Financial Integration and Risk Sharing: The Role of the Monetary Union*

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Abstract

This paper first reviews the literature on financial integration with a specific focus on the euro area. We discuss how to measure financial integration and describe the main legislative and regulatory harmonization policies that the EU member states have implemented in financial markets. Second, we present empirical results showing a positive impact of these policies and of the single currency on cross-border banking integration. We also find that banking integration increases consumption risk sharing. Our results, therefore, suggest that the increased cross-banking integration triggered by the euro has fostered ex-post the optimality of the currency union by improving cross-country risk sharing.

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Introduction

Financial systems play a key role in the functioning of modern economies. The capital markets, by efficiently allocating resources across space and time, are instrumental to ensure long-term non-inflationary growth. From a central banking perspective, financial systems represent the primary channel through which monetary policy is conducted. A stable and efficient financial system enhances the smooth and effective transmission of monetary policy throughout the economy. Furthermore, the capital markets affect consumption, savings and investment decisions, which have to be taken into account in the conduct of monetary policy.

Barriers and obstacles to financial integration prevent the allocation of the available resources to the most valuable projects at the lowest possible cost. Before 1999, European capital markets had been shaped by decades of actions of market participants and the national public authorities. Various conventions and infrastructures have survived the introduction of the single currency, because strong network externalities make it costly for market participants to abandon them. This, in turn, implies an important loss of efficiency. As a consequence, promoting integration of European financial markets has been one of the priorities of European policy makers.

This paper is composed of two parts. First, we review the current state of financial integration in the euro area. Second, we present empirical evidence regarding the impact of financial integration on consumption risk sharing, focusing on the role of the single currency. We show how the euro has significantly enhanced the degree of financial integration, which in turn has increased the amount of consumption risk sharing.

There is a vast and growing literature on measuring financial integration. Financial markets are considered integrated if all agents face the same set of rules, are treated equally and have equal access to financial products. If these conditions are satisfied, any price difference between two identical assets will be immediately arbitraged away by rational agents. Given the variety of asset classes traded, the measurement of financial integration is not straightforward. Most of the contributions to the literature on financial integration aim at overcoming this difficulty, either exploiting the implications of asset pricing models or looking directly at cross-border asset allocations within similar asset classes.

Although the introduction of the euro has arguably been the single most important force behind the evolution of European financial markets over the past two decades, it has been preceded and followed by a series of key policy initiatives aimed at creating a level playing field across the euro

area. The importance of these initiatives in the process of financial integration should not be understated: they are continuously shaping the legislative architecture and technical infrastructure on which financial markets operate. We, therefore, discuss the main legislative actions taken at the European level, as well as the ongoing efforts aimed at integrating the infrastructure of the different market segments.

We next turn our attention to the determinants of banking integration. We analyze banking integration since the banking system, especially in the euro area, is the main financial channel for both the corporate sector and households. We first examine the impact of monetary union and legislative harmonization policies on cross-border banking integration. As the introduction of the euro has coincided with the period of global financial integration, it is not easy to disentangle its effects from the worldwide trends. Using a panel of twenty developed countries covering the last thirty years, we provide new empirical evidence of the effects of the euro and some key policy initiatives on the degree of banking integration. Specifically, we show that the introduction of the euro has spurred cross-border banking activities across euro area member states by as much as 30%. Furthermore, using cross-country time-varying information about the implementation of the twenty directives of the Financial Services Action Plan (FSAP), we find that the higher the number of directives implemented the stronger the degree of banking integration. These results, therefore, suggest that both monetary and regulatory integration have contributed to fostering cross-border banking activities.

We then examine the effects of banking integration on consumption patterns. Financial integration can be welfare enhancing since individuals can smooth consumption and diversify idiosyncratic country-specific risk away. We find that the average consumption risk sharing among the twenty developed countries included in the analysis is 38% over 1978–2007. This means that 38% of the idiosyncratic country-specific output risk is diversified away. In addition, we find that a country that increases the holdings of external assets (relative to population) by 100% achieves 17% of additional consumption smoothing, i.e. an additional 17% of the idiosyncratic shocks to GDP will be smoothed out. The liabilities seem to have a dis-smoothing effect but the coefficient is not significant at the standard levels. Our results are the first that show an economically significant positive effect of cross-border banking integration on risk sharing. The only other study that we are aware of is Demyank et al (2007), who also investigated the effect of bank integration on risk sharing. They find, however, no effect of foreign bank integration on consumption risk sharing.[1]

[1]The difference in results could be due to the use of different datasets and time period covered. We use a more complete dataset than Demyank et al (2007) on cross-border banking holdings in terms of countries and years.

Our findings have important policy implications for the euro. Asymmetric shocks in a currency union generate output and inflation differentials. The impact of such shocks is considerably reduced if cross-country risk sharing is significant. To the extent that risk-sharing allows for the hedging of consumption, it represents a key counteracting mechanism against output asymmetric shocks among members of a currency union. This mechanism reduces the need for policy intervention in dealing with such asymmetries. Our results, therefore, suggest that the increased cross-border banking integration due to the euro has improved ex-post the optimality of the currency union by improving consumption risk sharing.

The paper is composed of two parts, each of which is split into two sections. In the first part, we review the vast and growing literature on financial integration with a specific focus on the euro area. We discuss ways of measuring financial integration and describe the main regulatory and legislative policies that the EU member states have (are) implemented (implementing). In the second part we turn our focus to the determinants of banking integration and present new empirical evidence regarding the impact of these policies and the single currency on banking integration. We then evaluate the effect of banking integration on consumption risk sharing. Section 3 concludes.

1 PART I

1.1 The Evolution of the Euro Area Financial System

The market for a given set of financial instruments and/or services can be considered fully integrated if all potential market participants with the same relevant characteristics (Baele *et al.* (2004)):

1. face a single set of rules when they decide to deal with those financial instruments and/or services,
2. have equal access to the above-mentioned set of financial instruments and/or services,
3. are treated equally when they are active in the market.

This definition encompasses the law of one price, which is typically taken as the benchmark for measuring financial integration. The law of one price states that assets with identical risk and return characteristics should be priced identically regardless of where they are traded (see for instance Adam *et al.* (2002)). The law of one price is in fact an implication of the above definition

of financial integration: if all agents face the same rules, have equal access and are treated equally, any price difference between two identical assets will be immediately arbitraged away.

Financial integration may be seen as a necessary but not sufficient condition for the efficiency of a financial system. A financial system that is not integrated is surely not the most efficient. On the other hand, full integration is not a synonym of full efficiency, as, for example, the introduction of new financial instruments or a better regulatory framework can contribute to improve the functioning of an integrated but not developed financial system.[2] By opening access to foreign markets, financial integration will give agents a wider range of financing sources and investment opportunities, and permits the creation of deeper and more liquid markets. This allows more information to be pooled and processed more effectively, and economies of scale to be exploited. Financial integration also increases competition, thereby putting pressure on the cost of production for financial services. Finally, financial integration may promote financial development (Kose et al. (2006)).[3]

Although increased financial integration and development are usually associated with better economic performance, the implications for financial stability are more ambiguous. Greater financial integration and development can have a positive impact on financial stability, to the extent that they allow better sharing of risks among agents. On the other hand, as the recent turmoil clearly demonstrates, some new (ill-designed or badly implemented) financial instruments may increase asymmetric information, distort incentives and offer opportunities for extreme risk taking. As pointed out among others by Rajan (2006) and Ferguson et al. (2007), financial development will improve stability most of the times but may make rare and extreme events more severe.

A key summary statistic to gauge the development of a financial system is the capital market size.[4] Figure 1 reports the total size of capital markets, which aggregates the size of stock, bond and loan markets as a share of GDP. We see that it has been growing steadily over the past fifteen years

[2]Levine (2005) and Papaioannou (2007) review the literature on finance and growth, which provides evidence that financial development spurs investment and productivity growth. See also Hartmann *et al.* (2007) and ECB (2008a) for an overview of selected indicators of financial development that can be used to monitor the functioning of the euro area financial system.

[3]According to Hartmann *et al.* (2007), financial development can be understood as a process of financial innovations, institutional and organizational improvements in the financial system that reduces asymmetric information, increases the completeness of markets and contracting possibilities, reduces transaction costs and increases competition.

[4]One important caveat is in order in the current juncture. The data behind the indicators discussed in this survey stop in mid 2008. Therefore, they do not cover the very recent financial market developments. A proper evaluation of the impact of the financial crisis on the indicators of financial integration is subject of ongoing research and will discussed in ECB (2009). Preliminary evidence shows signs of divergence on price-based indicators (for instance in the cross-country dispersion of money market lending rates). From a financial integration perspective, it is important to understand how much of this divergence reflects differences in credit risk among banks, or alternatively higher market segmentation and therefore less integration.

for all developed economies. Although we take five year averages to smooth short run fluctuations, part of the recent increase may reflect a credit bubble related to the recent turmoil.

INSERT FIGURE 1

The growing size of the euro area financial system, however, hides uneven developments of its individual segments. In the rest of this section we will review the most interesting aspects of euro area money, bond, equity and banking markets. Following the literature on financial integration, we will distinguish between price-based measures (based on asset pricing models) and quantity-based measures (based on cross-border asset allocations) (Obstfeld and Taylor (2004)). Early surveys include Adam *et al.* (2002), Hartmann *et al.* (2003) and Baele *et al.* (2004). Recently, both the European Commission and the ECB have been publishing comprehensive reports on financial integration (see EC 2008 and ECB 2008). Most of the following discussion will be based on the indicators published in ECB (2008).

1.1.1 Money Markets

The euro area money market covers interbank short-term debt or deposits. It is composed of different segments.[5] The most important segment is the unsecured and secured repo markets. The unsecured deposit market is where credit institutions exchange short-term liquidity without any collateral as guarantee. In the repo market, participants obtain liquidity against collateral, with the agreement to reverse the transaction at some pre-specified future date and price. The derivatives market includes interest rate futures, options and swaps, and has become increasingly important in recent years. The short-term securities market consists of commercial paper issued by corporations and certificates of deposit issued by banks with less than one year maturity.

Hartmann *et al.* (2001), Gaspar *et al.* (2001) and Perez-Quiros and Mendizabal (2006) analyze the evolution and integration of these markets in the early years of EMU. Financial integration in money markets is typically measured by the dispersion of average daily interest rates prevailing in each euro area country. Since transactions in these markets are characterized by similar cash flows and, given the very short term maturity contained very little credit risk (until the start of the turmoil), the law of one price suggests that in perfectly integrated markets any dispersion should converge to zero. The available evidence suggests that both the unsecured and secured segments of money markets have reached a high degree of integration (see figure 2). The cross-sectional

[5]See ECB (2008d) for a review of the recent developments in money markets.

standard deviation of the overnight lending rates across euro area countries fell sharply to close to zero following the introduction of the euro. Spreads between the policy rate and the inter-bank rates have been also small and have remained stable until the summer of 2007, the start of the financial turmoil. Similar results hold for the 1-month and 12-month EURIBOR and EUREPO rates.

INSERT FIGURE 2

In the current turmoil, even very short term interbank loans are perceived as risky. This in part explains the higher dispersion of money market rates observed over the last year, which must not necessarily be associated with increased market segmentation. In the presence of asymmetric information – for instance with high uncertainty about the number of risky borrowers in the inter-bank market – the interest rate rises and safer borrowers may choose to drop out of the market. As counterparty risks increase even further, banks may prefer not to lend to other banks, thus reducing liquidity and increasing volatility in the interbank market (Heider, Hoerova and Holthausen (2008)).[6]

The market for short-term securities, on the other hand, has shown little signs of integration, mainly because of differences in market practices and standards. Since commercial paper contracts vary across countries due to differences in legal systems and regulatory requirements, the market for short-term paper in Europe has remained largely of domestic nature.[7] Since June 2006, the STEP initiative (Short-Term European Paper) aims at fostering the integration of this market by promoting convergence of market standards. We will discuss this initiative at greater length in section 1.2.

