Lending

⁴² In Europe, several international fora have started to look into these issues (including the EC, the Committee of European Banking Supervisors and the European Banking Committee).

Table 4 M	easures adopted by the US administration							
Institution	Program	Supported institution	Commitment USD bn	Usage USD bn	Usage EUR bn	Type of measure	Ended	Proceeds bn USD
		TARP/Financial Stability Plan						
Targeted at 1	ïnancial sector							
Treasury	Capital Assistance Program (CAP)	Largest banks				Capital injection		
Treasury	Capital Purchase Program (CPP)	Banks	205	65	49	Capital injection	31/12/2009	11.2
Treasury	Systemically Significant Failing Institution Program (SSFI)	AIG	70 ^a	48	36	Capital injection		
Treasury	Targeted Investment Program (TIP)	Citigroup, BOA	40^{a}	0	0	Capital injection	23/12/2009	3.8
Treasury	Asset Guarantee Program (AGP)	Citigroup	5	0	0	2nd loss asset guarantee	23/12/2009	0.7
Treasury	Consumer and Business Lending Initiative Investment Program (TALF)		4.3	4 ^{a,b}	ю	Collateralised lending		0.0
Treasury	Public-Private Investment Program (PPIP)		22	14	10	Bad bank model		0.2
Treasury	Community Development Capital Initiative	Banks		0.57	0.4			
Targeted at 1	eal sector							
Treasury	Making Home Affordable Program	Households	46	1	0			-0.8
Treasury	Automotive Industry Financing Program	GMAC, GM, Chrysler	80	67	51	Capital Injection/ Debt Obligation		-14
Treasury	Automotive Supplier Support Program	GM and Chrysler supplier receivables	5	0	0	Debt Obligation		
Treasury	Small Business and Community Lending Initiative	Small Business	15	0	0	Securities purchase		
		Sum	599.3	199	152			1.8
Government Treasury	sponsored entities Preferred Stock Purchase Agreements	Freddie Mac	200	63 ^b	62	Capital injection		

Table 4 (c	ontinued)							
Treasury	Preferred Stock Purchase Agreements	Fannie Mae	200	85 ^b	85	Capital injection		
Treasury	MBS Purchase Program	Fannie and Freddie		167	127	Asset purchase		
		Sum	400	315	274			
		FED						
	Program	Supported institution	Commitment	Usage USD bn	Usage EUR bn	Type of measure	Ended	Proceeds bn USD
	Targeted at financial institutions							
Fed	Maiden Lane I	Bear Steams	29	29 ^c	22	Loan		3.6
Fed	Maiden Lane II	AIG	19	15°	11	Loan		1.2
Fed	Maiden Lane III	AIG	24	16	12	Loan		1.6
Fed	AIG Credit Facility	AIG	29	19 ^b	14	Credit line		2.2
Fed	Term Auction Facility (TAF)	Depository institutions	500	0	0	Collateralised lending	08/03/2010	0.8
Fed	Term Asset-Backed Securities Loan Facility (TALF)		200	41 ^a	31	Collateralised lending (ABS)	30/06/2010	0.0
	Targeted at mortgage market							
Fed	System Open Market Account (SOMA)	Fannie, Freddie, Ginnie	1250	1079	823	Asset purchase	31/03/2010	44.8
Fed	System Open Market Account (SOMA)	Fannie, Freddie, Federal Home Loan Bank	175	154	117	Asset purchase	31/03/2010	3.9
	Targeted at short-term debt markets							
Fed	Money Market Investor Funding Facility (MMIFF)	Money market mutual funds and other fin. institutions	0	0	0	Asset purchase	30/10/2009	0.0
Fed	Commercial Paper Funding Facility (CPFF)			0	0	Asset purchase (CP)	01/02/2010	4.4
Fed	Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF)	Banks		0	0	Asset purchase (ABCP)	01/02/2010	0.1

