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Enhancing private and public risk sharing: Lessons from the literature and reflections on the COVID-19 crisis

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Enhancing private and public risk sharing

Lessons from the literature and reflections on
the COVID-19 crisis

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Abstract

This article surveys the literature on consumption risk sharing, focusing on the findings for the euro area and for the United States, but also presenting evidence for other countries. The literature examined found that risk sharing is higher in more mature federations, such as the United States, than in the euro area. The papers surveyed suggest that state/country-specific output shocks are primarily smoothed out through the capital and credit channel, whereas the fiscal channel as a minor role, especially in the euro area. Overall, about 70% of shocks is smoothed in the United States while just 40% in the euro area. At the same time, our analysis of the response to the COVID-19 crisis indicates that risk sharing in the euro area has been more resilient than it was during the global financial crisis of 2008-09. Overall, our results point to the need for further improvements to the private and public risk-sharing channels in the euro area to ensure more effective cushioning against asymmetric shocks and to boost progress towards the completion of European Monetary Union (EMU).

Keywords: Risk sharing, COVID-19 crisis, EMU reform

JEL codes: C23, E62, G11, G15

Executive summary

This article surveys the literature on consumption risk-sharing, focusing on results for the euro area and the United States, while also presenting findings for other countries. It also provides empirical estimates of how risk sharing operated during the peak of the COVID-19 pandemic. Finally, it discusses reform proposals to enhance private and public risk sharing in the euro area.

Risk-sharing is the capacity of a country to absorb asymmetric output shocks through ex ante insurance on capital markets or ex post compensation through savings or fiscal transfers.

How countries and regions can better isolate themselves from idiosyncratic output shocks by diversifying risks across borders is an issue that has been extensively analysed in the literature (Obstfeld, 1994; Persson and Tabellini, 1996). When a country is hit by a negative shock, there are different channels that may come into play to smooth out its impact on disposable income and consumption. First, the effects of the shock may be softened if the country's resident agents (households, firms and the government) are able to obtain income from other countries (regions) not affected by the shock. Such revenue may derive from the "income channel", namely from labour, or from the "capital market" channel, which is more common due to the lesser importance of workers remittances in advanced economies (which enter the income channel, but not the capital channel). The greater the cross-regional financial integration and labour mobility, the greater the strength of these private channels. Moreover, households and firms in a country hit by an adverse shock may protect their consumption by drawing on savings and/or turning to the credit market, i.e. the "savings-credit" channel. Finally, the effects of the shock may be smoothed out through fiscal transfers drawn from a central or federal budget, this typically being referred to as the "fiscal or budgetary" channel. This channel may operate at international level (across countries), between states in a federal state, as in the case of the United States, or regions in a country (e.g., Germany, Italy, etc).

Our review of the literature on this issue highlights the fact that, despite some progress, the risk-sharing mechanisms in euro area countries continue to be relatively weak as compared with those in the United States.

At the same time, an improvement in risk sharing has been observed in the euro area over the course of the COVID-19 pandemic, which is mainly explained by a stronger saving-credit channel. This is likely to be at least partially due to the launch of the Next Generation EU (NGEU) stimulus package and its principal instrument, the Recovery and Resilience Facility (RRF), which amounts to €724 billion (90% of the total NGEU envelope, in current 2021 prices). The RRF funds temporary programmes, known as recovery and resilience plans (RRPs), are designed to boost the recovery and structural transformation of EU economies. The RRF provides grants and loans that are financed by European debt issuance. Our findings suggest that the provision of this unprecedented policy support – together with the measures implemented by the European Central Bank (ECB) such as the pandemic

emergency purchase programme (PEPP) – has probably prevented private risk-sharing channels from collapsing, thus boosting confidence and reducing the risk of a sudden halt of cross-border financial flows.

Our review of the current debate touches on proposals aimed at enhancing both the private risk-sharing channels (the credit and capital channels) and the public (fiscal) channel. First, several authors have highlighted the fact that the credit channel is relatively effective in EMU, making banking integration of prime importance. Second, empirical evidence shows that the use of equity financing is still rare in the euro area and shows a strong home bias. This result, combined with evidence that the more integrated financial markets in the United States have contributed decisively to enhancing risk sharing, points clearly to the need to complete the capital markets union (CMU) in the euro area. Third, the research shows that a central fiscal capacity at euro area level may facilitate the task of budgetary policy to absorb common and idiosyncratic shocks and could even boost the effectiveness of the private risk-sharing channels. However, some authors object to stronger fiscal risk-sharing measures owing to their likely impact on the incentive structure in a currency union. From a political-economy perspective, the right balance must be found between additional euro area central stabilisation and risk-sharing instruments, on the one hand, and the enforcement of fiscal rules on the other.

1 Introduction

Since the Delors Report¹ conceived of the idea of a single currency, ensuring the resilience of European Economic and Monetary Union (EMU) has been one of the main concerns of European policymakers. There are two fundamental nested dimensions to this debate. The first concerns the mechanisms available at a *national level* to reduce exposure to risks or to mitigate their effects (e.g. eliminating price and wage rigidities, building fiscal buffers). The second concerns the notion of *international risk sharing*, which plays a central role in this debate, given that it relates to the cross-border channels available to insure against idiosyncratic or country-specific output shocks (as opposed to shocks hitting the EMU as a whole). This paper focuses on this later dimension.

Risk sharing is the capacity of a country to absorb asymmetric shocks through ex ante insurance on capital markets or ex post compensation through savings or fiscal transfers. How countries and regions can isolate themselves more effectively from idiosyncratic shocks by diversifying risks across borders has been extensively analysed by international finance (Obstfeld, 1994; Persson and Tabellini, 1996). When a country is hit by a negative shock there are different channels that may come into play to smooth out its impact on disposable income and consumption: the capital markets channel, the credit channel and the fiscal channel. The first two channels are predominantly private channels while the latter one is of public nature. These channels could operate at the international level (across countries) or between states in a federation, as in the United States (US), or regions in a country (e.g., Germany, Italy, etc).

First, the effects of the shock may be softened if the country's resident economic agents obtain income from other countries (regions) not affected by the shock. This income may derive from the "income channel", namely from labour, or from the "capital market" channel, which is more common due to the lesser importance of workers remittances in advanced economies (which enter the income channel, but not the capital channel). The greater the cross-regional financial integration and labour mobility, the greater the strength of this private channel. Second, households and firms in the country hit by an adverse shock may protect their consumption by resorting to savings or to credit conceded by other countries, i.e., the "credit channel". This primarily includes credit from financial (domestic and foreign) intermediaries but also foreign governments or international institutions (e.g., the International Monetary Fund) which provide official loans in the context of adjustment of other programmes. Third, the effects of the shock may be smoothed out through fiscal transfers drawn from the central or federal budget, this typically being referred to as the "fiscal or budgetary" channel.

Our review of the literature highlights the fact that the strength of the risk-sharing mechanisms in euro area countries has remained relatively weak as compared with the United States. The lesser degree of risk sharing through European capital

¹ See Committee for the Study of Economic and Monetary Union (1989).

markets is the key difference as compared with the United States. In addition, the budgetary channel is virtually negligible in the euro area. Some papers document a significant decrease in risk sharing in euro area countries in periods of recession, precisely when it is most needed, owing to the fragmentation of financial markets. However, other papers point to a progressive improvement in the shock-absorption capacity of the euro area since the European sovereign debt crisis of 2010-12 as a result of the activation of the European Financial Stability Facility (EFSF) and the European Stability Mechanism (ESM), which channel official loans to distressed euro area economies (Milano and Reichlin, 2017; Cimadomo et al., 2020).

Our own empirical analysis is based on a sample from 1997 to 2022 for the Eurozone, and on a sample from 1997 until 2020 for the US, thus encompassing the peak of the COVID-19 crisis. Our findings show that risk sharing is more powerful across the United States than across EMU countries. Furthermore, it can be seen that risk sharing has improved in the United States since the global financial crisis of 2008-09, mainly owing to a stronger contribution by the credit channel.

As regards the euro area, our findings point to an improvement in risk sharing since the start of the COVID-19 pandemic, i.e. between 2020 and 2022, which is mainly explained by a stronger savings-credit channel. In particular, on top of the significant fiscal support provided at the national level, which has contributed to prevent the fragmentation of capital markets and the decline in private risk sharing channels, there have been significant advances in the provision of public support measures at the EU level. This includes the triple safety net that made €540 billion available in loans through the ESM to help to finance pandemic-related sovereign expenditure, on national short-time work schemes and in credit guarantees to firms provided through the European Investment Bank. While the “Temporary Support to Mitigate Unemployment Risks in an Emergency” (SURE) has been the only measure to be used to date, the announcement of these public support initiatives has undoubtedly contributed to boosting confidence and preventing sudden interruptions of cross-border financial flows.

The most significant step forward was the introduction of the EU’s RRF, the main component of the NGEU package. The facility is a temporary instrument designed to bolster the recovery and structural transformation of EU economies through a combination of grants and loans to be financed by European debt issuance.² It amounts to €724 billion (in current 2021 prices), and the expectation is that more than four-fifths will be taken up by euro area countries.

In addition, monetary policy measures of the ECB and particularly its Pandemic emergency purchase programme (PEPP) may have prevented financial fragmentation during the COVID crisis thus indirectly contributing to enhance risk sharing through the credit and capital channels in this period.

² The RRF entered into force on 19 February 2021. It was launched to finance reforms and investments in EU Member States from the start of the coronavirus pandemic in February 2020 and is set to run until 31 December 2026. It has made €723.8 billion available to EU countries in total, of which €385.8 billion in loans and €338 billion in grants. For an in-depth analysis of the impact of the RRF and NGEU on the euro area economy, see Bańkowski et al. (2022).

The COVID-19 pandemic is providing clear and tangible evidence of the benefits of having risk-sharing mechanisms to cope with such unexpected and unprecedented shocks with asymmetric effects. These effects have been shown to depend, among other things, on the stringency of the mitigation strategies applied to contain the crisis and on the productive structures that exist (Battistini and Stoevsky, 2021).