Figure 3 illustrates the progress achieved so far. The figure shows that in 2007 more than half of the outstanding commercial paper in euros had been assigned the STEP label. As more issuers use a common STEP label, obstacles to cross-border transactions represented by different domestic practices are progressively eliminated. The commercial paper market has therefore the potential to become a truly integrated euro area market, whose dimension is comparable to that of the US.

INSERT FIGURE 3

[6]Cassola, Lo Duca and Holthausen (2008) show that cross-border trades declined significantly after the start of the turmoil. At the same time the price for cross-border transactions has been significantly lower than that for domestic trades. According to the authors, these facts are consistent with a two-tier system of the money market: cross-border interbank trades are conducted by banks with a relatively high credit standing, while the other banks are mainly trading in domestic markets where interest rates are higher because the average credit risk is perceived to be higher.

[7]The London based Euro Commercial Paper (ECP) market is the only market where the short term paper is traded on a cross border basis.

1.1.2 Bond Markets

With the introduction of the euro and the removal of exchange rate risk, yields in the bond market have converged in all countries and tend to be increasingly driven by common factors. The extant literature and available indicators show that the euro had a substantial impact in these markets, considerably raising their degree of integration. Unlike for money markets, whose rates are directly comparable, naïve comparisons of bond yield differentials may give a misleading indication of the state of integration of bond markets. Spread divergences may be due to differences in perceived credit risks, and as such they reflect the proper functioning of market discipline, rather than lack of integration. Most price-based measures of integration in bond markets are based on the intuition that in integrated markets bond yields should react to common, rather than local, factors. We review the evidence for government and corporate bond markets separately.

Government Bond Markets Examining the effect of monetary integration on government bonds is quite important, as even a small reduction of spreads due to further market integration may entail significant savings for the tax payer. Spreads – after the impressive convergence in the run up to EMU – have not disappeared completely after the introduction of the euro. Since the start of the financial market turmoil in summer 2007, spreads have increased significantly and have reached even higher levels than those observed in the early years of the EMU (see figure 4).

INSERT FIGURE 4

Although part of the remaining spread reflects cross-country differences in debt levels, a common finding of the literature is that spreads tend to move together (see Pagano and Von Thadden (2004) for an early review of the literature). The literature has tried to identify which common factors explain spread co-movement. Codogno *et al.* (2003) find that yield differentials between government bonds can be explained by variations in international risk factors, proxied by the spread between the U.S. corporate and government bonds. The results are obtained with simple regressions, where spreads are regressed against countries' deviation of debt-to-GDP ratios with respect to Germany and their proxy for the international risk premium. Using different data and econometric techniques Geyer *et al.* (2004) and Bernoth *et al.* (2004) reach similar conclusions. Manganelli and Wolswijk (2008) show that spreads of euro area government bonds are tightly related to the level of short term interest rates set by the Eurosystem, which in turn may be related to time varying risk aversion: an increase in interest rates is associated to a widening of spreads and conversely lower interest rates induce a reduction in spreads. Their finding is also consistent with an emerging line of empirical

research, showing how tight monetary policy decreases the willingness of investors to bear risks.[8]

The importance of liquidity is further scrutinized in a series of other papers (e.g., Gomez-Puig 2006, Jankowitsch *et al.* 2006, Favero *et al.* 2007). The general finding is that only the benchmark property appears to command a liquidity premium, although there may be relevant non-linear interactions between liquidity and credit risk.

Overall, the available evidence shows that the lack of complete convergence of government bond spreads partly reflects market discipline, with lower rated governments being forced to pay higher premiums. Nevertheless, liquidity risk premiums remain non-negligible. Their presence calls for the attention of policy makers and market participants, who should step up their efforts to bring the ongoing process of financial integration to completion.

Corporate Bond Market The introduction of the euro has been one of the driving forces behind the strong development of the euro area corporate bond market. Pagano and von Thadden (2004) provide a broad overview of the major structural developments. On the supply side, the introduction of the euro has offered companies the opportunity to access a larger pool of investors and diversify their liabilities away from traditional loans. Rajan and Zingales (2003), using panel data on domestic corporate debt outstanding in several countries since 1989, document that the euro did have a positive and statistically significant effect on the amount of net debt issues. Similarly, the market for corporate euro bond underwriting, after the introduction of the euro became a much more contestable business. Santos and Tsatsaronis (2003) show that the arrival of the euro had an important negative impact on the underwriting fees of international corporate bonds issued in the new currency. Biais *et al.* (2006) document how euro area corporate bonds have narrower bid-ask spreads than comparable bonds denominated in other currencies. According to the study this spread reduction is largely the outcome of the large pool of institutional investors, which was made possible by the integration of the European corporate bond market after the introduction of the euro. On the demand side, there has been a strong increase in geographical diversification of euro area bond portfolios. Much of this diversification is due to institutional investors, as shown by Adam *et al.* (2002).

Figure 5 shows that the trend towards internationalization is continuing. The figure plots cross-border holdings among euro area Member States of long-term debt securities. Overall, euro area residents have strongly increased their cross-border holdings of debt securities since the end of the

[8]See, for instance, Rajan (2006), Bernanke and Kuttner (2005) and Jimenez et al. (2008).

1990s, from about 10% to almost 60%. Given the very low starting point in 1997, this indicator suggests that investors have substantially diversified their portfolios across the euro area. One obtains similar results by looking at cross-border holdings of financial institutions. Cross-border holdings of long-term debt securities have continued to increase over the past ten years from about 15% in 1999 to about 40% in 2007 (see ECB 2008). The visual impression of figure 5 is confirmed by more formal econometric analysis. Lane (2006) and Coeurdacier and Martin (2007) regress the amount of cross-border bond holdings on an EMU dummy, controlling for several bilateral characteristics, among which EU membership and bilateral trade. They find that the introduction of the euro had a substantial impact on the amount of cross-border bond investments.

INSERT FIGURE 5

The substantial integration of corporate bond market is also found by researchers who study price-based measures. Baele *et al.* (2004) test whether risk-adjusted yields have a systematic country component. In an integrated market, the proportion of the total yield spread variance that is explained by country effects should be close to zero. The respective indicator shows that the euro area corporate bond market is quite integrated. Country effects explain only a very small proportion of the cross-sectional variance of corporate bond yield spreads (see ECB 2008).

1.1.3 Equity Markets

Equity markets in Europe have developed substantially over the past two decades, in the midst of a wave of consolidation of stock exchanges. Consolidation of stock exchanges is in an important aspect of financial integration, as it ensures that all participants have equal access to capital markets (see ECB 2007a). Through network externalities and economies of scale the consolidation of stock exchanges can further spur integration. The consolidation has initially occurred at national level. As reported by Schmiedel and Schönenberger (2005) securities exchanges (including stocks and derivatives) in the 12 euro area countries have decreased from 30 in 1999 to 22 in 2005. Consolidation continued first at regional level (Euronext and OMX), and more recently outside the euro area (with the NYSE-Euronext and LSE-Borsa Italiana mergers).

It is harder to assess the degree of integration of equity markets relative to money and government bond markets, as equity returns are not directly comparable. In principle, in a perfectly integrated market only common risk factors are priced, while diversifiable country risks command no risk premium. In practice, it is difficult to disentangle the impact on equity returns of changing economic fundamentals from changes in the pricing mechanism (see Adjaouté and Danthine 2004

for a more in-depth discussion). A simple, direct attempt to quantify the impact of integration in equity markets is to look at the dynamics of investors' portfolios. In a truly integrated market, investors should not prefer national over foreign equities. Evidence of decreased home bias can therefore be consistent with the disappearance of psychological or physical barriers to cross border investments.

The available quantity-based measures indicate a rising degree of integration in equity markets. De Santis and Gerard (2006) investigate the determinants of international portfolio reallocation for the 30 largest economies between 1997 and 2001. They find an overall decrease in home bias that is pronounced for euro area member states. Lane and Milesi-Ferretti (2007) and Coeurdacier and Martin (2007) reach similar results. Figure 6 shows that euro area residents increased their holdings of equity issued in another euro area country (as a share of their total portfolio of shares issued in their own country and elsewhere in the euro area) between 1997 and 2004. Over this period, the share of intra-euro area cross-border holdings of equity securities doubled to 28%, while the share of euro area equity assets held outside the euro area is much lower and increased only slightly. This implies that euro area investors have reallocated their equity portfolio from domestic holdings to holdings elsewhere within the euro area, after the introduction of the euro.

INSERT FIGURE 6

Another part of the literature studies integration in equity markets by looking at asset returns. A first group of papers uses asset pricing models, while a second group looks at changes in co-movements at country and sectoral level. Hardouvelis *et al.* (2006) use a conditional asset pricing model where the risk premium of the stock market is decomposed into a euro area wide and country specific risk factors. The relative importance of these two factors is measured by a time-varying parameter that reflects the (conditional) level of integration of each market. The empirical findings show that the degree of integration has gradually increased to the point where individual eurozone country stock markets appear to be fully integrated into the EU market. In a similar fashion, Cappiello, Lo Duca and Maddaloni (2008) use an intertemporal CAPM to study the dynamics of equity risk premia for the five largest euro area economies. They also find that euro area equity markets are well integrated. Fratzscher (2002), Baele *et al.* (2004) and Fratzscher and Stracca (2008) assess to what extent local equity returns react to news. The estimates are interpreted as a measure of the intensity with which euro area and world factors are transmitted to local equity markets. They find that greater economic and financial integration leads to a higher degree of co-movement across countries and therefore to an increase in sensitivities to euro area factors.

Asset pricing models depend on the particular methodology and empirical specification of the risk factors. Furthermore, any test of market integration based on an asset pricing model is at the same time a test of the asset pricing model itself. To address this possible shortcoming, the literature has developed measures of integration based on less-restrictive ("model free") approaches.[9] A typical approach is to analyse the relative importance of country and industry factors in driving returns, following the seminal contribution of Heston and Rouwenhorst (1994).[10] The intuition here is that in segmented financial markets the benefits of cross-country diversification should be relatively higher than cross-sector diversification. An interesting finding of this line of research is that the dominance of country factors has decreased substantially and at certain points in time it has even reversed in favor of industry factors in the euro area. These results are confirmed by simple plots of filtered cross-sectional dispersion of country and sector index returns for euro area countries (see ECB 2008).

1.1.4 Banking Markets

Banking markets encompass interbank (or wholesale) activities, capital market-related activities and retail banking activities. Since we have already analysed interbank and capital market related activities, we focus here on the retail segment.[11] As banking is a multi-product business and banking services are quite heterogenous it is hard to precisely assess the degree of integration. Retail customers typically buy packages of financial services, whose content differ from bank to bank, let alone from country to country. Furthermore, because of limited access to "hard information" (such as publicly accessible account statements or an observed repayment track record), banks' loans to small customers have to rely on "soft information", such as personal interaction with the customer and knowledge of the local customs.

A simple way to describe the progress of integration in the banking market is to examine whether barriers to entry have been progressively reduced. In principle, the absence of barriers to entry and the threat of new entries should deter incumbents from charging prices in excess

[9] Ayuso and Blanco (2001) use the approach proposed by Chen and Knez (1995) to develop a model free measure of financial integration, which is still rooted on basic asset pricing theory. Although their application is limited to US, German and Spanish stock markets, their results point to an already substantial degree of integration during the nineties.

[10] See Adjouté and Danthine (2004), Galati and Tsatsaronis (2003), Brooks and Del Negro (2004), Cappiello, Lo Duca and Maddaloni (2008), Cappiello, Kadareja and Manganelli (2008), Carrieri, Errunza and Sarkissian (2004), Bekaert, Hodrick and Zhang (2008), Eiling, Gérard and de Roon (2005).