Table 4 ((continued)							
	Targeted at primary dealers							
Fed	Term Securities Lending Facility (TSLF)	Primary dealers	25	0	0	Asset swap	01/02/2010	
Fed	Primary Dealer Credit Facility (PDCF)	FRBNY		0	0	Overnight collateralised loan facility	01/02/2010	0.0
	Other							
Fed	Asset Guarantee Program (AGP)	Citigroup	220	0	Non-recourse loan		23/12/2009	0.1
Fed	Foreign Central Bank Liquidity Swaps			0.1	0	Currency swaps		2.2
		Sum	2,472	1,353	1,032			66
	FDIC (TLGP)							
FDIC	Debt Guarantee Program	Banks (max. 125 % of senior unsecured debt outstanding)	502	287	219	Guarantee of new senior debt issues	30/04/2010	10.4
FDIC	Transaction Account Guarantee Program	Covers deposits above USD 250,000	700	700	534	Guarantees non- interest-bearing transaction	31/12/2010	0.8
Other								
FDIC	Asset Guarantee Program (AGP)	Citigroup	10	0	0	3rd loss asset guarantee	23/12/2009	
		Sum	1212	987	753			11.2
		Overall sum	4,683	2854	2177			
Content ba	ased on available information as of October 2	010						

^a The Treasury provided USD 20 billion credit protection for loans extended by the Fed's Term Asset-Backed Securities Loan Facility (TALF), which has a volume of up to USD 200 billion. This Table distributes the total usage of USD 41 bn between the Treasury and the Fed accordingly

^b Commitment was subject to changes

° Commitment includes accrued and capitalized interest. Usage presents the fair value of assets

Program	Launch date	Objective	Institutions involved (other than Treasury)	Closure date
Capital injections				
Capital Purchase Program (CPP)	14 Oct. 2008	To provide capital (in the form of senior preferred stock and subordinated debentures) to viable financial institutions of all sizes		31 Dec. 2009 ^a
Targeted Investment Program (TIP)		To make investments in institutions that are critical to the functioning of the financial system. Form, terms and conditions of any investment to be made on a case-by-case basis		23 Dec. 2009 ^b
Capital Assistance Program (CAP)	25 Feb. 2009	To restore confidence throughout the financial system that the largest banks have a sufficient capital cushion against larger than expected future losses. Key component of CAP was the Supervisory Capital Assessment Program (SCAP). The Treasury will consider requests to exchange outstanding preferred shares sold under the CPP or TIP. Capital investments under the CAP will be placed in a separate entity, the Financial Stability Trust, set up to manage the government's investments in US financial institutions	The Fed (through SCAP)	
Systemically Significant Failing Institution Program (SSFI)		To prevent disruptions to financial markets from the failure of institutions that are critical to the functioning of the nation's financial system. The SSFI has been used to inject capital, in the form of preferred stock, into AIG		
Community Development Capital Initiative	3 Feb 2010	To provide ensure the availability of lending to small businesses in the hardest-hit communities by providing capital to banks, thrifts and credit unions—which have been certified by Treasury as targeting more than 60 % of their small business lending and other economic development activities to underserved communities.		30 Apr 2010
Asset support				
Asset Guarantee Program (AGP)	3 Oct. 2008	To guarantee certain assets held by the qualifying financial institution and originated before March 14, 2008.	FDIC, the Fed	23 Dec. 2009 ^b

Table 5	Treasury measures	under the	Troubled Asset	Relief Program	(TARP)
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Table 5 (continued)

Program	Launch date	Objective	Institutions involved (other than Treasury)	Closure date
Public-Private Investment Program (PPIP)	23 Mar. 2009	To buy legacy loans and securities from banks, thereby removing them from banks' balance sheets and transferring them to a public-private partnership.	FDIC (legacy loans), the Fed (legacy securities, TALF)	
Other programs TALF Consumer and Business Lending Initiative Investment Program	12 Nov. 2008	To support the consumer and business credit markets by providing financing to private investors to help unfreeze and lower interest rates for auto, student loan, small business, credit card and other consumer and business credit. Joint initiative with the Federal Reserve System; builds upon, broadens and expands the resources of the Term Asset-Backed Securities Loan Facility (TALF)	The Fed	
Making Home Affordable Program	4 Mar. 2009	To offer assistance to as many as seven to nine million homeowners (through refinancing and loan modifications)		
Automotive Industry Financing Program		To prevent a significant disruption of the American automotive industry, which poses a systemic risk to financial market stability and would have a negative effect on the real economy. The form, terms and conditions of any investment to be made on a case-by- case basis		
Automotive Supplier Support Program	19 Mar., 2009	To provide suppliers with the confidence they need to continue shipping their parts and the support they need to help access loans to pay their employees and continue their operations (through access to government-backed protection and the sale of their receivables into the program at a modest discount)		