All in all, evaluating risk sharing is paramount for countries in a monetary union. Within monetary unions, countries face a loss of monetary policy autonomy and of exchange rate mechanisms for coping with idiosyncratic shocks (or with the divergent impact of common shocks). Building national fiscal buffers, eliminating structural rigidities and strengthening private and public risk-sharing channels are crucial to enhancing the capacity of the euro area to cope with future shocks. This is the principal rationale for most proposals to improve the institutional architecture of EMU, some of which are also reviewed here.³

This paper is organised as follows. Section 2 reviews some selected papers in the risk-sharing literature, focusing on the impact of euro adoption, the differences between the euro area and the United States, the relationship between risk sharing and the economic cycle and whether private and public channels should be viewed as complementary or as substitutes for each other. Section 3 presents the model underpinning our empirical analysis. Section 4 describes the dataset. Section 5 comments on our findings and reflects on how risk sharing has operated since the start of the COVID-19 crisis. Section 6 reviews certain reform proposals aimed at enhancing risk sharing in the euro area and, finally, Section 7 sets out our conclusions.

³ See, for example, the Five Presidents' Report (Juncker et al., 2015) and other proposals summarised in Section 6.

2 Results from the literature

The literature on international risk sharing has grown considerably over the past three decades, especially since the seminal paper on the United States by Asdrubali, Sørensen and Yosha (1996). That paper finds that 75% of shocks to the per capita gross product of individual states between 1963 and 1990 were smoothed out, leaving a relatively small number of shocks that were not absorbed. Looking at the different channels, 39% of income shocks were smoothed out by insurance or cross-ownership of assets and 23% by borrowing or lending. Only 13% of income shocks were absorbed by federal tax-transfers and grant schemes. It should be noted in this regard that several US states have a balanced-budget rule in place, leaving limited scope for counter-cyclical fiscal policies at state level. Overall, the analysis in the aforementioned paper shows that state-specific shocks in the United States were, for the most part, smoothed out through private risk-sharing channels, i.e. market transactions, rather than through public channels.

2.1 Impact on risk sharing of euro adoption and financial integration

A number of studies published since Asdrubali, Sørensen and Yosha (1996) and other early literature on risk sharing have analysed whether the adoption of the single currency in Europe has strengthened risk sharing and consumption in the euro area. Building on the experience of the United States, where risk sharing was found to have increased over time following financial deregulation and integration (Athanasoulis and van Wincoop, 2001; Demyanyk, Ostergaard and Sørensen, 2008), the general consensus was that creation of the Monetary Union would have led to greater financial integration and thus more consumption smoothing (Jappelli and Pagano, 2008). Indeed, several studies identified a growing trend towards a smoothing out of consumption in the years running up to the global financial crisis, primarily due to greater financial integration in the euro area.⁴

However, Afonso and Furceri (2008) highlight a decline in risk sharing after the introduction of the euro; Ferrari and Rogantini-Picco (2016) suggest that this might be due to the credit market channel amplifying shocks in periphery countries rather than smoothing them out.

⁴ For instance, Balli et al. (2012), using data from 1992 to 2007, document an increase in risk sharing in the euro area and other OECD countries through factor income and capital gains since 2000. See also Demyanyk et al. (2007) and Kalemli-Ozcan et al. (2008).

2.2 Comparing the euro area with the United States and other countries

Since the start of the EMU process, much of the literature has focused on estimating the degree of shock absorption and risk sharing in the euro area, and on comparing it with the situation in the United States and other countries or federal states. The general conclusion is that risk-sharing mechanisms in euro area countries has continued to be relatively weak as compared with the situation in the United States. As shown in Table 1, on average 60% of adverse shocks in a euro area country translate into a decline in that country's consumption, as compared with the 30% estimated for the United States.

The degree to which risk is shared through capital markets is the key difference between the United States and Europe, with the capital market playing a much more important role in this regard in the United States, given that this market acts as a form of insurance (smoothing out close to 40% of shocks to domestic income). In Europe, however, the role it plays is comparatively small, as shown in Table 1. This may be due to the more limited development of equity markets in Europe, the greater national bias seen in euro area countries in contrast to the United States and the fact that cross-border investment is concentrated in just a few EU Member States (Milano and Reichlin, 2017; Véron and Wolff, 2016; Goncalves-Raposo and Lehmann, 2019).

The bulk of risk sharing in the euro area takes place through the savings-credit channel, but is not sufficient to compensate for the weakness of the other channels. Until the NGEU programme was launched, the budgetary channel was only marginally relevant in the euro area, given that the resources basically boiling down to EU structural and cohesion funds (which are in fact disbursed for convergence reasons and not to achieve stabilisation), while in the United States this channel is estimated to cushion between 10% and 20% of adverse shocks owing to the sizeable US federal budget.

Other authors have focused on different groups of countries within the euro area and on sub-samples, distinguishing in particular between the pre and post-global financial crisis periods. Kalemli-Ozcan et al. (2014) were among the first to estimate the degree of risk sharing, focusing on the peripheral and core euro area countries and looking at the Great Recession between 2008 and 2010. Their findings suggest that during that crisis, international factor income did not provide any risk sharing for periphery countries. On the contrary, it may have acted as a shock amplifier. More recently, Cimadomo et al. (2020) looked at a sample of eleven euro area countries and only at intra-euro area financial flows, finding that only about 40% of shocks were absorbed in the early years of EMU, while in the aftermath of the 2009 sovereign debt crisis around 65% of shocks are smoothed out. This could be in part attributed to the activation of official financial assistance packages for countries under stress, namely the Greek Loan Facility, the EFSF, the European Financial Stability Mechanism (EFSM) and the ESM. Milano and Reichlin (2017) also found that there had been an increase in risk sharing in euro area countries since the sovereign debt crisis as a result of that assistance.

The empirical literature examined also provides evidence for certain other countries. The findings of some of these papers are summarised in Table 1. While these papers use different samples and methodologies, some interesting common insights can be drawn from them. In general, the literature suggests that the effectiveness of risk sharing at inter-regional level tends to be higher than at international level (Crucini, 1999; Dedola et al., 1999). In the case of Germany, Hepp and von Hagen (2013) found a very high level of risk sharing across German regions in the pre-unification period: 91% of shocks to per capita state gross product were smoothed out. In the post-unification period this level decreased somewhat but remained high (at about 80%). A significant contribution came from federal tax-transfers and the grant system. The analysis presented in Hauptmeier et al. (forthcoming)⁵ also points to a very high degree of inter-regional risk sharing in France, mainly owing to a strong capital channel. For Italy, risk sharing appeared to be of a similar level (around 75% of shocks smoothed out), whereas the level seems to have been lower, i.e. about 50%, for Spanish regions (Alberola and Asdrubali, 1997).⁶

Chart 1 summarises the findings of the papers referred to in Table 1 by taking the averages, for each country or federal state, for each risk-sharing channel. This sort of “meta-analysis” again highlights the fact that the level of risk sharing across euro area (and EU) countries has been significantly lower not only than the one for the United States but also as compared with risk sharing between regions in Germany, Italy and Spain. Canada and the United Kingdom exhibit a slightly lower level of risk as compared with the United States, but higher than the level for the EMU. Overall, the situation in the United States and some European countries points to the potential for greater risk sharing that has not so far been fully realised in the case of the euro area.

⁵ Hauptmeier, S., Holm-Hadulla, F. and Renault, T. (forthcoming), Risk-sharing and monetary policy transmission, ECB Working Paper Series.

⁶ The 2020 ECB’s Financial Integration and Structure Report focused on unlisted shares, i.e., private ownership (including cross-border) of non-listed companies. These turn out to be much bigger in the EU than in the US. This mechanism may explain why Hepp and von Hagen (2013) and Hauptmeier et al. (forthcoming) found that risk-sharing through capital markets in Germany and France is surprisingly high (see: <https://www.ecb.europa.eu/pub/pdf/fie/ecb.fie202003~197074785e.en.pdf>).

Table 1

Summary of the findings of the literature

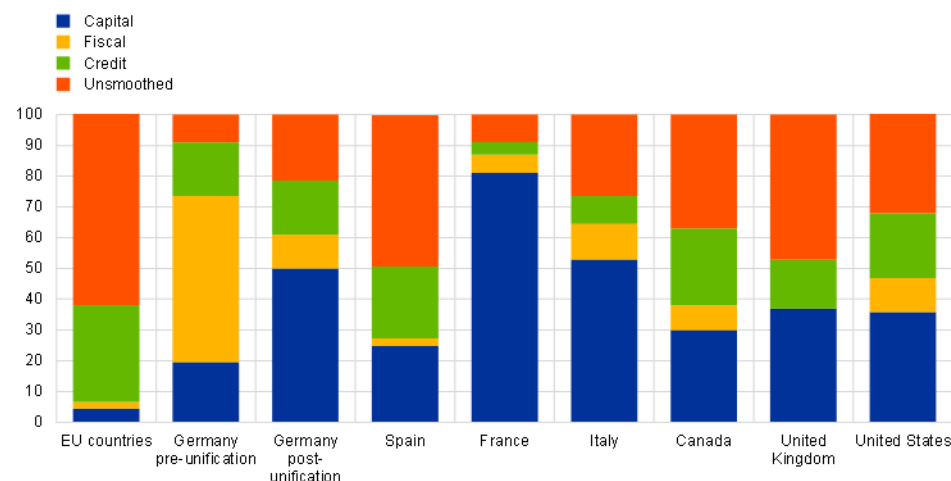
			Capital markets	Public transfers	Credit channel	Non-smoothed
EU countries						
Del Negro (1998)	1967-1990	EU-10	0	0.02	---	---
Asdrubali and Kim (2004)	1960-1990	Impact	0.04	0	0.43	0.53
		Cumulative	-0.01	-0.01	0.24	0.79
Poncela et al (2016)	1960-2014	Impact	0	0	0.25	0.75
		Cumulative	0.03	0.02	0.18	0.78
	1999-2014	Impact	0.01	0	0.13	0.86
		Cumulative	0.09	0.02	0	0.89
Ferrari and Rogantini Pico (2017)	1990-2014	All countries	---	0.07	0.42	0.55
		Core	-0.2	0.08	0.61	0.5
		Periphery	---	0.07	0.39	0.52
Furceri and Zdzienicka (2015)	1979-2010	Normal times	0.08	0.04	0.31	0.66
		Financial crisis and downturns	-0.07	0.02	0.15	0.9
Nikolov (1996)	2000-2015		0.06	0	0.18	0.76
Kalemli-Ozcan et al (2013)	1990-2007	All countries	0.05	0	0.49	0.46
		Periphery	0.12	0	0.31	0.57
Milano (2017)	1970-2014		0.01	0	0.27	0.72
	1999-2014		0.03	0	0.3	0.67
	2007-2014		0.02	0	0.39	0.59
Afonso and Furceri (2008)	1980-2005		0.01	0.02	0.39	0.58
	1998-2005		0.14	0.01	0.25	0.6
Hoffmann, Maslov, Sorensen and Stewen (2018)	1998-2013		0.01	0.02	0.39	0.58
	1998-2005		0.14	0.01	0.25	0.6
Alcidi et al (2017)	1998-2013		0.1	0.01	0.14	0.75
Cimadomo et al (2018)	1998-2016		0.2	0.05	-0.05	0.8
United States						
Del Negro (1998)	1969-1994		0.4	0.14	---	---
Asdrubali, Sorensen, Yosha (1996)	1963-1990		0.39	0.13	0.23	0.25
Asdrubali and Kim (2004)	1960-1990	Impact	0.34	0.07	0.21	0.38
		Cumulative	0.36	0.15	0.14	0.36
Nikolov (1996)	1964-2013		0.45	0.08	0.27	0.18
Melitz and Zumer (1999)	1964-1990		0.24	0.13	0.24	0.39
Alcidi et al (2017)	1998-2013		0.48	0.08	0.27	0.17
Cimadomo et al (2018)	1998-2016		0.3	0.1	0.2	0.4
Other countries						
Hepp and Von Hagen (2013)	1970-1994	Germany- pre unification	0.2	0.54	0.17	0.09
	1995-2006	Germany- post unification	0.5	0.11	0.18	0.22
Hauptmeier, Holm-Hadulla, Renault (forthcoming)	2000-2018	France	0.81	0.06	0.04	0.09
Melitz and Zumer (1999)	1984-1992	Italy	0.49	-0.01	-0.04	0.55
Dedola et al (1998)	1983-1992	Italy	0.67	0.18	0.15	0
Fiorelli, Giannini, Martini (2020)	2000-2016	Italy	0.43	0.17	0.16	0.24
Alberola and Asdrubali (1997)	1973-1993	Spain	0.25	0.03	0.23	0.49
Melitz and Zumer (1999)	1972-1996	United Kingdom	0.34	0	0.05	0.61
Dedola et al (1998)	1978-1994	United Kingdom	0.4	0	0.27	0.33
Melitz and Zumer (1999)	1962-1994	Canada	0.3	0.08	0.25	0.37