[11] Dermine (2006), Cabral, Dierick and Vesala (2002), and Goddard, Molyneux, Wilson and Tavakoli (2007) survey recent developments in European banking systems.

of their marginal costs. In practice, such an ideal condition is very rarely met. Several studies show that, even in the U.S., the distance between borrower and lender does affect the lending conditions (see for example Petersen and Rajan (2002)).[12] Degryse and Ongena (2004) provide an extensive overview of empirical and theoretical literature suggesting that market segmentation may persist in retail banking for some time. In particular, bank lending to small firms in Europe will remain constrained by distance (i.e. geographical proximity) and borders (i.e. national, cultural, or regulatory obstacles) between borrowers and lenders.

Notwithstanding these caveats, quantitative measures of integration in the retail bank market can be obtained directly by looking at the dispersion of interest rates on loans and deposits from banks to non-financial corporations and households. Euro area cross-country dispersion of bank interest rates has remained relatively high (at least when compared to the government bond market and interest rates on debt securities more generally, see ECB 2008).[13]

Quantity-based indicators of banking integration are based on measures of cross-border activities. Figure 7 reports the geographical holdings of securities issued by euro area financial institutions and held by other financial institutions resident in other euro area countries or in the rest of the European Union. The indicator shows substantial progress in the degree of euro area diversification. Other indicators, such as loans to other financial and non-financial institutions confirm the existence of an increasing trend of cross-border activity (see ECB 2008). The econometric analysis of Perez, Salas-Fumas and Saurina (2005) shows that this integration process has been boosted by the introduction of the euro.

INSERT FIGURE 7

As discussed above, the intrinsic nature of the banking system – characterised by strong information asymmetries – suggests that bank mergers and acquisitions (M&A) may be the best strategy to enter another market and provide truly pan-European cross-border services. Cross-border M&A in banking is low compared to related activities in the manufacturing sector. This reflects the existence of barriers, not only of geographical but also of regulatory and legal nature (see ECB (2007b), Berger (2007), Altunbas and Marqués-Ibáñez(2008)). Figure 8 reports average cross-border M&A activities of euro area banks, broken down by the geographical location of the deals. We notice

[12] Degryse and Ongena (2005), using a data set containing more than 17,000 loans made by an important Belgian bank to individual firms, find that loan rates decrease in the distance between the firm and the lending bank. Similarly, loan rates increase in the distance between the firm and competing banks.

[13] An alternative way to gauge directly the degree of integration in banking market is to compare cross-country efficiency of European banks, as suggested for instance by Bos and Schmiedel (2007).

that there has been a substantial reduction in the proportion of domestic deals which has been substituted by intra-euro area cross-border M&A activity. The extent to which banks are owned by foreign institutional investors appears to be an important determinant of cross-border M&A activity (ECB (2008e)). If foreign institutional ownership and cross-border M&A help reducing home bias and encourage foreign portfolio investments, they may represent important channels to foster financial integration.

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1.2 Policy Initiatives to Foster Integration

The degree of financial integration varies considerably across the various market segments. Perhaps not surprisingly, the more uniform the characteristics of the asset exchanged on the market, the more integrated that market. The unsecured money market, where banks lend to each other on such a very short term that the credit risk was essentially null (until the start of the turmoil), appeared to be the most integrated. Bond markets, where the cash flow is directly comparable and credit risk can be reasonably estimated, also appear quite integrated. Equity and banking markets, where the cash flow of the underlying assets cannot be directly compared, appear to be the least integrated.

Lack of integration reflects the existence of barriers to cross-border activities. We can classify the obstacles to financial integration in three main categories:

1. Psychological/informational
2. Regulatory/legal
3. Technical/infrastructure

Recent work shows that there are non-negligible psychological and cultural barriers to financial integration (see for a review Guiso *et al.* 2006). For example cultural differences and mistrust explains a significant portion of bilateral financial (and trade) flows (see Kalemli-Ozcan et al. (2008) and Guiso *et al.* (2008) for evidence). Besides cultural phsychological reasons, information frictions seem to have a significant effect on financial integration. Research by Portes and Rey (2005) shows that variables reflecting information asymmetries among countries (such as telephone costs, trading time, foreign newspaper circulation) correlate significantly with cross-border equity flows. Subsequent work on other forms of financial integration reaches similar results (e.g. Aviat and

Coeurdacier (2006); Papaioannou (2008)). Quite importantly in all studies distance is negatively correlated with financial integration even if one accounts for cultural, regulatory, or informational differences. While policy can not do much here, this result suggests that informational frictions and cultural mistrust can have an even larger impact from that documented in previous academic work. EU integration policies mainly focused in removing regulatory-legal barriers and building the necessary infrastructure for cheap and fast trading and settlement procedures. We thus focus our analysis on these barriers.

1.2.1 Regulatory Obstacles

A precondition for financial integration is the removal of any legislative or regulatory differences discriminating agents on the basis of their location. Many of the efforts at the European level have been directed at the removal of barriers to cross-border activities.

The legal and regulatory environment of the European banking industry has been radically changed over the past three decades (see Dermine 2003, 2006). The transformation started in 1977, with the First Banking Directive establishing the principle of home country control: supervision of financial institutions operating in two or more member countries was shifted to the home country of the parent institution. It was followed in 1988 by the Second Banking Directive, under which all credit institutions authorized in an EU country would be able to establish branches or supply cross-border financial services in other EU countries without further authorization ("single banking license"). In parallel with these EU-wide policies member states adopted additional policies that aimed at further strengthening the banking system (e.g. privatization policies).

After the introduction of the single currency, the European Commission launched in 1999 the Financial Services Action Plan (FSAP). The FSAP included a set of initiatives aiming at increasing financial integration along three strategic objectives (see Hartmann *et al.* 2003 for details):

- A single EU market for wholesale financial services,
- Open and secure retail markets,
- State of the art prudential rules and supervision.

While the FSAP constituted a major overhaul of the EU legislation for the entire financial sector, most of the initiatives related to securities markets. Major measures in this respect included for example the Markets in Financial Instruments Directive (MiFID), the Transparency Directive, the

Market Abuse Directive, and the Prospectus Directive. Building on the achievements under the FSAP, the Commission adopted in December 2005 a White Paper on EU financial services policy for the years 2005–2010. The White Paper aims at ensuring the effective and consistent implementation of the FSAP measures and at consolidating and simplifying existing EU legislation.

Several EU initiatives have recently been adopted in the areas of banking regulation and supervision to remove existing obstacles to cross-border banking. As already discussed in the banking section, cross-border banking groups are central for the integration process, as they enhance competition across jurisdictions. Against this background, the removal of policy-related obstacles to cross-border banking has become a policy priority in recent years. Partly as a result of a survey of the European Commission on barriers to cross-border banking consolidation, three main obstacles have been identified:

- Prudential – Differences in supervisory approval process and prudential rules.
- Legal – Incompatibilities in national company laws and insufficient legal harmonization.
- Fiscal – Differences in tax treatment of operations related to cross-border banks' M&A activities.

The European Commission has adopted several directives to address some of these issues. For instance, legal obstacles to cross-border M&A operations arising from differences in national company laws have been addressed to some extent with the Directive on take-over bids, adopted under the FSAP, and with the more recent Directive on cross-border mergers. Similarly, a Directive adopted in 2007 clarifies the procedural rules and the evaluation criteria for the prudential assessment of acquisitions and increases of holdings in the financial sector (see ECB (2007b) for details).[14] In Section 2 we investigate the effect of these policies on cross-border banking integration finding that the implementation of these policies did have a positive impact.

[14]Many of these initiatives have been implemented in the context of the so-called "Lamfalussy framework", a legislative architecture introduced by the EU to increase the speed and flexibility of the regulatory process. The framework distinguishes four levels in the approach to financial legislation. Level 1 concerns the development of basic principles, which are adopted by the European Parliament and the Council. Level 2 involves the implementation of the technical details of level 1 directives and regulations, which is delegated to suitable committees. At level 3 the committees ensure the homogeneous implementation of community legislation at national level. At level 4 the European Commission is in charge of strengthening the enforcement of EU law at national level, co-operating with the relevant Member States parties. The practical functioning of the Lamfalussy framework – which since 2003 has also been implemented in the banking and insurance sectors – has been closely monitored and improved over the years.

1.2.2 Technical Obstacles

Technical market infrastructures are also key for financial integration. Impediments to securities trading across national borders inhibit arbitrage forces and induce violations of the law of one price. It is not surprising then that European policy makers and the Eurosystem in particular have devoted great efforts to the establishment of a common market infrastructure.

TARGET and TARGET2 There is unanimous agreement that the high degree of integration of the large value payment systems (mostly used for interbank payment transactions) has been instrumental to the integration of money markets and wholesale banking activities. Before 1999, the system was highly fragmented, with only domestic platforms operating in legacy currencies. Payments across national borders within the EU were typically made via correspondent banking, at higher costs and delays compared to national transactions.

The effective conduct of the single monetary policy required the elimination of any difference between intra euro-area and within country payments. With the introduction of TARGET (Trans-European Automated Real-time Gross settlement Express Transfer system) payments between credit institutions within the euro-area take place in real-time and at a harmonized transaction fee. At the same time the number of payment systems was reduced from seventeen to six in 1999.[15]

TARGET was based on the principle of minimum harmonization, linking the national settlement systems of the 15 EU Member States and the ECB payments mechanism into a single platform. In response to the growing demand from financial institutions, the Eurosystem launched TARGET2 on 19 November 2007, which is no longer based on a decentralized architecture of "system of systems", but on a single shared platform. TARGET2 has replaced the TARGET system in full since 19 May 2008.[16] TARGET2 is expected to further enhance the integration of wholesale payments by providing its participants with:

- a single pricing structure for both domestic and cross-border transactions,
- a harmonized set of cash settlement services in central bank money for ancillary systems,
- a single technical communication interface for multi-country users, to process the information from branches in different countries.

[15] Since the introduction of the euro, two of the remaining six systems were closed down. Amongst the remaining four systems, the TARGET system and the private net settlement system EURO1 process most of the traffic, with TARGET being the largest of the two.

[16] We refer to ECB (2008c) for comprehensive information about the main recent developments.

The centralization of payment business is expected to allow users to exploit benefits from economies of scale and efficiency gains in speed and quality.

TARGET2-Securities The integration of the infrastructure underlying bond and equity markets is much less advanced, partly reflecting the greater complexities of these markets. Each country has developed it own system based on different practices, as well as different legal, regulatory and fiscal regimes. The resulting fragmentation implies higher post-trading costs for EU cross-border securities transactions and constitutes a significant barrier to a truly integrated European financial market. These problems have been under the radar screen of EU policy makers for quite some time, and a number of actions has already been taken, such as:

- Harmonization of market practices, law, regulation and taxation to remove the so-called "Giovannini barriers".[17]
- The development of a "Code of Conduct for clearing and settlement" to stimulate fair and open competition among all exchanges, central counterparties and central securities depositories.
- The development of standards for the securities settlement systems aimed at promoting convergence towards the highest standards of safety and efficiency.

To fully exploit the benefits of scale and competition from a truly pan-European securities market, the Eurosystem is working at the establishment of TARGET2-Securities (T2S), a borderless and neutral platform for securities settlement.[18] The resulting system endeavors making cross-border settlement as cheap and efficient as domestic settlement. At the same time it will allow market participants to pool their liquidity and collateral, reducing costs. The use of a common settlement platform should increase cost transparency and facilitate investors' decision to hold securities in the issuing depository, in an investor depository or in a custodian bank. Once implemented, investors should be able to choose the provider on the basis of costs and services offered, rather than the location of the security. This in turn will reduce custodian services fees, which currently represent a significant fraction of the costs for end-users.

[17]The Giovannini Group identified a set of barriers to cross-border clearing and settlement, stemming from differences in market practices, legal, regulatory and fiscal provisions. For details, see http://ec.europa.eu/economy_finance/eu_economic_situation/integrating_markets300_en.htm. See Giovannini (2008) for an extensive overview of clearing and settlement systems in Europe.

