Cost and Benefits of Eurozone Breakup
The role of contract redenomination and balance sheet effects in policy analysis

Jens Nordvig
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Abstract

Eurozone financial markets have stabilized since 2012. But the European monetary union continues to face significant challenges. Widespread political opposition to further European integration implies that the risk of a breakup has not been eliminated. To analyze the costs and benefit of single country exit from the Eurozone as well as full-blown breakup of the euro it is necessary to take into account both real and financial effects. Importantly, legal parameters that will guide currency redenomination at the micro/contract level also turn out to be key determinants of the balance sheet effects at the macro level. I present a comprehensive framework - based on legal analysis - for redenomination of contracts, ranging from cash instruments to derivatives. I then aggregate the key insights to the macro level. To quantify the balance sheet effects involved in exit from the Eurozone, I create a database of the relevant external exposures for each Eurozone country. One specific implication of the analysis is that the negative balance sheet effect associated with exit from the Eurozone is much larger for Spain than for Italy, even if Italy's headline public debt level is higher than Spain's.

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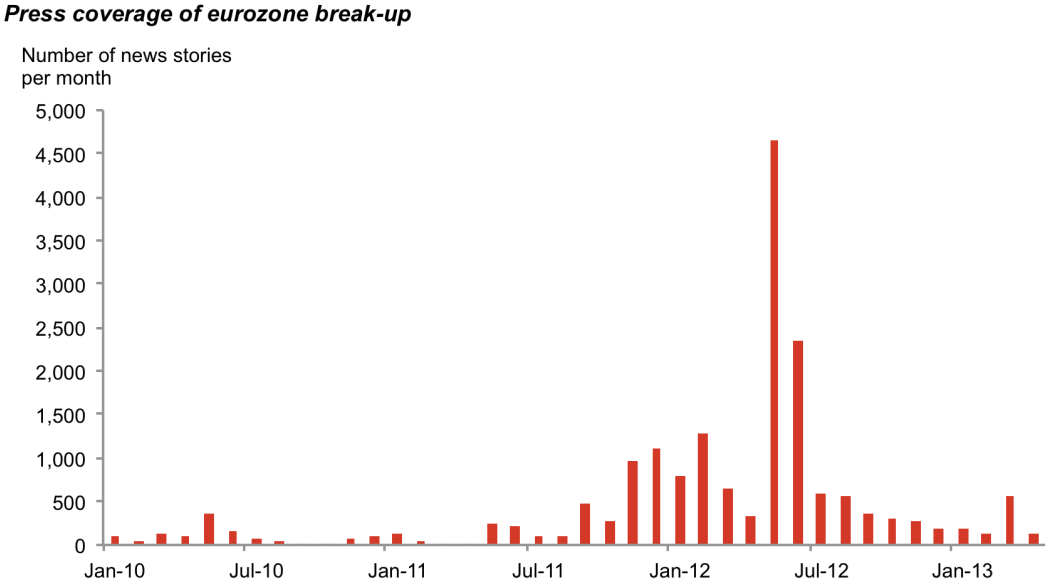
The author is affiliated with Nomura Securities International, Inc. Worldwide Plaza, 309 West 49th Street, New York, NY 10019 and the Department of Business and Economics, University of Southern Denmark, Campusvej 55, DK-5230 Odense M, Denmark. Contact details: jnordvig@me.com. The author would like to thank the judges in the 2012 Wolfson Economics prize competition for feedback on earlier papers on this topic as well as Thomas Barnebeck Andersen, Wouter Schmit Jongbloed, Nikolaj Malchow-Møller and Kai Schaffelhuber for feedback on the current paper. All remaining errors are mine.

1. INTRODUCTION

In its first ten years, the Euro was generally perceived as a success. Very few market participants or academic researchers thought about breakup of the common European currency as an issue of practical relevance.

That has changed since 2010. The Eurozone experienced intense market instability from 2010 to 2012 and a potential breakup of the Euro has been discussed increasingly openly. The debate has often taken place in the context of a possible Greek exit from the European common currency. But other countries have also been viewed as close to exit too at some point during the crisis period, including Portugal, Spain and even Italy.

Figure 1: Mentions of Eurozone breakup in the news



Note: Shows number of stories with keywords "Leave", "Exit", and "Breakup" in the context of the euro that are available on Bloomberg and that come from over one hundred authoritative global sources.

Since the summer of 2012, when the ECB announced its Open Market Transactions (OMT) program to backstop the region's sovereign bond markets, we have observed a substantial calming of Eurozone financial markets.[1] As a result, fears of disorderly sovereign defaults in the Eurozone and 'accidental' breakup of the Euro have been reduced, as evidenced by the dramatic compression in sovereign spreads in the Eurozone since the summer of 2012.[2] For example, Spanish sovereign 10-year bond spreads (relative to German bunds) spiked to more than 500bp in the summer of

[1] Various steps taken towards creating a banking union have also played a role in reducing perceived and actual systemic risk.

[2] Even so, an exit by Cyprus was discussed as recently as in the spring of 2013, when the island's banking system was on the verge of collapse and unprecedented capital controls were imposed to avoid destabilizing capital flight.

2012, but have since receded to a level of less than 200bp by September 2014. The compression in sovereign spreads in Greece, Ireland and Portugal has been even more pronounced.

Nevertheless, the debate about the Eurozone's future and its viability goes on. While financial market tension has been reduced, the level of unemployment remains at a record high in many Eurozone countries, and the economic and political vulnerability associated with the continued absence of fiscal and political union to underpin the currency remains.

Importantly, there is no strong political support for significant further European integration (beyond the banking union now under way). This implies that there is little near-term prospect of substantially reducing the remaining sources of weakness in the common currency area, Nordvig (2013). The Eurozone will have to live without any meaningful cross-border fiscal transfer capacity for years to come, and domestic fiscal policy is constrained by high debt levels and institutional restrictions on deficit spending.[3] Against this background, economic downturns within the region are likely to be more pronounced in the Eurozone than in currency unions with a more powerful centralized fiscal capacity, such as the USA. This economic underperformance has been evident again in 2014, in that Eurozone growth has again disappointed.

The institutional weakness in the Eurozone is a source of tension between countries and a source of political risk. The brewing political tension is visible in that non-centrist political forces (opposing either the Euro, the EU, or both), are gaining traction in a long list of countries.[4] These political forces are actively calling for separation rather than integration. The strong showing of Euro-skeptic parties in the European parliamentary election in May 2014 is a further example of this.

Reasonable people can disagree on their subjective assessment of the probabilities involved. There is really no single reliable way to estimate the risk of a Eurozone breakup. Ultimately the outcome will depend on the complex interaction between economic, political and sociological forces; and different commentators and analysts have differing views on those dynamics. But I think it is fair to argue that the risk remains non-negligible even after the police steps taken over the last few years. For this reason, it is a scenario policymakers should consider and develop contingency plans for.[5] Hence, it is worth thinking it as objectively as possible, and to develop

[3] Those constraints were originally embedded in the Maastricht Treaty, but have been strengthened in the so-called Fiscal Compact, which was implemented during the Euro-crisis.

[4] The list of countries includes France (Front National), the Netherlands (the Freedom Party), Italy (the Five-Star Movement), Greece (SYRIZA), and Finland (Finns Party, formerly True Finns). Even in Germany, which has historically been uniformly pro-European across the political spectrum, an anti-Euro party (Alternativ für Deutschland) is gaining momentum.

[5] Recently, the press has reported that the UK, Ireland and the Netherlands have indeed done comprehensive contingency planning for a Euro breakup during the height of the Euro-crisis. This shows that it is a risk that policy makers have taken seriously in the past. This goes to show that there is a need for the best possible analytical framework. Example here:

the best possibly framework for analyzing cost of benefits associated with the breakup scenario.

Still, detailed macroeconomic analysis of the cost and benefits of actual exit from the Eurozone remains surprisingly scarce, Nordvig (2012d).[6] The analysis, which has been done previously, is often theoretical and overly simplistic, focusing on the positive trade effects associated with currency depreciation rather than a more holistic evaluation of cost and benefits. Moreover, analysis and commentary in the area frequently fails to take into account important legal aspects of exit and currency redenomination.[7] Linked to this, the balance sheet effects associated with exit and currency depreciation are often not given sufficient attention, although they in reality have potential to dominate the more mainstream (real) effects through trade (as the Asian crisis taught us).[8]

In this paper, I attempt to fill several gaps in the literature. First, I present a comprehensive framework, based on legal analysis, for thinking about redenomination of financial assets and liabilities in a scenario of exit from the Eurozone. Second, I present a method to pinpoint the relevant components of the international investment position by categorizing each line item according to its governing law/jurisdiction characteristics. Third, I derive a breakdown (by local law and foreign law) of exposures in the form of debt securities (i.e. bonds) from a database of more than four hundred thousand bonds issued by Eurozone residents. Fourth, I illustrate (using data for Spain and Italy) how the conceptual framework and the empirical estimates of relevant external exposures can be used to evaluate macroeconomic balance sheet effects associated with exit from the Eurozone.

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http://mobile.reuters.com/article/idUSL6N0MI2JT20140321?feedType=RSS&irpc=932

[6] Various think tanks and consultancies have very recently made some progress towards conducting actual cost-benefit-analysis of exit. See for example the recent research from the European Solidarity Manifesto on www.european-solidarity.eu, and Capital Economics analysis of Dutch Exit from the Euro, and Libera (2014) on Finnish exit from the Euro. However, complete balance sheet analysis (a key feature of the cost side of exit), is still often missing from such analysis.

[7] A good example of commentary ignoring legal constraints, and focusing on a 'theoretical' economic solution to the Euro-crisis and policy prescriptions that may be legally impossible includes Jacomb (2012).

[8] The importance of balance sheet effects in business dynamics have been discussed at least since the 1990s. Bernanke, Gertler and Gilchrist (1996) used the term *the financial accelerator* to describe the importance of corporate credit constraints in economic downturns. Kiyotaki and Moore (1997) showed the importance of imperfect credit markets in exacerbating macroeconomic fluctuations. Meanwhile, the role of balance sheet effects in connection with currency depreciations has been discussed intensively in connection with the Asian crisis. For example, Krugman (1999) suggested a 'third generation' currency crisis model to explain economic dynamics during the Asian crisis emphasizing weakness of corporate balance sheets as a result of unexpected and large currency depreciations.

The paper is structured as follows.

In section 2, I review the legal aspects of money and implications for currency redenomination (the change from one currency to another). This section includes a review of literature on currency redenomination, including the few papers written on currency redenomination in the context of Eurozone breakup.

In section 3, I discuss the various types of breakup of the Eurozone, differentiating between a partial breakup (where the Euro lives on in some form) and a full-blown breakup (where the Euro ceases to exist altogether). A key insight is that in a partial breakup, the governing law and jurisdiction of financial contracts are crucial to whether an instrument can redenominate into new local currency, or whether it will stay in Euro.

- If a contract is governed by local law and under local jurisdiction: Redenomination into new currency is often possible.
- If a contract is governed by foreign law and under foreign jurisdiction: The obligation will likely stay in Euros even after Eurozone exit. [9]

In section 4, I analyze the most important classes (from cash to derivatives) of financial instrument one by one, in order to pinpoint how each type of instrument would behave in a Eurozone exit scenario. I classify instrument according to whether they are local law category, foreign law category, or hybrid category (bonds can be either local law or foreign law).

In section 5, I map the insights at the micro/contract level into the line items of the international investment position. This allows macroeconomic analysis of balance sheet effects following Eurozone exit. The end result is a simple formula defining the relevant external exposures at the macro level. I.e. the exposures which behave as foreign currency liabilities after exit and have potential to generate negative balance sheet effects as a result of depreciation of the new local currency.

In section 6, I present a method for calculating the proportion of local and foreign law exposures of the bond exposures (which are hybrid in nature in terms of governing law/jurisdiction). The end result is a database of relevant external liabilities for 11 major Eurozone countries (the main countries featured in the debate). Information of this nature has previously been unavailable since official sources entirely ignore the legal dimensions of countries' external exposures.

[9] In the past, this governing law parameter, hidden within legal contracts (or perhaps not even explicitly specified), has been viewed, including by market participants, as an obscure detail, which generally was irrelevant, except in instances bankruptcy. The lack of awareness of important legal aspects of certain assets and liabilities helps explain why economists have generally been overlooking this dimension's practical importance in the context of analysis of breakup of the Eurozone and currency redenomination.

In section 7, I illustrate how the basic method of analysis and the empirical estimates of relevant exposures can be used to quantify balance sheet effects associated with exit from the Eurozone for Spain and Italy.[10] I also show that the relevant external exposures are generally very large relative. In particular, I compare the exposures to those in place in emerging markets ahead of currency crises over the last 20 years. This comparison suggests that the economic impact of the balance sheet effect could be even bigger than has been observed in emerging markets historically for some Eurozone countries.

Section 8 concludes, highlighting the importance of incorporating quantitative estimates of balance sheet effects in a comprehensive cost-benefit analysis of exit from the Eurozone.

2. LEGAL ASPECTS OF MONEY AND CURRENCY REDENOMINATION

Countries do not change their currency often. But if you go back long enough in history, you will realize that there are plenty of examples of governments deciding on redenomination from one currency to another.

In Nordvig and Firoozye (2012b), I presented a list more than sixty examples (in the period since 1918) of exit from currency unions (or full-blown breakup of currency unions). This list includes famous episodes, such as the dissolution of the Austro-Hungarian Empire (1918), the split of Czechoslovakia (1992) and the breakdown of the Rublezone (1991-94), as well as a considerable number of more obscure examples.[11]

In addition, there are countries, which have changed from one currency to another on a unilateral basis and for internal reasons, typically to deal with a severe inflation problem. For example, Germany addressed its hyperinflation issue in the 1920s by introduction of a new currency. Similarly, Brazil introduced the current currency (the BRL) in 1994 to fight inflation.

Currency redenomination is generally triggered by economic or political events, such as a severe inflation problem and/or a desire for economic and political independence. But while the catalyst for the change is generally economic or political, there are certain legal aspects of a shift from one currency to another that feature prominently in the transition regardless of the specific circumstances. These considerations are likely to be crucial in the context of exit from the Eurozone. In particular, as we discuss in detail in the following sections, certain legal aspects of

[10] Since Spain's external liabilities has a higher proportion of foreign law instruments, the balance sheet effects associated with currency depreciation in an exit scenario has potential to be bigger, even if Italy's government debt is substantially larger than Spain's

[11] Lately, the topic of currency redenomination has resurfaced in the context of Scotland's referendum on independence from the United Kingdom, which could involve adoption of a new Scottish currency.

contracts, such as the contracts underpinning bonds, will be an essential determinant of certain macroeconomic effects associated with exit.

It is instructive to take a step back, and think about the legal aspects of money, and how redenomination would work in the context of the Eurozone, given that adoption of the Euro was supposed to be 'irrevocable'[12].

2.1 Legal aspects of money and the lex monetae

Various forms of fiat money (notes, coins, deposits, etc.) are essentially financial contracts governed by certain laws. Legal tender laws stipulate that a certain currency is legal tender in a given jurisdiction (and that other currencies are not[13]). Meanwhile, banking laws lay out the rules for money in the form of deposits.

The legal aspects of money have been discussed in detail by Mann (1960) and various compilations of his analysis, Proctor (2005) and Proctor (2012). A key concept in this literature in relation to possible redenomination is the *lex monetae* or "the law of money". In simple terms, this principle establishes that *sovereign nations have the internationally recognized right to determine their legal currency* and hence the right to implement redenomination in certain contingencies.

Moreover, there is case law dating back to the 1920s applying the principle in an international context. A prominent example is the German redenomination in the inter-war period:

"…when Germany replaced the Mark with the Reichsmark in the 1920s, courts of other countries enforced re-denominated contracts because they resolved the matter under German law, the lex monetae.", Scott (1998, p. 223).

As it happens, the *lex monetae* principle was also utilized in connection with establishment of the Euro, as highlighted by Duisenberg (1999). At the time, the lex monetae principle allowed orderly redenomination of national currencies (and instruments denominated in ECU) into Euro in 1999 because it was internationally recognized that sovereign nations have control of their currencies, and have the right to implement redenomination into new currency.

2.2 Redenomination in the context of Eurozone breakup

The literature concerning currency redenomination in the context of the Euro is naturally younger than the more general discussion about legal aspects of redenomination, which dates back at least half a century.

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[12] Irrevocable was the term used to describe the new fixing rates at the introduction of the Euro in 1999. See http://www.ecb.europa.eu/press/pr/date/1998/html/pr981231_2.en.html

[13] For example, by law, the grocery store has to accept your Euro notes and coins as payment for goods. But the store located in the Eurozone has a right to refuse payment in various other means, such as bitcoin or Japanese Yen.

Scott (1998) was the first to discuss the issue of redenomination in a Euro breakup. He touched explicitly on redenomination of contracts in the context of both a partial or complete breakup of the Euro. [14]

In the following ten years, when the Euro was perceived by most to be a success, there was almost no focus on the risk of breakup and related redenomination issues. An exception is Eichengreen (2007), who discusses a possible Euro breakup. He makes the point that redenomination will have to be comprehensive (spanning the majority of financial instruments) to avoid negative balance sheet effects for specific domestic economic agents. [15] That said, the discussion by Eichengreen is entirely conceptual and focusing on micro-level balance sheet effects, and there is no attempt to quantify any of the effects involved.[16]

In parallel with the discussion about the legal aspects of redenomination of contracts, there has been a debate about the legal aspects of institutional arrangements around exit from the European Union and exit from the Eurozone. A prominent example is a paper by Athanassiou (2009), which was controversially published as a European Central Bank Working Paper (although the views expressed were not official views of the ECB).

The focus of the debate, both within the economics and legal professions as well as in popular media, shifted dramatically following the outbreak of tension in Eurozone markets in 2010. [17] Since then, a large number of briefing notes by international law-firms have been published, all aimed at guiding market participants on how to think about 'redenomination risk' for certain assets and liabilities. I will refer to those contributions in sections 3-4, where I synthesize the legal consensus about redenomination (they are also summarized in Appendix A).