Note: The table shows the share of idiosyncratic output income shocks that were smoothed out through the capital, credit and fiscal channels in the United States, the euro area and other countries, together with the share of unsmoothed shocks as estimated in certain papers selected. The sum of the four columns is by construction equal to one. In Fiorelli, Giannini and Martini (2020), smoothing-out through capital depreciation was allocated to the capital market channel.

Chart 1

Strength of the risk-sharing channels in the various countries covered by the literature examined

(x-axis: regions; y-axis: measure of synchronisation)



Source: ECB calculations.

Note: The table shows the average values for each country or federal state and for each channel referred to in Table 1.

2.3 Relationship between risk sharing and the economic cycle

Some of the literature has explored whether risk sharing has varied over the business cycle. In particular, consideration was given to whether it has been countercyclical, thus providing stronger absorption of local shocks when this was most needed (i.e. during economic downturns), or if it had instead been procyclical, thus amplifying the effects of shocks. Hoffmann and Shcherbakova-Stewen (2011) find that inter-state risk sharing in the United States varies over the business cycle, increasing in booms and decreasing during downturns. In the period 1963-2005, risk sharing during recessions was on average about 20 percentage points below its mean. This showed that income smoothing through capital income flows tended to be countercyclical, whereas the savings-credit channel was strongly procyclical, this latter effect turning out to dominate. In the case of the euro area, Furceri and Zdzienicka (2015) document a significant decrease in risk sharing in recessions among euro area countries, which becomes more intensive in severe downturns that are persistent and unanticipated. Moreover, several papers show that during the 2008-2009 global financial crisis and the subsequent 2010-2012 euro area sovereign debt crisis there was a strong decrease in private risk sharing (Kalemli-Ozcan et al., 2014; Banco de Espana, 2016). The main driver was the behaviour of credit markets that typically collapsed during financial crises. However, it should be borne in mind that in the euro area, in contrast to the United States, there was no sizeable

smoothing channel other than the ESM financial assistance and, more recently, the NGEU package.

2.4 Private and public risk-sharing channels: complements or substitutes?

Different views emerge on whether the main risk-sharing channels operate as complements, thus reinforcing each other, or as substitutes. With regard to the credit and capital market channels, Hoffmann et al. (2018) present empirical evidence – rationalised in a dynamic stochastic general equilibrium (DSGE)-model framework – that supports the strong complementarity of both channels. In their model, banking integration improves the access of bank-dependent firms to finance but at the cost of making those firms' profits more volatile and more procyclical. This, in turn, increases the benefits of international portfolio diversification and equity market integration. This finding is consistent with past literature that suggests that proper diversification of funding sources leads to more investment and to lower vulnerability to financial flows.

With regard to public versus private risk-sharing channels, the evidence is more scarce and tends to point to substitutability. Some authors consider that if risk sharing in the private sector was fostered through a fully-fledged banking union and a CMU, the euro area could achieve significant capacity to absorb shocks that would be similar to that of other federal states. For example, Belke and Gros (2015) consider that financial institutions (e.g. through the Single Resolution Mechanism and the common deposit insurance scheme) are more important for restoring investor confidence than fiscal institutions. In contrast, others argue for fiscal insurance, as a complement to private risk sharing. A central fiscal capacity might reduce the financial frictions associated with having foreign debt, serving as a backstop for cross-border private borrowing and lending (Beetsma et al., 2021a; Beetsma et al., 2021b; Giovannini et al., 2021). For the United States, Schelkle (2017) argues that the Federal Deposit Insurance Corporation (FDIC) performs the role of fiscal backstop for state budgets in a systemic crisis. In addition, Farhi and Werning (2017) make a theoretical case for market-based insurance being suboptimal in currency unions given that private economic agents do not internalise the macroeconomic stabilisation effects stemming from a higher diversification of asset portfolios. Others argue that a central fiscal stabilisation capability could foster private risk sharing by reducing the possibility of a recession that could prompt procyclical credit flows. From a more practical perspective, some argue that the banking union currently in place falls short of realising its potential for shock absorption and that it will take many years to develop a genuine banking and CMU. Fiscal union is a necessary complement to and not a substitute for a banking and capital markets union.

3 Empirical model

In their seminal paper on the United States, Asdrubali, Sørensen and Yosha (1996) propose a framework based on a cross-sectional variance decomposition of shocks to gross domestic product for estimating the risk-sharing channels. This approach has been extensively adopted in the literature owing to the fact that it has the merit of bringing together in an integrated framework the three smoothing channels previously mentioned.⁷ The approach is based on the following formula:

$$GDP_{it} = \frac{GDP_{it}}{GNP_{it}} \frac{GNP_{it}}{GDI_{it}} \frac{GDI_{it}}{C_{it}} C_{it}$$

where GDP is gross domestic product, GNP is gross national product, GDI is gross disposable income and C is total consumption.

With full risk sharing through the capital markets (be it through the “capital” or the “income” channel), GDP and GNP should not co-move. Possible differences in GDP and GNP are explained by income from financial assets held abroad and from employment abroad of citizens of the domestic country. The second channel depends on the difference between GNP and GDI, and is referred to as the “fiscal channel”. This primarily involves cross-border transfers between governments (e.g. structural funds) in the case of the EU, or federal transfers to states in the case of the United States. The third channel is captured by the difference between GDI and C, and is generally labelled the “credit channel”. This includes, for example, borrowing abroad by individuals and governments, either in credit markets or through supranational insurance mechanisms such as the ESM. RRF loans would also fall under this channel.

The first two channels capture ex ante risk sharing, as they relate to financial arrangements made before any GDP shock materialises. The last channel captures ex post risk sharing, given that it relates to financial arrangements generally made after the GDP shock has taken place.

Empirically, Asdrubali, Sørensen and Yosha (1996) measure the strength of each channel using panel regressions of the following type:

$$\Delta GDP_{it} - \Delta GNP_{it} = \alpha_1 + \beta_1 \Delta GDP_{it} + \varepsilon_{1t}$$

$$\Delta GNP_{it} - \Delta GDI_{it} = \alpha_2 + \beta_2 \Delta GDP_{it} + \varepsilon_{2t}$$

$$\Delta GDI_{it} - \Delta C_{it} = \alpha_3 + \beta_3 \Delta GDP_{it} + \varepsilon_{3t}$$

$$\Delta C_{it} = \alpha_4 + \beta_4 \Delta GDP_{it} + \varepsilon_{4t}$$

⁷ In the past, the literature focused on these channels separately. For instance, Sala i Martin and Sachs (1991) were among the first to study how much smoothing out was provided by the central government budget in the United States, while Atkeson and Bayoumi (1993), for their part, focused on the role of capital markets.

The coefficients β_1 , β_2 and β_3 approximate the percentage of risk shared through capital markets, fiscal transfers and the credit markets respectively. The coefficient β_4 measures the percentage of risk not shared.

It is important to stress that the approach adopted by Asdrubali, Sørensen and Yosha (1996) does not capture the dynamic behaviour of consumption smoothing. International consumption smoothing not only has a cross-border dimension but also has a temporal element reflected in the behaviour of savings. As a result, proposals are made in some of the literature examined to address this issue. For instance, Del Negro (1997) measures risk sharing by taking into account shocks to the overall level of wealth and not just to income to allow for the intertemporal dimension of insurance.

In this paper, we have applied the method proposed in Asdrubali and Kim (2004) (hereinafter, the AK method). They use a panel vector autoregression (VAR) model, in which the four equations set out above are combined into a single model with ΔGDP_{it} , $\Delta GDP_{it} - \Delta GNP_{it}$, $\Delta GNP_{it} - \Delta GDI_{it}$ and $\Delta GDI_{it} - \Delta C_{it}$ serving as endogenous variables.⁸ In our analysis, the panel VAR model has two lags and also includes country fixed effects. Estimates are made using the least squares dummy variable estimator (LSDV).