[18]The T2S project was officially launched by the Governing Council of the ECB on 17 July, 2008. See http://www.ecb.int/paym/t2s/html/index.en.html for more details.

SEPA: Single Euro Payments Area The integration of retail banking markets has been hampered by, among other things, the high level of fragmentation of the retail payments infrastructure. Prices for cross-border credit transfers were higher and execution time substantially longer than for domestic transfers. Despite some initiatives by the banking industry, progress was slow and the pricing structure remained highly heterogeneous. The processing of credit transfers, direct debits and payment cards remained fragmented reflecting the underlying payment infrastructures.

The European Parliament and the Council adopted a Regulation in December 2001, which enforced an equal pricing of cross-border and national euro payments for the consumers. This was followed in early 2002 by the launch of the Single Euro Payments Area (SEPA) initiative by the banking industry. In SEPA all euro payments will be treated as domestic payments and remaining distinctions between national and cross-border payments will disappear. By creating a truly integrated infrastructure, SEPA should foster the integration and improve the efficiency of the euro area retail banking markets (see ECB 2007c for further details).[19]

STEP: Short-Term European Paper To promote integration in the short-term debt securities (i.e. commercial papers and certificates of deposit) the ECB called for market participants to improve the functioning of this market. In response, the Financial Market Association (ACI) launched the Short-Term European Paper (STEP) initiative to foster the integration of the European market segments for short-term securities. The STEP initiative aimed at (i) identifying a set of common market standards and practices suitable to promote market integration and (ii) fostering the voluntary compliance of market participants by granting a common label to compliant issuance programmes.

The project has been implemented in two main phases. The first phase – concluded in June 2006 with the STEP Market Convention – focused on identifying and codifying adequate market standards. The second phase aimed to raise public awareness. The campaign contributed to the rapid acceptance and the increasing relevance of the STEP market (see figure 3).[20]

[19] In contrast to the previously discussed initiatives, the Eurosystem was not the main driver of SEPA. Its role was limited to acting as a catalyst to foster agreement and convergence towards common standards among market participants.

[20] Like SEPA, STEP is a market led initiative. The ECB played a key catalyst role by providing assistance in the formulation and promotion of the project (see ECB 2008b for further details).

2 PART II

In the second part of the paper, we first evaluate the effect of the euro and some of the EU-wide policies reviewed in part I on banking integration. Then we investigate the effect of banking integration on the amount of consumption risk sharing. This part draws heavily on Kalemli-Ozcan, Papaioannou and Peydró (2008).

2.1 The Effects of the Euro and EU-wide Policies on Banking Integration

As described in Part I, the introduction of the euro has been accompanied by many policy and legislative initiatives at the European level. A fast growing body of research analyzes the effect of the euro on various forms of financial integration, but little attention has been given to isolating the effects of harmonization policies from monetary integration.

The work on the impact of the euro follows an earlier body of the literature on the effects of free-trade-agreements and currency unions on international trade (e.g. Rose (2000); Micco *et al.* (2003); Flam and Nordstrom (2007); see Baldwin (2006) for a review). We have seen in Part I that Lane (2006), Courdacier and Martin (2007), and De Santis and Gerard (2007) use bilateral cross-sectional bond and equity holding data (from IMF's Coordinated Portfolio Investment Survey) in advanced economies to examine the effect of the euro on cross-border linkages. In the same vein Papageorgiou (2005), Petroulas (2007), and Flam and Nordstrom (2007) quantify the impact of the single currency on bilateral FDI flows. While estimates differ across studies, the overall evidence shows that the euro has spurred financial integration in equity and bond markets among member states.

Here, we first examine the effects of the euro on cross-border banking integration and then try to disentangle the effects of EU wide policies. As discussed in Part I, quantity indicators of banking cross-border activities show an increasing degree of euro area diversification. Both data on holdings of securities and loans to other financial and non-financial institutions confirm the existence of an increasing trend of cross-border activities. Part of these developments have been fostered by policy initiatives taken at European level. The two banking directives of 1977 and 1988 allowed all EU credit institutions to offer cross-border financial services without further authorization from other supervisory authorities. The creation of TARGET and the Single Euro Payment Area initiative are contributing to removing important technical obstacles to cross-border banking. But the single most important factors behind these developments have arguably been the introduction of the single

currency and the subsequent launch of the Financial Services Action Plan (FSAP).

In the rest of this section we examine in greater details the effects of the euro and the implementation of the FSAP directives on cross-border banking integration. To do so we exploit a data-set from the Bank of International Settlements (the International Locational Banking Statistics Database) which contains information on bilateral bank holdings and flows among developed countries. After presenting our data and empirical model, we examine the direct effects of the euro and EU membership on banking integration. We then investigate the impact of regulatory and harmonization policies that accompanied monetary integration on cross-border financial integration. This helps us isolate the impact of monetary unification from the associated harmonization policies.

2.1.1 Specification and Data

Our empirical specification takes the following form:

$$BANKINT_{i,j,t} = \alpha_t + \alpha_{i,j} + \psi_1 EU1_{i,j,t} + \psi_2 EU2_{i,j,t} + \psi_3 EZ1_{i,j,t} + \psi_4 EZ2_{i,j,t} + \varphi HARM_{i,j,t} + v_{i,j,t} \quad (1)$$

The dependent variable ($BANKINT$) is a measure of banking integration between country i and country j in year t. We construct $BANKINT$ using data from BIS International Locational Banking Statistics Database. The dataset reports asset and liability holdings of banks located in the main industrial countries and some financial centers in roughly 150 countries since 1977. We extract from this dataset bilateral banking integration statistics covering 20 countries over the 1977–2007 period. Our data consists of the 12 initial euro area countries, the three EU15 non-euro area countries (namely Denmark, Sweden and the United Kingdom), as well as Australia, Canada, Japan, Switzerland, and the United States.

The BIS statistics cover the entire banks' on-balance sheet exposure, as well as some "off-balance sheet" items (mainly in the "trustee business"). Specifically it includes international bank to bank lending, such as foreign loans and deposits, and holdings of debt securities. The data also include other assets, such as equity and FDI, but BIS documentations suggests that equity portfolio is still a relatively small fraction of international banking activities (albeit growing).[21] BIS also reports

[21] Assets include mainly deposits and balances placed with non-resident banks, including bank's own related offices abroad. They also include holdings of securities and participations (i.e. permanent holdings of financial interest in other undertakings) in non-resident entities. Data also include trade-related credit, arrears of interest and principal that have not been written down and holdings of bank's own issues of international securities. They also cover portfolio

estimates of flows, which are estimated as the exchange rate adjusted changes in holdings (stocks).

We construct four measures of banking integration, two based on stocks and two based on (gross) flows. $BANKINT1_{i,j,t}$ is (the log of) the sum of gross bilateral flows in assets and liabilities, standardized by the sum of the population of countries i and j. $BANKINT2_{i,j,t}$ is (the log of) the sum of total bilateral assets and liabilities, standardised as well by the sum of the population of countries i and j. $BANKINT3_{i,j,t}$ and $BANKINT4_{i,j,t}$ are defined similarly but without the population standardization. We also constructed other proxy measures of bilateral banking integration. For example we standardized bilateral holdings and gross flows with the sum of the two countries' GDP and with the sum of the total holdings and gross flows of the two countries. The results are similar.

We focus on the coefficient on the $EZ2_{i,j,t}$ variable that takes on the value one if both countries are members of the euro-zone in year t and zero otherwise. To isolate the effect of the single currency from a potentially positive overall EU effect, we also include in the specification a dummy variable that equals one if both countries are members of the EU and zero otherwise ($EU2_{i,j,t}$). $EU1_{i,j,t}$ and $EZ1_{i,j,t}$ take on the value one when one of the two countries is a member of the EU or the euro zone in a given year, respectively. These measures capture general trends in EU or euro area countries.

After examining the unconditional effects of EU and euro area membership on banking integration, we investigate the effect of legislative-regulatory harmonization policies among EU countries, captured with $HARM_{i,j,t}$ in the above expression. We use information from the European Commission on the implementation of the 20 Directives of the FSAP among member states to construct a time-varying measure of legislative-regulatory harmonization.[22] We first define twenty indicator variables that equal one starting at the year of the transposition of each Directive into national law (and zero otherwise). Second, we construct a country-time varying legislation measure ranging from 0 to 20 by summing the values of the indicator variables (LEX). Third, as we need a country-pair time-varying measure, we take the product (and for robustness the sum) of the legislation measure for each pair of countries at each year (i.e. $HARM1_{i,j,t} \equiv LEX_{i,t} * LEX_{j,t}$ and $HARM2_{i,j,t} \equiv LEX_{i,t} + LEX_{j,t}$).[23] Since the variable is highly skewed we enter the variable in the regression in

and direct investment flows of financial interest in enterprises. Yet equity investment has only become important in recent years, as traditionally the data covered almost exclusively bank to bank lending (see BIS (2003a,b) and Wooldridge (2002)). Unfortunately the data-base does not distingusih between portfolio investment and debt loans.

[22]The Commission has created league tables to put pressure on the countries to quickly adopt the directives. The data is available at: http://ec.europa.eu/internal_market/finances/index_en.htm

[23]See Imbs (2006) for an analogous approach.

logarithmic form. The fact that the banking integration measure (the dependent variable) is also in logs facilitates the interpretation of the results, as the coefficient estimate is an elasticity.

In contrast to previous work that mainly used cross-sectional approaches[24], the three dimensional panel structure allows us to control for year fixed effects (α_t) and country-pair fixed-effects ($\alpha_{i,j}$). Year fixed-effects account for global trends on banking integration. This is important as, for example, cross-border bank flows have increased considerably among the past twenty years. To further account for unobserved dynamic patterns, we also estimate models adding country-specific time trends. Country-pair fixed-effects enables us to control for all sources of (to a first-approximation) time-invariant bilateral characteristics that may affect financial integration. Country-pair fixed-effects control for distance, adjacency, and other (gravity-like) factors that correlate with banking integration (e.g. Portes and Rey (2005); Aviat and Coeurdacier (2006); Papaioannou (2008)). In addition country-pair fixed-effects account for other unobserved or hard-to-account-for factors, such as cultural proximity, political ties, legal system similarities, etc. that may affect financial linkages.

Our empirical model constitutes a difference-in-difference specification where euro area member countries constitute the "treatment" group, while the three EU and the five non-EU countries serve as the "control" group. The coefficients on the four indicator variables identify the effect of EU and euro membership on banking integration of the participating countries compared to general evolution of international banking integration in the other industrial countries. As a further robustness check we estimate the above model in the EU15 sample. These models compare banking integration across euro area member countries (the "treatment" group) with the three EU15 countries that have decided to opt out from the single currency which serve as the "control" group.

2.1.2 The Effects of EU and Euro

Table 1 reports the results on the direct effects of the euro and EU on banking integration.[25] Columns (1)-(4) report estimates on the full sample of industrial countries, while columns (5)-(8) give results in the EU15 group. For brevity we report results with the two standardized variables (results are similar when we use the non-standardized measures). The coefficient on the $EZ2$ indicator variable is positive and statistically significant at the 1% in all model permutations in the

[24]This is because previous work mainly relies on IMF's CPIS data that started becoming available at 1997. Since the initial surveys covered a small number of countries and the data was questionable, most studies use CPIS data after 2001.

[25]To account for serial correlation (arising from banking integration exhibiting inertia) standard errors are clustered at the country-pair level (Bertrand, Duflo, and Mullainathan, 2004).

full sample of countries. This suggests that the euro has spurred cross-border banking integration across member states. The estimates imply that following the adoption of the euro cross-border bilateral bank assets and liabilities and gross flows increased among member states approximately by $40\% - 50\%$ compared to the general evolution of banking integration among our sample of industrial countries ($\exp(0.3425) = 1.40$ in column (2); $\exp(0.4152) = 1.51$ in column (1)). In contrast the coefficient on the $EU2$ dummy is indistinguishable from zero in all specifications. This suggests that it was the adoption of the single currency rather than EU membership that has spurred banking integration. This result is robust across the banking integration measures and the inclusion of country-specific trends.