However, it is worth noting that these legal papers all have a 'micro focus'. They are aimed at addressing legal questions at the contractual level in order to quantify risks for certain financial market participants, which have specific exposures at stake. These contributions are *not* aimed at facilitating macro-level analysis, nor do they focus on making normative statements about the right direction of policy. The

[14] Partial breakup describes the situation in which one or more countries leave the Euro, while the rest continue with the Euro, more or less as before. Complete (or full-blown) breakup of the Euro, describes a situation where the Euro disappears altogether, and all countries shift to new currencies in some form.

[15] If the redenomination is done selectively (does not involve all assets and liabilities), there would invariably be domestic agents that would suffer substantial losses from redenomination of assets (but receive no relief on their liabilities). Eichengreen may have been the first to highlight the possible balance sheet effect associated with breakup and currency depreciation following exit from the Eurozone.

[16] In the context of exit from the Eurozone, negative balance sheet effects would arise from the combination of A) depreciation of the new local currency, B) a structure of external liabilities, which means that a large share of the liabilities cannot be redenominated into new local currency, and hence stays in hard currency (Euro), which is harder to repay for creditors with revenue/income in depreciated local currency.

[17] One could argue that the crisis started in late 2009, when the newly elected Greek government restated fiscal accounts, and credit rating agencies responded with downgrades of the sovereign. But the broader turmoil in Eurozone financial markets only appeared during 2010.

following sections will try to bridge the gap between the legal insights at the micro level and conducting macro and policy level analysis of the controversial topic of Eurozone exit.

3. REDENOMINATION IN A PARTIAL AND FULL-BLOWN EUROZONE BREAKUP

In theory, there is a myriad of possible types of breakup of the Eurozone ranging from a single country leaving the monetary union to the Euro disappearing altogether (with all Eurozone countries moving to new national currencies or to newly created currency unions)[18].

In relation to building a framework for redenomination of contracts in various breakup scenarios, it is useful to distinguish between a partial breakup and full-blown breakup.

The partial breakup is conceptually easier to think about, and it is probably also the more relevant scenario to think about from a policy perspective. There are several countries, which could conceivably consider exiting (Greece, France and Finland, for example). Meanwhile, it is harder to imagine a full-blown breakup. Core Eurozone countries (including Germany) have shown great commitment to the project of the common European currency. Given core countries' relative economic strength and political weight, it indicates that the possibility of full-blown breakup is a considerably lower risk from a practical perspective. For completeness, however, we include the discussion of the issues around the full-blown breakup below.

3.1. The full-blown breakup of the Eurozone

In a *full-blown breakup*, all countries within the Eurozone move away from the Euro to new currencies, and the Euro ceases to exist as a currency. In this situation, the *lex monetae* principle would likely play a dominant role from a legal perspective, as each country would be forced to decide on how to manage its currency going forward, Scott (1998) and Scott (2011).

Assets and liabilities with a clear nexus to a given country, such as those under local governing law and local jurisdiction, would therefore almost certainly redenominate into the new national currencies of Eurozone countries, Proctor (2010). Initially, the conversion rate between the Euro and the new local currency would be stipulated in the new monetary law (legal tender law). But the exchange rate (relative to the US dollar and other global currency) would likely be determined in the market (rendering the initial conversion rate less important).

[18] The idea of a Northern and Southern Euro fits in this category, see Bootle (2012).

In any case, since the Euro ceases to exist, some form of redenomination would have to take place, by definition (at least from a settlement and payment perspective). But what would happen to international assets and liabilities governed by foreign law in a situation where the Euro ceases to exist? This is a question, which does not have an easy legal answer, as pointed out both various academics, major law firms and financial market analysts. [19]

For example, what would happen to a loan denominated in Euros extended by a US investment bank to a Polish corporation? Would it be redenominated into Polish Zloty? Would it be redenominated into US dollars? Or would it redenominate into some other currency and what would the exchange rate of the conversion be? In a full-blown breakup, there are no easy answers.

Some legal experts have suggested that obligations without a clear nexus to a given Eurozone country, such as international financial contracts governed by English or New York law, could potentially be converted to pound sterling or USD, depending on what the courts in the relevant jurisdiction decide. [20] But this is a controversial issue.

The exposures in question may seem obscure, and of limited practical relevance. But that is far from the case in reality. Since the Euro is the world's second reserve currency, trillions worth of such 'internationally governed Euro exposures' are currently outstanding. [21] It is certainly not a minor issue.

The lack of a logical answer and the absence of legal precedent to the redenomination question in the full-blown breakup (including absence of any relevant case law) would almost certainly lead to widespread legal disputes. Counterparties to trillions worth of financial instruments would try to get courts to rule in their favor.

One would expect that creditors would seek to redenominate contracts into the more valuable currency in disputes. Creditors may seek redenomination into new German currency for example, by trying to establish that a given contract has a legal nexus to Germany. Their goal would simply be to ensure asset values as high as possible. Meanwhile, debtors would have an incentive to see their liabilities redenominate into a less valuable currency. They may seek redenomination into

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[19] Examples of articles making this point include: Eichengreen (2007), Scott (1998), Allen & Overy (2011), Slaughter & May (2012), Deloitte (2012), Clifford Chance (2012) and Nordvig et al. (2011).

[20] According to Proctor (2011) and Proctor (2012), if payment cannot be made in EUR, English law contracts must be settled in sterling [Libyan Arab Foreign Bank v Bankers Trust Co (1987)]. Similarly ART 3-107 of Uniform Commercial Code in the US contemplates payment of foreign currency amounts by tender of equivalent amounts of US Dollar. In both cases, should the EUR cease to exist, it is likely courts would use the last available exchange rate.

[21] For example, there are hundreds of billions worth of syndicated loans in Euro's extended by consortia of international banks, often with participation of banks headquartered in the US, the UK and Japan. I have previously provided estimates of the magnitudes of these exposures in Nordvig and Firoozye (2012b).

new Italian lira, for example, by establishing a nexus of a given contract to Italy. Or alternatively, they may hide behind local courts and possible capital controls, impeding an efficient enforcement process. Legal disputes would follow logically from the combination of legal uncertainty and rational profit maximization (or loss minimization) at the agent level. [22]

Since there is no precedent for such a situation and since there would be a huge number of individual disputes, it amounts to a legal nightmare scenario with potential to freeze the global legal and financial system, see Nordvig (2013, Chapter 12). The cost of this extreme legal uncertainty could turn out to be very substantial. The legal costs could potentially even dominate the macro-economic effects that economists typically focus on, although providing specific estimates for this effect would be a real challenge.

Certain policies may help to reduce the legal uncertainty. Scott (1998) argues that coordination (through an EU directive) to collectively guide the process of redenomination is preferable to a case-by-case redenomination exercise (in a step mirroring how the initial redenomination into Euros in 1999 was handled).

Similarly, I have advocated - see Nordvig et al. (2011) and Nordvig and Firoozye (2012a, 2012b) - for guidance on redenomination by EU directive to reduce legal uncertainty and related economic cost. Specifically, I have suggested a relatively simple general formula for redenomination using an accounting unit that I call the ECU-2. [23] This concept would serve to make the process relatively simple (one rule for a large group of contracts) and reasonably fair (as the value of the ECU-2 would be a weighted average of new national currencies). As such, the standardized redenomination process would both help to reduce legal uncertainty and minimize litigation (and the cost associated with litigation). In addition, a less disruptive redenomination process would help to avoid the most random valuation gains or losses for financial market participants (deriving from unpredictable court rulings), reducing the amount of unnecessary bankruptcies linked to ex post (after Exit) open currency exposures.

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[22] For example, imagine an example where the Eurozone breaks up in its entirety and an Italian legal tender law seeks to redenominate Euro obligations into new lira obligations at an exchange rate of 1:1. After exit, the new Italian currency would likely depreciate. In Nordvig (2013, Chapter 13) I have estimated by 20-30%. While the new German currency my appreciate 10-20% relative to the 'old' Euro (and hence up to 40-50% versus the new Italian currency). Hence, a German bank, which has lent into an Italian corporate in Euro, would have a strong incentive to seek repayment in new German currency (or some form of basket concept, ECU-2 perhaps, which would proxy the value of the Euro). Meanwhile, the Italian corporate borrower would have an incentive to repay the loan in new Italian currency, which will trade at a large discount to the new German currency in the market.

[23] This process would need an EU directive saying that all international law Euro exposure (without a clear nexus to a given Eurozone country) would be valued according to the value of the ECU-2, which is defined as a weighted average – based on GDP weights – of the market value of the new national currencies of previous Eurozone member countries. Settlement of ongoing payments (coupons etc.) and principal on such contracts can happen in any convertible new national currency of previous Eurozone member countries with the exchange rate determined by the market exchange rate between the national currency and the ECU-2 basket. Hence, the ECU-2 would be a vehicle for efficient redenomination rather than a new currency as such (it would be a basket currency concept, similar to the IMF's SDR).

Nevertheless, it would be naïve to think that widespread legal disputes could be entirely avoided in the full-blown breakup scenario. [24] There are trillions worth of international deposits, loans and bonds denominated in Euros. There are hundreds of trillions worth of derivatives exposures, denominated in Euro's and predominantly governed by English law and New York law. Even the best effort to provide centralized guidance on redenomination would likely be insufficient to avoid an explosion in disputes between financial market participants around contract redenomination.

3.2. The partial breakup of the Eurozone

In a *partial breakup*, a single country exits the Eurozone. The remaining countries, however, continue to use the Euro, more or less as before. [25] The key point is that the Euro lives on, even after exit (or exits) has taken place.

The partial breakup is fundamentally different from the full-blown breakup in that redenomination may not be necessary or possible for certain contracts and instruments. Since the Euro lives on in some form, there is the possibility that contracts can continue to be denominated and serviced in Euros. They key question is to determine in the partial breakup is, which specific instruments will redenominate into new currency and which will stay in Euro.

3.2.1. What to do when there is more than one lex monetae

The lex monetae principle, as mentioned in section 2.1, is more difficult to apply in the partial breakup scenario, given that there are two competing lex monetae (the country's own, and the European Union's). [26]

Hence, in this situation, it would mainly be a matter of the so-called *law of the contract approach*. One cannot simplistically infer that one of the two lex monetae would uniformly dominate. Neither the EU's lex monetae nor the new local lex monetae would universally win out.

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[24] This view is common among market commentators. One example is Wolf (2014).

[25] A situation with several countries leaving could then be seen as a process of sequential exits.

[26] This point has been made by Norton Rose Fulbright (2012) and Proctor (2010), for example. There may be situations, even in a partial breakup, where the lex monetae principle is simpler to apply. This includes 1) contracts, where the Euro is defined as the currency of country X from time to time, rather than the currency of the member states within the EU using the Euro, 2) contracts, which were initiated before Euro adoption (in 1999, for the original Eurozone members), so that the original currency was the legacy currency of country X, rather than the Euro. Such obligations would be easier to convert back to new local currency using the lex monetae approach. But such contracts are exceptions.

For example, Procter (2010) states that:

> *"This question [of redenomination] must, in turn, depend upon the original, contractual intention of the parties, and this will be determined by reference to the law applicable to the contract as a whole"*

Scott (2011) makes a similar observation (in the context of Greek exit from the Eurozone):

> *"…one possible law of the currency — Greek law — would permit redenomination, while another possible law of the currency — E.U. law — likely would not. As Mann recognized, the very concept of lex monetae is unhelpful when the 'question is which of two competing laws of the currency shall prevail'…".*

3.2.2. The law of the contract approach to redenomination

Based on the reasoning above, the key legal issue to consider then becomes the governing law and jurisdiction of an obligation, as stipulated either explicitly in the contractual text underpinning it, or as inferred by the broader context of the financial arrangement.

The *governing law* parameter refers to which set of laws apply to a given contract. The *jurisdiction* refers to which courts should decide in a dispute (or whether disputes are submitted to arbitration).

Since this is an important point, it is noteworthy that there seem to be a consensus within the legal profession that the governing law and the jurisdiction pertaining to a given contract would play a key role in determining the likelihood of redenomination in a Eurozone exit scenario.

In Appendix A, I have collected statements on this topic from eight international law firms based on their published memo's on redenomination risk. Specifically, the papers quoted are Ashurst (2012), Allen Overy (2012), Slaughter & May (2011b), Field Fisher Waterhouse (2012), Norten Rose Fullbright (2012), Clifford Chance (2012), Edwards Angell Palmer & Dodge (2011), and Linklaters (2012)

While, the specific wording differs slightly from firm to firm, they all stress the importance of governing law and/or jurisdiction of contracts as key parameters determining whether certain obligations would redenominate into new national currency (or stay in Euro) in a partial breakup scenario.

We can summarize the basic conclusions on the role of governing law and jurisdiction in a Eurozone exit (partial breakup) as follows:

- If an obligation is governed by the local law and under the jurisdiction of a Eurozone country, which is exiting the Eurozone, then that sovereign state is likely

to be able to convert the currency of the obligation from EUR to the new local currency through a new currency law. [27]

- If an obligation is governed by foreign law and under foreign jurisdiction, then the country, which is exiting the Eurozone, cannot by its statute change a foreign law, and redenomination is therefore more problematic, and considerably less likely.

For example, Italian bonds (both corporate and sovereign) issued with reference to Italian governing law and under Italian jurisdiction, are highly likely to be redenominated into a new Italian currency, if Italy exits the Eurozone. [28] On the other hand, so-called Euro-bonds issued by an Italian corporate in international markets, typically using English law and under the jurisdiction of English courts, would not be easy to redenominate. Such obligations may well stay in Euro's regardless of the policies of Italy with respect to a new currency.

3.2.3. Caveats to using the law of the contract approach

Since there are millions of different contracts underlying the Eurozone's financial system (and its real economy), there are many possibilities for exceptions to the general rule. I will focus on four caveats to the basic conclusion from the law of the contract approach: 1) the situation where the governing law/jurisdiction is not explicit; 2) the distinction between unilateral and multilaterally agreed exit from the Eurozone; 3) the situations involving insolvency and local proceedings; and 4) the situation in which the governing law and jurisdiction do not coincide.

Caveat #1: One specific caveat derives simply from the fact that the governing law is not always explicitly stated in the underlying legal documentation of a given contract. In those cases, the governing law needs to be inferred by 'center of gravity' tests, Allen & Overy (2012). These tests may involve parameters such as place of payment and the location of parties to the contract. [29] It follows that such tests may not yield a conclusive determination of whether local or foreign law applies.

Caveat #2: Beyond the governing law dimension*, the method for break-up* (as mention in Section 2.2) may be a key determinant of whether certain liabilities can be redenominated, and crucially whether international courts will recognize and respect the redenomination.

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[27] Note, the ability to redenominate, from a legal perspective, does not mean that it will be the preferred economic choice in all circumstances. For example, in the hypothetical situation of German exit from the Eurozone, which would presumably be associated with appreciation of the new German currency relative to the EUR, one could argue that it would be in Germany's interest to keep certain obligations in EUR. For example, the burden of government debt would be lower, if government debt would be kept in (weaker) Euro currency.

[28] This is the case, both because it would seem legally feasible, and because it would be in Italy's best economic interest to service its debt in a depreciated new Italian currency, rather than the stronger Euro, although, as we will argue in section 8, balance sheet effects, including in the private sector, should be incorporated in the analysis, both from a financial stability and growth perspective.

[29] In connection with the Eurozone, there are certain rules on this topics embedded in the Rome Treaty dealing with the issue of the applicable law for contracts.

Specifically, is the method a legal or a multilateral framework, or is it done illegally and unilaterally? It may be important to distinguish between lawful and consensual withdrawal versus unlawful and unilateral withdrawal[30].

- Unilateral withdrawal and no multilaterally agreed framework for exit: foreign law contracts are highly likely to remain denominated in Euros, and English courts are highly unlikely to rule in favor of redenomination even if the lex monetae is determined to that of the exiting country[31].
- Exit is multilaterally agreed: there may be certain foreign law contracts and obligations which could be redenominated into new local currency using the Lex Monetae principle (as the multilaterally agreed exit would entail the admission that the new local tender law is indeed internationally valid), if the specific contracts in question have a very clear link to the exiting country. However, the large majority of foreign law contracts and obligations (generally used for international purposes) are likely to stay denominated in Euros.

Caveat #3: Up to this point, we have discussed the legal aspects of redenomination, without placing much weight on insolvency issues. From a practical perspective, however, solvency may be in question (as a function of redenomination or due to other factors). In these situations, it becomes an issue of enforcement, and if the debtor has local assets, such enforcement may involve local insolvency proceedings. In this case, the external law on the financial instrument in question would provide less protection for the creditor. [32]

This caveat could turn out to be a very important consideration for specific creditors with investment in certain financial instruments governed foreign law, but lacking a robust enforcement mechanism locally.

Importantly, this situation would arise in situations of sovereign debt restructuring. A debt exchange (or other form of default) is often implemented in conjunction with implementation of capital controls. The purpose of the controls would be to shield domestic debtors (including the sovereign itself) from the demands from foreign creditors. In general therefore, this would be of special importance if the exiting

[30] Schaffelhuber (2012) specifies under what circumstances a withdrawal from the Eurozone can be lawfully accompanied and facilitated by exchange control regulations, which may be crucial to financial stability after exit, and to what extent such exchange control regulations will be enforced by the courts of other EU member states.

[31] Proctor (2010) states it as follows: "…if Greece had withdrawn from the eurozone without the consent of the other Member States and in breach of the terms of the TFEU, then it would be manifestly contrary to English public policy to give effect to a new Greek monetary law passed in flagrant disregard of treaty obligations owed to the UK itself; and the net result seems to be that at least so far as an English court is concerned, the substitution of the new Greek drachma for euro obligations will only be recognized and enforced…if (i) Greece supplies the lex monetae of the contract and (ii) Greece's withdrawal from the eurozone occurred on a lawful and consensual (as opposed to a unilateral and unlawful) basis."