Past studies, using a static system (as in Asdrubali, Sørensen and Yosha, 1996), examined how ΔGDP_{it} was smoothed out by the different channels within the same year and assumed ΔGDP_{it} to be as exogenous. In contrast, the AK model studied how changes in GDP due to exogenous shocks were smoothed out dynamically by the various risk-sharing channels. This last framework also makes it possible to assess smoothing properties over time and not just contemporaneously. In order to derive the exogenous GDP shock, Asdrubali and Kim simply assumed a recursive structure in their baseline formulation whereby GDP was ordered first and a Cholesky identification scheme then applied. In this work, we follow the same approach, making it possible not only to capture the dynamics of inter-regional risk sharing but also to endogenise the output process, i.e. take into account potential feedback and inter-linkages between output and the various smoothing channels. In practice, we have estimated the impulse responses of the capital channel ($\Delta GDP_{it} - \Delta GNP_{it}$), the fiscal channel ($\Delta GNP_{it} - \Delta GDI_{it}$) and the credit channel ($\Delta GDI_{it} - \Delta C_{it}$) to an orthogonalised GDP shock. Any GDP response not absorbed by these three channels is labelled “unsmoothed”.

⁸ The same methodology was also used in European Central Bank (2017), “Financial Integration and Structure Reform” and in European Central Bank (2018) “Risk-sharing in the euro area”, Economic Bulletin, Issue 3.

4 Data

The sample used in the empirical analysis encompasses eleven euro area countries: Belgium, Germany, Greece, Spain, France, Italy, Luxembourg, the Netherlands, Austria, Portugal and Finland.⁹ The US dataset covers all 50 states. For the euro area, we include annual data spanning the period from 1997 to 2022. Data were retrieved from the European Commission's annual macroeconomic database (AMECO) dataset, Spring 2022 vintage. We also decided to include nowcast for 2022. Although these are preliminary and likely to be revised to some extent in the future, they help to provide initial insight into developments during the COVID-19 crisis. For the United States, the dataset spans the period 1997-2020. We retrieved US data from various official sources, but primarily from the Bureau of Economic Analysis and Census. We proceeded as follows. First, we estimated the model based on the full sample, then, on the basis of twelve-year rolling windows to explore how risk sharing had evolved over time.¹⁰

Tests of international risk sharing have typically been based on the relationship between total economy consumption growth and output growth, controlling for global economic shocks and other factors. A full risk-sharing scenario would be characterised by (local) consumption being uncorrelated with (local) output, indicating that idiosyncratic output shocks hitting a particular region in a federal state or a country in a monetary union would be smoothed out through financial market channels or inter-regional transfers. Empirically, initial descriptive evidence of the degree of risk sharing might be based on the approach proposed by Kalemli-Ozcan et al. (2014). They construct a measure of synchronisation based on the negative absolute difference of GDP growth between country i and country j in year t . We have applied this measure to both GDP and consumption growth and separately for the euro area and the United States. More specifically, we have calculated the measure of synchronisation between all $n(n-1)/2$ country pairs, then computed the average of these pairs for each year t . The more negative this measure is, the less synchronised the countries (states) in the two monetary unions analysed are. A value of zero would indicate perfect synchronisation.

Chart 2 shows, first, that consumption and output have a similar degree of dispersion across euro area countries while, for the United States, consumption is remarkably less dispersed than output across states. This is already *prima facie* evidence of stronger risk-sharing in the United States than in the euro area. Second, the United States experienced a sizeable increase in output dispersion during the global financial crisis of 2008-09. However, this was accompanied by a smaller increase in

⁹ Ireland was excluded from the analysis owing to unusually large revisions of some of the country's main macroeconomic statistics for 2015 that were undertaken in July 2016. These revisions affected real GDP, some of its components and balance of payments figures; some of these figures would feed into the indicator in this chart although they would not indicate a change in risk sharing. See International Monetary Fund (2017), which also presents a timetable for resolving measurement problems in the future.

¹⁰ For construction of the dataset, and in particular definition of the key variables used in the empirical analysis, we closely followed the definitions given in Asdrubali, Sørensen and Yosha (1996) (see the Data appendix).

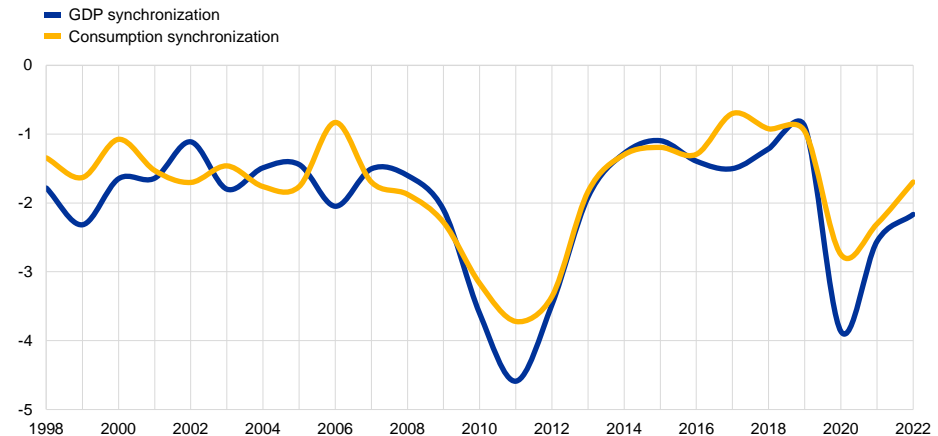
dispersion for consumption. The euro area witnessed a bigger increase in dispersion, although this occurred at a later stage, namely during the 2010-12 European sovereign debt crisis. Dispersion also increased strongly in the euro area during the COVID-19 crisis, but then declined rapidly in 2021 and 2022 to pre-pandemic levels. Remarkably, consumption dispersion for the euro area was only slightly lower than output dispersion during both the European sovereign debt crisis and the COVID-19 crisis, signalling the limited role of risk sharing. Overall, this initial evidence suggests more powerful risk-sharing mechanisms in the United States than in the euro area, especially during severe recessions. Federal transfers, inter-state credit and capital flows are likely to have contributed to smoothing out local output shocks, thus resulting in more synchronised consumption across states as compared with the situation in the euro area. However, preliminary evidence on the COVID-19 crisis indicates that ex post risk sharing through common instruments put in place in the EU seems to have limited income and consumption dispersion in the aftermath of the COVID-19 crisis.

Chart 2

Synchronisation of output and consumption within the euro area and the United States

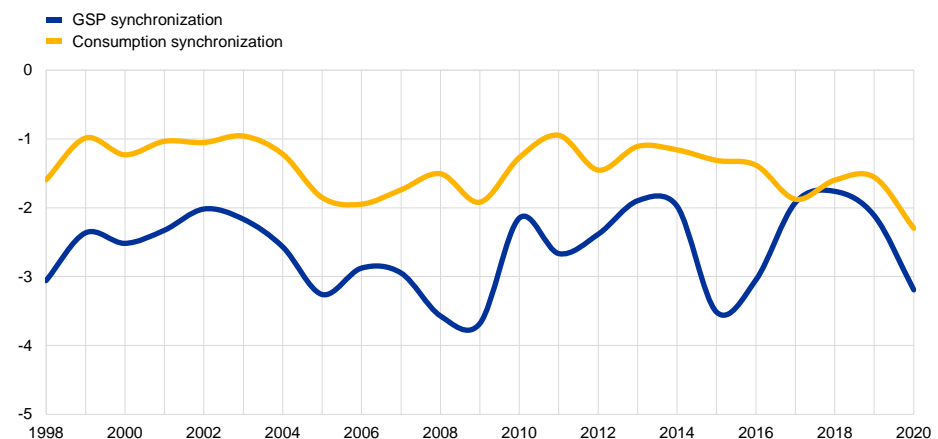
a) Euro area: synchronisation of Gross Domestic Product and consumption across member countries

(x-axis: years; y-axis: measure of synchronisation)



b) United States: synchronisation of Gross State Product and consumption across States

(x-axis: years; y-axis: measure of synchronisation)



Source: ECB calculations.

Notes: The chart shows a measure of synchronisation based on the negative absolute difference of GDP growth between country (state) i and country (state) j in year t . This measure is applied to both GDP and consumption growth, separately for the euro area and the United States. The measure of synchronisation is calculated between all $n(n-1)/2$ country pairs, then averaged across all pairs for each year t . The more negative this measure is, the less synchronised the countries (states) will be within the two monetary unions considered. A value of zero would indicate perfect synchronisation.

5 Empirical results

Based on the empirical framework presented in Section 3, we estimate the overall degree of risk sharing and the contribution of the different risk-sharing channels in both the euro area and the United States. In contrast to previous studies, this work – which builds on the panel VAR framework proposed by Asdrubali and Kim (2004) – makes it possible to evaluate not only the contemporaneous effects (i.e. within a year) of risk sharing, but also the dynamic effects (i.e. shock absorption and the contribution of each channel) after some years.¹¹

The impulse responses generated from the panel VAR model are used to assess how idiosyncratic GDP shock affects consumption and the roles played by the three risk-sharing channels in the propagation mechanism. Chart 3 shows the effect of GDP shock on consumption growth at various horizons for the euro area and the United States. In particular, the panels depict the contemporaneous response of each channel and then the cumulative responses after one, two, three and four years. The total impact is normalised at 100 at every horizon: for example, if a GDP shock occurs in year t , it may translate into a one-to-one change in consumption (i.e. no risk sharing). Where this is the case, the “unsmoothed” bar will take a value of 100, while the other bars will be at zero. In the opposite case, where there is full risk sharing, the unsmoothed bar will be at zero, and the sum of the capital, fiscal and credit channels will be 100. The advantage of the representations in Chart 3, which is novel, is that it makes it possible to evaluate not only the contemporaneous effect of the output shock, but also how it is dampened over time.

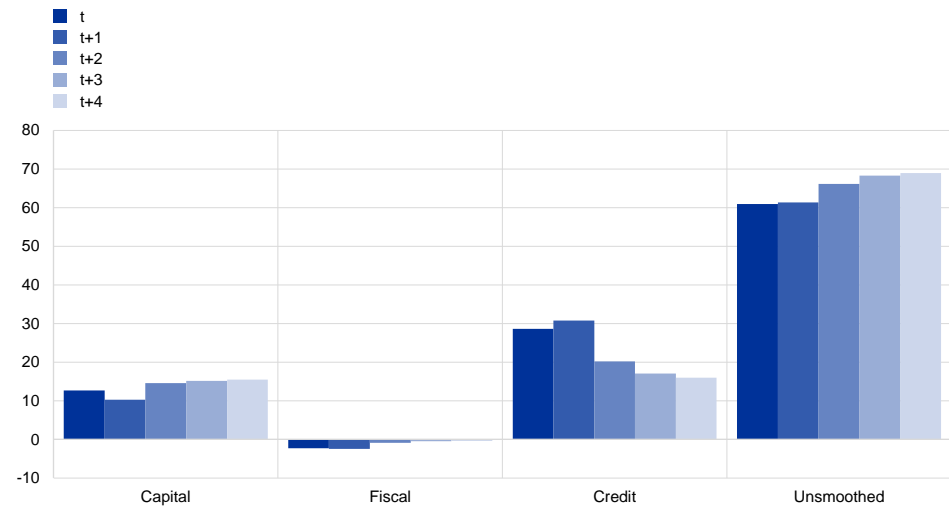
¹¹ See also European Central Bank (2016) and Cimadomo et al. (2018) for a related analysis.