Initiative Investment Program implemented under TALF) and new programs have been set up (e.g. CAP and PPIP). Out of a total of USD 700 billion, the Office of Financial Stability (OFS) expects to use up to USD 475 billion. So far USD 388 billion has been disbursed under the specific programs and USD 204 billion have already been recovered.⁴³ On basis of committed amounts under the different measures of USD 475 billion this amounts to a take up ratio of about 82 %.

FDIC measures

Starting on 14 October 2008, the Temporary Liquidity Guarantee Program (TLGP) has tried to strengthen confidence and encourage liquidity in the banking system by (i) guaranteeing newly issued senior unsecured debt of banks, thrifts, and certain holding companies (the Debt Guarantee Program), and by providing full coverage of non-interest bearing deposit transaction accounts, regardless of the dollar amount (the Transaction Account Guarantee Program (TAGP)). Table 6 provides some details of these two programs. The FDIC has estimated that about USD 700 billion of deposits in non-interest bearing transaction accounts have been guaranteed which otherwise would not have been insured.⁴⁴ Banks could choose to opt out of one or both of the programmes. With regard to the Debt Guarantee Program, the basis for the pricing of newly issued debt is linked to the maturity of the debt.⁴⁵ The amount of debt guaranteed by the FDIC is limited to 125 % of the par or face value of senior unsecured debt outstanding as of 30 September 2008 per bank. For banks with no senior unsecured debt outstanding, a limit of 2 % of total liabilities applies. Based on these limits, the FDIC estimated that the total amount of guaranteed debt that can be issued is about USD 609 billion. The debt guarantee program was extended by 6 months for senior unsecured debt issued after 1 April 2009 and before 31 October 2009 and maturing before the end of 2012. However, a phasing out process has been initiated by raising the assessment fee in accordance with the time at which the debt was issued and the maturity date. In addition, non-insured depository institutions were charged a higher fee. On 20 October 2009 the FDIC established a limited, 6month emergency guarantee facility upon expiration of the Debt Guarantee Program. Under this emergency guarantee facility, financial entities can apply to the FDIC for permission to issue FDIC-guaranteed debt during the period from 31 October 2009 to 30 April 2010. The fee for issuing debt under the emergency facility will be at least 300 basis points, which the FDIC reserves the right to increase on a case-by-case basis, depending upon the risks presented by the issuing entity. Overall, about USD 305 billion of FDIC insured debt was outstanding as of 30 April 2010. With regard to the TAGP, the participation fee consists of a 10 basis point annual rate surcharge on non-interest-bearing transaction deposit amounts over USD 250,000. The TAGP was extended by a 12 month period until 31 December 2010 with participation costs rising after the end of 2009. Riskier institutions will be subject to a higher fee for participating in the TAGP. Overall, the FDIC earned about USD 11.4 billion in fees

⁴³ See http://www.financialstability.gov/docs/2010%200FS%20AFR%20Nov%2015.pdf.

⁴⁴ See http://www.fdic.gov/regulations/resources/tlgp/index.html for more details.

⁴⁵ Fees were determined by the amount of FDIC-guaranteed debt, the maturity of the debt (expressed in years) and the annualized assessment rate, which increased with the maturity of the debt.

Program	Launch date	Objective	Institutions involved (other than FDIC)	Closure date
Debt Guarantee Program	14 Oct. 2008	To guarantee newly issued senior unsecured debt of banks, thrifts and certain holding companies with a maturity of more than 30 days. Runs until 31 October 2009, with guarantees not extending beyond 31 December 2012		30 Apr. 2010
Transaction Account Guarantee Program	14 Oct. 2008	To provide full coverage of non-interest bearing deposit transaction accounts, regardless of dollar amount		31 Dec. 2010

Table 6 FDIC measures under the Temporary Liquidity Guarantee Program

and surcharges on both programmes with the debt guarantee programme contributing USD 10.4 billion. 46

Measures targeted at government sponsored entities

Specific measures in support of the government sponsored entities (i.e. Fannie Mae, Freddie Mac, Ginnie Mae and the Federal Home Loan Bank) have been established by the Treasury and the Fed. As of June 2010, the overall amount used has been sizeable (USD 1,548 billion). The Treasury organised the support of the GSEs outside TARP, and thus the support needs to be added to the overall measures taken. The Treasury injected about USD 148 billion of capital in the GSEs and bought USD 167 billion of mortgage-backed securities (MBSs) issued by these entities.⁴⁷ The Fed also bought USD 1,079 billion of GSEs' MBSs and a further USD 154 billion of agency debt as of end September 2010.