[32] In addition, as pointed out by Field Fisher Waterhouse (2012), there is the possibility that local parties to a dispute would attempt to submit a case to local court, even if the jurisdiction specified in the contract is a foreign one. This should not be permitted within EU law, but in an exit scenario, perhaps particularly a unilateral exit, it is unclear that the basic rules of jurisdiction within the EU would be upheld.

country has a weak commitment to fulfillment of its international obligations and is willing to shelter (sovereign or corporate) assets against execution. This relates to the special nature of sovereign workouts, in which creditors do not have recourse to a traditional bankruptcy law, as highlighted by Allen & Overy (2012b).[33]

Investors with exposures of this nature would be concerned about the overall return/loss on their investment. Whether the loss comes from redenomination (and currency depreciation of the new local currency) or a haircut from a debt restructuring (or default) is a secondary consideration.

From a macro perspective, however, and in relation to thinking about balance sheet effects, it may matter less whether enforcement issues imply that creditors will take a hit (as discussed in more detail in section 6 and 7). Regardless of whether enforcement is an issue, there is likely to be negative balance sheet effects and negative growth implications when large foreign law liabilities are involved.[34]

Caveat #4: The final caveat we will mention refers to the cases where the governing law and the jurisdiction do not overlap. In theory, there are four combinations:

A1. Local governing law and local jurisdiction	B1. Local governing law and foreign jurisdiction
A2. Foreign governing law and local jurisdiction.	B2. Foreign governing law and foreign jurisdiction

Local governing law and local jurisdiction (A1) and foreign governing law and foreign jurisdiction (B2) are the simpler cases in this matrix, and the ones I have focused on in the main text.

In most cases the governing law and jurisdiction concepts coincide (i.e. the cells A1 and B2 in the matrix above are the most common in practice), but that is not always the case, Manuelides (2013). For example, it could be that in special cases the jurisdiction is Italian (i.e. Italian courts decide), but that the governing law is a different one. There could therefore be complex cases, in which it would be

[33] Sovereign workouts, which often involve an offer to exchange the defaulted bonds for new rescheduled bonds, are not carried out in the context of a bankruptcy law that fixes the position of the parties in case of a dispute. There is no international bankruptcy regime that applies to sovereigns. For example, there are no stays on creditors, no liquidation of assets, no administrator, no ladder of priorities, no realization of assets for creditors. Instead, the law of free contract applies and the outcomes are determined by the negotiating power of the parties. The terms of the bonds are relevant, i.e. collective action clauses and governing law, but this is not all that matters in a sovereign context.

[34] In an arithmetic sense, enforcement issues and debt restructuring (explicit or implicit) will reduce the external liabilities under foreign law. But the process, by which this reduction in liabilities takes place, will in itself create legal uncertainty and related credit market tensions. The result is credit rationing in some form, which will entail negative macroeconomic effects through the credit channel. That is, large ex ante external liabilities under foreign law seem likely to trigger balance sheet effects through one channel or another. It matters less if these effects are triggered from enforcement issues, which trigger immediate credit tensions, or through currency depreciation, which trigger cash-flow tension, and credit tensions as a second round effect.

substantially more difficult to say anything clear about the likelihood of redenomination (predict which courts would decide, and what conclusion they would reach). Fortunately, this would seem to be special cases, and while important for the parties with such specific exposures, less important from a macro perspective simply because the aggregate exposures of this nature are likely to be small.

3.2.4. Lessons at micro versus macro level

In general, it is not easy to come up with simple rules for redenomination, which will provide a perfect guide for all types of obligations. There are many exceptions and caveats involved, which may matter greatly at the micro level, for the companies, banks and governments with the specific exposures on their balance sheets.

That said, from a macro perspective, there are principles that generally apply in the majority of cases and can be applied to macro level statistics to get a reasonable sense of the magnitude of certain macro-economic effects (while recognizing that the estimates will not be overly precise).

A key take-away from the legal analysis is that the governing law and jurisdiction parameters, which often coincide, will be crucial determinants of whether an obligation can be redenominated in a Eurozone exit scenario (the partial Eurozone breakup). This is particularly true when solvency risk is a secondary issue. Hence, from a macro perspective, the distribution of assets and liabilities along the legal dimension (local or foreign law/jurisdiction) will be a key determinant of balance sheet effects associated with currency depreciation, and therefore growth performance too.

In this context, it is worth noting that this discussion is more than just a theoretical analysis. The asset price movements observed during the Euro-crisis tend to confirm that redenomination risk is indeed higher on local law instruments compared to foreign law instruments, consistent with our legal insights. In Nordvig (forthcoming), I document two stylized facts about spreads between local and foreign law bonds with similar characteristics. First, spreads tend to be positive during the Euro-crisis (consistent with the legal analysis). Second, spreads tend to widen during periods of escalating tensions and heightened breakup concerns for countries where currencies would be expect to depreciate following exit (again consistent with our legal insight that a positive risk premium should be warranted).

4. REDENOMINATION AT THE MICRO/INSTRUMENT LEVEL

Having touched on the high level principles for redenomination, I now turn to look at the most important classes of financial instrument one by one. The main purpose is to make statements about how each class would behave in an exit scenario. Specifically, I seek to group instruments according to whether redenomination into

new local currency is feasible (and therefore typically likely) in a Eurozone exit scenario or not. This exercise involves analyzing which bodies of law underpin each set of instruments.

There is a wide spectrum of financial instruments in existence. The most important groups include the following:

- notes and coins,
- bank instruments (deposits and loans),
- bonds (locally issued bonds, international bonds, covered bonds),
- equity instruments (FDI and portfolio equity),
- derivatives (both currency and interest rate derivatives are relevant),
- central bank liabilities (including TARGET2 liabilities),

We will comment on each of these six groups separately, in order to illustrate the different issues at play at the instrument/micro level. [35]

4.1. Notes and coins

Notes and coins do nog come with detailed legal documentation attached to them. [36] The notes and coins in circulation are nevertheless subject to legal tender laws (of the country or currency union). In the case of the Eurozone, article 128 in the Treaty of the Functioning of the European Union stipulates that the ECB has the exclusive right to authorize the issue of Euro banknotes (and approve the member states' issue of coins).

In a situation of exit from the Eurozone, and the implementation of a new country-specific legal tender law by a (former) Eurozone country, the country level legislation would clearly play a crucial role. In addition, certain capital controls would likely be needed to restrict movement of capital in and out of the country for a transition period.

When Crimea was annexed by the Russian Federation in early 2014, a new legal tender law was approved by local authorities, making the Russian ruble the official currency of Crimea and the city of Sevastopol. In Crimea's case, there was no explicit redenomination of Ukrainian hryvnia notes and coins into ruble. The Ukrainian hryvnia was allowed to remain a parallel currency of Crimea until January 1, 2016). Still, the recent situation in Crimea is an example of currency

[35] In addition to the six groups here, there are also exposures in place in the form of supplier contracts and other ad hoc contractual arrangements. Such contracts can be written with explicit governing law provisions, or the governing law may be implicitly inferred using center of gravity tests. It is difficult to say anything systematic about such exposures, but they are likely to be substantially smaller than more mainstream financial exposures, and hence less important in relation to macro level analysis, and they will not be our focus here.

[36] In the US, the Dollar notes do have a line saying "This note is legal tender for all debts, public and private". In the Eurozone, the notes (and the coins) don't have any such legal qualifications explicitly written on them.

redenomination, which impacted salary payments, bank deposits and other financial instruments.

In 1993, when the Czechoslovak currency union broke into two currencies (the Czech Koruna and the Slovak Koruna), there was a more binary change (as no parallel currency was allowed). During that episode, currency separation was implemented during an extended bank holiday. Borders were closed, and the law stipulated mandatory stamping of all currency, to distinguish between Czech and Slovak money, Dedek (1996). Hence, notes were effectively redenominated into a new currency unit (along with other financial instruments).

Obviously, there would be potentially significant logistical issues around redenomination of notes and coins in connection with exit from the Eurozone.

One specific challenge is that the basic rules of the common market within the EU stipulate that there should be free movement of production factors, including capital. However, the capital controls implemented by Cyprus in 2013 have already set a precedent that capital controls can be permitted based on financial stability considerations.

A key challenge around exit and currency redenomination would be to avoid hording of 'good currency' (existing Euro notes). As expressed by Gresham's law (that bad money drives out good), the challenge would be to create a stable demand for a new and potentially weaker new domestic currency. This issue is extensively discussed in Bootle et al. (2012), and would be likely to involve capital controls for weaker exiting countries (although such controls may be avoided for stronger economies, such as Germany, the Netherlands or Finland).

To use the parallel with Czechoslovakia, you could argue that the remaining Eurozone countries would have an incentive to distinguish their currency from the currency previously in circulation in the exiting country (to limit the purchasing power of old Euro notes in circulation in the exiting country). However, while this was achieved through mandatory stamping in the Czech Republic and Slovak Republic, this would be a logistical challenge of greater proportions in the context of the Eurozone, where the currency is used in 18 independent countries (19 by 2015), with several hundred million citizens and complex borders.

Nevertheless, there is little doubt that such a redenomination/currency change for cash instruments would ultimately have to be accepted internationally (if not de jure, then at least de facto).

There are plenty of examples in history of such currency changes and the possibility of currency redenomination was ultimately recognized by various policy makers during the Euro-crisis, see Nordvig (2013, Part II). Moreover, there is generally little a foreign power can do to stop another country from implementing an internal

change in currency policy. The recent currency redenomination in Crimea, an entity not internationally recognized as a sovereign state, is an example of this.

> *There is a long list of historical precedents for redenomination of physical currency in circulation, and foreign authorities and courts would have little ability to directly influence or stop such a process, should a democratic Eurozone country chose to adopt its own legal tender.*

This is not to say that there would not be logistical challenges involved in the exercise. But it has been done before, and it could probably be done again. The specific challenges would depend on the country in question, the quality of preparations, and the degree of cooperation with remaining Eurozone countries.

With regard to the issue of balance sheet effects, which is a key focus in this paper, notes and coins play a somewhat different role than other financial instruments.

Bank notes and coins are inherently assets to their holders (except for the central bank) and exposures are generally substantially smaller than other financial assets and liabilities.[37] As such, they would not be associated with as large potential balance sheet effects as other liabilities in hard currency (such as those bonds and loans can create for banks and corporations). The devaluation of the value of notes and coins (in terms of purchasing power and in relation to other currencies) could entail a negative wealth effect for the households holding them, though presumably on a smaller scale than other balance sheets effects (and with more moderate implications for financial stability).

The caveat here is that the notes and coins that figure as assets on household and corporate balance sheets are also liabilities of the European System of Central Banks (ESCB). As we will discuss in section 4.6 it is possible that there could be a balance sheet effect on an exiting country's central bank balance sheet, in connection with the so-called TARGET2 balances, which could in theory create balance sheet exposures.

4.2. Bank instruments

Bank instruments within the Eurozone include mainly bank deposits and bank loans in Euros. Local bank law at the country level rather than EU law provides the legal basis for intra-country exposures. But in situations involving international loan and deposit transactions, there are various possibilities with regard to the legal underpinnings.

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[37] For a quick comparison, the latest ECB data from April 2014 show currency in circulation of 949bn. Meanwhile, broader money supply (M3) in the Eurozone amounted to EUR9.8 trillion by March 2014. Finally, bonded exposures in Euro were around EUR13.4bn trillion by end 2012, according to our calculations in Section 7. The bottom line is that exposures in notes and coin are relatively small, compared to other exposures.

While there has been much talk about the creation of a banking union within the European Union, it currently rests on a relatively thin legal basis (Elliot (2012)). Even after the Single Supervisory Mechanism has been created, with the ECB the main supervisor for the Eurozone's largest banks, the governing banking laws, which provide the legal basis for banking instruments in the Eurozone banking system, remain largely national.

This situation would only materially change if a new European Union treaty were to encompass banking law. However, given the politics currently at play within the European Union, a meaningful change in the treaty text seems many years away.[38] Hence, it makes sense instead to focus on the legal frameworks currently in place. Below, we focus on the legal underpinnings of bank deposits and bank loans, with a view to pinpoint the redenomination risk associated with each.

4.2.1. Bank deposits

Bank deposits are governed by local banking laws at the national level, and this is the case even after the European Banking Union has given the ECB supervisory powers for the largest banks in the Eurozone. For example, deposit insurance schemes remain national in nature, and the governing law for deposits will generally be the national law of the bank in question, based on where the bank branch is located.

In many cases, the governing law will be explicit in documentation underlying Certificates of Deposits (CDs) and institutional deposit agreement. In other cases, the governing law may be implicit, and it will need to be established by inference using certain 'gravity' tests. In connection with a deposit, the place of payment, i.e. the jurisdiction of the bank branch accepting the deposit, would be a crucial element in the gravity test, Allen & Overy (2012).

Based on these basic considerations, bank deposits in a given bank branch will generally be governed by the laws that apply in the jurisdiction in which the bank branch is located and has a banking license.

It is worth noting that there is no such thing as a EU or Eurozone banking license. Moreover, the notion that the governing law is the local banking law should hold irrespective of where the depositor is located. I.e. the governing law of deposits in a bank branch located in Spain will be the banking laws of Spain regardless of whether the depositor resides in Spain or in Germany, or somewhere else.

> *We can conclude that funds deposited in a given bank in a Eurozone country is governed by the local bank laws of the country in which the bank branch is located/registered country (rather than EU law, or any other law). As such,*

[38] British Prime Minister Cameron has been lobbying Germany and France for a chance in the European Union Treaty in early 2014, but the idea has received no support in core Eurozone countries.

deposits are likely to be subject to redenomination into new local currency, should the exiting country's government wish to leave the Euro.

4.2.2. Bank loans

Bank loans are more complicated than deposits as they take various forms and involve more complex legal underpinnings. The spectrum of bank loans span from a small consumer loans between a bank in a given jurisdiction and a household in the same jurisdiction to a large syndicated loan by groups of banks to multi-national companies. Syndicated loans often involve a group of global commercial banks headquartered in different parts of the world.

The governing law and the jurisdiction of bank loans can vary depending on what type of loans we are talking about.

Intra-country consumer loans or loans to small businesses from local banks may not have an explicit 'choice of law' provision but will implicitly be covered by the laws of the land. I.e. a loan from an Italian bank to a household or small business in Italy would invariably be subject to Italian governing law and jurisdiction, even if not explicitly stated. The implicit governing law can be derived using the usual gravity tests, including place of payment criteria, residence of borrower and lender etc. In other cases the choice of law will explicitly be state as the local law.

The 'choice of law' issue is more complex in connection with *cross-border loans*. For large syndicated loans, it is now standard practice to use English Law as the governing law, see Loan Market Association (2013). In the context of a borrower from a Eurozone country, this would then be a foreign law contract. For other cross-border loans, typically smaller size business loans, which do not require syndication, there can in theory be different choices of governing law.

Before the Euro-crisis, there was much less focus on the governing law stipulations. As a result, various different European jurisdictions were used for cross-border loan transactions. But since the Euro-crisis, the large majority of cross-border loans have been using English Law as the choice of law, Manuelides (2014).

As a broad conclusion, intra-country loans are likely to be under local banking laws. Meanwhile, cross-border loans can theoretically be both local and foreign law, from the perspective of the issuer. However, from a practical standpoint, there large majority of cross-border loans, and almost all large syndicated loans, would be foreign law loans (typically English law). Such cross-border loans would therefore be outside the jurisdiction of any national Eurozone government, and hence hard or impossible to redenominate in an exit scenario.

4.3. Bonds

A bond differs from a loan in that it is designed to trade more easily in secondary markets. For this reason, bonds are also called 'negotiable instruments', which reflect the notion that they are easy to transfer between parties. Linked to this, bond documentation is typically more transparent than is the case for loans. In addition, it is increasingly the case that various data providers, such as Bloomberg, are starting to provide a central repositary for such information, although there is still no single complete and reliable source.

The universe of bonds is large and diverse. There is a myriad of different types bonds, which differ by issuer, maturity, nature of coupons (fixed/floating), currency of denomination, place of registration, etc. In our analysis of the universe of bonds issued by Eurozone residents, we have pinpointed several hundred thousand individual bonds. We discuss this analysis in Section 7 in much more detail.

In order to determine whether a given bond can be redenominated from Euro to a new currency, we are primarily interested in the governing law and jurisdiction of each bond, as discussed in Section 3. The bond documentation will normally specify the governing law, and the legal jurisdiction for settling disputes, for each bond individually (and those two parameters tend to coincide)[39].

Since there are hundreds of thousands of different bond issued in Euros, it is no easy task to make general statements about the distribution of these bonds by legal category. Many sovereign issuers tend to issue under local law (but not always) and many corporate issuers issue under international law (but not always). Moreover, the legal characteristics of bond exposures differ by country, and can change over time.

> *As a broad conclusion, we can say that bonds issued by the residents of a given Eurozone country can be classified as hybrid in terms of the governing law and jurisdiction dimensions: They can be either local law or foreign law, and in practical terms a mix of governing laws are used.*

The analytical challenge is to pin down the proportion of the overall bond exposure that is foreign law/jurisdiction. Coming up with empirical estimates of the bond exposures, which will stay in Euros even after a Eurozone exit, is no easy task. There is more data to work with at the instrument level than is the case for bank loans (as already discussed) and for derivatives (as we discuss below). But there are no official data sources available. Hence, it is a question of building a proprietary database based on micro-level data. As I will explore in detail in Section 6, the shear volume of bonds (hundreds of thousands of individual issues) makes it a complex IT

[39] Nordvig (forthcoming) documents that the governing law and the jurisdiction coincides in a very high proportion of foreign law bonds, as high as 98%.

project on its own. But it is feasible to estimate the foreign law/jurisdiction proportions with the right methodology and by using different data sources.