Chart 3

Transmission of output shocks to consumption and the smoothing channels over time

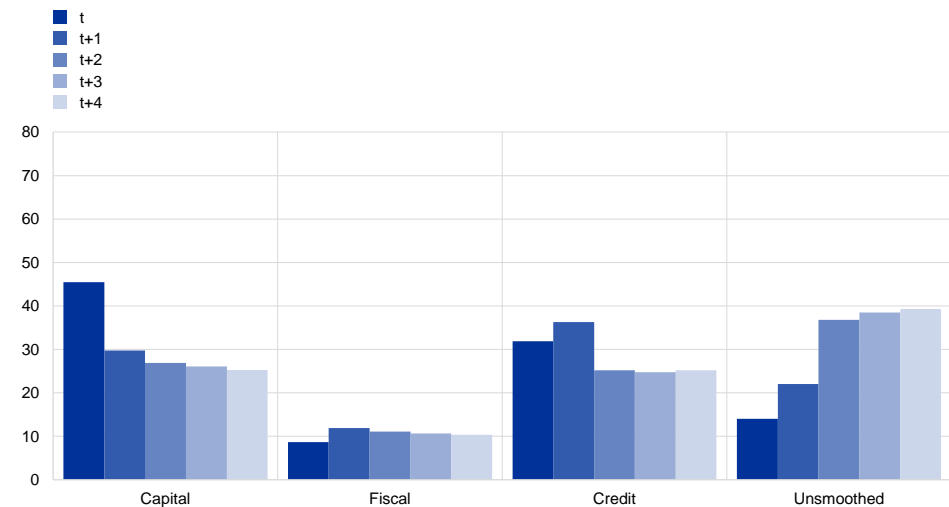
a) Euro area: transmission of output shocks to consumption and smoothing channels

(y-axis: percentages)



b) United States: transmission of output shocks to consumption and smoothing channels

(y-axis: percentages)



Source: ECB calculations.

Notes: The charts depict the effect of a GDP shock on consumption growth at various horizons, based on impulse responses generated by the panel VAR model referred to in Section 3. The first bar represents the contemporaneous response of each channel, i.e. in the same year in which the output shock occurred. The cumulative responses after one, two, three and four years are then given. The sum of all channels and the unsmoothed part is normalised at 100 at every horizon. Panel a: the sample is for the period 1997-2022. Panel b: the sample is for the period 1997-2020.

The charts show that, for both the euro area and the United States, risk sharing operated more effectively in the short to medium term, i.e. within one year after the shock occurs (in t and $t+1$), while the effectiveness of risk-sharing mechanisms weakens over time, as reflected in the “unsmoothed” bars which increased over the four-year horizon. In the euro area, the largest contribution was from the credit channel, which dampened about 30% of the output shock within the first two years. In the United States, the contribution of the capital channel was high in the first year, before turning negative (the bars show the cumulated effect), while the contribution

from the credit channel declined more slowly over the horizon. This is probably due to the fact that income from the equity and capital market is more volatile, while loans from financial intermediaries or governments have a longer duration and thus contribute to more steady stabilisation over time. The contribution of the fiscal channel was in the order of 10% for all horizons in the United States, while close to zero in the euro area. The share of unsmoothed shocks increased over time for both the euro area (from around 55% to 70% four years after the shock) and the United States (from around 15% to 40%).

To evaluate how risk sharing has evolved over the last two decades, we estimated the effects of a GDP shock on consumption on the basis of twelve-year rolling windows. The results are reported in Chart 4 (panel a: euro area; panel b: United States). In these charts, each bar represents the contribution of the capital channel, fiscal channel and credit channel respectively – together with the share of unsmoothed shocks – over the individual twelve-year windows, each of which end in the year reported on the x-axis. For example, the 2022 bar shows estimates for the sample 2010-22.¹² Year-on-year variation in the shares shown reflects changes in the re-estimated model parameters for each window. The remaining portion represents the share of the shock to country-specific real GDP growth that remains unsmoothed and is therefore fully reflected in country-specific consumption growth. The individual bars may fall below 0% and rise above 100% if one or more of the channels have a disruptive effect on the smoothing out of country-specific consumption growth. The sum of all channels equals 100%.

Panel a) of Chart 4 shows that the number of unsmoothed shocks increased across the euro area when the global financial crisis of 2008-10 was included in the sample. Indeed, over that period, the role of the capital and credit markets became progressively less important, possibly reflecting financial market investor flight to safety and procyclical cross-border lending. However, the large decline in risk sharing slowed down in the period 2011-2012. This might be in part attributable to the activation of official assistance programmes in the euro area, which are likely to have had a positive effect on risk sharing (see Cimadomo et al., 2020). Moreover, ECB President Mario Draghi's "whatever it takes" speech on 26 July 2012, the Outright Monetary Transactions (OMTs) announcement on 2 August 2012 and the subsequent ECB measures have probably further contributed to prevent financial fragmentation in EMU.

When the sample included the COVID-19 crisis, there was an improvement in risk-sharing, mainly attributable to the savings-credit channel. While an exact identification of the drivers of this channel is not possible in this framework, this evidence suggests that the provision of unprecedented policy support (including the activation of the EU's RRF which channels loans and grants to euro zone countries and the ECB Pandemic Emergency Purchase Programme), probably prevented

¹² The bars represent the cumulative responses two years after the shock has occurred. This is comparable to the bar $t+2$ in Chart 3, although the latter are estimated over the full sample.

private risk-sharing channels from collapsing, reducing the risk of a sudden stop in cross-border financial flows.¹³¹⁴¹⁵

Panel b) in Chart 4 shows that the global financial crisis did not hamper risk sharing as severely in the United States, meaning that the credit and financial infrastructure in the United States operated effectively to dampen shocks and made it possible to ensure a relatively stable level of consumption across states. Interestingly, the contribution of the credit channel became progressively more important after 2010, possibly due to the emergence of new sources of consumer credit, such as non-bank financial institutions.

In general, what emerges clearly from Chart 4 is the relative weakness of both the private risk-sharing channels (capital and credit) and the fiscal channel in the euro area as compared with the United States, which suggests that measures should be taken to help strengthen these channels.

¹³ It is also likely that monetary policy, and in particular the pandemic emergency purchase programme (PEPP), contributed to enhanced risk sharing during the COVID-19 crisis period. However, while the PEPP probably influenced both the capital channel and the credit channel, the methodology used in this paper does not make it possible to isolate clearly the contribution of monetary policy to the effectiveness of these two channels.

¹⁴ See also Bańkowski et al., 2022, for a related analysis of the importance of the confidence effects generated by the launch of the NGEU programme)

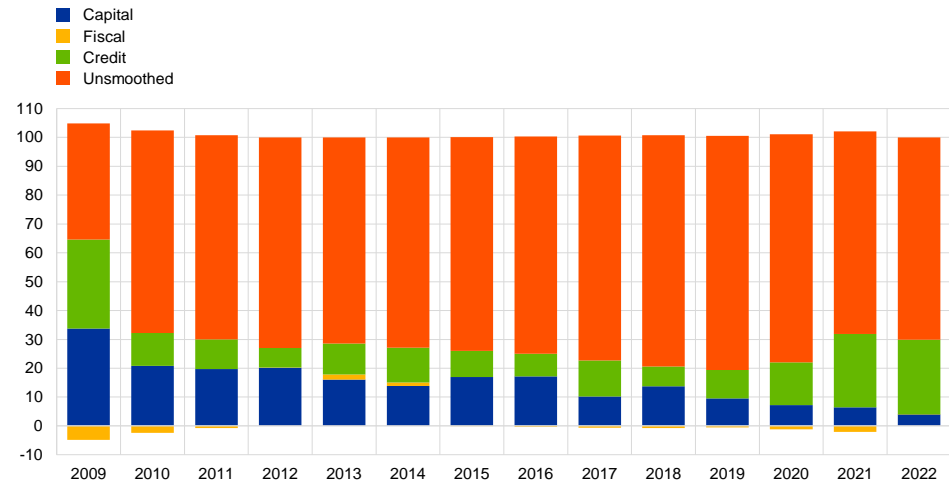
¹⁵ Other studies point to the fact that risk sharing was relatively resilient during the COVID-19 crisis. For example, Giovannini et al. (2021) and Giovannini et al. (2022) suggest that lockdown measures taken to reduce the spread of COVID-19 prevented households from consuming a large share of their normal consumption basket. Consequently, for this period, it was recommended that analysis focus on income risk sharing, i.e. the ability to separate a country's change in GDP from changes in its output, rather than on consumption risk sharing. The findings of these authors suggest that income risk sharing was relatively stable during the crisis. Analysis of private intra-euro area cross-border flows confirms this, given that these flows exhibited a high degree of resilience during the COVID-19 crisis, in sharp contrast to the situation during the global financial crisis (Gros and Alcidi, 2013).