As a further sensitivity check we re-estimated the model only in the EU15 group of countries. This enables us to compare the twelve euro area member countries with the three EU economies that have decided not to join the currency area. The estimates are reported in models (5)-(8). Although by discarding observations we lose efficiency the estimates are quantitatively alike to the full sample estimates. There is evidence that the euro has spurred banking integration across member states. As before this result does not seem to be driven by country-specific trends or an overall (unilateral) positive impact of the euro (which is captured by the $EZ1$ variable).[26] These results add to recent and parallel studies showing that monetary union has spurred cross-border capital movements across member countries.

2.1.3 The Effects of Regulation and Legislation Harmonization

As reviewed above besides eliminating exchange rate risk, the introduction of the euro was supported by various legislative and regulatory harmonization policies. While some reforms occurred before 1999, European banking markets remained fragmented. The Financial Services Action Plan aimed to create a single and deep liquid financial market by harmonizing legislation in financial markets.

In Table 2 we provide a first assessment on the effects of the FSAP. The Table reports panel fixed-effect models examining the within correlation of bilateral legal-regulatory harmonization with each of the banking integration measures. In these models we use $HARM1_{i,j,t}$, but the results are similar when we use $HARM2_{i,j,t}$. The coefficient on $HARM1$ is positive and significant at the

[26] Previous work has shown that EU membership and currency unions spur international trade (see Baldwin (2006) for an eloquent survey). We have thus also estimated (1) controlling for bilateral trade. The estimates on the four indicator variables are similar to the unconditional models reported in Table 1.

1% level in all model permutations. This implies that legal-regulatory harmonization policies in the context of the FSAP did have a significant positive effect on banking integration. While this correlation does not necessarily imply a causal effect (as adaptation policies across member states may be driven to some extent by the degree of financial openness) it suggests that legislative harmonization did have an effect on the integration of financial markets. Note also that these models are quite restrictive as we do not have that many post 1999 observations to precisely measure the impact of these legislative policies. We also examine the effect of legal-regulatory harmonization policies on banking integration repeating the estimation on the EU15 sub-sample. In all specifications the coefficient on the bilateral harmonization measure enters with a positive coefficient. The estimate is, however, statistically significant only when we use the flow based measures of banking integration.

2.1.4 Joint Effects of Monetary Union and Regulatory Harmonization

In Table 3 we enter the EU and euro area dummy variables jointly with the legislation harmonization measure in the empirical model. The idea is to isolate the effect of monetary integration from the effects of other complementary integration policies. Across all specifications the indicator that equals one when both countries are members of the euro area ($EZ2$) enters with a positive estimate. The coefficient is significant at the 1% level in most specifications. The estimate is around 0.35 very close to the unconditional estimates. These results clearly show that the monetary union had a first-order impact on cross-border banking integration.

The coefficient of the legislative measure is also positive and statistically significant at standard confidence levels in all models. This suggests that besides monetary integration, legislative-regulatory harmonization also led to a spur of cross-border banking activities. This finding indicates that further legal and regulatory reforms and harmonization policies can accelerate integration in the banking sector.

Restricting the sample to EU15, the coefficient on the $EZ2_{i,j,t}$ is positive across all models. The estimate is significant at standard confidence levels although p-values vary from 12% (in (5)) to 1% (in (6)-(8)). Yet the most conservative estimate implies that banking integration across euro area countries increased after 1999 by 30%, compared to the three non euro area EU member states ($exp(0.27) = 1.31$ in column (5)). The estimate on the legal harmonization proxy continues to be positive even in the EU15 sample; yet the estimate is not always significant.

Overall our empirical evidence suggests that the euro had a first-order effect on banking in-

tegration. This result is robust to different banking integration measures, different samples, and different model specifications.[27] Most importantly our estimates imply a considerable economic effect. The panel estimates also show that it was the adoption of the single currency rather than EU membership that spurred banking integration. Our results further indicate that legislative-regulatory harmonization policies that aimed to support monetary unification also played a part on the increased level of banking integration across euro area countries.

2.2 Banking Integration and Risk Sharing

In this section we analyze the impact of banking integration on risk sharing. We first discuss the benchmark risk sharing estimation and then report our evidence.

If consumption growth rates in all countries of, for example, EMU are identical, then we say there is full (perfect) risk sharing. As shown by Arrow and Debreu this is an equilibrium outcome assuming consumers have identical CRRA utility functions and access to a complete set of Arrow-Debreu securities.[28] The empirical implication is that consumption in each country is a constant share of aggregate consumption. Starting with Mace (1991) the literature generally tests whether or not the growth rates are identical, where a rejection implies no perfect risk sharing.[29] If a labor-leisure choice is added to the model, as in Backus, Kehoe, and Kydland (1992) then the consumption growth rates will not be identical but will be similar and must be correlated more than the output growth rates.

Obviously, it is not a necessary condition to have a full set of Arrow-Debreu securities to reach the optimal consumption allocation. If a country can issue an asset that makes its payoff proportional to its GDP, perfect risk sharing will be achieved.[30] Given the fact that the difference between a country's income (GNI) and its output (GDP) is net factor income (NFI),[31] if NFI equals the country's share in aggregate EMU output growth minus the growth of country's domestic

[27] We performed various sensitivity checks. First, we repeat estimation dropping observations before 1990. Second, we also controlled for bilateral trade, as previous work shows that trade in goods and assets move in tandem (e.g. Rose and Spiegel, 2004; Aviat and Coeurdacier, 2007). Third, we used alternative measures of banking integration (for example we standardized bilateral gross flows with GDP or aggregate flows or holdings). The significant impact of the euro is robust to these modifications.

[28] See Obstfeld and Rogoff (1996).

[29] Mace (1991) uses individual level data and Obstfeld (1994) uses country level data to test the same prediction.

[30] As in output-linked assets or so-called "Shiller Securities", see Shiller (1998).

[31] In the country-level national accounts the difference between Gross Domestic Product and Gross National Income is net factor income which includes the net capital income from foreign assets and the net earnings of domestic *residents* abroad (not based on citizenship). However, foreign earnings of domestic residents are usually fairly small compared to capital income.

output, the perfect risk sharing allocation will be obtained.[32]

$$NFI = r_{fdi}[fdi_{assets} - fdi_{liabilities}] + r_{equity}[equity_{assets} - equity_{liabilities}] + r_{debt}[debt_{assets} - debt_{liabilities}]$$

This is a simplification where the return must be thought of as the net return since returns can be different on assets and liabilities and hence on domestic and foreign borrowing. The important point is that there will be a high level of risk sharing if the return on a particular foreign asset is correlated with the EMU output growth and the return on foreign liabilities is correlated with domestic output growth. That is, income (GNI) will be smoothed if payments on liabilities are high when domestic output growth is high and income from foreign assets is high when domestic output growth is low. If this is the case then risk sharing must increase with the quantities of foreign assets and liabilities.[33]

Since agents derive utility from consumption, to analyze risk sharing we should assess to what extent external assets and liabilities affect consumption. Given the above framework agents can further smooth their consumption adjusting their savings conditional on income. Forward looking risk averse consumers would like to have a smooth consumption path over their lifecycle. Nevertheless there are difficulties in using consumption to measure risk sharing. Many models, such as permanent income hypothesis, do not predict consumption smoothing by adjusting savings in the case of persistent output shocks.[34] Recent models, such as Carroll (1997), show the importance of precautionary saving, housing markets and habit formation. In the case of a credit expansion, both consumption and output will increase. Such an increase will be detected as no risk-sharing or dis-smoothing of consumption in the data. This can be a plausible scenario for the new EU members states from Eastern Europe.[35] Hence in an environment where credit constraints are relaxed it might not be possible to detect consumption smoothing. In addition, as well known in the literature,[36] consumption also fluctuates due to "taste shocks", where consumption changes are not related to income changes. A significant part of consumption smoothing also comes from government. Pro-cylical government savings can smooth consumption, but at the same time fluctuations

[32]Kalemli-Ozcan et al. (2001) derive a formula for the equilibrium share of aggregate output for each country in case of endowment economies with log-normal output fluctuations.

[33]Indeed Sorensen et al. (2007) showed that this is the case between 1993–2003 among the OECD countries.

[34]This is also known as "excess smoothness puzzle." Campbell and Deaton (1988) showed that the aggregate shocks in the U.S. are very persistent implying agents should dissave after a positive shock as predicted by Hall (1978).

[35]Illiquid assets such as houses can also explain the slow response of consumption to income.

[36]See Lewis (1999).

in government consumption can be considered as taste shocks. Despite all these caveats, since agents ultimately derive utility from consumption, we will base our risk sharing analysis mainly on consumption data. Nevertheless, we will also investigate income risk sharing.

We construct standard measures of the degree of consumption risk sharing among groups of countries, that takes a value of unity (100 percent) if the growth rates of country-level consumption are identical, and, therefore, equal to the growth rate of aggregate consumption. Denote country i's year t (per capita real, government plus private) final consumption, C_{it}, and denote aggregate consumption in year t, C_t. Similarly, denote country i's year t (real per capita) output, GDP_{it}, and aggregate output in year t, GDP_t. Our measures build on the observation that the correlation of country-specific consumption, with country-specific output shocks is zero under perfect risk sharing. We consider country-specific growth rates because aggregate shocks cannot be eliminated by the sharing of risk, and the aggregate component is therefore deducted from the individual countries' growth rates.

$$\Delta logC_{it} - \Delta logC_t = \mu_i + \kappa(\Delta logGDP_{it} - \Delta logGDP_t) + \epsilon_{it} \tag{2}$$

In this panel specification, suggested by Asdrubali, Sorensen, and Yosha (1996), $1 - \kappa$ is the measure of average amount of risk sharing over the period.[37] κ measures the average co-movement of the countries idiosyncratic consumption growth with their idiosyncratic GDP growth. The inclusion of country fixed effects is equivalent to subtracting the country average over the period for each variable and running the regression with no constant. Hence since the country averages over time are removed, risk sharing at longer horizons will not be captured here. This regression with country fixed effects will only capture risk sharing at the business cycle frequency, which is our aim here.

Our purpose is to evaluate how much risk sharing is driven by banking integration. We modify the standard risk sharing regression as in Melitz and Zumer (1999) and extended to include a time-varying coefficient by Sorensen et al. (2007):

[37]Note that the above equation is equivalent to using a time fixed effect to remove the aggregate shock as shown by Ravallion and Chaudhuri, Econometrica, 1997. So we can also run;

$$\Delta logC_{it} = \mu_i + \lambda_t + \kappa\Delta logGDP_{it} + \epsilon_{it} \tag{3}$$

$$\Delta logC_{it} - \Delta logC_t = \mu_i + \kappa_{it}(\Delta logGDP_{it} - \Delta logGDP_t) + \epsilon_{it} \tag{4}$$

where

$$\kappa_{it} = \kappa_0 + \kappa_1.(t - \bar{t}) + \kappa_2.(BANKINT_{it-1} - BANKINT_{t-1}) \tag{5}$$

$\bar{t}$ is the middle year of the sample period, and $BANKINT_{t-1}$ is the (un-weighted) average across countries of $BANKINT_{it-1}$ at time t-1. Demeaning the interaction terms is equivalent to removing permanent differences between countries in banking integration and hence the regressions captures the effect of time variation in banking integration on risk sharing.

The estimated value of $1-\kappa_0$ corresponds to the average amount of consumption risk sharing over time and within the group of countries. $1 - \kappa_0 - \kappa_1.(t - \bar{t}) - \kappa_2.(BANKINT_{it-1} - BANKINT_{t-1})$ then measures the amount of risk sharing obtained in period t by country i with bank integration level $BANKINT_{it-1}$. We include a time trend in order to guard against the upward trending bank integration measures spuriously capturing trend changes in risk sharing that may be caused by other developments in international markets. The parameter $-\kappa_1$ captures the average year-by-year increase in risk sharing. Hence here the amount of risk sharing is allowed to change over time with the trend and with bank integration. The parameter $-\kappa_2$ measures how much higher than average banking integration lowers the co-movement and hence increases the risk sharing.