4.3.1. Covered bonds

There is one type of bonds, which is local law essentially by construction. This is the covered bond category. Covered bonds are securities backed by pools of mortgages.[40] According to the European Covered Bond Council (ECBC) there were more than EUR2.5 trillion covered bonds outstanding by 2011. Since each European mortgage market is regulated by national legislation, it follows that the covered bonds, which rely on pools of country-specific mortgages, are also local law instruments. From the perspective of redenomination, the underlying collateral (mortgages) would be highly likely to redenominate into new national currency in an exit scenario and the covered bonds, which are linked to these pools, and issued locally, would also be highly likely to redenominate into new national currency. This relates to the issue that equity, which is linked to hard assets, would also redenominate into new local currency (as discussion in Section 4.4 below).

> *Covered bonds is a special category within the broader bond category. Due to their link to mortgages (covered by local laws), covered bonds are governed by local law and under local jurisdiction, and they are likely to redenominate to new local currency in an exit scenario.*

4.4. Equity

Equity shares in corporations of various types can be traded either publicly or privately. Publicly traded equities are typically listed on a local stock exchange and subject to considerable regulation. In some cases a given stock is listed on multiple exchanges (internationally as well as locally). Nevertheless, since stock ownership merely amounts to fractional ownership of the underlying company, the equity instrument will remain subject to local corporate law, regardless of an international listing.

The same applies to private equity transaction, such as that involved in foreign direct investment transactions. The equity ownership will be subject to local corporate law. For example, bankruptcy laws relevant to various corporate entities in the Eurozone are the national bankruptcy laws of each member country. Given the importance of debt restructuring in the Eurozone periphery, this is currently a hot topic, and something, which is catalyzing change in (local) bankruptcy laws.

It follows from the local governing laws, that payments relating to equities, such as dividends, would be highly likely to redenominate into new local currency, following

[40] "Covered bonds are debt instruments secured by a cover pool of mortgage loans (property as collateral)", is the definition by the European Covered Bond Council (ECBC). It is worth noting that this definition does not cover residential mortgage backed securities, which could be foreign law.

a certain country's exit from the Eurozone. Perhaps more importantly, since equity investments reflect a fractional ownership arrangement, and not a nominal obligation specified in a certain currency (as in the case of a loan or a bond), redenomination of the underlying assets should not in itself materially impact the real value of the financial exposures. [41]

> *Equity assets are governed by local corporate laws and under local jurisdiction. As such, exit from the Eurozone would likely involve redenomination into new currency of equity related instrument and related payments (dividends).*

4.5. Derivatives instruments

In addition to the financial instruments discussed above (notes & coins, deposits, loans, bonds and equities), there are significant exposures in Euros in derivative form. The two main groups of derivatives of relevance in our setting are currency derivatives and interest rate derivatives denominated in Euro[42].

- *Currency derivatives* in Euro involve currency forwards, currency swaps (essentially a combination of spot and forward transactions), as well as currency options.
- *Interest derivatives* with reference to Euro interest rates include mainly interest rate swaps (IRS), so-called swaptions (options on swap contracts), and interest rate futures.

4.5.1. The size of the derivatives markets in Euro

The nominal size of the Euro denominated derivatives markets is very large. The BIS semi-annual derivatives survey report the following figures:

- The outstanding stock of foreign exchange derivatives (forwards, swaps and options) amounted to EUR26 trillion by end 2013.
- The outstanding stock of single currency interest rate derivatives (FRAs, swaps and options) amounted to EUR241 trillion by end 2013.

Hence, the nominal gross exposures substantially exceed the ones in place for the other categories of financial instruments we have discussed previously. But since derivatives are often used for hedging purposes it is hard to evaluate the balance sheet effects that would result from these large gross exposures (and it is not easy to come by a detailed breakdown of the exposures).

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[41] This argument is similar to the situation where the stock price of an emerging market export company, with revenue globally but listed in an emerging market, is somewhat independent of local currency movement. I.e. the stock price in local currency will tend to go up when the local currency depreciates, so as to keep the dollar price constant, since the real value (or dollar value) of the company is somewhat independent of local currency fluctuations.

[42] There could also be redenomination effects associated with other derivatives, including equity and commodity derivatives, but they seem less important from a macro-perspective (since the underlying, real, asset values would not be directly impacted), and we will not deal with them in detail.

Modern balance of payments statistics (see for example the IMF's Balance of Payments Manual, version 5) do include line items for derivatives. Conceptually, the balance of payments in the EU are meant to deal with derivatives as follows[43]:

> "all financial derivatives transactions in the euro area b.o.p. financial account are recorded on a net basis. By contrast, financial derivative asset and liability positions in the i.i.p. should be recorded on a gross basis."

Hence, the international investment position data is in theory supposed to show gross exposures in derivative form on the asset side and liability side of a given country's balance sheet, while the flow focused balance of payment statistics are supposed to show the (net) cross-border flows from derivatives.

In general, the flows from derivatives are substantially smaller than the financial flows in debt, equity and other categories (at least this is the case for Eurozone countries). Moreover, even if the cross exposures in the IIP are larger, it is often the case that assets and liabilities net out to a large degree (and at the sector level). For example, monetary financial institutions (banks) have sizeable assets and liability positions in derivatives, but only small net positions. [44]

Whether the smaller net exposures really mean that the macro-level risks associated are also smaller depends on the distribution of risks. The very large derivatives exposure on AIG's balance sheet ahead of the collapse of Lehman Brothers (and which to a large degree netted against other investment bans) is a good example of this problem. Small country level cross-border derivative exposure is no guarantee that there will not be a potentially important systemic issue to deal with, as individual institutions may deal with very substantial losses on (gross) derivatives positions in an exit. This is an issue regulators and policy makers should be aware of. At the same time, it is an issue, which it is hard to analyze using publicly available data.

4.5.2 Special considerations regarding redenomination of derivatives

As with the other financial instruments considered above, the key question is what are the legal underpinnings of these exposures, and whether certain derivatives can be redenominated into new local currency.

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43 http://www.ecb.europa.eu/pub/pdf/other/bop_052007en.pdf??d6ff2428493338214b99b126a1c786c3

44 We can use Italy to illustrate. The latest detailed IIP data is from Q2 2012. At the net level, it shows a net liability for financial derivatives of EUR29bn, compared to a total net liability for debt securities of EUR481bn and a total net liabilities for equity securities of EUR216bn. At the gross level, the numbers are quite different, even at the sector level. Banks (other monetary and financial institutions have derivative assets of EUR132bn vs EUR155bn in liabilities. It is difficult to know, whether these exposures are offsetting within individual financial institutions or only within the sector, and unfortunately know this may be key to determining any financial stability issues.

Simply from the perspective of the currency definition within derivatives documentation, it would seem that redenomination is unlikely. The ISDA 2000/2006 definition of EUR is: "lawful currency of the member states of the European Union that adopt the single currency in accordance with the EC Treaty".

However, for derivatives, the issue has multiple dimensions.

K&L Gates (2012) puts it this way:

> *"for purposes of considering how such a redenomination may affect currency derivatives transactions, it is necessary to consider two categories of contracts. The first comprises the derivatives transaction itself. The second category consists of the underlying obligations that may be directly or indirectly referenced in such transactions or that may represent the currency exposure that is being hedged."*

Hence, the fact that the derivative itself may be hard to redenominate, does not in itself directly imply that redenomination will not create currency (and interest rate) related mismatches on various balance sheets.

There is a clear possibility that redenomination of the underlying assets will create a situation where the hedging instruments (the derivative) no longer works as a hedge. Two examples will illustrate the basic issue.

- A Portuguese importer, which has hedged foreign currency risk by selling the Euro forward (versus the dollar) through a standard currency forward contract, could face unexpected open currency exposure in a scenario where Portugal exits the Euro and the new currency of Portugal depreciates. Since the forward transaction would not redenominate from Euro to Portugal's new currency, the contract would not offer any protection for movements in the newly created currency.

- A Spanish bank, which has hedged interest rate risk on a long Spanish government bond exposure by paying fixed interest in an interest rate swap (and receiving floating rates), may be faced with unexpected risk in the event the bond redenominates into new currency, but the swap stays in Euro (with different interest rates). The interest rate swap will no longer hedge the interest rate risk that the bank is actually exposed to after exit (the interest rate on the new Spanish yield curve).

From this perspective, the lack of redenomination of derivatives contracts, consistent with them being governed by foreign laws, would imply that new exposures (previously thought hedged) would suddenly be 'unhedged', and present a risk for the balance sheets in question.

4.5.3. The universe of derivatives and their legal backing

In Nordvig and Firoozye (2012b) we listed the different bodies of law underlying certain financial instruments, including derivatives. The table below replicates the derivatives section of the that list:

Table 4.5.3: Types of derivatives contracts

	Security type	Body of Law	Examples
Master Agreements	International Swap Dealers Association (ISDA)	English or NY Contract	IR Swap/Fwd, FX Swap/Fwd, CDS, Bond option
	Commodity Master Agreements	Varies for each commodity	Gold Swap/Fwd, Electricity Swap/Fwd, etc.
	Rahmenvertragfür Finanztermingeschäfte (DRV)	German Contract	Swaps and repos with German counterparties
	Fédération Bancaire Française (AFB/FBF)	French Contract	Swaps with French counterparties and all local authorities
	Contrato Marco de Operaciones Financieras (CMOF)	Spanish Contract	Swaps with Spanish counterparties
	ICMA Global Master Repurchase Agreement (GMRA)	English Contract	Repo agreements
	Master Repurchase Agreement (MRA)	NY Contract	Standard NY law repo agreement
	European Master Agreement (EMA)	English Contract	Repo with Euro-system NCB/ECB
	General Master Securities Loan Agreement (GMSLA)	English Contract	Sec lending
	Master Securities Loan Agreement (MSLA)	NY Contract	Sec lending
	(Euro) Medium-Term Note Programme (MTN/EMTN)	English or NY Contract	WB, Republic of Italy, EIB MTN Programmes
Other	Bond Futures (Eurex)	German Contract	Bund, Bobl, Schatz, BTP Futures on Exchange
	IR Futures (Liffe)	English Contract	EURIBOR Contracts on Exchange
	Equity Futures	Local Law/ English Law	SX5E, DAX, CAC40, MIB, IDX, IBEX, BEL20, PSI-20
	OTC Futures	English or NY Contract	Client back-to-back futures with member firm
	Clearing Houses (LCH, ICE, etc)	English Contract, etc.	Repo, CDS, etc. via clearing houses
	Cash Sales	Sales or Transaction	All cash sales prior to settlement (i.e. before T+3)

Source: adapted from Nordvig and Firoozye (2012b)
Note: Master Agreements are general legal documents, which provide the legal underpinning of various contacts between two counter-parties. The majority of over-the-counter (OTC) derivatives are entered in the context of such master agreements.

4.5.4. Master/ISDA agreements and the governing law of derivatives

Derivatives transactions are typically executed over the counter (OTC) between different financial counterparties (such as a bank and a large corporation).[45] Linked to the decentralized nature of the derivatives markets, no detailed central database of such transactions exists (there is no central repositary of the documentation underlying such transactions). This makes it difficult to analyze the legal underpinnings of these instruments from a bottom-up approach.

Nevertheless, Nomura Research in corporation with Nomura's legal department conducted a small internal survey of the legal documentation of about 100 derivatives transactions done with European counter parties in 2012. The result from the survey was that the large majority (around 95%) of transactions was governed by international law (mainly English law), see Nordvig and Firoozye (2012b).

[45] Recent regulation has been seeking to encourage that more derivatives will transact on exchanges in the future, to increase transparency and to reduce systemic risk in the system. However, this process is only moving ahead gradually, and the majority of derivatives remain OTC in nature.

This finding is consistent with the notion that the majority of derivatives transactions in the OTC markets are transacted with reference to a so-called ISDA agreement generally governed by English or New York law, Liang (2001) and Clifford Chance (2012). In addition, the standard English governing law version of the ISDA agreement (in both 1992 and 2002 versions) gives exclusive jurisdiction to English courts. [46]

In relation to an exit scenario, where a given country exits the Euro, it would likely be hard or impossible to redenominate derivatives, which are generally governed by foreign laws (and given the definition of EUR in the ISDA documentation). This is both due to the fact that the large majority of such contracts are written under English and New York laws (foreign law) and given that they make specific reference to the Euro and Euro interest rates (Euribor), so that a nexus to specific Eurozone country cannot be established. There may be certain other derivatives, such as bond future contracts, which will behave differently in this context, but we would argue that these situations are less important from a macroeconomic perspective.

The main caveat is stated in K&L Gates (2012), and relates back to the basic issue that enforcing payment in 'hard currency' may be impossible in reality due to insolvency and/or exchange controls, even if the legal language provides 'theoretical' protections

> *"where a party to a currency swap transaction is located in a country that has exited the eurozone and that has imposed exchange controls, questions may arise as to whether one party may effectively reduce its contractual obligation by using an exchange rate that is unfavorable to the other side but that complies with the language of the relevant provision of the master agreement."*

Ashurst (2012) make a similar point, stressing that exit from the Eurozone combined with capital controls (recognized by the IMF, and hence applicable to all IMF member countries) would potentially render FX derivatives un-enforceable. [47]

These considerations all apply to the partial breakup scenario. For completeness, it is worth mentioning that in a *full-blown breakup*, there would be a need to redefine the meaning of the contracts written with reference to the Euro.

- There would be a need to re-define a new relevant interest rate benchmark to avoid frustration of contract in connection with the outstanding set of interest rate

[46] The ISDA agreement is a complex bilateral agreement generally between banks and their institutional and corporate counterparties, which spells out the legal framework for all derivative transactions between the counter-parties in different countries. Since ISDA agreements are generally written with reference to English or New York jurisdictions, it follows that a large subsection of the overall derivatives population are also governed by the laws of those jurisdictions.

[47] Ashurst (2012) references section 2b of article VIII of the IMF Agreement in this connection.

derivatives, including basic swaps. In this context, the switch over from ECU interest rate to Euribor in 1999 could serve as a template, from a legal perspective.

- There would be a need for a mechanism to deal with settlement of currency forwards and currency options, and potentially define a substitute (or substitute basket) for existing currency derivatives. This is again the legal nightmare scenario, which we have mentioned earlier (in Section 3.1), in which an EU directive, specifying settlement of derivatives transactions according to an ECU-2 concept would likely be helpful to try to avoid the most extreme financial stability issues.

As we will illustrate in more detail in the Section 5, we are most interested in the foreign law liabilities, which could potentially be problematic in an exit scenario. Specifically, hard currency exposures, which become harder to repay due to a depreciating domestic currency, are the relevant exposures.

In connection with derivatives, our analysis suggest that a great deal of derivatives transactions are contractually under foreign law (often English and NY law), which means that payment on such contract is likely to stay in Euro after exit. In relation to thinking about balance sheet effects, it is worth nothing that net derivatives exposures in the form of derivatives are typically small relative to the other exposures (in securities form). This is no guarantee, however, that the cross exposures cannot create tension, and balance sheet effects even at the individual institution (likely bank) level could be systemically important. Unfortunately, since most of the derivatives in question are OTC (and confidential) there is no obvious way to break down the exposures and conduct a disaggregated analysis. [48]

4.6. Central bank and government liabilities

The final type of exposure we touch on are special liabilities of government and central banks, different from the various financial instruments discussed above.

Within balance of payment statistics, there are separate line items for central bank liabilities and government liabilities that are not captured within portfolio securities. These are unusual financial exposures, which may have different legal characteristics than the instruments we have already discussed.

These exposures have become important in a Eurozone context. Certain governments (and central banks) within the Eurozone have accumulated significant external liabilities during the Euro-crisis. These exposures take two main forms:

1) Liabilities in the form of loans from the European Stability Mechanism (ESM), and from its predecessor facilities.

[48] The ECB's ongoing Asset Quality Review (AQR) may un-earth more detail on this, but the raw data is likely to be kept confidential and for internal use only.

2) Central bank liabilities, predominantly TARGET2 liabilities, to other Eurozone central banks.

4.6.1. Loans from the ESM/EFSF/EFSM

The ESM loans are under the jurisdiction of the Court of Justice of the European Union. This is explicit for the ESM loans, as stated in the Treaty Establishing the European Stability Mechanism. The EFSF documentation also has explicit reference to the jurisdiction of the Courts of the Grand Duchy of Luxembourg, while the ad hoc EFSM loans to Greece had no explicit such references, Stratigopoulou and Mylonakis (2013).

Hence, it seems clear that the ESM/EFSF loans are under foreign jurisdiction, and even if the governing law is not explicit, the reference to the foreign jurisdiction should be sufficient to argue that redenomination is likely to be difficult/impossible.

It is generally perceived that dealings between sovereign countries are arguably less driven by law than private sector relationships. Hence, debt restructuring may involve a principal reduction on ESM and related liabilities. However, this is presuming a negotiated process after exit. In the absence of such an ad hoc deal, we should think about ESM and related exposures as 'hard currency' in nature. They are currency denominated in Euro, and would be likely to stay in Euro even after a (borrowing) country has exited the Eurozone.

4.6.2. Liabilities to the IMF/World Bank

The liabilities countries have to the IMF and international development banks are different from liabilities to private sector banks or liabilities in the form of debt securities. For these exposures there is no lending agreement with a specified governing law, equivalent to what exists in the context of private sector lending arrangements, or similar to what is embedded in the provisions underlying ESM lending.

The legal framework underpinning IMF is contained in the IMF's Articles of Agreement. But those agreements are defined in the context of international law, rather than with reference to any specific well-defined jurisdiction. Many would argue that the actual status of IMF lending has developed more by convention, over time, than through legal means.

Schadler (2012) puts it this way:

> "The IMF's preferred status is de facto rather than de jure",

And Westermann (2013) has a similar view:

> "The International Monetary Fund (IMF), which has proven its seniority over the private sector in the financial crises of recent decades, for instance, is "De Jure" not senior. It awards its credit without corresponding clauses in its debt contracts or institutional by-laws."

Similarly, lending by the World Bank (or other international development banks) is generally is not governed by the laws of a specific jurisdiction. Instead, the legal framework of the World Bank specifies that lending arrangements are not subject to the local laws of the borrowing country (or its related agencies), Head (1996).