Chart 4

Changes in consumption risk sharing and the smoothing channels

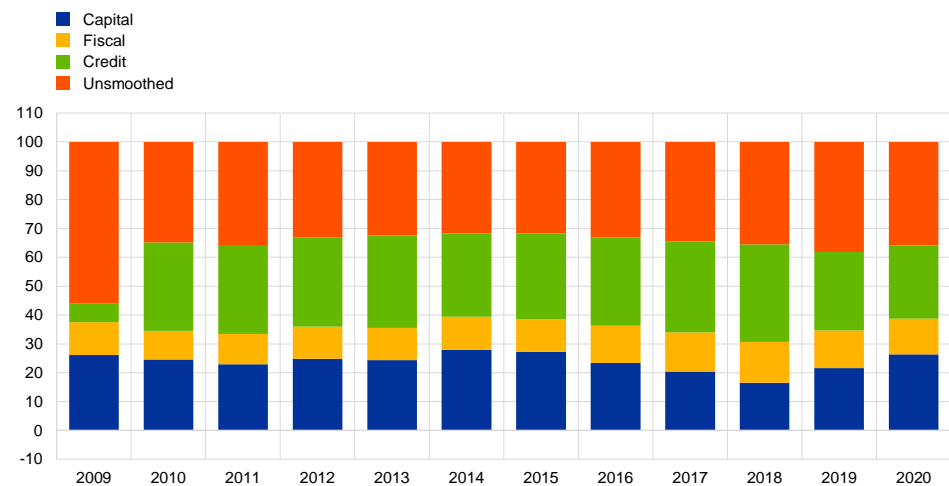
a) Euro area: changes in consumption risk sharing over time

(x-axis: end-year of the 12-year window; y-axis: percentages)



b) United States: changes in consumption risk sharing over time

(x-axis: end-year of the 12-year window; y-axis: percentages)



Source: Authors' calculations.

Notes: The charts show the percentage of consumption growth that is smoothed out through the capital, fiscal and credit channels, as well as the unsmoothed component, following a shock to domestic GDP. These contributions are computed on the basis of the cumulative impact of the shock at the two-year horizon. The contributions of the channels are calculated using a panel VAR model based on parameters estimated over a 12-year rolling window of annual data. The x-axis reports the end-year for the 12-year window. Panel a: the sample is for the period 1997-2022. Panel b: the sample covers the period 1997-2020.

6 Reform proposals

6.1 Proposals to enhance private risk-sharing mechanisms

Past findings have highlighted the need for institutions that could contribute to insuring against country-specific shocks in the euro area. In particular, the finding that risk sharing through the credit channel is relatively effective in the euro area makes the process of banking integration of prime importance. Moreover, the observation that risk sharing through this channel falls significantly in the euro area in times of financial crisis or severe downturns points to the need for measures to avoid “home bias” in credit flows in times of financial stress.

Substantial progress has been made to increase the soundness of the banking sector, which is a necessary prerequisite for increasing cross-border financial integration and enhancing risk sharing. The main catalyst for reform was the establishment of the Single Supervisory Mechanism (SSM). Currently, the ECB directly supervises all significant European credit institutions, which represent almost 82% of total banking assets in the euro area.

Progress has also been made through the creation of the Single Resolution Mechanism that establishes homogeneous resolution criteria based on the principle of minimising taxpayer cost. The agreement achieved at the euro summit in December 2018 to operationalise a common backstop for the Single Resolution Fund (SRF) will increase its capacity to deal with severe banking crises without destabilising the public finances of countries affected.

There are still important challenges to achieving a truly integrated banking system. For example, while the integration of (wholesale) interbank lending across the euro area countries has been relatively successful over the past few years, progress with retail banking integration and cross-border consolidation has been somewhat limited. Despite the absence of formal restrictions, few banks have entered retail markets in other member countries and cross-border lending to the real sector has been less than adequate. As a result, the majority of firms and households in the euro area continue to be largely dependent on funding provided by their own domestic banking system, despite the clear benefits of having foreign banks operating in the domestic economy, as confirmed in the literature examined (see, for example, Albertazzi et al., 2021).¹⁶

Interbank flows have proved to be highly procyclical in the euro area, contributing to the deterioration in risk sharing after 2008. Among other factors, several authors have suggested that this might reflect significant differences in banking regulation across countries and the existence of national regulations that protect existing banks or regional banks, thereby reducing the incentive to expand their activities across borders (Restoy, 2015; Angeloni, 2020). Indeed, as shown in Hoffmann and

¹⁶ Hoffmann et al. (2018) also suggest that what when banks direct cross border lending direct to the real sector (i.e. through foreign intermediaries) this is associated with more risk sharing, while indirect integration through interbank flows is not.

Shcherbakova-Stewen (2011), state-level banking deregulation in the United States during the 1980s improved small firms' access to credit in recessions. These types of firm typically rely primarily on banking credit and, consequently, on the robustness of inter-state risk sharing in economic downturns. In the light of this, the euro area also needs to be equipped with a genuine banking union that would foster an increase in cross-border lending to the real economy.

In this regard, the creation of a fully-fledged European Deposit Insurance System (EDIS) might also facilitate cross-border banking operations and increase risk sharing. There have been some proposals along these lines. For instance, Gros (2015) suggests the introduction of an EDIS under which national existing deposit insurance schemes would retain their autonomous role based on a reinsurance system, at least in the initial stages (European Commission, 2017a). Other proposals include an EDIS funded by the countries concerned on the basis of their country-specific risks (Schnabel and Véron, 2018; Schoenmaker, 2018).

With regard to the capital market channel, a recent study by Goncalves-Raposo and Lehmann (2019) that was based on firm-level data showed that the use of equity financing is still rare in the euro area and has a strong home bias. This, combined with evidence that the more integrated financial markets in the United States contribute decisively to enhanced risk sharing, points clearly to the need for full completion of the CMU within the euro area. Unlike the banking union, the integration of capital markets in the euro area has received less institutional impetus recently. The European Commission launched the CMU project in 2015 to remove cross-border barriers and diversify the financing sources available to European firms and households. Greater diversification through capital markets can enhance cross-border risk sharing and alleviate the risks of financial fragmentation. Single or unified European supervision of capital markets and regulatory harmonisation in areas such as insolvency law could contribute to achieving this goal. Full CMU could play a key role in funding recovery from crises such as that caused by COVID-19 and mitigate asymmetries across euro area countries (Sapir et al., 2018; Friedrich and Thiemann, 2017).

6.2 Proposals to enhance public risk-sharing mechanisms

As mentioned above, market-based risk-sharing mechanisms alone are not sufficient to withstand severe shocks (Farhi and Werning, 2017). Central fiscal capacity at euro area level might increase the capacity of budgetary policy to absorb common and idiosyncratic shocks, with the dual aim of softening the effects on individual countries and safeguarding stability in the euro area as a whole in the event of extreme shocks, such as those experienced in the past two decades (Juncker et al., 2015). The ESM could play a key role as a shock absorber (Milano, 2017; Cimadomo et al., 2020). However, the initial design of the ESM, which was

conceived as an instrument of last resort, makes it ill-suited to preventing common euro area crises.¹⁷

Several proposals have been discussed for designing cross-country public insurance mechanisms within the euro area, requiring different degree of political ambition. The existing proposals mainly focus on the macroeconomic stabilisation function via direct transfers to countries in need (Beetsma et al., 2021), through a European investment protection scheme that would shield investment in the event of a downturn (Bara et al., 2017) or, alternatively, a European unemployment reinsurance scheme (Balassone et al., 2018; Bénassy-Quéré et al., 2018; Dolls, 2020). Other proposals envisage a rainy-day fund, with countries experiencing a boom being the net payers and countries in downturns being the net receivers (Carnot et al., 2015; Furceri and Zdzienicka, 2015; Beetsma et al., 2022). The most ambitious proposals include the creation of an economic government for the euro area, with its own budget for macroeconomic stabilisation, that would have responsibility for a European debt agency entrusted with issuing joint debt instruments (see European Commission, 2017a).

All these instruments would reallocate resources inter-temporally but also across participants in different positions along the economic cycle, thereby contributing to the synchronisation of business cycles in the euro area. Some papers have simulated what would have happened had such mechanisms been in place since the creation of the euro area (see, for example, Furceri and Zdzienicka, 2015; Banco de España, 2016; Koester and Sondermann, 2018). Their findings suggest that a central fiscal capacity of a relatively moderate size would enable the euro area to achieve a stabilising power close to that of federal budget transfers in the United States. Codogno and van den Noord (2019) applied a model-based framework to analyse how this type of instrument could improve the resilience of the euro area economy against shocks. They concluded that a central fiscal capacity combined with a safe asset would remove the doom loop between banks and sovereign states, reduce the loss in output for economies in the event of shocks and improve the stabilisation properties of fiscal policy for euro area countries; it would therefore be welfare enhancing.

A somewhat different perspective is offered by de Haan and Kosterink (2018). They argue that when governments have fiscal sustainability, they can use national fiscal policy to stabilise idiosyncratic shocks (see also Bayoumi and Masson, 1995; Dolls et al., 2012). Therefore, they make the point that coordination of domestic monetary and fiscal policies with monetary policies adopted by the ECB to stabilise common shocks might make reinforcement of fiscal risk sharing unnecessary.

In general, a strong politico-economic argument against the establishment of central fiscal capacity is the increased risk of moral hazard and hence the need for the introduction of adequate safeguards in the form of strengthened surveillance and coordination mechanisms.

¹⁷ Nevertheless, the recent reform of preventive credit lines strengthens the crisis prevention capacity of the ESM.

The pandemic has further underlined the need for a common public risk-sharing mechanism in the euro area. In 2020 the EU rapidly set up what was called triple safety net, amounting to €540 billion and providing loan-based support to governments through three schemes (of which only the first has been used so far): the SURE programme, the ESM's Pandemic Crisis Support credit line and the European Investment Bank's pan-European guarantee fund to provide support to companies. By far the most sizeable EU public support programme is the NGEU economic recovery package aimed at supporting Member States hit by the COVID-19 pandemic with loans and grants worth up to €724 billion. These measures are an important milestone in public risk-sharing arrangements, for all they are temporary in nature. Codogno and van den Noord (2021), having applied a stylised macroeconomic model, argue that an alternative approach, with ex ante risk sharing through the creation of a Eurobond and permanent central fiscal capacity, would be at least as powerful, but more sustainable, automatic and timely.

In general, while it is not contested that risk sharing increases the capacity to absorb shocks, some authors object to risk-sharing measures owing to the likely impact on the incentive structure in a currency union (e.g. Bargain et al., 2012). From a political-economy perspective, the right balance must be found between additional central euro area stabilisation and risk-sharing instruments on the one hand, and enforcement of fiscal rules on the other.

It should be also noticed that, since the start of the COVID-19 pandemic, the political debate around the introduction of a CFC (and its configuration) has somewhat decelerated. With the introduction of the NGEU, EU countries created the basis for a European social contract for exiting the pandemic. The NGEU's RRF could be also seen as an embryo of a future CFC. Therefore, the debate about the introduction of a new common fiscal instrument will be necessarily influenced by the actual implementation of the RRF.