One can think of other interaction effects. At the same time, the choice of the interaction effect should not violate the fact that risk sharing is about buffering shocks via large gross holdings of assets within a group of countries such as OECD or EU. Hence primarily one should account for this direct effect. For example euro is not suitable to use as an interaction effect since as we have shown in section 2.1 euro has spurred banking integration in the euro area. This implies the effect of euro on risk sharing works via financial integration. In addition euro might be capturing issues such as increase in trade, decrease in transaction costs, all of which may or may not have an indirect effect on risk sharing through financial integration. Hence given the fact that we have a good proxy for financial integration itself there is no reason for us to consider euro as a proxy for integration as done in some other work.

Since external assets and liabilities might have asymmetric effects on risk sharing (see Kalemli-Ozcan, Papaioannou, and Peydró (2008) for asymmetric effects on consumption and output volatil-

ity), we specify the risk sharing equation as follows:

$$\kappa_{it} = \kappa_0 + \kappa_1.(t-\bar{t}) + \kappa_2.(BANKINT^{Assets}_{it-1} - BANKINT^{Assets}_{t-1}) + \kappa_3.(BANKINT^{Liab}_{it-1} - BANKINT^{Liab}_{t-1}) \quad (6)$$

Table 4 reports the estimated coefficients. On average consumption risk sharing is 38% (=1-0.62) across the 20 countries over 1978–2007. This number is similar to what has been found in other studies.[38] The effect of banking integration is also economically and statistically significant. The interpretation of these coefficients in the interaction term of idiosyncratic growth with the banking integration measures (κ_2 and κ_3) are as follows. A country that increases the holdings of external assets (relative to population) by 100% achieves 17% of additional consumption smoothing, i.e. an additional 17% of the idiosyncratic shocks to GDP will be smoothed out. The liabilities seem to have a dis-smoothing effect but the coefficient is not significant at the standard levels.

Column (2) drops Luxembourg. This country is an outlier and hence this is an important robustness test. The average level of risk sharing (κ_0) and the risk sharing through assets (κ_2) slightly decrease, but the results remain qualitatively similar. The dis-smoothing role of liabilities is now significant at 10%. One should note that asset and liability banking integration measures are highly correlated and hence dropping observations will lead to an increase in signal-to-noise ratio. Nevertheless it is important to show the results with and without Luxembourg. In both cases we confirm the presence of significant amounts of risk sharing on average and through foreign bank assets. Finally, in column (3) we look at household consumption. The results are similar. The coefficients are slightly lower, possibly due to the smoothing role of governments. Overall our results indicate much higher levels of risk sharing across our sample in the last 30 years, compared to what has been found in the literature. The main reason for this is likely the fact that we have a longer time series, which increase the precision of our estimates.

Finally, we estimated a similar regression on income (instead of consumption) data. We find that income risk sharing has increased over the years. Specifically, average income risk sharing over the last two decades has increased and hovered around 12%.

2.3 The Other Real Effects of Financial Integration

The standard theory predicts that financial integration leads to lower consumption volatility, higher output volatility and a lower degree of business cycle synchronization. Surprisingly, the empirical

[38] See Demyank et al. (2007).

literature fails to find such effects. Kalemli-Ozcan, Papaioannou, and Peydró (2008) document these predicted effects of financial integration as a robust regularity. They investigate how financial integration affects the synchronization of the business cycles and macroeconomic volatility in a panel of industrial countries. They use a similar data set to the one used in this paper. Their analysis reveals two main findings. First, controlling for country-pair specific unobserved heterogeneity and global trends, they show that higher integration leads to less synchronized business cycles. This result stands in contrast to previous cross-sectional studies, which document a positive correlation between financial integration and output co-movement (Imbs (2004, 2006)). Second, Kalemli-Ozcan, Papaioannou, and Peydró (2008) show that a higher degree of external bank liabilities is associated with more volatile output fluctuations. Yet an increased level of foreign assets leads to less volatile consumption growth. This result implies that financial integration spurs risk sharing. These results are consistent with the estimation of the augmented risk sharing specification in this paper, explained in detail above.

The results of Kalemli-Ozcan, Papaioannou, and Peydró (2008) support the predictions of the standard international business cycle model. These models show that a positive productivity shock will yield low cross-country output correlations as capital will flow to the country where the marginal product of labor is high and workers will substitute leisure for labor (Backus, Kehoe, and Kydland (1992), Baxter and Crucini (1995), Heathcote and Perri (2002)). The dynamic stochastic open economy model with perfectly diversified ownership of capital, no labor-leisure choice, and where regions hit by persistent productivity shocks also implies less synchronized output cycles (Kalemli-Ozcan, Reshef, Sorensen, and Yosha (2008)). An indirect mechanism that leads to lower co-movement of the business cycles works through industrial specialization. By allowing agents to hold a diversified portfolio, financial integration shifts investment towards high return risky projects that in turn enhances specialization in production. This mechanism implies that asset market integration leads to less synchronized cycles and higher output growth volatility (Obstfeld (1994)).[39] Kalemli-Ozcan, Papaioannou, and Peydró (2008) find support for the direct effects of financial integration on synchronization and volatility and also find a evidence for the direct effect of industrial specialization on co-movement as predicted by the above theories.

[39]Although the literature fails to find evidence of the above mentioned direct effects, there is evidence for the indirect effect highlighted by Obstfeld (1994). Kalemli-Ozcan, Sorense, and Yosha (2001, 2003), show a higher degree of portfolio diversification leads to a higher level of industrial specialization, which in turn leads to less synchronized output growth correlations.

3 Conclusion

The advent of the euro and the financial harmonization policies have transformed European capital markets. Transaction costs in equity and corporate bond markets have fallen considerably, whereas spreads in the government bond markets have narrowed and tend to move together. While retail banking activities remain fragmented, the interbank markets have shown considerable integration. The degree of integration differs across market segments, but nevertheless the overall evidence suggests that the euro has accelerated financial integration.

This paper is composed of two parts. In the first part, we reviewed the vast and growing literature on the effects of the European monetary union on money, bond and equity markets, and on the banking sector. We then discussed the key financial policy initiatives that accompanied and strengthened the monetary union. In the second part, we presented new empirical evidence regarding the impact of these policies and of the single currency on cross-border banking integration. Our panel estimates show that controlling for country-pair characteristics and global trends, the euro has fostered banking integration across the 12 euro area countries by more than 30%. In addition, we used information on the speed of implementation of the main financial market related policies by EU member states (FSAP directives) to isolate the effect of the monetary union from complementary legal reforms. Our results suggest that both the euro and the harmonization policies have contributed crucially to cross-border banking integration. Finally, we evaluated the effect of cross-border banking integration on consumption risk sharing using a panel of 20 high income countries over the last 30 years. We find that higher cross-border banking integration increases consumption risk sharing.

Our findings have important policy implications for the euro. Asymmetric shocks in a currency union generate output and inflation differentials. The impact of such shocks is considerably reduced if cross-country risk sharing is significant. To the extent that risk-sharing allows hedging of consumption, it represents a key counteracting mechanism against output asymmetric shocks among members of a currency union. This mechanism reduces the need for policy intervention in dealing with such asymmetries. Our results, therefore, suggest that the increased cross-banking banking integration due to the euro has improved ex-post the optimality of the currency union by improving consumption risk sharing.

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Table 1: EU, Euro and Bank Integration, Country-Pairs

	All Countries				EU15 Sample			
	BANKINT1		BANKINT2		BANKINT1		BANKINT2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EU1	-0.5446	-0.3966	-0.6112	-0.3003				
	-3.63	-2.5	-3.38	-1.91				
EU2	0.0192	-0.0712	-0.1535	-0.0645				
	0.13	-0.76	-0.78	-0.65				
EZ1	-0.0051	-0.0771	-0.0922	-0.0922	-0.2836	-0.0948	-0.4575	-0.552
	-0.03	-0.55	-0.71	-0.7	-0.87	-0.37	-0.91	-1.39
EZ2	0.4152	0.3425	0.3851	0.3851	0.2732	0.4208	0.4807	0.3704
	2.79	3.61	4.03	3.94	1.54	3.20	2.06	2.50
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-specific time trends	No	Yes	No	Yes	No	Yes	No	Yes
Observations	4188	4188	4188	4188	2311	2311	2312	2312
Country-pairs	189	189	189	189	105	105	105	105

Notes: The Table reports panel fixed-effect models of equation (1) in the text. The dependent variable in models (1), (2), (5) and (6) is the log of bilateral gross flows between country i and country j in year t, as share of the sum of the population in the two countries (BANKINT1). The dependent variable in models (3), (4), (7) and (7) is the log of bilateral gross holdings (stocks) between country i and country j in year t, as share of the sum of the population in the two countries (BANKINT2). In specifications (1)-(4) the empirical model is estimated in the full sample of 20 countries over the period 1978-2008. In columns (5)-(8) estimation is performed in the EU15 sub-sample. EU1 and EZ1 are indicator (dummy) variables that take on the value one when one of the two countries is a member of the EU or the euro-zone in a given year (and zero otherwise), respectively. EU2 and EZ2 are indicator (dummy) variables that take on the value one if both countries are members of the EU15 or the euro-zone in a given year (and zero otherwise), respectively. All models include a vector of country-pair specific fixed-effects and a vector of time (year) fixed-effects. Models (2), (4), (6), and (8) also include a vector of country-specific time trends. t-stats based on (clustered) country-pair specific heteroskedasticity and autocorrelation standard errors are reported below the coefficient estimates.

Table 2: HARM and Bank Integration, Country-Pairs

	All Countries				EU15 Sample			
	BANKINT1		BANKINT2		BANKINT1		BANKINT2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HARM	0.0952	0.0728	0.0777	0.0545	0.1832	0.0113	0.1785	0.0412
	3.31	4.56	2.84	2.37	2.54	0.34	2.21	0.6
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-specific time trends	No	Yes	No	Yes	No	Yes	No	Yes
Observations	4187	4187	4188	4188	2311	2311	2312	2312
Country-pairs	189	189	189	189	105	105	105	105

Notes: The Table reports panel fixed-effect models of equation (1) in the text. The dependent variable in models (1), (2), (5) and (6) is the log of bilateral gross flows between country i and country j in year t, as share of the sum of the population in the two countries (BANKINT1). The dependent variable in models (3), (4), (7) and (7) is the log of bilateral gross holdings (stocks) between country i and country j in year t, as share of the sum of the population in the two countries (BANKINT2). In specifications (1)-(4) the empirical model is estimated in the full sample of 20 countries over the period 1978-2008. In columns (5)-(8) estimation is performed in the EU15 sub-sample. HARM is a country-pair time-varying index that reflects the harmonization of legislative-regulatory practices in financial services across EU15 countries. The measure is based on the adaptation of the 20 EU-wide Directives in the context of the Financial Services Action Plan (FSAP) across member states. For details on the construction of the measure see Section 2.1.1. All models include a vector of country-pair specific fixed-effects and a vector of time (year) fixed-effects. Models (2), (4), (6), and (8) also include a vector of country-specific time trends. t-stats based on (clustered) country-pair specific heteroskedasticity and autocorrelation standard errors are reported below the coefficient estimates.