In the context of analysis of Eurozone breakup, exposures to the IMF are the most relevant, since several countries have obtained IMF credit as a component of their bailout programs (Greece, Ireland and Portugal).

The specific legal status of IMF lending is a controversial matter, and we will not go into further detail here. But we would simply note that the IMF's loans to Greece were excluded from the debt restructuring in March 2012. Hence, they were certainly treated differently from the local law obligations, which suffered the steepest haircuts.

Hence, for our purposes, it makes sense to treat exposures of the IMF as foreign law, grouping them similarly to lending from EU and Eurozone official sector lending.

4.6.3. Central bank liabilities (TARGET2)

Central bank liabilities became a hot topic – see Sinn & Wollmershaeuser (2011) - during the Euro-crisis because the breakdown in international money markets forced the European System of Central Banks (ESCB) to provide stop-gap liquidity to weak banking systems facing a liquidity shortage.

This process created large-scale central bank liabilities between national central banks within the ESCB. For example, at the peak of tension during 2012, the Spanish central bank had external liabilities of more than EUR400bn, reflecting almost entirely the TARGET2 imbalance to the ECB.[49]

The legal aspects of the exposures within the European System of Central Banks are laid out in the Official Journal of the European Union. Specifically, article 12, section 3, of the Guideline of the European Central Bank of 26 April 2007 on a Trans-European Automated Real-time Gross settlement Express Transfer system (TARGET2) states that:

> *"In the event of a dispute of the type referred to in paragraph 1, the parties' respective rights and obligations shall primarily be determined by the rules and procedures laid down in this Guideline. In disputes concerning payments between TARGET2 component systems, the law of the Member State where the seat of the Eurosystem CB of the payee is located shall apply in a supplementary manner, provided that it does not conflict with this Guideline."*

Alas, in an exit scenario, where a given country leaves the Eurozone, and has a debit balance towards the ESCB, it would not be possible to redenominate the balance

[49] Data based on http://www.querschuesse.de/target2-salden/

into new local currency. From a purely legal perspective, the law of the creditor (payee) central bank applies. Hence, in effect TARGET2 liabilities will be governed by foreign law from the perspective of the exiting country (if we are thinking about a scenario of a debitor country exiting). Hence, such central bank liabilities, as reported within the international investment position, will likely stay in Euro's even if the country adopts a new currency, creating a potential for a negative balance sheet effect. Obviously, it may be hard to contemplate such a scenario, without at the same time thinking about risk of sovereign default, and potential debt restructuring. It will depend on the circumstances. Nevertheless, from a legal perspective, it makes the most sense to think about these external exposures at the central bank level as in 'hard currency', and likely to stay as such. [50]

5. MAPPING MICRO-LEVEL LEGAL ANALYSIS TO THE MACR0-LEVEL

Having gone through all the relevant financial instruments one by one in Section 4, from cash to derivatives, we are able to classify instruments into either local law/local jurisdiction, foreign law/foreign jurisdiction, or hybrid categories.

In order to conduct macro-level analysis, we have to map this information at the micro level (by each type of financial contract) into a space where we normally conduct policy analysis at the country level. Our basic goal is to quantify the open currency exposures, for each of the important agents in the economy, primarily governments, corporates and banks. These are the sectors that could potentially have exposures, which would become problematic if the new local currency depreciates after exit from the Eurozone. [51]

The relevant exposures for our purposes (quantifying negative balance sheet effects) are those that will be in foreign currency after exit. This will naturally include exposures that were foreign currency in the first place (such as exposure in US dollars). But more importantly, it will include exposures, which were in Euros previously, and which cannot be redenominated. These exposures will turn into foreign currency exposure after new local currency is created. Moreover, we can be sure that no foreign currency hedges exists for such (contingent) open currency exposures. This is different for US dollar exposures, for which market participants have easy access to cheap hedging instruments, such as currency forwards.

The best data source for analyzing cross-border financial exposures and the potential balance sheet effects associated with currency fluctuations are the

[50] Some would argue that legal aspects of contracts and generally matter less in dealings between sovereign states. For example, Allen & Overy has put it this way in their description of the lessons from the Greek default in 2012: "The outcomes of a sovereign bankruptcy are determined by the bargaining position of the parties, not prescriptive law.", Allen & Overy (2012b).

[51] In theory, there could be additional exposure on household balance sheets. But in reality, such cross-border exposure would likely be small at the macro level.

international investment positions (IIP) statistics.[52] To leverage our contract level insights, we reinterpret the international investment position in a legal context by applying the micro-level insights from Section 4 to each line item in the IIP.

The *relevant external liabilities* for the purpose of analyzing balance sheet effects associated with exit from the Eurozone are those that involve foreign law/foreign jurisdiction external liabilities. These are the exposures that are likely to stay in Euro following exit and are likely to be problematic in that they can cause negative balance sheet effects in an exit (if it involves currency depreciation).

The basic reasoning is that currency depreciation can cause stress for economic agents if it reduces their net worth. This was the mechanism at play during the Asian crisis. Hence, corporates with liabilities in Euros and assets (and revenue) in depreciated local currency, will potentially face more limited access to credit or outright credit rationing, A similar mechanism can be in play for governments and banks, if they have significant liabilities in foreign currency and no offsetting assets. This in turn will generate negative output effects.

At the country level, we define the concept of (gross) relevant external liabilities (for the purpose of analyzing balance sheet effects associated with Eurozone exit):

> Relevant external liabilities =
> [Total external liabilities] x [Proportion governed by foreign law] [53]

We can apply this concept to each line item in the international investment position. For most instruments, the micro-level analysis tells us if the liability in question is 0% local law or 100% foreign law. For some line items, particularly bonded debt (which is hybrid in nature), the fraction needs to be estimated, as the legal analysis does not provide a clear binary classification.

In sections 3 and 4 above we highlighted the 'legal consensus' on redenomination in various Eurozone breakup scenarios. But the focus in the legal literature is often on the details and exceptions at the micro level (because it may matter greatly in individual disputes). However, in a macro context, the big picture is more important. We are more interested in the general rules that we can apply to the majority of assets and liabilities in each category, rather than the exceptions and caveats that may apply to a small proportion of exposures (and are likely to be impossible to incorporate in an empirical analysis).

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[52] IIP statistics are superior to gross external debt statistics in that they also include asset side information and include equity exposures, which are omitted from the gross external debt statistics. That said, the gross external debt statistics sometime provide a more detailed breakdown of exposures. Hence, both sets of statistics can be useful.

[53] This concept was first defined in Nordvig and Firoozye (2012b).

Our focus is on what we can we say about the legal dimension of each line item in the international investment position (IIP). The goal is to quantify the relevant external liabilities at the country/macro level.

Figure 6 shows a stylized IIP breakdown of foreign assets and liabilities, with the legal dimension of each category highlighted (local law categories in black and foreign law categories in red).

Starting from the beginning, and drawing directly on the conclusions in section 3 and 4, we make the following classification:

Figure 6: Classification of a Eurozone country's cross-border positions by legal jurisdiction

External Assets	External Liabilities	
FDI	FDI	
Portfolio equity securities	Portfolio equity securities	
Portfolio debt securities	Portfolio debt securities	Portfolio debt securities
	Covered Bonds	
Other assets (bank instruments)	Other liabilities (loans)	Other liabilities (deposits)
Derivatives	Derivatives	
Intergovermental assets	Inter-govermental liabilities (ESM etc.)	
Central bank assets	Central bank liabilities (TARGET2 etc.)	

foreign law/jurisdiction
local law/jurisdiction

Liabilities noted as local law are subject to redenomination in the case of exit from the Eurozone, whereas foreign law assets and liabilities are likely to stay denominated in Euros.

Note: There are minor exceptions to the general classification outlined in the table. For example, a small proportion of Euro-denominated derivatives is traded under local law and could be redenominated. Moreover, external assets in the form of debt securities could, in special cases, be local law.

Foreign Direct Investment (FDI) and *portfolio equity investment* are governed by local laws and under local jurisdiction. Each country's company laws will be the body of law of relevance. It follows that external exposures in the form of equity exposures (within the balance of payment listed as FDI or portfolio equity investments) will generally not create balance sheet effects of the nature we are interested in here. [54]

[54] While the basic concept of equity exposures not creating balance sheet effects seems conceptually sound, there may nevertheless be data issues involved with using balance of payment statistics to pinpoint

A company that has received a capital injection by selling a number of shares to a foreign investor will face the same liability (number of shares) after exit and redenomination. Hence, there should be no direct balance sheet effects as a function of redenomination for FDI or portfolio equity exposures.

Portfolio debt securities can be either local law or foreign law. They cannot be classified in a binary way (foreign law or local law). Instead, they should be regarded as hybrid in nature.

For example, sovereigns can issue either under local law/local jurisdiction, or they can issue so-called Eurobonds (English law and the jurisdiction of English courts) or Yankee bonds (NY law and NY jurisdiction), etc.

The same ambiguity applies to corporates, which can issue both using local law and using foreign law. In general, however, the proportion of foreign law issues is higher in the corporate category.

There is one type of bond, which can be classified squarely in the local law category. *Mortgage instruments/covered bonds*, such as German Pfandbrief, are governed by local covered bond laws and under local jurisdiction. Hence, this sub-set of portfolio debt is under local law and should not generate any problematic external liabilities.

All told, the problematic foreign law component of external liabilities (as it pertains to portfolio securities) can be estimated by first excluding covered bonds, and then estimating the foreign law percentage of the remaining (non-covered) bond exposures.

Cross-border bank liabilities (also called other liabilities in the international investment position) are a mix of foreign law and local law. The IIP generally does not differentiate well between liabilities in the form of loans and liabilities in the form of deposits. However, the IIP can be supplemented with BIS data to estimate the breakdown.[55] Once the bank liabilities are decomposed into cross-borders loans and cross-border deposits, the classification is easier.

Cross-border loans are largely foreign law/foreign jurisdiction. This is almost certainly true for syndicated loans. Moreover, since 2010 there has been a strong focus on redenomination risk in the legal profession, and creditors have been

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the relevant exposures. Specifically, a sub-category within the FDI line-item in BoP statistics is the so-called intercompany loans, which could potentially constitute a nominal obligation, similar to other loans.

[55] The IIP data provides a headline number for 'other external liabilities', which includes all liabilities through cross-border bank exposures. But the IIP data itself does generally not provide a breakdown of these cross-border bank exposures into deposits and loans. However, we can supplement with data from the BIS to get a sense of the break-down between liabilities in the form of cross-border deposits (local law) and liabilities in the form of cross border loans (generally foreign law). The BIS data, which can be used for this purpose is the BIS Locational Banking Statistics, section 7A. We have utilized this way of generating a breakdown of the external bank related exposures when comparing foreign law external liabilities of Spain and Italy in section 7.1 of this paper.

careful to make loans into peripheral European countries with foreign law (typically English law) stipulated as the governing law. [56] Hence, these are relevant external liabilities in the context of calculating balance sheet effects since they will likely stay in Euros in an exit scenario.

Cross-border bank liabilities in the form of deposits within other liabilities in the international investment position are local law, governed by local banking laws and under local jurisdiction. Hence, these are likely to redenominate into new local currency in an exit scenario, and should not generate the balance sheet effects associated with open hard currency exposures.

Derivatives can theoretically be structured under various jurisdictions. However, the large majority of derivatives is governed by English or New York law. Hence, derivatives exposures are likely to be foreign law in the context of a Eurozone country. Conceptually, they constitute relevant external liabilities therefore. However, for practical purposes, the (net) exposures are not large at the macro level, as we argued in Section 4, and data issues make it very difficult (if not impossible) to properly break down the exposures at the relevant institutional and sector levels.

Intergovermental liabilities include loans between official creditors (non-banks) and the country in question. In the context of the Eurozone, the ESM loans are particularly relevant, as they constitute a large proportion of external government debt. As outlined in section 4.2.2, the governing law of these obligations is generally foreign, either explicitly or implicitly.

Central bank liabilities includes so-called TARGET2 balances, which have featured prominently in the debate about Eurozone breakup. Their contractual underpinnings point to application of the governing law of the creditor within this system, and any creditor country (such as Germany) is highly unlikely to accept any redenomination of their assets (the liabilities of an exiting country). Hence, it makes sense to regard them as foreign law for this purpose (in relation to deriving the relevant external liabilities in a breakup).

Hence, our formula, after excluding derivatives exposure, becomes:

> Relevant external liabilities =
> [Bond external liabilities] x [Proportion governed by foreign law] +
> [Cross-border bank liabilities] x [Proportioned in loan form] +
> [Cross-border intergovernmental liabilities] x 100%
> [Central bank external liabilities] x 100%

[56] There may be exceptions to this rule in the context of lending into Germany. But this is less relevant from the perspective or analyzing negative balance sheet effects.

For example cross-border bank deposits will be 100% local law, and hence not relevant for the calculation. On the other hand, cross-border liabilities in the form of official sector loans will be approximately 100% foreign law, and hence all relevant for the calculation.

We will illustrate in section 7 how this concept of relevant external liabilities can be applied based on IIP data for Italy and Spain and proprietary estimates of foreign law proportions of bond exposures, which is the topic of section 6.

6. ESTIMATING THE FOREIGN LAW PERCENTAGE OF BOND EXPOSURES

In the previous sections, we have focused on the legal aspects of currency redenomination and how this may translate into balance sheet effects in relation to external liabilities. But the discussion has been conceptual. To quantify the size of possible balance sheet effects, it is necessary to quantify the proportion of external debt in the form of bonds, which stay in Euro even after exit from the Eurozone.

6.1. The original sin methodology from EM applied to the Eurozone

We can apply the basic methodology in the literature on foreign currency borrowing in emerging markets. This literature about 'original sin' in term of emerging markets borrowing, see Eichengreen (2002), use the percentage of hard currency bonds in the total sample of outstanding bonds from a given issuer to approximate the hard currency portion of the percentage of bonds held by foreigners.

Similarly, we can use the percentage of foreign law bonds in the total sample of outstanding bonds to approximate the foreign law percentage of bonds held by foreigners, which is the exposure most likely to cause a negative balance sheet for a weak country exiting the Eurozone. [57]

It is no easy task, however, to estimate the proportion of foreign law bonds in the total population of bonds outstanding at a given point in time. As mentioned in section 4, there is no official data, which provides any information about this parameter. [58]

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[57] You could argue that all foreign law debt is potentially problematic, and would cause potential balance sheet effects. This may be true at the micro level. But in the aggregate, the gains and losses on bonds held by residents, resulting from currency changes, would be offsetting, and hence we focus on the external liabilities, which would create aggregate balance sheet effects.

[58] The BIS's database of international debt statistics, offers data on international debt issuance (debt issued in markets outside the country in which the issuer resides). For example, if a Greek issuer registers its securities with the FSA in the UK, they will be classified as international debt securities. However, this concept does not necessarily coincide with the governing law or jurisdiction parameters, which is our focus. The distinction in those statistics refers to the place of registration and trading. For example, the Handbook of Securities Statistics mention the security's listing (domestic exchange or foreign exchange) as the number one determinant of classification within the international debt statistics, IMF (2009).

6.2. Bottom up analysis of a large sample of individual bonds

Generally, bond markets offer more transparency than loan, forward, and swap markets (which are dominated by over-the-counter (OTC) transactions). As a negotiable instrument actively traded in secondary markets, the bond documentation is generally public (or at least supposed to be).

The practical problem is that there is no universal repository for such documentation and that a very large number of individual bonds are issued in the Eurozone (we have collected data on more than four hundred thousand individual bonds).

Nevertheless, with a suitable IT infrastructure, it is possible to estimate the proportion of foreign law bonds using various information sources that provide such information bond-by-bond basis.

After comprehensive cross-checking of data sources (see details in Appendix D), the conclusion is that the preferred method for generating the break-down of fixed income securities by their governing law involves a mix of three main data sources.

First, we have scanned a sample of more than four hundred thousand individual bonds from Bloomberg to find their governing law. Since there are hundred of thousands of individual bonds outstanding, it is a data intensive process. For example, it goes beyond the data limits embedded in a single Bloomberg license to do the analysis, and it requires substantial cross-checking and filtering of the underlying data to clean the data to get to a reliable sample, for which the information on the 'governing law' parameter is available for the large majority of issues.

Second, we have used data from Dealogic to accrue additional information on the governing law of bonds within the financial and non-financial issuer categories. The advantage of Dealogic (relative to Bloomberg) is that is has data on governing law for a much higher proportion of the securities in the database (the drawback is that the overall database is smaller).

Third, we have used data on covered bonds from the ECBC to further improve the coverage of the overall sample, since these bonds are poorly represented in the Bloomberg data and in the data from Dealogic (see appendix).

The most important data based on this methodology is presented in the tables below.[59] We break the data into Euro-denominated bonds and non-Euro-

[59] We note that our database does not cover Euro-denominated bonds issued by non-Eurozone issuers. Such an exercise would be relatively straightforward to run, but from a macro standpoint and in relation to balance sheet effects for Eurozone countries, we regard it as less important than the other exposures we focus on.

denominated bonds, and we also display a separate table for the total bond amounts. The details of the methodology are presented in the appendix.