7 Conclusions

This article has presented a survey of the literature on consumption and income risk sharing, focusing on the euro area and the United States. It has also provided its own estimates of how risk sharing has evolved in both regions since the end of the 1990s. Overall, the literature finds a higher degree of risk-sharing in the United States, rather than in the euro area. This is mainly due to the stronger role of private risk-sharing channels (the capital and credit channels) as compared with the fiscal channel, which has a relatively small part to play in the United States and is negligible in the euro area. Our own analysis confirms these findings and points to an improvement in risk sharing in the euro area during the COVID-19 crisis on the back of a stronger savings-credit channel. The "Next Generation EU" and its Recovery and Resilience Fund are likely to have contributed to consumption smoothing during the pandemic, both "directly" (e.g., via loans and grants disbursed to Member States) "indirectly", through the confidence effects generated by the announcement of these initiatives. This added to the sizeable fiscal stimuli and the monetary policy measures implemented during the pandemic, which contributed to prevent financial market fragmentation. Overall, our findings point to the need to improve private and public risk-sharing mechanisms in the euro area, while at the same time weighing the trade-off between further common stabilisation mechanisms and the risks of moral hazard.

Data appendix

Euro area

Variable	Source
Gross domestic product	AMECO
Gross National Product	
Gross domestic product	AMECO
+ <u>net primary income from the rest of the world</u>	AMECO
= Gross national product	
Gross disposable income	
Gross national product	AMECO
+ <u>net current transfers from the rest of the world</u>	AMECO
= Gross disposable income	
Consumption	
Gross disposable income	AMECO
- <u>capital formation and saving</u>	AMECO
= consumption	

United States

State income:

	State personal income (SPI)	BEA
+	Federal nonpersonal taxes and contributions	(see below)
+	State and local nonpersonal taxes	BEA
-	Direct transfers to individuals (federal and state)	BEA
=	State income	

Federal nonpersonal taxes and contributions:

	Federal corporate income taxes (CIT)	BEA
+	Tobacco taxes	BEA
+	Miscellaneous taxes and other excise taxes	BEA
+	Social security contributions	BEA
+	Unemployment insurance taxes	BEA
=	Federal non-personal taxes and contributions	

State and local nonpersonal taxes:

	State and local tax revenue	BEA
-	State and local personal taxes	BEA
=	State and local nonpersonal taxes	

Disposable state income:

	State income	
+	Federal grants to state governments	<i>Census</i>
+	Federal transfers to individuals (federal direct transfers)	
-	Federal nonpersonal taxes and contributions	
-	Federal personal taxes	<i>BEA</i>
=	Disposable state income	

Federal transfers to individuals:*BEA*

	Retirement and disability insurance benefits	
	(Social Security benefits)	
	(Railroad retirement and disability benefits)	
	(Workers' compensation)	
	(Other gov. retirement and disability insurance benefits)	
+	Medical benefits	
-	Medicaid	
+	Income maintenance benefits	
	(Supplemental Security Income (SSI) benefits)	
	(Earned Income Tax Credit (EITC))	
	(Supplemental Nutrition Assistance Program (SNAP))	
	(Other income maintenance benefits)	
+	Excluding state unemployment insurance compensation	
	(Unempl. Comp. for Fed. civilian employees (UI))	
	(Unempl. Comp. for railroad employees)	
	(Unemployment compensation for veterans (UI))	
	(Other unemployment compensation)	
+	Veterans' benefits	
	(Veterans' pension and disability benefits)	
	(Veterans' readjustment benefits)	
	(Veterans' life insurance benefits)	
	(Other assistance to veterans)	
+	Education and training assistance	
+	Receipts from the Federal government (non profit)	
=	Federal transfers to individuals	

State consumption:

	Retail sales (rescaled with old ratio)/ PCE	<i>BEA & ASY</i>
+	State and local government consumption	
=	State consumption	

State and local government consumption:

	State and local government expenditure	<i>Government finances</i>
-	State and local transfers	
=	State and local government consumption	

State and local transfers: *BEA*

	Direct transfers	
-	Federal transfers to individuals (federal direct transfers)	
=	State and local transfers	

References

- Afonso, A. and Furceri, D. (2008), “[EMU enlargement, stabilization costs and insurance mechanisms](#)”, *Journal of International Money and Finance*, Vol. 27, Issue 2, pp. 169-187.
- Alberola, E. and Asdrubali, P. (1997), “[How Do Countries Smooth Regional Disturbances? Risksharing in Spain: 1973-1993](#)”, *Documento de Trabajo*, No 9724, Servicio de Estudios, Banco de España, Madrid, January.
- Albertazzi, U., Cimadomo, J. and Maffei-Faccioli, N. (2021), “[Foreign banks and the doom loop](#)”, *Working Paper Series*, No 2540, European Central Bank, April.
- Albrizio, S., Berganza, J.C. and Kataryniuk, I. (2017), “[Federal unemployment insurance in the United States](#)”, *Economic Bulletin*, No 2, Banco de España, Madrid, 25 May, pp. 1-10.
- Alcidi, C. and G. Thirion (2016). “[Assessing the Euro Area's Shock-Absorption Capacity Risk sharing, consumption smoothing and fiscal policy](#)”, CEPS Special Report 146.
- Alcidi, C., D'Imperio, P., & Thirion, G. (2017). “[Risk-sharing and Consumption-smoothing Patterns in the US and the Euro Area: A comprehensive comparison](#)”, CEPS Working Document No 2017/04, May 2017.
- Andor, L. (2016), “[Towards shared unemployment insurance in the euro area](#)”, *IZA Journal of Labor Studies*, Vol. 5, pp. 1-15.
- Angeloni, I. (2020), “[Time to address the shortcomings of the banking union](#)”, *SAFE Policy Letter No 77*, Leibniz Institute for Financial Research SAFE, Frankfurt am Main.
- Asdrubali, P. and Kim, S. (2004), “[Dynamic risk-sharing in the United States and Europe](#)”, *Journal of Monetary Economics*, Vol. 51, Issue 4, May, pp. 809-836.
- Asdrubali, P., Sørensen, B.E. and Yosha, O. (1996), “[Channels of Interstate Risk Sharing: United States 1963-1990](#)”, *The Quarterly Journal of Economics*, Vol. 111, Issue 4, November, pp. 1081-1110.
- Athanasoulis, S.G. and van Wincoop, E. (2001), “[Risk-sharing Within The United States: What Do Financial Markets And Fiscal Federalism Accomplish?](#)”, *The Review of Economics and Statistics*, Vol. 83, Issue 4, 1 November, pp. 688-698.
- Atkeson, A. and Bayoumi, T. (1993), “[Do private capital markets insure regional risk? Evidence from the United States and Europe](#)”, *Open Economies Review*, Vol. 4(3), pp. 303-324.

- Balassone, F., Momigliano, S., Romanelli, M. and Tommasino, P. (2018), “[Just round the corner? Pros, cons, and implementation issues of a fiscal union for the euro area](#)”, *Economia Pubblica*, Franco Angeli, Milan, pp. 5-34.
- Balli, F., Kalemli-Ozcan, S. and Sørensen, B.E. (2012), “[Risk-sharing through capital gains](#)”, *Canadian Journal of Economics/Revue canadienne d'économique*, Vol. 45, Issue 2, May, pp. 472-492.
- Banco de España (2016), “Fiscal policy in EMU”, *Annual Report*, Madrid.
- Bańkowski, K., Bouabdallah, O., Domingues Semeano, J., Dorrucci, E., Freier, M., Jacquinot, P., Modery, W., Rodríguez Vives, M., Valenta, V. and Zorell, N. (2022), “[The economic impact of Next Generation EU: A euro area perspective](#)”, *Occasional Paper Series 291*, European Central Bank.
- Bara, Y-E., Castets, L., Ernoult, T. and Zakhatchouk, A. (2017), “[A contribution to the work on the strengthening of the euro area](#)”, *Trésor-Economics*, No 9, Ministère de l'Economie et des Finances et de la Relance, February.
- Bargain, O., Dolls, M., Fuest, C., Neumann, D., Peichl, A., Pestel, N. and Siegloch, S. (2012), “[Fiscal Union in Europe? Redistributive and Stabilising Effects of an EU Tax-Benefit System](#)”, *Discussion Paper Series*, No 6585, Institute of Labor Economics (IZA), May.
- Barkbu, B., Wang, H., Ture, E., Yao, J. and Arnold, N. (2018), “[A Central Fiscal Stabilization Capacity for the Euro Area](#)”, *IMF Staff Discussion Note*, No 2018/003, International Monetary Fund, Washington, March.
- Battistini, N. and Stoevsky, G. (2021), “[The impact of containment measures across sectors and countries during the COVID-19 pandemic](#)”, *Economic Bulletin*, Issue 2, European Central Bank.
- Bayoumi, T. and Masson, P.R. (1995), “[Fiscal flows in the United States and Canada: Lessons for monetary union in Europe](#)”, *European Economic Review*, Vol. 39, Issue 2, February, pp. 253-274.
- Beetsma, R., Cima, S. and Cimadomo, J. (2021a), “[Fiscal Transfers without Moral Hazard?](#)”, *International Journal of Central Banking*, Vol. 17, September, pp. 95-153.
- Beetsma, R., van Spronsen, J. and Cimadomo, J. (2021b), “[One Scheme Fits All: A Central Fiscal Capacity for the EMU Targeting euro area, National and Regional Shocks](#)”, *CEPR Discussion Papers*, No 16826, Centre for Economic Policy Research, December.
- Belke, A. and Gros, D. (2015), “[Banking Union as a Shock Absorber](#)”, *Discussion paper series*, No 15-02, Research On Money in the Economy research network, Rome network.
- Bénassy-Quéré, A., Brunnermeier, M., Enderlein, H., Farhi, E., Fuest, C., Gourinchas, P-O., Martin, P., Pisani-Ferry, J., Rey, H., Schnabel, I. et al. (2018), “[Reconciling risk-sharing with market discipline: a constructive approach to euro area](#)”

reform”, *CEPR Policy Insight*, No 91, Centre for Economic Policy Research, London, January.

Burriel, P., Chronis, P., Freier, M., Hauptmeier, S., Reiss, L., Stegarescu, D. and Van Parys, S. (2020), “[A fiscal capacity for the euro area: lessons from existing fiscal-federal systems](#)”, *Occasional Paper Series*, No 239, European Central Bank, April.