Table 3: EU, Euro, HARM and Bank Integration, Country-Pairs

	All Countries				EU15 Sample			
	BANKINT1		BANKINT2		BANKINT1		BANKINT2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HARM	0.0464	0.0358	0.0545	0.0538	0.1725	0.0368	0.1735	0.0087
	1.81	1.56	7.23	3.45	2.14	0.54	2.5	0.26
EU1	-0.5301	-0.3858	-0.5942	-0.2841				
	-3.53	-2.44	-3.3	-1.81				
EU2	-0.0101	-0.0645	-0.1879	-0.0545				
	-0.07	-0.68	-0.98	-0.55				
EZ1	-0.0347	-0.0807	0.0662	-0.0978	-0.2871	-0.0958	-0.461	-0.5522
	-0.21	-0.58	0.36	-0.76	-0.88	-0.37	-0.91	-1.39
EZ2	0.3526	0.3105	0.5024	0.3369	0.2698	0.42	0.4772	0.3702
	2.38	3.26	2.58	3.5	1.53	3.19	2.06	2.5
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-specific time trends	No	Yes	No	Yes	No	Yes	No	Yes
Observations	4188	4188	4188	4188	2311	2311	2312	2312
Country-pairs	189	189	189	189	105	105	105	105

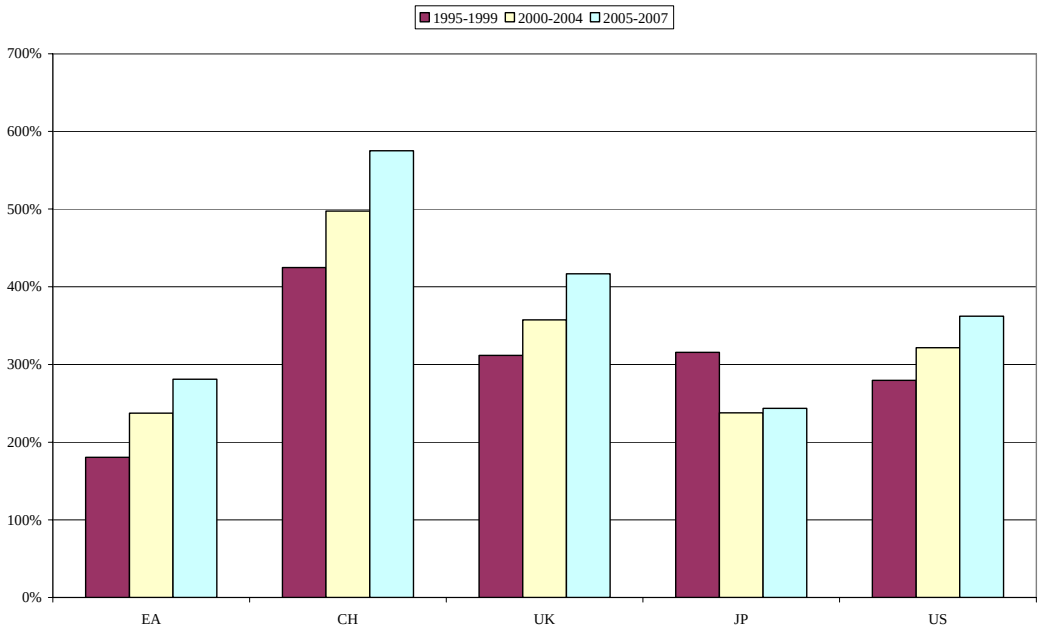
Notes: The Table reports panel fixed-effect models of equation (1) in the text. The dependent variable in models (1), (2), (5) and (6) is the log of bilateral gross flows between country i and country j in year t, as share of the sum of the population in the two countries (BANKINT1). The dependent variable in models (3), (4), (7) and (7) is the log of bilateral gross holdings (stocks) between country i and country j in year t, as share of the sum of the population in the two countries (BANKINT2). In specifications (1)-(4) the empirical model is estimated in the full sample of 20 countries over the period 1978-2008. In columns (5)-(8) estimation is performed in the EU15 sub-sample. EU1 and EZ1 are indicator (dummy) variables that take on the value one when one of the two countries is a member of the EU or the euro-zone in a given year (and zero otherwise), respectively. EU2 and EZ2 are indicator (dummy) variables that take on the value one if both countries are members of the EU15 or the euro-zone in a given year (and zero otherwise), respectively. HARM is a country-pair time-varying index that reflects the harmonization of legislative-regulatory practices in financial services across EU15 countries. The measure is based on the adaptation of the 20 EU-wide Directives in the context of the Financial Services Action Plan (FSAP) across member states. For details on the construction of the measure see Section 2.1.1. All models include a vector of country-pair specific fixed-effects and a vector of time (year) fixed-effects. Models (2), (4), (6), and (8) also include a vector of country-specific time trends. t-stats based on (clustered) country-pair specific heteroskedasticity and autocorrelation standard errors are reported below the coefficient estimates.

Table 4: **Banking Integration and Risk Sharing**

Dependent Variable: Idiosyncratic Consumption Growth			Sample:
Sample:	All	No LUX	All
Consumption:	Total	Total	Household
	(1)	(2)	(3)
Idiosyncratic GDP Growth	0.62	0.66	0.66
	(21.51)	(21.95)	(21.30)
Idiosyncratic GDP Growth* log (assets/pop)	–0.17	–0.13	–0.14
	(–3.00)	(–1.93)	(–2.00)
Idiosyncratic GDP Growth* log(liab/pop)	0.08	0.09	0.07
	(1.61)	(1.82)	(1.52)
Idiosyncratic GDP Growth* Trend	–0.01	–0.01	–0.01
	(–2.74)	(–2.34)	(–3.05)
Country FE	Yes	Yes	Yes

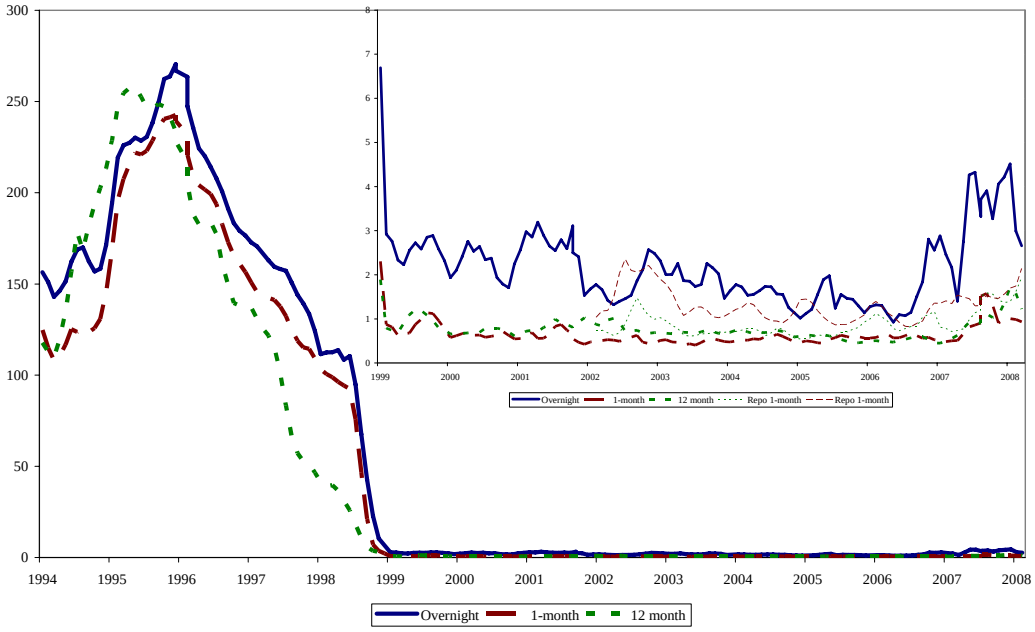
Note: All bank integration variables are lagged 1 period. Log (assets/pop) and log (liab./pop) are also included but they are not significant so not reported. All RHS variables are demeaned by period by period country means. t-stats are reported in the table.

Figure 1: Size of Capital Markets



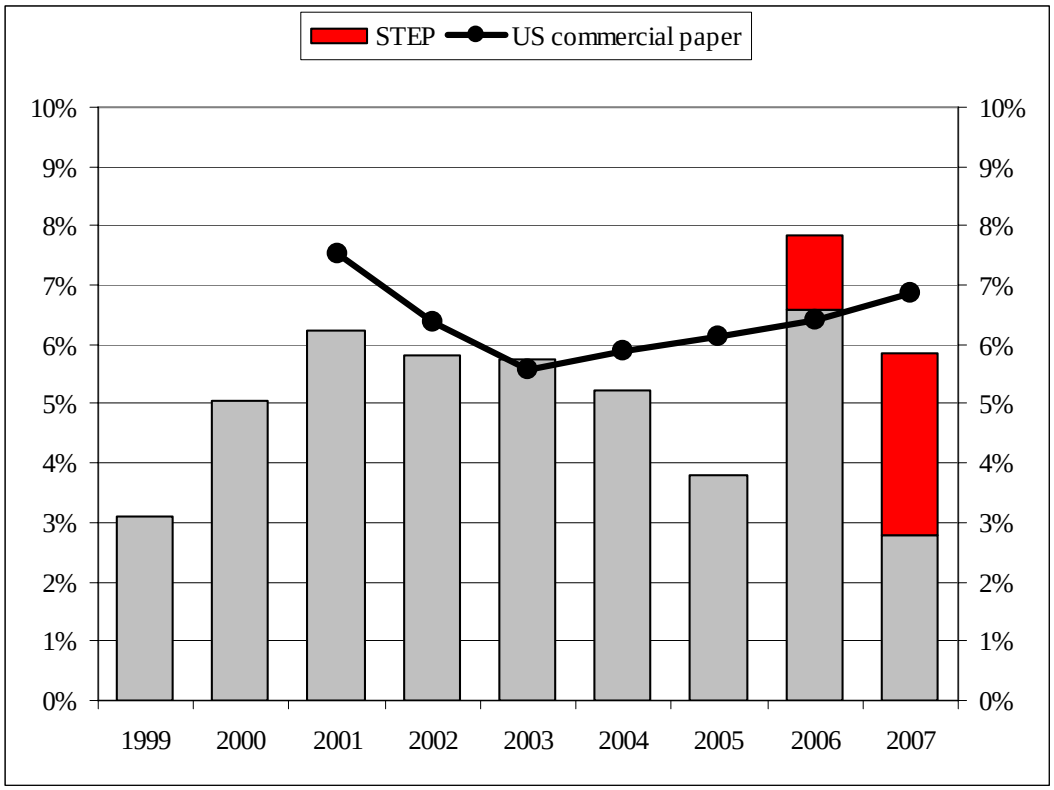
Source: WFE, IMF, ECB, Datastream, Eurostat.
Note: Sum of (i) stock market capitalisation, (ii) bank credit to the private sector and (iii) debt securities issued by the private sector divided by GDP.

Figure 2: Cross-country standard deviation of unsecured interbank and repo rates across euro area countries.



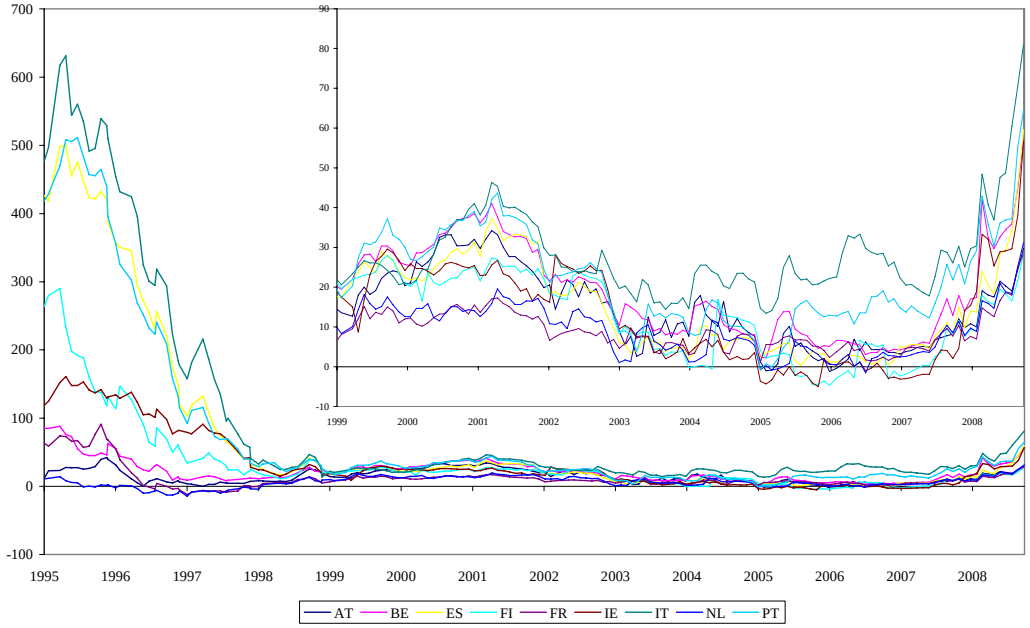
Source: ECB, http://www.ecb.int/stats/finint/html/index.en.html.
Note: Each indicator is constructed as the unweighted standard deviation of average daily interest rates (in basis points) prevailing in each euro area country. The small figure reports the indicators since the introduction of the euro.