Figure 6.2.A: Euro-denominated bonds issued in the Eurozone (EUR bn)

	Sovereign			Financial			Nonfinancial			Total
	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	
Austria	176	2	1	61	37	3	7	7	0	295
Belgium	309	16	5	5	115	4	40	25	3	522
Finland	69	1	0	13	15	0	3	7	1.4	110
France	1421	19	12	689	179	22	206	145	22	2716
Germany	1530	1	23	1199	58	6	297	42	17	3172
Greece	73	127	2	38	49	2	6	37	2	335
Ireland	114	0	0	93	32	3	4	45	16	307
Italy	1517	74	14	168	261	15	272	113	12	2446
Netherlands	282	15	0	192	25	19	324	47	21	925
Portugal	107	13	2	56	29	2	22	49	1	281
Spain	638	74	16	758	80	9	594	143	11	2323
Total	6237	342	76	3270	881	87	1773	660	106	**13433**

Figure 6.2.B: Non-Euro denominated bonds issued in the Eurozone (EUR bn)

	Sovereign			Financial			Nonfinancial			Total
	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	
Austria	1	11	6	3	15	0	0	0	0	37
Belgium	6	0	1	0	40	2	1	22	7	79
Finland	0	14	11	0	2	0	0	3	0.8	32
France	27	31	33	21	67	29	9	103	14	334
Germany	19	0	5	54	45	22	47	60	38	290
Greece	0	3	2	0	2	0	1	2	1	11
Ireland	0	0	0	2	14	2	6	23	7	55
Italy	8	27	6	6	13	3	1	65	18	145
Netherlands	0	3	2	75	53	17	7	37	13	206
Portugal	1	1	0	0	3	2	0	2	1	10
Spain	3	18	7	3	90	20	5	90	23	260
Total	66	109	73	167	342	97	77	407	122	**1460**

Figure 6.2.C: All bonds issued in the Eurozone, irrespective of currency (EUR bn)

	Sovereign			Financial			Nonfinancial			Total
	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	
Austria	177	13	7	65	52	3	7	7	0	332
Belgium	315	16	5	5	155	5	41	47	11	601
Finland	69	15	12	13	17	0	3	11	2.2	142
France	1448	50	45	710	246	51	215	248	36	3050
Germany	1549	2	27	1253	104	29	343	102	54	3462
Greece	73	130	4	38	52	3	6	38	3	346
Ireland	114	0	0	95	46	6	10	68	23	362
Italy	1525	101	20	174	274	18	273	179	29	2592
Netherlands	282	18	2	267	78	36	331	83	33	1131
Portugal	109	14	3	56	32	4	22	51	2	291
Spain	640	92	23	762	170	29	599	233	35	2583
Total	6303	451	149	3437	1224	184	1849	1068	228	**14893**

Source: Nomura, Dealogic, Bloomberg, and ECBC

The overall sample covers around EUR15trillion of bonds issued by Eurozone issuers, of which EUR13.4 trillion were Euro-denominated. To be specific, the sample of Euro-denominated bonds includes 26,770 bonds, from the 11 larger Eurozone countries (excluding Malta, Cyprus, Slovenia, Slovakia, Estonia and Luxemburg), which we analyzed in detail. The number of bonds is smaller than the full sample number available from Bloomberg. The larger number of bonds listed on the Bloomberg system is accounted for by a large number of very small bond issues, for which the data on the governing law appears to be generally unreliable. Hence, we focus on the proportions within the screened sample of bonds with somewhat larger amounts outstanding.

The tables on the previous page show a general breakdown of bonds issues by Eurozone issuers broken down by legal jurisdiction. Key figures to note for Euro-denominated bonds include:
- EUR342bn of foreign law bonds in the sovereign category.
- EUR881bn of foreign law bonds in the financial issuer category.
- EUR660bn of foreign law bonds in the non-financial (corporate) category.

We note that the available data do not have information about the governing law for every single issue. But the methodology presented here minimizes this problem by using multiple data sources. Hence, the 'unknown' columns in the table represent relatively minor portions of the overall data.

The table below, Figure 6.2.D, offers additional detail on the specific foreign governing law categories of the bonds included in the table above. As it turns out, the most relevant foreign law categories are the English, German, and New York laws. For simplicity, the data is reported in aggregate figures, rather than broken down into the individual Eurozone countries. The main message here is that English law accounts for the majority of all foreign law issues. Also, financial issuers seem to use German law rather than their own domestic jurisdiction. Meanwhile, New York law applies to just below 10% of non-financial (corporate) issuance under foreign law, and even less than that for sovereign and financial issues.

In terms of summary figures, there are EUR1883bn worth of total allocated foreign law bonds in our sample. Scaling this amount up to the size of the total sample (including both allocated and unallocated bonds) suggests that foreign law bonds amount to EUR1.9 trillion when all legal jurisdiction information is available.

Figure 6.2.D: Legal jurisdiction of EUR-denominated bond amounts outstanding (EUR bn)

	Sovereign		Financial		Nonfinancial		Total
	Amount Outstanding (EUR bn)	%	Amount Outstanding (EUR bn)	%	Amount Outstanding (EUR bn)	%	
Total	**6655**	**100%**	**4239**	**100%**	**2539**	**100%**	**13433**
Unallocated	19	0%	87	2%	106	4%	212
Allocated	6636	100%	4152	98%	2433	96%	13221
Local law	6294	95%	3270	79%	1773	73%	11338
Foreign law	342	5%	881	21%	660	27%	1883
English	251	73%	688	78%	499	76%	1438
New York	18	5%	7	1%	53	8%	78
German	17	5%	69	8%	25	4%	111
Other	56	16%	118	13%	83	13%	257

Source: Nomura Credit Syndicate, Bloomberg, and ECBC

Figure 6.2.E below shows the breakdown by legal jurisdiction in percentage terms. Note that amounts listed under the sovereign header include sub-sovereigns, i.e., regions, municipalities and agencies.

Focusing on assets classes, the table shows that foreign law bonds are most prevalent within corporate (nonfinancial bonds), and least prevalent among sovereign bonds.

Focusing on countries, the table shows that Greece has the highest proportion of foreign law bonds, while Germany has the lowest. This is perhaps no surprise in relation to where investors are most comfortable with the legal process and the underlying domestic macro risks.

Figure 6.2.E: Governing law breakdown for all bonds issued in the Eurozone

	Sovereign		**Financial**		**Nonfinancial**		**Total**	
	Local Law	Foreign Law	Local Law	Foreign Law	Local Law	Foreign Law	Local Law	Foreign Law
Austria	93%	7%	56%	44%	47%	53%	77%	23%
Belgium	95%	5%	3%	97%	47%	53%	62%	38%
Finland	83%	17%	43%	57%	21%	79%	67%	33%
France	97%	3%	74%	26%	46%	54%	81%	19%
Germany	100%	0%	92%	8%	77%	23%	94%	6%
Greece	36%	64%	43%	57%	14%	86%	35%	65%
Ireland	100%	0%	67%	33%	13%	87%	66%	34%
Italy	94%	6%	39%	61%	60%	40%	78%	22%
Netherlands	94%	6%	77%	23%	80%	20%	83%	17%
Portugal	89%	11%	64%	36%	30%	70%	66%	34%
Spain	87%	13%	82%	18%	72%	28%	80%	20%
Total	**93%**	**7%**	**74%**	**26%**	**63%**	**37%**	**81%**	**19%**

Source: Nomura Credit Syndicate, Bloomberg, and ECBC

The table below, Figure 6.2.F, offers additional detail on the specific foreign law breakup of the bonds included in the table above. As it turns out, the most relevant foreign laws are the English, German, and New York law frameworks. For simplicity, the data is reported in aggregate figures, rather than broken down into the individual Eurozone countries. The main message here is that English law accounts for the majority of all foreign law issues. Also, financial issuers seem to occasionally use German law rather than their own domestic jurisdiction. Meanwhile, New York law applies to just below 10% of non-financial (corporate) issuance under foreign law, and even less than that for sovereign and financial issues.

In terms of summary figures, there are EUR1883bn worth of total allocated foreign law bonds in our sample. Scaling this amount up to the size of the total sample (including both allocated and unallocated bonds) suggests that foreign law bonds amount to EUR1.9 trillion.

Figure 6.2: Legal jurisdiction of EUR-denominated bond amounts outstanding (EUR bn)

	Sovereign		Financial		Nonfinancial		Total
	Amount Outstanding (EUR bn)	%	Amount Outstanding (EUR bn)	%	Amount Outstanding (EUR bn)	%	
Total	**6655**	**100%**	**4239**	**100%**	**2539**	**100%**	**13433**
Unallocated	19	0%	87	2%	106	4%	212
Allocated	6636	100%	4152	98%	2433	96%	13221
Local law	6294	95%	3270	79%	1773	73%	11338
Foreign law	342	5%	881	21%	660	27%	1883
English	251	73%	688	78%	499	76%	1438
New York	18	5%	7	1%	53	8%	78
German	17	5%	69	8%	25	4%	111
Other	56	16%	118	13%	83	13%	257

Source: Nomura Credit Syndicate, Bloomberg, and ECBC

The data compilations here are based on bonds outstanding by April 2012. If anything, the percentage of foreign law bonds has been on the rise in the period since; since local law bonds are maturing, and more and more English law bonds are issued, due to the focus on redenomination risk among investors.

7. BALANCE SHEET EFFECTS FROM EUROZONE EXIT BY SPAIN AND ITALY

When analyzing the cost and benefits of exit from the Eurozone, the focus has typically been on potential gains from improved competiveness (i.e. the greater export growth from a weaker exchange rate) and perhaps the transition cost associated with financial instability during a change in currency regime.

But the lesson from emerging market crises over the past few decades is that (negative) balance sheet effects associated with currency depreciation has potential to dominate the (positive) trade effects, see Frankel (2004). [60]

As such, it is crucial to think about the potential magnitude of such balance sheet effects. To analyze the balance sheet effects associated with Eurozone breakup from a practical perspective it is necessary to quantify the *relevant external exposures*. I.e. those that would behave like 'hard currency, and which would be difficult or impossible to redenominate into local currency in an exit.

Conceptually, this requires two main steps. First, dividing external liabilities into those that are 'by legal definition' either local or foreign law. Second, quantifying the foreign law proportions of the bond category, which can be of either type from a legal perspective.

In addition, it is necessary to supplement the other liabilities category in the IIP, which capture all bank liabilities, with information from the BIS, in order to break that information down into cross-border loans and cross-border deposits. From a legal perspective the two types of exposure will behave very different in a breakup.

Below, we illustrate how the basic framework for analyzing redenomination of contracts and the macro implication can be applied to exit by Italy and Spain (other countries could be analyzed similarly).

7.1 Comparing relevant external liabilities for Spain and Italy

Table 7.1 shows an example of a calculation of relevant external liabilities for Italy and Spain. The table only focuses on the part of the external liability structure (within the IIP framework), which has potential to include foreign law liabilities (as outlined in Section 6). That is, we have excluded the line items pertaining to equity liabilities (FDI and portfolio equity), and we have stripped out the deposit portion of the bank liabilities, since those external exposures would likely to redenominate into new local currency, and hence not create any macro level balance sheet effects.

The table utilizes the proprietary estimates of the foreign law proportion of bonds from table 7.2.C in the previous section.

[60] It is generally accepted in the literature that negative balance sheet effects (Frankel 2004; Towbin et al. 2011) played a large role in negative output developments following large depreciations in a number of emerging market countries, such as the Asian countries following the Asian crisis in 1997-1998. Since the output effect associated with the negative balance sheet effect from large foreign currency external liabilities has potential to dominate the positive trade effect from currency depreciation, this aspect matters greatly in the context of growth considerations in break-up scenarios.

Figure 7.1: Applying the concept of Relevant External Liabilities (end-2012 data)

Relevant External Liabilities in Spain and Italy

External Portfolio Debt, Loans and central bank liabilities (EUR bn)			Proportions of foreign law		Relevant External Liabilities (EUR bn)	
	Italy	Spain	Italy	Spain	Italy	Spain
Bond related external liabilities	954.8	708.0				
General government	666.5	247.6	6%	13%	40.0	32.2
Private sector	288.3	460.4	46%	14%	132.5	65.2
Loan related external liabilities						
banks	258.2	315.0	100%	100%	258.2	315.0
corporate sector	115.1	178.0	100%	100%	115.1	178.0
government	6.9	34.7	100%	100%	6.9	34.7
central bank (TARGET2)	194.1	175.4	100%	100%	194.1	175.4
			Relevant External Liabilities (total)		746.8	800.5

The table a priori excludes liabilities in the form of FDI, portfolio equity and cross-border deposits, since the legal analysis concludes that such liabilities are under local law. Note the loan related external liabilities are not the same as total bank liabilities, as they exclude cross-border deposits by utilizing information about the breakdown of BIS banks' exposures to individual countries from the Locational Banking Statistics (section 7A).

The interesting part of this calculation is that while Italy has substantially larger overall external exposures than Spain (due to large exposure in the form of foreign owned government debt), the composition is different. In particular, Spain has larger exposures in the categories, which are likely to be 100% (or near 100%) under foreign law. Hence, Spain turns out to have larger relevant external exposures than Italy, even if its total external liabilities are smaller.

This conclusion is even more pronounced in % of GDP, since Spain's GDP is lower. In Italy's case the relevant external liabilities amount to 54% of GDP. In Spain's case the relevant external liabilities amount to 78%. This number is pushed higher by a large stock of loans to banks and corporates, provided by international banks.

It is debatable whether a net or gross relevant liability concept is more relevant for macro analysis. My position would be that since assets and liabilities are sitting on different balance sheets, and given that there is no hedging market for risk sharing the gross positions are more relevant than the net positions. That said, a holistic macro analysis would take both concepts into account, and some degree of partial weighting of assets in the calculation, as suggested in Nordvig and Firoozye (2012b), may also be appropriate. The important point is that an analysis that focuses only on net exposure is unlikely to realistically capture the balance sheet effects that will impact specific sectors. Appendix C shows a calculation, which incorporates asset side of-set to liabilities.

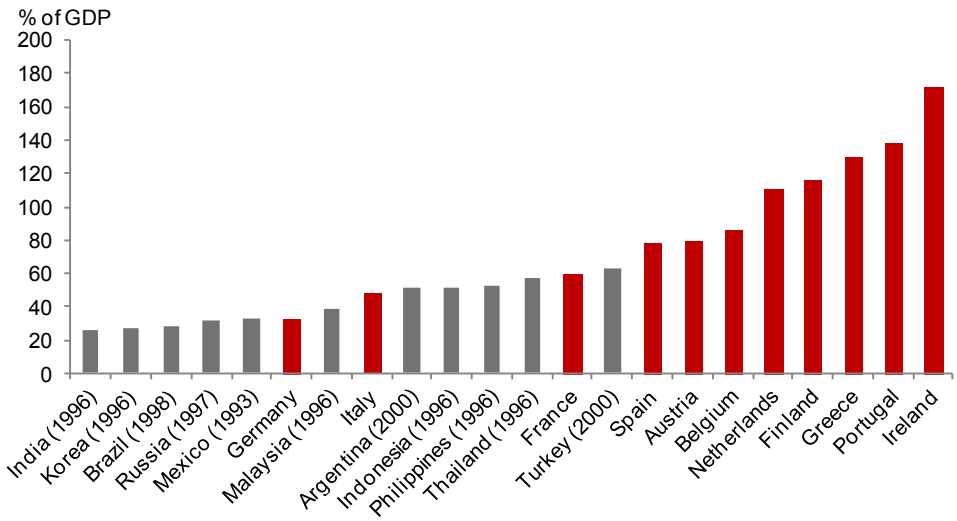
7.2 Balance sheet effects in Eurozone countries in an international perspective

To map these exposures into effects on growth in an exit scenario, one would need to project trade effects and balance sheet effects separately for a given move in the currency (depreciation in the case of exit of a relatively weak country). This is no easy task. But since balance sheet effects have potential to dominate the trade effects associated with currency moves (typically depreciation), it is crucial to take the balance sheet effect into account.

One way to attack the question is to do a simple cross-country comparison with crisis-countries, which have experienced significant balance sheet effects in the past of the type we are concerned about, Nordvig and Firoozye (2012b).

The chart below compares the relevant external liabilities for Eurozone countries with the historical levels of foreign currency debt in selected emerging market countries ahead of large currency moves. It shows that Eurozone countries tend to have very high relevant external exposures. In this chart, Ireland has the largest exposure at 172% of GDP, followed by Portugal and Greece at 139% and 130%, respectively.

Figure 7.2: Balance sheet effects: Foreign currency liabilities in EM countries and the Eurozone



Note: The Eurozone figures are based on the relevant external liabilities calculations in Appendix IV, which measure foreign currency liabilities following an exit from the Eurozone.

Source: Authors' calculations, Lane (2007)

The exposures may not be directly comparable to those in emerging markets. First, the European economies are financially more advanced (higher leverage). Second, in some cases the numbers are inflated by multinational companies operating (and issuing debt) within a specific national jurisdiction (Ireland is the best example of

this). Third, there may be assets, which can compensate for the liabilities to some degree.

Nevertheless, most Eurozone countries have very significant relevant external liabilities, averaging more than two times the average for emerging markets in the past. The average exposure for Eurozone countries is 102% of GDP, compared to an average of 41% for the EM countries in our sample. [61] It is also worth noting that Italy and France (as well as Germany, less surprisingly), have substantially smaller relevant external liabilities than countries such as Greece, Portugal and Spain, suggesting that exit could potentially provide greater net benefits for those two countries, than for the smaller countries in the peripheral group.

I am not aware of any detailed research, which quantifies the impact of the balance sheet effect on output in the context of Eurozone countries following a redenomination process. A basic starting point is to use our own metrics of relevant external liabilities and compare them to output effects as estimated in the emerging markets literature.

One way to measure the size of the balance sheet effect is to pinpoint a level of foreign currency external liabilities for which the negative balance sheet effect fully negates the positive trade effect. A threshold level of around 30% of GDP has been estimated for emerging markets, Céspedes (2005). Foreign currency liabilities above this level imply a negative balance sheet effect that dominates the positive trade effect.

Obviously, this is only a rule of thumb, but they help to illustrate that the liability exposures in place in the Eurozone could easily lead to very large balance sheet effects. Importantly, each of these countries shows a level of external liabilities well above the 30% threshold, with Italy and France at 49% and 59% of GDP, respectively, while Spain and Belgium come in at 78% and 86%, respectively. Interestingly, the three countries with the largest relevant external liabilities in the Eurozone are Greece, Portugal, and Ireland; all with relevant external liabilities in excess of 100% of GDP.

It is beyond the scope of this paper to fully model the negative balance sheet effects on growth from the combination of currency depreciation and large hard currency external debts. But the appendices show a few additional ways to think about the balance sheet effects, taking into account sector specific issues and the asset side of the balance sheet.