Carnot, N., M. Kizior, and G. Mourre (2017), “Fiscal Stabilization in the Euro Area: A Simulation Exercise,” Centre Emile Bernheim Working Paper 17/025.

Cimadomo, J., Ciminelli, G., Furtuna, O. and Giuliadori, M. (2020), “[Private and public risk-sharing in the euro area](#)”, *European Economic Review*, Vol. 121, January.

Cimadomo, J., Hauptmeier, S., Palazzo, A.A. and Popov, A. (2018), “[Risk-sharing in the euro area](#)”, *Economic Bulletin*, Issue 3, European Central Bank.

Codogno, L. and van den Noord, P. (2019), “[The rationale for a safe asset and fiscal capacity for the euro area](#)”, *LSE ‘Europe in Question’ Discussion Paper Series*, LEQS Paper No 144, London School of Economics and Political Science, May.

Codogno, L. and van den Noord, P. (2021), “[Assessing Next Generation EU](#)”, *LSE ‘Europe in Question’ Discussion Paper Series*, LEQS Paper No 144, London School of Economics and Political Science, February.

Committee for the Study of Economic and Monetary Union (1989), “[Report on Economic and Monetary Union in the European Community](#)”, *Technical report*, European Council, Brussels.

Crucini, M.J. (1999), “[On International and National Dimensions of Risk Sharing](#)”, *The Review of Economics and Statistics*, Vol. 81, February, pp. 73-84.

de Haan, J. and Kosterink, P. (2018), “[The case for more fiscal risk-sharing and coordination of fiscal and monetary policy](#)”, in Campos, N. and Sturm, J-E. (eds.), *Bretton Woods, Brussels and Beyond: Redesigning the Institutions of Europe*, Centre for Economic Policy Research, London, pp. 107-116.

Dedola, L., Usai, S. and Vannini, M. (1999), “[An assessment of regional risk-sharing in Italy and the United Kingdom](#)”, in Adams, J. and Pigliaru, F. (eds.), *Economic Growth and Change*, Chapter 15, Edward Elgar Publishing.

Del Negro, M. (2002), “[Asymmetric shocks among U.S. states](#)”, *Journal of International Economics*, Vol. 56, Issue 2, pp. 273-297, March.

Demyanyk, Y., Ostergaard, C. and Sørensen, B.E. (2007), “[U.S. Banking Deregulation, Small Businesses, and Interstate Insurance of Personal Income](#)”, *Journal of Finance*, Vol. 62, November, pp. 2763-2801.

Demyanyk, Y., Ostergaard, C. and Sørensen, B.E. (2008), “[Risk-sharing and portfolio allocation in EMU](#)”, *European Economy – Economic Papers 2008-2015*, Vol. 334, Directorate General Economic and Financial Affairs (DG ECFIN), European Commission, Brussels.

Dolls, M. (2020), “[An Unemployment Re-Insurance Scheme for the euro area? Stabilizing and Redistributive Effects](#)”, *CESifo Working Paper Series*, No 8219, CESifo, Munich.

Dolls, M., Fuest, C. and Peichl, A. (2012), “[Automatic stabilizers and economic crisis: US vs. Europe](#)”, *Journal of Public Economics*, Vol. 96, Issues 3-4, pp. 279-294.

European Central Bank (2016), “[Financial Integration in Europe](#)”, *Technical Report*, April.

European Commission (2017a), “[Communication to the European Parliament, the Council, the European Central Bank, the European Economic and Social Committee and the Committee of the Regions on completing the Banking Union](#)”, COM/2017/0592 final, 11 October.

European Commission (2017b), “Roadmap for deepening Europe’s Economic and Monetary Union”, *Technical report*.

Farhi, E. and Werning, I. (2017), “[Fiscal Unions](#)”, *American Economic Review*, Vol. 107, No 12, December, pp. 3788-3834.

Ferrari, A. and Rogantini-Picco, A. (2016), “[International Risk-sharing in the EMU](#)”, *Working Paper Series*, No 17, European Stability Mechanism, Luxembourg, May.

Fiorelli, C., Giannini, M. and Martini, B. (2020), “Channels of interregional risk sharing in Italy”, mimeo, University of Rome Tor Vergata.

Friedrich, J. and Thiemann, M. (2017), “[Capital Markets Union: the need for Common Laws and common supervision](#)”, *Vierteljahrshefte zur Wirtschaftsforschung*, Vol. 86, Issue 2, June, pp. 61-75.

Furceri, D. and Zdzienicka, A. (2015), “[The Euro Area Crisis: Need for a Supranational Fiscal Risk-sharing Mechanism?](#)”, *Open Economies Review*, Vol. 26, pp. 683-710.

Giovannini, A., Horn, C-W. and Mongelli, F.P. (2021), “[An early view on euro area risk-sharing during the COVID-19 crisis](#)”, Centre for Economic Policy Research, January.

Giovannini, A., Ioannou, D. and Stracca, S. (2022), “[Public and private risk-sharing: friends or foes? The interplay between different forms of risk sharing](#)”, Occasional Paper No 295, European Central Bank.

Goncalves-Raposo, I. and Lehmann, A. (2019), “[Equity finance and capital market integration in Europe](#)”, *Policy Contribution*, Issue No 3, 29149, Bruegel, 17 January.

Gros, D. (2015), “[Completing the Banking Union: Deposit Insurance](#)”, *CEPS Policy Brief*, No 335, Centre for European Policy Studies, December.

Gros, D. and Alcidi, C. (2013), “[European Economy – Country adjustment to a ‘sudden stop’: Does the euro make a difference?](#)”, *Economic Paper 492*, Directorate

General for Economic and Financial Affairs (DG ECFIN), European Commission, April.

Hauptmeier, S. F. Holm-Hadulla and T. Renault (forthcoming), “Risk-sharing and monetary policy transmission”, ECB Working Paper Series.

Hepp, R. and von Hagen, J. (2013), “[Interstate risk-sharing in Germany: 1970–2006](#)”, *Oxford Economic Papers*, Vol. 65, January, pp. 1-24.

Hoffmann, M., Maslov, E., Sørensen, B.E. and Stewen, I. (2018), “[Are Banking and Capital Markets Union Complements? Evidence from Channels of Risk-sharing in the euro area](#)”, *CEPR Discussion Papers*, No 13254, Centre for European Policy Research.

Hoffmann, M. and Shcherbakova-Stewen, I. (2011), “[Consumption Risk-sharing over the Business Cycle: The Role of Small Firms' Access to Credit Markets](#)”, *The Review of Economics and Statistics*, Vol. 93, Issue 4, November, pp. 1403-1416.

International Monetary Fund (2017), “Tackling Measurement Challenges of Irish Economic Activity”, *World Economic Outlook*, April, pp. 43-45.

Jappelli, T. and Pagano, M. (2008), “[Financial Market Integration Under EMU](#)”, *CEPR Discussion Papers*, No 7091, Centre for European Policy Research, December.

Juncker, J-C., Tusk, D., Dijsselbloem, J., Draghi, M. and Schulz, M. (2015), “[Completing Europe's Economic and Monetary Union](#)”, mimeo, European Commission.

Kalemli-Ozcan, S., Luttini, E. and Sørensen, B. (2014), “[Debt Crises and Risk-Sharing: The Role of Markets versus Sovereigns](#)”, *Scandinavian Journal of Economics*, Vol. 116, Issue 1, pp. 253-276.

Kalemli-Ozcan, S., Manganelli, S., Papaioannou, E. and Peydró, J.L. (2008), “[Financial integration, macroeconomic volatility and risk-sharing – The role of monetary union](#)”, *Proceedings of the Fifth ECB Central Banking Conference. The euro at ten – lessons and challenges*, European Central Bank, November.

Koester, G. and Sondermann, D. (2018), “[A euro area macroeconomic stabilisation function: assessing options in view of their redistribution and stabilisation properties](#)”, *Occasional Paper Series*, No 216, European Central Bank, October.

Melitz, J. and Zumer, F. (1999), “[Interregional and international risk-sharing and lessons for EMU](#)”, *Carnegie-Rochester Conference Series on Public Policy*, Vol. 51, Issue 1, December, pp. 149-188.

Milano, V. (2017), “[Risk-sharing in the Euro Zone: The Role of European Institutions](#)”, *CELEG Working Paper Series*, No 01/17, Center for Labor and Economic Growth, Department of Economics and Finance, LUISS Guido Carli, March.

Milano, V. and Reichlin, P. (2017), "[Risk-sharing across the US and EMU: The role of public institutions](#)", *Policy Brief*, No 9, LUISS School of European Political Economy, January.

Obstfeld, M. (1994), "[Risk-Taking, Global Diversification, and Growth](#)", *American Economic Review*, Vol. 84, December, pp. 1310-1329.

Persson, T. and Tabellini, G. (1996), "[Federal Fiscal Constitutions: Risk-sharing and Moral Hazard](#)", *The Journal of Political Economy*, Vol. 104, No 5, The University of Chicago Press, October, pp. 979-1009.

Restoy, F. (2015), "[The Banking Union: achievements and challenges](#)", speech by Mr Fernando Restoy, Deputy Governor of the Bank of Spain, at the closure of the presentation of the third report on the Banking Union "La Unión Bancaria: suma y sigue", organised by Centro de Sector Financiero PwC and IE Business School, Madrid, Bank for International Settlements, Basel, 2 December.

Sala-i-Martin, X. and Sachs, J. (1991), "[Fiscal Federalism and Optimum Currency Areas: Evidence for Europe From the United States](#)", NBER Working Paper No 3855.

Sapir, A., Véron, N. and Wolff, G.B. (2018), "[Making a reality of Europe's Capital Markets Union](#)", *Policy Contribution*, Issue No 7, Bruegel, April.

Schelkle, W. (2017), "[Hamilton's Paradox Revisited – Alternative lessons from US history](#)", *CEPS Working Document*, No 2017/10, Centre for European Policy Studies, September.

Schnabel, I. and Véron, N. (2018), "Breaking the Stalemate on European Deposit Insurance", *Bruegel, blog post*, March.

Schoenmaker, D. (2018), "[Building a Stable European Deposit Insurance Scheme](#)", *Journal of Financial Regulation*, Vol. 4, Issue 2, September, pp. 314-320.

Véron, N. and Wolff, G.B. (2016), "[Capital Markets Union: A Vision for the Long Term](#)", *Journal of Financial Regulation*, Vol. 2, Issue 1, March, pp. 130-153.

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