Figure 3: Amounts outstanding of Commercial Paper in % of the GDP



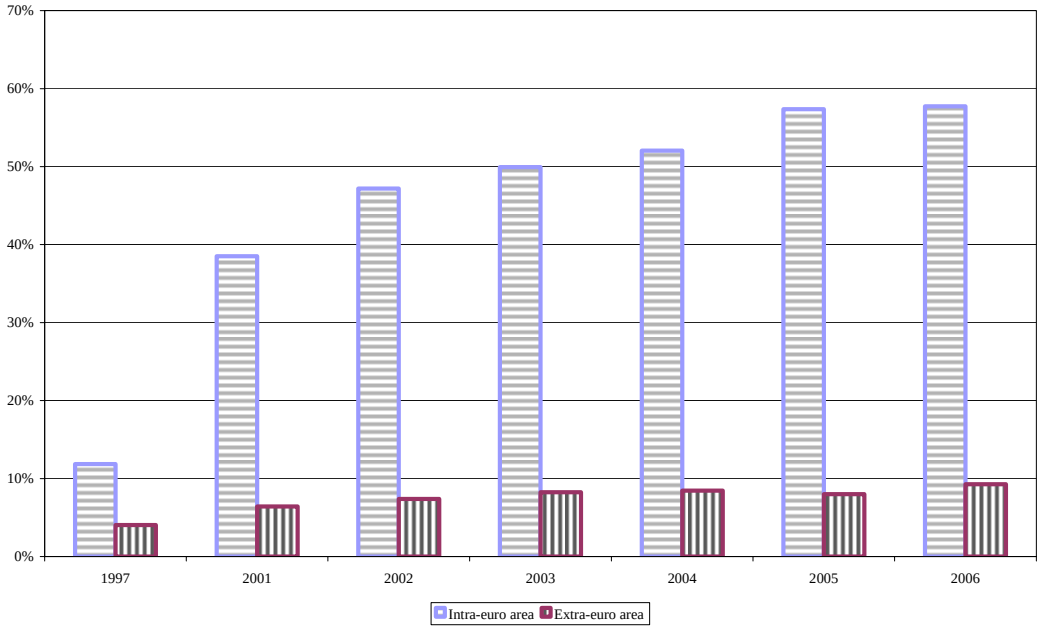
Sources: ECB, Euroclear, Banque De France, Dealogic and FED.
Note: The height of the bar for Europe is the sum of Euro Commercial Paper (ECP), and the commercial paper outstanding in the Belgian, German, Dutch, Spanish and French markets. Certificates of deposits and Asset Backed commercial paper are excluded. The red area indicates the fraction of commercial paper that has the STEP label. Since issuance in the ECP market is mainly undertaken by residents in the euro area and UK, the amounts outstanding of European commercial paper have been expressed in percentage of the sum of the Euro area and UK GDP.

Figure 4: Average monthly spreads of 10 year euro area government bonds with respect to Germany



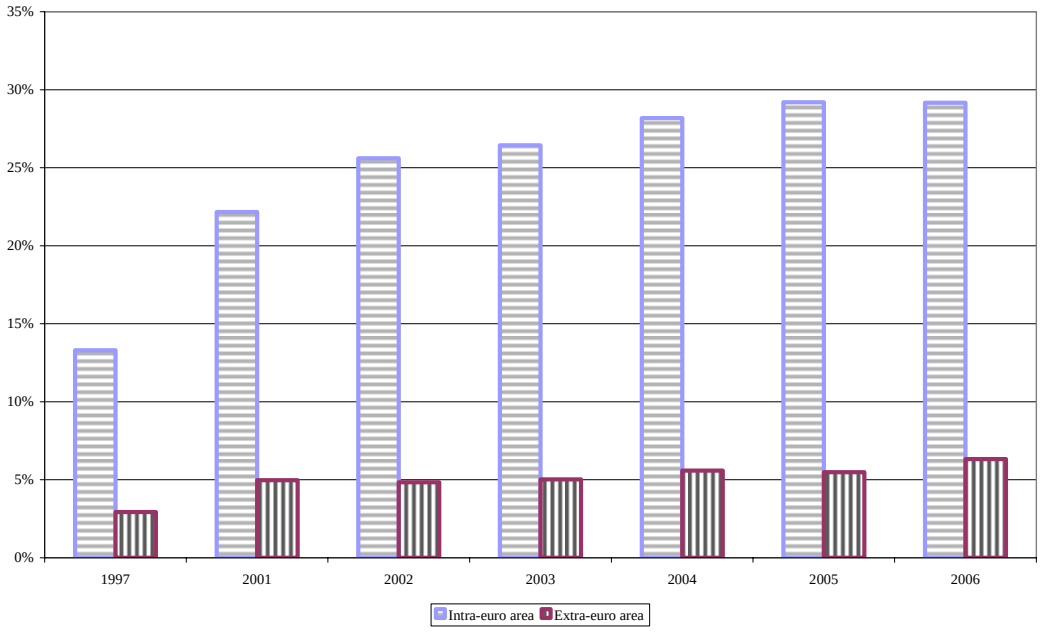
Sources: Datastream.
Note: Spreads are expressed in basis points. The small figure reports the behaviour of spreads since the introduction of the euro.

Figure 5: The degree of cross-border holdings of long-term debt securities issued by euro area residents.



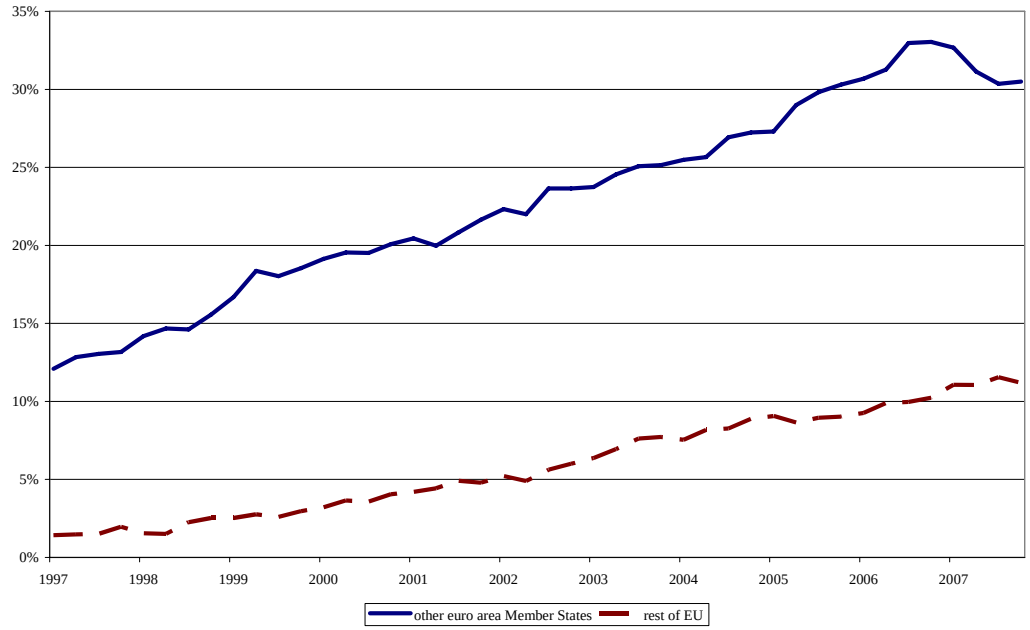
Sources: ECB, http://www.ecb.int/stats/finint/html/index.en.html.
Note: "Intra-euro area" is defined as the share of long-term debt securities issued by euro area residents and held by residents (excluding central banks) in other euro area countries. "Extra-euro area" is defined as the share of long-term debt securities issued by euro area residents and held by non-residents (excluding central banks) of the euro area.

Figure 6: The degree of cross-border holdings of equity issued by euro area residents



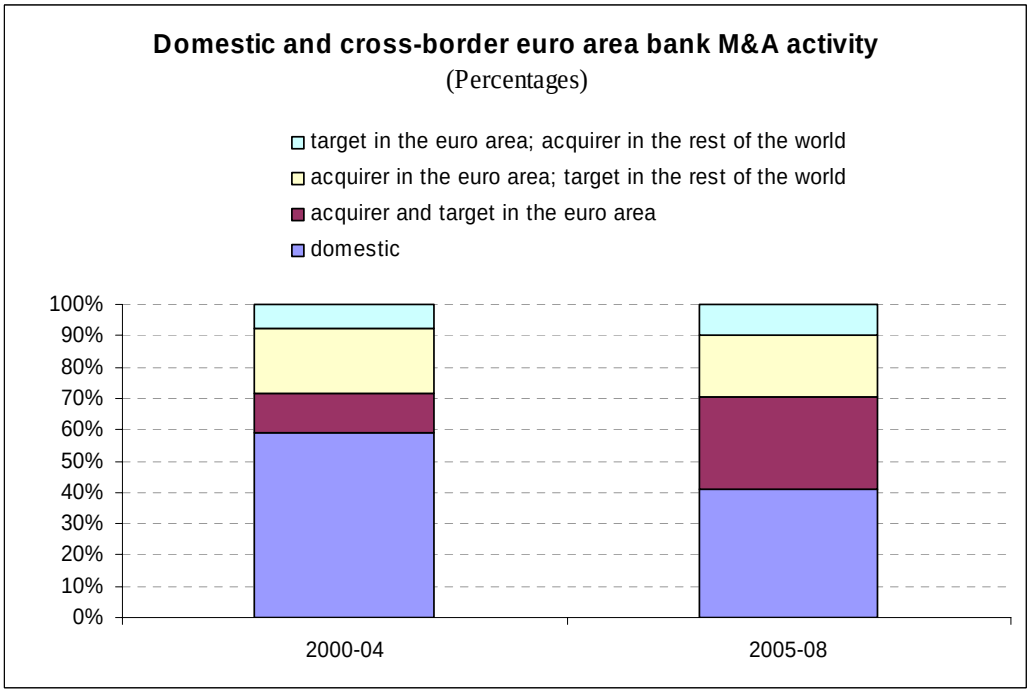
Source: ECB, http://www.ecb.int/stats/finint/html/index.en.html.
Note: "Intra-euro area" is defined as the share of equities issued by euro area residents and held by residents (excluding central banks) in other euro area countries. "Extra-euro area" is defined as the share of equities issued by euro area residents and held by non-residents (excluding central banks) of the euro area.

Figure 7: MFI holdings of securities issued by MFIs: outstanding amounts by residency of the issuer *(as a share of total holdings, excluding the Eurosystem).*



Source: ECB, http://www.ecb.int/stats/finint/html/index.en.html.
Notes: Geographical counterparty diversification of securities issued by euro area MFIs and held by MFIs in other euro area and non-euro area EU countries.

Figure 8: Domestic and cross-border euro area bank M&A activity.



Source: ECB.
Notes: Domestic deals comprise M&A deals where the acquirer and the target bank are located in the same euro area country. All acquisition transactions are taken into account provided that the resulting stake is above 10% of the share capital. 2008 data is related to the first half of the year.