Fed measures

The Federal Reserve System has adopted a range of non-standard measures in response to the current financial crisis. These measures are reflected in the establishment of several separate facilities that target specific financial institutions or market segments. Table 7 provides the details of these measures.

The Fed has also supported some financial institutions directly. The so-called *Maiden Lane* transactions comprise three separate limited liability companies (LLCs) which acquired assets from Bear Stearns and AIG.⁴⁸ The Fed provided funding of USD 81.7 billion in the form of senior loans to the LLCs. The duration of the loans is

⁴⁶ See http://www.fdic.gov/regulations/resources/tlgp/reports.html.

⁴⁷ See Monthly Treasury Statement of Receipts and Outlays of the United States Government.

⁴⁸ The two Maiden Lane transactions involving AIG differed as regards the asset pools acquired. Maiden Lane II involved the purchase of residential mortgage-backed securities and Maiden Lane III multi-sector collateralised debt obligations.

Program	Launch date	Objective	Institutions involved (other than the Fed)	Closure date
Maiden Lane I	26 Jun. 2008	To facilitate the merger of JPMC and Bear Stearns by providing senior loan to Maiden Lane to fund the purchase of a portfolio of mortgage-related securities, residential and commercial mortgage loans and associated hedges from Bear Stearns		
AIG Credit Facility	16 Sep 2008	To lend to AIG to prevent a disorderly failure of this systemically important firm, protect the financial system and the broader economy, and provide the company time to restructure its operations in an orderly manner		
Maiden Lane III	25 Nov. 2008	To provide a loan to Maiden Lane III to fund the purchase of asset-backed collateralised debt obligations from certain counterparties of AIG Financial Products Corp. on which AIG had written credit default swap and similar contracts		
Maiden Lane II	12 Dec. 2008	To provide a loan to Maiden Lane II to fund the purchase of residential mortgage-backed securities from the securities lending portfolios of several US insurance subsidiaries of AIG		

^a Indicates deadline for application and ^b date of repayment

10 years for the Bear Stearns' facility and 6 years for the two AIG facilities.⁴⁹ After the repayment of the loans, any remaining proceeds from ML-I are paid to the Fed and, in the cases of ML-II and ML-III, shared between the Fed and AIG. The transactions thus resemble a bad bank in which assets are transferred out of the institutions' balance sheets. In addition, the Fed made a *lending facility available to AIG* in September 2008. The initial commitment under this facility was USD 85 billion secured by a pledge of AIG's assets. The commitment under this facility was reduced to USD 60 billion in November as a result of a capital injection under TARP of USD 40 billion. In June 2009, AIG agreed with the Fed to swap USD 25 billion of debt for equity which cut the amount of AIG's debt from USD 40 billion to USD 15 billion. More specifically, the transaction led to a reduction in the maximum amount available under the lending facility from USD 60 billion to USD 35 billion in December 2009. Subsequent sales of business units by AIG further reduced the ceiling of the credit facility to USD 29 billion as of October 2010. Finally, the Fed contributes to a ring-fencing agreement between Citigroup, the US Treasury, the

⁴⁹ The interest rate for the senior loan to Maiden Lane I (ML-I) was based on the Primary Credit Rate while, in the other two cases, the interest rate was the 1-month LIBOR plus 100 basis points.

FDIC and the Fed by committing to extend a non-recourse loan should the losses exceed a certain threshold. 50

Another set of actions has the aim of supporting the mortgage market by the outright purchase of securities issued by government-sponsored enterprises (GSEs) and mortgage-backed securities guaranteed by GSEs with a total volume of USD 154 billion and USD 1,079 billion, respectively, as of 29 September 2010, acquired via open market operations. These securities are held in the System Open Market Account (SOMA), which is managed by the Federal Reserve Bank of New York.