[61] It should be noted that traditional official debt statistics, which are recorded on a residence basis, may on certain occasions not fully capture the relevant debt exposures of a given country. This is particularly the case when a country relies heavily on offshore debt issuance, which may be not fully recorded in the statistics. This may have implied that EM foreign currency debts have been underestimated to some degree in the past, see Nordvig (2014).

In addition, to provide an illustration of the potential magnitude of the effects involved, we can use regression estimates from the literature to map the foreign currency external liabilities into an output effect. Applying the estimated coefficients in Céspedes (2005), we find a very large negative output effect amounting to 7-9% for Ireland, Portugal and Greece.[62] This would likely dominate the trade effect, which would likely only add a few percentage points to GDP on shorter-term horizons. In general, whether trade or the balance sheet effects dominate is an empirical question. It will depend on the size of relevant exposures, and on the elasticity of net exports to real exchange rate movements. In addition, there may be important transition cost associated with exit, which needs to be taking into account (even if they are not infinite, such as many commentators seem to claim).

While a precise quantification of the GDP effects are beyond the scope of this paper, the key point is that the relevant external exposures are very large for a number of Eurozone countries, meaning that related negative balance sheet effects have potential to dominate positive effects working through the trade channel.

[62] Specifically, we apply the estimated coefficient on the interaction term (the product of FX depreciation and size of foreign currency external liabilities) to our specific parameters for Eurozone countries, i.e. the product of estimated FX depreciation and the relevant external liability positions. This is the estimated drag on output that would ensue, assuming no debt relief or restructuring around the exit.

8. CONCLUSION

The goal of this paper has been to synthesize the legal consensus in the literature on redenomination of contracts, instrument by instrument, and aggregate the main insights from this analysis to a country-level framework. This framework can be used to quantify macro-level balance sheet effects, which are essential in a holistic cost benefit analysis of exit from the Eurozone.

Given the limited focus on legal aspects of redenomination in the literature and a lack of macro level data (such as gross external debt statistics and international investment position data broken down by the governing law dimension), few attempts have been made previously to accurately quantify balance sheets effects associated with Eurozone exit scenarios. This creates a gap in the current understanding of the macroeconomic costs and benefits of exit from the Eurozone breakup. Importantly, balance sheet effects have potential to dominate trade effects associated with currency moves (typically depreciation). Which effect would dominate is an empirical question, and it will depend on the size of exposures, and on the sensitivity of the economy to currency shifts.

The key point is that any discussion of the merits of breakup of the Eurozone that does not take into account the legal dimension of currency redenomination likely to lead to erroneous conclusions and potentially costly policy decisions.

While the research presented here fills several gaps in the literature, more works needs to be done:
First, more specific analysis of the link between financial exposures, which will result in negative balance sheet effects, and the impact on growth would be valuable. Specifically, previous research in this area has focused on emerging markets. Focused research on this topic, relevant to Eurozone countries would be helpful for policy makers thinking about the cost and benefits of alternative scenarios.
Second, gross derivatives exposures are very large, and could create significant challenges for individual companies even if the exposures net out at the country and sector levels. Research in this area, ideally based on information available only to regulators, would be valuable to evaluate systemic risk.

Broadly speaking, there is a need to move away from a non-analytical approach to discussing the cost and benefits of keeping the Euro and the cost and benefits of departing the Euro. This paper aims at providing a set of analytical tools, which can be helpful to conduct objective cost benefit analysis at the macro level.

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Appendix A

Paper	Quote governing law/jurisdiction in determining redenomination
Ashurst (2012) "International contracts and the Eurozone crisis", Jan 2012	"Assuming that an Instrument would otherwise fall within the scope of the New Currency Law (for example, because a counterparty with a Euro payment obligation is a national of the Exiting State), we can be fairly certain that such Instrument would indeed redenominate into the New National Currency where i) its governing law is that of the Exiting State and ii) it provides for disputes to be determined by the counts of the Exiting State. Further, though less certain - we would expect that even if only one of these factors is present, the Instrument would redenominate"
Allen Overy (2012) "The Euro: the ultimate crip", July 2012	"You work out whether the governing law of an obligation is local or external. The two basic rules of international recognition of a redenomination law and exchange controls are as follows: If the obligation is governed by local governing law, it is redenominated and blocked unless penal or discriminatory or (possibly) in violation of an EU treaty or similar. Obligations governed by an external law are not redenominated and not blocked, i.e. they are insulated and shielded from a local statute. "
Slaughter & May (2011b) "The Eurozone Crisis: And indicative approach to contingency planning", Dec 2011	"Contracts governed by the law of an EMS [Eurozone Member State] are likely to be more at risk of re-denomination/disruption if the EMS exits the euro. For example, if, hypothetically, Italy were to withdraw from the euro, it might be expected that contracts governed by Italian law (expressly or by implication) would be interpreted to reflect the new Italian monetary law, which would form part of Italian law. Contracts adjudicated before the Italian courts, regardless of their governing law, might also be expected to be interpreted in accordance with the new monetary law on the basis that the change in law would form part of the mandatory rules of the forum. The choice of governing law and jurisdiction is therefore an important feature to take into account."
Field Fisher Waterhouse (2012) "The Eurozone Crisis and Financial Transactions", May 2012	"Contracts governed by the law of a country are considered to be governed by the law of that country in effect from time to time. Since the departing state will introduce legislation redenominating euro obligations, payment obligations under contracts governed by the law of the departing state will (if they fall within the scope of that legislation) be redenominated. The creditor must therefore accept payment in the new currency and would be unable to claim for payment in euro."

Norton Rose Fulbright (2012) "Redenomination Risk", Aug 2012	"If the governing law of a contract is that of the departing member state it is more likely to be at risk of being redenominated into the currency of the departing member state. This is either because the departing member state also has jurisdiction to hear any disputes and therefore applies its own laws (including redenomination laws); and even if the courts of a non departing member state hear the dispute, that court may be bound to recognises the choice of law of the parties and, with it, that departing state's redenomination legislation".
Clifford Chance (2012) "The Eurozone Crisis and Derivatives", Aug 2012	"if the contract is governed by the law of the Departing State. In that case, the English or the New York courts may be obliged to give effect to the redenomination legislation, although such courts may refuse to give effect to that legislation on the grounds of public policy, for example if it is discriminatory, confiscatory or contrary to treaty obligations."
Edwards Angell Palmer & Dodge (2011) "The Greek Crisis and the Euro - A Tipping Point?", Jun 2011.	The law creating the new drachma will be directly binding on the Greek courts and will thus have to be applied by those courts in a significant number of cases. It is therefore likely that Greek courts would redenominate contracts into the new currency unit, thus favouring the position of debtors and obligors. In contrast, courts sitting in other countries will not be directly bound by the new Greek currency law, and will only have to give effect to the new drachma conversion if the parties intended to contract by reference to internal Greek monetary rules.
Linklaters (2012) "Eurozone Bulletin: Updating Contingency Plans", Jun 2012	"Where all aspects of a contract (the parties, the performance, etc.) are based in an exiting member state and the governing law of the contract is that of the exiting member state, euro denominated payment obligations under such contract would be expected to be redenominated into that exiting member state's new national currency. However, where the contract has an international/foreign element (whether in terms of parties, place of payment/performance and/or governing law), euro denominated payment obligations under such contract may not be redenominated into that exiting member state's new national currency."

Appendix B: *Balance sheet effects at sector level*

Up to this point, we have looked at relevant external liabilities for the countries as a whole. From a practical standpoint, however, it is likely to be important in which sectors and specific entities these exposures are concentrated. For example, if exposures are concentrated in the corporate sector, they may be hard to offset through official sector financial support.

Figure 5.3: Sector breakdown of gross relevant external liabilities

(% of GDP)	Austria	Belgium	Finland	France	Germany	Greece	Ireland	Italy	Netherlands	Portugal	Spain
Public position	20%	17%	11%	11%	8%	109%	100%	16%	2%	66%	23%
Central bank	11%	14%	1%	8%	2%	49%	77%	12%	0%	36%	16%
General government	9%	3%	10%	4%	6%	61%	23%	3%	2%	30%	6%
Private position	59%	69%	105%	48%	25%	20%	72%	33%	108%	73%	56%
Bank	44%	50%	84%	36%	19%	16%	24%	21%	87%	48%	34%
Non-bank	16%	19%	21%	11%	6%	4%	49%	12%	21%	25%	22%
Total relevant external liabilities	**80%**	**86%**	**116%**	**59%**	**33%**	**130%**	**172%**	**49%**	**110%**	**139%**	**78%**

Source: Authors' calculations, National central banks, World Bank, BIS

The table above breaks gross relevant external liabilities into its key sector components. A few numbers stand out:

In terms of public sector relevant external liabilities, the program countries (Greece, Ireland and Portugal) all have very large relevant public external debt, in the region of 65%-110% of GDP. This stems from a mix of official sector loans (the General Government line item) and ECB funding to NCBs (the Central Bank line item).

In terms of private sector exposure, the Netherlands, Ireland, Portugal and Finland show the largest exposures (all above 70% of GDP). For Ireland and the Netherlands, this is partially a function of issuance by multinationals in those jurisdictions as a function of tax issues, and for Finland, this is a function mainly of bank debt.

For corporates (the main component of non-banks on the liability side), Ireland, Portugal and Spain have the highest relevant exposures, at 49%, 25%, and 22% of GDP, respectively, pointing to large negative balance sheet effects in an exit scenario if left unaddressed by policy steps.

Appendix C: Net balance sheet effects

Net relevant external liabilities

A final point pertains to whether there are any offsets on the asset side of external balance sheets. For example, a country such as the Netherlands, which has large relevant external liabilities, is likely to have more offset on the asset side of balance sheets than Greece and Portugal. However, it is unlikely to be useful to rely solely on a simple concept of net external liabilities. The current absence of a risk-transfer mechanism (see the component on hedging in Chapter 9) means that relevant assets at the country level will not provide full offset to relevant liabilities at the sector level.

One concrete example of this is the large majority of relevant external liabilities in the private sector sitting on corporate and bank balance sheets, while the relevant foreign assets are in the form of securities holdings of asset management companies (pension funds, etc.). These asset positions will provide little direct offset for the borrowers in the corporate and banking sectors, except in the case where public pension fund money is used for macro political purposes. For this reason, the idea of net relevant external liabilities is not always an accurate concept, as it is mainly the gross exposures at sector and agent levels, which will impact credit availability and output effects.

One can argue that we need a concept between gross relevant and net relevant liabilities. We have experimented with various approaches to produce the table below, which shows a measure of adjusted net relevant external liabilities with a 50% weight on positions on the asset side to capture the notion that external assets may not completely offset losses from external liabilities in a break-up scenario. There is potential for additional fine-tuning of these measures, but at a minimum, the adjusted net relevant external position allows for cross-country comparison, even if the specific value may not be that meaningful in a country-specific sense.

Figure 5.4: Adjusted net relevant external position using a partial weighting of assets (% of GDP)

(% of GDP)	Austria	Belgium	Finland	France	Germany	Greece	Ireland	Italy	Netherlands	Portugal	Spain
Net relevant external position	**-2%**	**34%**	**-34%**	**13%**	**42%**	**-92%**	**-73%**	**-20%**	**8%**	**-80%**	**-50%**
Private position	9%	49%	-48%	21%	33%	13%	20%	-8%	-4%	-22%	-31%
Assets	68%	118%	57%	68%	58%	34%	92%	25%	103%	51%	25%
Liabilities	59%	69%	105%	48%	25%	20%	72%	33%	108%	73%	56%
Public position	-10%	-15%	13%	-8%	9%	-106%	-93%	-12%	12%	-57%	-19%
Assets	10%	2%	24%	4%	17%	4%	6%	4%	15%	8%	4%
Liabilities	20%	17%	11%	11%	8%	109%	100%	16%	2%	66%	23%

Note: Negative figures denote an overall net external liability position, while positive figures denote a net external asset position.
Source: Authors' calculations, National central banks, World Bank, BIS

The overall impression from this final analysis is that Germany, Belgium, France and the Netherlands will be the most resilient in the aftermath of a break-up, while GIIPS will suffer the largest losses to their balance sheets. Italy, however, shows more moderate potential losses than the other periphery countries, in part because it does not rely on funding in the form of cross-border bank loans, and in part because the majority of public sector debt is under local law (93%). This is broadly in line with the conclusions drawn when examining balance sheet effects at the sector level: the program countries (Greece, Ireland, and Portugal) continue to see the greatest damage in the case of a break-up, while Germany proves to be the most protected in terms of its balance

Appendix D: Detailed methodology for estimating the foreign law share of debt securities

In this appendix, we describe how we can use various micro-based databases (with information about specific bonds) to derive a macro-level breakdown of bond exposures by governing law (especially local law versus foreign law).

Our starting point is the official data available, which gets us the closest to what we are trying to quantify. The international investment position provides an estimate of a given country's external assets and liabilities. The liabilities that are in the form of bonds, are recorded in the line item called 'portfolio investment, debt securities'.

The question we would like to answer is the following:

> Which proportion of international liabilities in the form of bonds is governed by foreign law (and under foreign jurisdiction)?

As we argued in the main text, we are interested in the foreign law exposures because this exposure will be hard to redenominate in a situation of exit from the Eurozone. Hence, in a scenario of a shift to a new currency, such exposure will stay in foreign currency. If the local currency depreciates following exit, the foreign currency exposures will appreciate and have potential to cause negative balance sheet effects for various economic agents. In essence, the foreign law exposures will become harder to repay for the government, corporates and banks. All those economic agent will generally have revenue and assets predominantly in local currency. A currency shock (sizeable depreciation) combined with balance sheets with substantial foreign currency exposure (ex post) can cause credit rationing and other forms of credit tensions. Ultimately, this is the balance sheet mechanism through which currency depreciation can have a negative growth impact for the overall economy (if the negative balance sheet effects dominates any positive trade effect).

There is no official data source, which provides a 'legal breakdown' of the exposures recorded in the international investment position. The IIP simply records the headline nominal exposures, either in US dollars or in local currency (depending on the country). But there are ways to estimate the foreign law and local law shares of the headline exposure using databases from private providers of financial market data (as opposed to official sources).

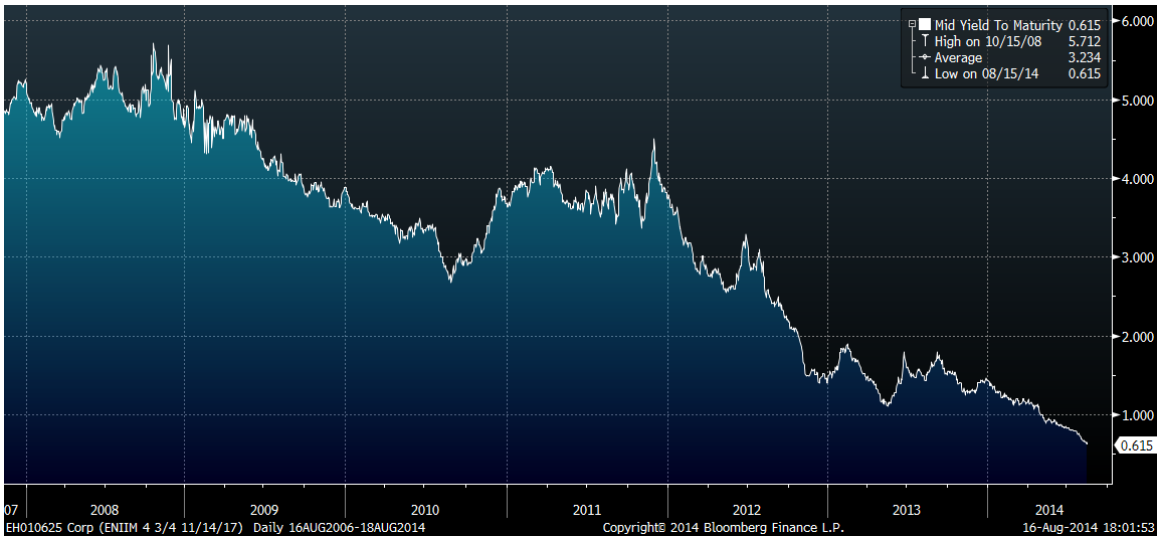
Specifically, we propose a micro-based method, which involves aggregating information from the entire sample of outstanding bonds issued by residents of a given country. By micro-based, we mean that the underlying dataset captures information bond by bond. Since this involves, in some cases, several hundred thousand individual bonds, this is a very data-intensive process. Essentially, it

involves creating a macro-data set from scratch using some of the same techniques official institutions use. The advantage is that it allows us to tailor the dataset to the specific need we have: the need to create a breakdown by governing law.

Below we show an example of some of the key information available on a Bloomberg terminal about a specific bond issued by the Italian energy company ENI spa, as well as a screen-shot showing the time series of the yield of the same bond:

Issuer: ENI SPA
Sector: Integrated Oil (Energy)
ID: EH0106250
Coupon: 4.75% (fixed)
Country (of risk): Italy
Exchange: Euroclear/Clearstream (Luxembourg).
Currency: EUR
Size: 1250000000
Governing law: English Law
Issue date: November 7, 2007
Maturity date: July 4, 2017

Figure A.D.1: Example of yield on a bond in Bloomberg's database



Our raw (unfiltered) databases contain this type of information for many thousands of individual bonds.

By aggregating the information from the micro-level, we can derive a country-level breakdown between foreign law and local law bonds for the entire population of bonds that is issued by residents of the country. Specifically, our method looks at the residency of the country ultimately at risk in relation to a given debt security. Hence, in situations where subsidiaries issue debt, the residency of the mother company is used for the computations, consistent with the approach in the BIS's consolidated banking statistics. All the bonds in this overall population (generated by simply

looking at all bonds issued), can in principle be owned by foreign residents. The exception would be if capital controls restricted foreign ownership in some form. But given provisions of free movement of capital (and other production factors) in EU treaties (Article 63 in the Treaty of the Functioning of the European Union), it makes sense to think of the entire population of bonds available for investment for foreign investors. That is, there is reason to believe that the proportion of foreign law bonds in the population of bonds issued is a reasonable proxy for the proportion of foreign law bonds within the portfolio of bonds held by foreign investors.