References

- Bank for International Settlements (2009) An Assessment of Financial Sector Rescue Programmes, BIS Papers No. 48
- Barth JR, Caprio G, Levine R (2001) Regulation and supervision: what works best?, World Bank Policy Research Paper No. 2725
- Basel Committee on Banking Supervision (2005) Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework, November, Part II

Blanchard O (2008) The crisis: basic mechanisms, and appropriate policies, MIT working paper series 09-01

CEPR (2010) A safer world financial system: improving the resolution of systemic institutions. Geneva Reports on the World Economy 12

Committee on the Global Financial System (2008) Central Bank Responses to the Financial Turmoil, CGFS Papers No. 31, July

De Grauwe P (2008) The banking crisis: causes, consequences and remedies. CEPS Policy Brief No. 178, November

Demirgüç-Kunt A, Detragiache E (2002) Does deposit insurance increase banking system instability? An empirical investigation. J Monet Econ 49:1373–1406

Dewatripont M, Freixas X (2012) Bank resolution: lessons from the crisis. In: Dewatripont M, Freixas X (eds) The crisis aftermath: new regulatory paradigms. CEPR, London, pp 105–143

European Central Bank (2010) Financial stability review, June

European Commission (2009) The Recapitalisation of Financial Institutions in the Current Financial Crisis: Limitation of Aid to the Minimum Necessary and Safeguards against undue Distortions of Competition. Official Journal of the European Union, C10/2

Gorton G (2008) The subprime panic, NBER Working Paper 14398

Hoggarth G, Reidhill J (2003) Resolution of banking crises: a review, Bank of England Financial Stability Review, December

Hoggarth G, Jackson P, Nier E (2005) Banking crises and the design of safety nets. J Bank Financ 29:143– 149

International Monetary Fund (2009a) Global financial stability report, April

International Monetary Fund (2009b) Fiscal implications of the global economic and financial crisis, IMF Staff Position Note 13, June

International Monetary Fund (2009c) Global financial stability report, October

International Monetary Fund (2009d) Greece: selected issues, IMF Country Report No. 09/245

Kydland F, Prescott E (1977) Rules rather than discretion: the inconsistency of optimal plans. J Polit Econ 85(3):473–492

 $^{^{50}}$ The loss-sharing arrangement was complex: Citigroup would have covered the first USD 39.5 billion losses on an asset pool of USD 301 billion, while the US Treasury would have assumed 90 % of the second loss tranche up to USD 5 billion, the FDIC would have assumed 90 % of the third loss tranche up to USD 10 billion. Should even higher losses have materialised, the Federal Reserve would have extended a nonrecourse loan to cover the rest of the asset pool, with Citigroup having been required to immediately repay 10 % of such losses to the Federal Reserve.

Levy A, Zaghini A (2010) The pricing of government-guaranteed bank bonds, Bank of Italy, Economic Working Papers 753

Li L (2010) TARP fund distribution and bank loan growth, unpublished working paper

- Lindgren C-J, Baliño TJT, Enoch C, Gulde A-M, Quintyn M, Teo L (1999) Financial sector crisis and restructuring: lessons from Asia, IMF Occasional Paper No. 188
- Petrovic A, Tutsch R (2009) National rescue measures in response to the current financial crisis, ECB Legal Working Paper No. 8, July

Reserve Bank of Australia (2009) Financial stability review, March

- Stolz S, Wedow M (2010) Extraordinary measures in extraordinary times: public measures in support of the financial sector in the EU and the United States, ECB Occasional Paper No. 117, July
- Taylor J (2009) The financial crisis and the policy responses: an empirical analysis of what went wrong, NBER Working paper 14631
- van Riet A (ed) Euro area fiscal policies and the crisis, ECB Occasional Paper No. 109, April 2010
- van Wijnbergen S, Treur L (2011) State aid and bank intervention: the ING Illiquid Assets Back-Up Facility (IABF), Tinbergen Institute Discussion Paper 11-146/DSF 26
- Völz M, Wedow M (2011) Market discipline and too-big-to-fail in the CDS market: does banks' size reduce market discipline? J Empir Financ 18:195–210

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