Generating an estimate of the macro-level breakdown by governing law requires an aggregation of large amounts of micro-level data, with information about individual bond issues. Each bond, which is registered for sale with a regulator in a given jurisdiction, is identified by a unique identification code (called CUSIP by US regulators). Our data analysis is done at the level of these bond specific codes. This is a very data intensive exercise. It requires a combination of several underlying sources of market data, to allow robustness checks along the way. In addition, a certain IT infrastructure is needed for managing and filtering the data (our underlying database is set up in SQL for example, since it is not a task that can be handled in a spreadsheet).

The main steps of our method are summarized below:

Step 1: Create micro-level data base containing all bonds issued by Eurozone residents. The database contains information about country of issue, sector, currency of issue, size of issue and importantly, the governing law of each issue. This step involves building 'pipes' to Bloomberg's and Dealogic's raw databases, and hosting the data within a flexible database able to handle very large data sets. For example, the underlying data from Dealogic contains information about 42000 individual bonds issued by Eurozone residents, while the raw Bloomberg data contains more than 400000 issuers with residence in the Eurozone (more than older versions of Microsoft Excel can handle).

Figure A.D.2: Breakdown of governing law using Dealogic data only (EUR bn):

DEALOGIC DATA

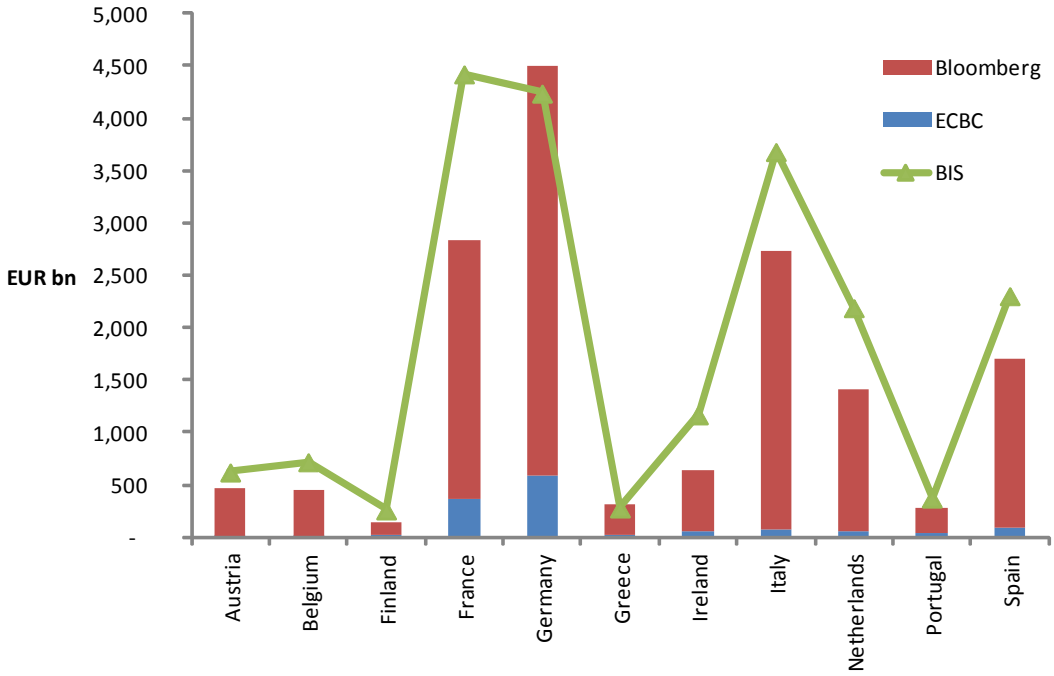
	Sovereign			Financial			Nonfinancial			Total
	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	
Austria	163	36	3	44	48	4	9	8	0	316
Belgium	268	0	3	5	115	4	2	115	4	515
Finland	65	7	0	3	15	0	3	6	1.4	100
France	1286	57	8	369	181	22	206	137	24	2290
Germany	1290	17	13	555	59	6	302	54	18	2314
Greece	194	6	1	18	49	2	2	37	2	312
Ireland	62	2	7	28	41	3	6	52	16	219
Italy	1269	31	8	131	263	15	272	134	12	2135
Netherlands	323	2	3	150	25	19	325	58	26	930
Portugal	120	12	0	27	29	2	22	49	1	262
Spain	596	64	1	762	170	29	597	240	13	2472
Total	5638	234	47	2091	995	107	1746	892	116	**11866**

Note: Table shows breakdown from Q1 2012 using Dealogic data only (i.e. before any cross-checking).

This step also involves various steps of filtering. For example, the raw Bloomberg database contains a large number of bonds of small denominations (hence the difference in the population size relative to dialogic). These bonds generally do not have information about governing law available and are of marginal importance from an aggregate perspective (we suspect most of these bonds are bonds sold by savings banks in Germany and other countries to their depositors, but not marketed more broadly). Hence, we filter out bonds in very small denominations, since they have little ability to impact the final macro figures, which is our objective, and since they make the data handling more complex.

Step 2: Aggregate information from micro-level sources in order to provide macro-aggregates of exposures broken down by their governing law (foreign, local, unknown). This step also involves a cross check with official sources of overall debt issuance. Specifically, we compare with the headline numbers within the BIS's Debt Securities Statistics. The purpose of this step is to validate that the aggregation of micro-level data provides numbers for aggregate debt stocks (outstanding amounts), which are similar in magnitude to the ones presented by the BIS, and which are generally regarded as the most reliable source of such information.

Figure A.D.3: Comparison of BIS Securities Statistics and Proprietary Aggregation



Note: Total bonds outstanding based on proprietary aggregation analysis and BIS data from Q2 2012

Our bottom-up exercise (aggregation of information from thousands of individual bonds) does not yield identical results to the figures in the BIS's securities statistics. It would be very surprising if it did. But it is nevertheless clear that the aggregation provides estimates of total debt issued, which are of the same order of magnitude as the BIS data. This is clear from inspecting Chart A.1. Moreover, the cross-sectional correlation between BIS estimates of aggregate securities stocks and our metric of such stocks (see step 4) stands at a very high level of 95%, when using data from early 2012.

Since the Dealogic data is providing aggregate figures, which are similar to Bloomberg, the same conclusion holds for this data set too.

The table below illustrates the difference between each cell in the grid (Bloomberg cell minus Dealogic cell). It is clear that given that we are talking about a combined population of bonds just below EUR12 trillion for Dealogic and just below EUR14 trillion for Bloomberg, some of the differences are very minor. That said, there are some substantial differences, especially for local law sovereign bonds.

Figure A.D.4: Differences between Bloomberg and Dealogic Data by cell (EURbn)

	Sovereign			Financial			Nonfinancial			Total
	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	
Austria	12.9	34.3	1.5	106.4	10.8	26.1	2.2	10.9	9.1	142.7
Belgium	40.9	15.3	2.0	2.1	107.9	2.5	8.2	105.6	82.7	69.1
Finland	4.2	6.3	0.4	5.9	1.0	9.9	0.1	1.8	0.6	14.1
France	135.6	38.1	4.5	53.2	42.1	102.8	66.7	48.3	76.0	176.8
Germany	239.9	15.9	9.9	1498.6	6.5	124.2	248.3	38.5	25.2	1601.6
Greece	61.7	2.7	4.0	0.7	30.7	44.9	0.5	33.9	0.3	48.6
Ireland	52.1	1.9	7.2	22.4	69.6	45.8	6.0	37.2	223.3	360.8
Italy	247.9	43.5	6.1	436.1	122.1	75.3	255.0	91.6	198.0	538.2
Netherlands	41.1	13.2	2.4	37.8	56.2	112.4	302.6	137.6	422.0	433.0
Portugal	12.9	0.5	2.2	12.4	12.6	19.3	5.4	47.3	25.6	18.2
Spain	41.3	10.6	15.1	271.8	138.2	4.2	583.1	208.0	265.7	864.2
Total	782.4	10.6	33.1	1899.6	311.5	562.4	1457.5	460.2	1326.6	**2364.4**

Note: Cells with relatively small differences are marked green. Cells with larger differences are yellow. And cells with very large differences are red. In the total columns all cells are pink.

It is also comforting that our methodology for generating macro data captures major changes over time. The best test of the methodology's ability to capture changes over time is the shift in exposures in Greece, which happened as a result of the debt restructuring in March 2012.

The two tables below (using aggregations from January 2012 and April 2012) illustrate this shift, with Greek exposure dropping substantially, and foreign law bonds becoming much more important for Greece, given that existing Greek government bonds under local law were exchanged for new Greek government bonds under English law.

For more detail on the details of the debt restructuring see the press release by the Hellenic Republic from March 9, 2012:
http://av.r.ftdata.co.uk/files/2012/03/9-MARCH-2012.pdf

Figure A.D.5: Aggregation of bond exposures based on Bloomberg data: *Before and After Greek Debt Swap (EUR bn).*

BLOOMBERG DATA (1/23/2012)

(As of 1/23/2012)	Sovereign			Financial			Nonfinancial			Total
	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	
Austria	176	2	1	151	58	30	11	19	9	459
Belgium	309	16	5	2	7	1	10	9	86	446
Finland	69	1	0	9	14	10	3	8	0.7	115
France	1421	19	12	422	139	125	139	89	100	2466
Germany	1530	1	23	2053	66	130	54	16	43	3916
Greece	256	9	5	19	18	47	2	3	1	360
Ireland	114	0	0	51	111	49	0	15	239	579
Italy	1517	74	14	567	141	90	17	43	210	2673
Netherlands	282	15	0	188	81	131	23	196	448	1363
Portugal	107	13	2	39	16	22	16	2	26	244
Spain	638	74	16	490	32	33	14	32	279	1608
Total	6420	224	80	3990	684	670	288	432	1443	**14230**

BLOOMBERG DATA (4/30/2012)

(As of 4/30/2012)	Sovereign			Financial			Nonfinancial			Total
	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	Local Law	Foreign Law	Unknown	
Austria	176	2	1	151	58	30	11	19	9	459
Belgium	309	16	5	2	7	1	10	9	86	446
Finland	69	1	0	9	14	10	3	8	0.7	115
France	1421	19	12	422	139	125	139	89	100	2466
Germany	1530	1	23	2053	66	130	54	16	43	3916
Greece	**73**	**127**	**2**	**16**	**22**	**50**	**0**	**3**	**0**	**292**
Ireland	114	0	0	51	111	49	0	15	239	579
Italy	1517	74	14	567	141	90	17	43	210	2673
Netherlands	282	15	0	188	81	131	23	196	448	1363
Portugal	107	13	2	39	16	22	16	2	26	244
Spain	638	74	16	490	32	33	14	32	279	1608
Total	6237	342	76	3988	687	673	287	431	1441	**14162**
Note: Greece data updated after debt swap, as of 4/30/2012										

Step 3: Compare 'legal breakdown' data from different sources. After constructing a legal breakdown of bonds, using both the database originating from Bloomberg and the database originating from Dealogic, we can do a quality check. For each sector, we select the preferred source, based mainly on which source has the highest coverage, defined as the highest percentage of bonds for which legal parameters are available (i.e. the least bonds in the unknown category). For the sovereign bonds, we can in certain cases also evaluate the quality of the aggregated micro-level data by comparing our estimates of the foreign law share with estimates from local Treasuries and Debt management agencies.

For example, the Greek Ministry of Finance has, within its public debt statistics published an estimate of their internationally issued bonds. By end-2011 (close to the point in time of our sample from January 2012), EUR18.5bn of international bonds were listed (Greek Ministry of Finance Public Debt Bulletin, January 2012). From the information released around the debt exchange in March-April 2012, we know that there were three individual JPY denominated bonds worth a total of EUR1.1bn, one USD denominated bond, worth around EUR1.2bn, and one CHF denominated bond worth EUR0.5bn. Hence, non-Euro denominated international bonds accounted for just below EUR3bn. This leaves a remainder of EUR15-16bn as Euro denominated international bonds issued under foreign law. We get a similar estimate by simply adding up the 16 foreign law Euro denominated bonds issued with Hellenic Republic title, which were included in the second round of the bond exchange (see Hellenic Republic Public Debt Management Agency press release from April 11, 2012). Specifically, that summation yields an estimate of EUR14.0bn. Hence, various government sources put the stock of Greek foreign law Euro denominated bonds during the period from December 2011 to April 2012 at EUR14-16bn. For comparison, our data analysis had captured EUR9bn of foreign law sovereign bonds and EUR5bn of non-classified bonds. Hence, if the non-classified bonds are added to the foreign law category, we would move to exactly the range we have established using official sources. This is an example of the type of cross-checks, involving official data sources where available, we have used to verify the Bloomberg-based data. In general, the broad impression (although less precise data is available for other countries, which did not restructure their debts) has been that the estimates have been fairly accurate, particularly for the sovereign bonds.

Turning to the more general comparison of the coverage, Dealogic data seems to be the most reliable for both corporate bonds (i.e. non-financial bonds) and bank bonds. For the total sample (pooling the data for the 11 countries we analyze), Dealogic has the legal parameter available for 97% of financial bonds (versus 87% for Bloomberg); and Dealogic has the legal parameter available for 96% of corporate bonds (versus just 33% for Bloomberg).

Coverage Ratios (Bloomberg Data)

	Sovereign	Financial	Non-financial
Austria	99%	87%	76%
Belgium	99%	89%	18%
Finland	99%	69%	94%
France	99%	82%	70%
Germany	99%	94%	62%
Greece	99%	43%	99%
Ireland	100%	77%	6%
Italy	99%	89%	22%
Netherlan	100%	67%	33%
Portugal	98%	72%	41%
Spain	98%	94%	14%
Total	99%	87%	33%

Coverage Ratios (Dealogic Data)

	Sovereign	Financial	Non-financial
Austria	99%	96%	97%
Belgium	99%	97%	97%
Finland	100%	99%	88%
France	99%	96%	93%
Germany	99%	99%	95%
Greece	99%	97%	96%
Ireland	90%	96%	79%
Italy	99%	96%	97%
Netherlanc	99%	90%	94%
Portugal	100%	96%	99%
Spain	100%	97%	98%
Total	99%	97%	96%

Note: Tables show the percentage of bonds in each category, which is allocated to either local or foreign law category, based on data from Q1 2012. The unknown portion is (1-coverage ratio)

For sovereign bonds, Bloomberg and Dealogic seem to have similar coverage ratios (both at a very high level of around 99%). But cross-referencing with country specific data from local treasuries and debt management agencies seem to indicate that the Bloomberg data is potential more accurate. This is also the conclusion you get (indirectly) from Figure A.D.4, which shows that the difference between Bloomberg and Dealogic data is substantially positive in some cases, indicating that Bloomberg captures more of the sovereign bonds actually issues; and since the coverage rate is similar between the sources, it is natural to use the Bloomberg data for sovereigns.

Step 4: Add covered bond data to the overall sample of bonds. This step is necessary, since neither Bloomberg or Dealogic seem to have covered bonds included in their databases (probably because the registration of covered bonds is following a different process than bonds without collateral). The data we add to solve this problem is from the European Covered Bond Council (ECBC). The data is different from the Bloomberg and Dealogic databases in that it is provided in macro-form (not bond by bond). However, since, we know from our legal analysis (section 4.3.1) that the covered bonds are all local law (by definition), we don't need a legal break-down as such to complete our analysis. We can simply add the aggregate figures for the covered bonds outstanding to the local law category for the overall bond population before calculating the final foreign law and local law shares of the entire bond population.

We note that the covered bonds are important in some countries, especially Germany, France and Spain, and they help boost the overall estimates of bonds outstanding to levels which are closer to the figures reported by the BIS, as seen in chart A.1.

The four-step method outlined above is the method, which we have used to generate the legal breakdown of exposures, as reported in Figure 6.2 in the main text. Having a sense of this legal breakdown is crucial to think about potential balance sheet effects. To illustrate the basic mechanism at play:

- If all bonds issued by residents of a given country are under local law, all liabilities will likely be redenominated following exit, and the currency change may not generate any traditional negative balance sheet effects through currency movements (the distribution of bonds issued by French residents has this flavor).

If all bonds are under foreign law, all liabilities will likely stay in Euros following exit, and the currency change has potential to generate large negative balance sheet effects, as such 'hard currency' liabilities will be harder to repay with a domestic

currency depreciating (the distribution of bonds issued by Greece and Portugal has this flavor).

There is a basic caveat to this basic methodology, which also applies to the 'original sin' literature in emerging markets, see Eichengreen, Hausmann and Panizza(2002), Foreign investors may have a preference for foreign law versus local law instruments. Hence, the estimates of foreign law shares for the overall bond population may not be an unbiased estimate of the foreign law share of the debt that is actually foreign owned. Since we are ultimately interested in the proportion of foreign owned bonds, which may be hard to redenominated, we would ideally like to estimate the share specific to the foreign holdings. However, the best we can do is to calculate the shares for the entire population, and assume that they proxy the share for the foreign holdings.

In this connection, it is perhaps relevant to think about how active foreign investors have been in various local law instruments. For example, foreign investors have been known to be very active in certain local law markets, such as the German Pfandbrief market, which are local law covered bonds (and something similar can be said about Danish mortgage bonds). Hence, there is no immediate reason to think that foreign investors would have a dramatically different composition of their bond holding by governing law category than the overall bond population. The basic lack of attention/focus on this dimension of specific financial instruments before the crisis certainly suggests that investors have not been 'avoiding' local law instruments. Hence, the basic assumption (that population level foreign law shares are equal to the foreign law shares of foreign bond holdings) is likely to be a reasonable approach (although a certain bias may have been appearing during the Euro-crisis).

In any case, it is very instructive to know for which countries the local law issues dominate, as that will provide a good indication that balance sheet effects would be smaller than would otherwise be the case.

However, recent awareness of the legal dimension of specific securities may mean that the bias (wedge between population foreign law shares and actual shares in the foreign holdings) could become a bigger issue over time, which is one additional aspect of the debate about 'fragmentation' of Eurozone financial markets.