Transatlantic Mortgage Credit Boom and Bust – the Impact of Market Structure and Regulation[1]

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1 Introduction

More than 4 years have elapsed since the U.S. subprime crisis broke out in 2007, taking with it hundreds of mortgage lenders. Since 2010 we find ourselves in a fully blown sovereign debt crisis in Europe, which to a substantial extent was caused by local mortgage credit booms with lending patterns and house price inflation very similar to the U.S. European countries in mortgage crisis include Ireland, Spain and Hungary. Waiting in the wings are others sitting on inflated house prices and hoping for a 'soft landing'.

Even though European mortgage default rates are below U.S. rates, the scale of problems, and as we will see the analogies of their causes, suggest that it is fair to speak of a Transatlantic crisis. The weight of residential mortgage lending in balance sheets invariably means banking crisis, and where regulated banking has been replaced 'shadow banking' crisis.[2] As governments rescue lenders, the resulting pressure for fiscal and wage austerity, as well as higher unemployment, in a feedback effect enhances pressure on house prices and portfolio quality. With the two largest reserve currencies being affected, USD and EUR, systemic risk implications globally follow suit.

Financial sector development and macro economist professions in the past had overlapped only little: the result has been that the former became notoriously weak at spotting (cross-border) liquidity and relative price shocks that destroyed even carefully designed financial institutions and regulations, and that the latter had little idea about the changing nature of the transmission channels between macro variables and their impact on the financial system. With the global financial crisis, greater interaction between the two professions is in demand, shown most clearly by the emergence of the concept of 'macroprudential' financial regulation.

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2 Shadow banking can be defined as financial entities, infrastructure and practices beyond the reach of existing government monitoring and regulation.

Recent IMF empirical analysis (2011a, b) has therefore combined macro and financial sector micro analysis to explain credit booms and draw conclusions for regulation. It comes to quite different results regarding the relative weight of either factor for emerging and advanced economies that fundamentally differ in their financial systems' complexities. The dominant role of macro capital flows for credit in emerging markets with their typically shallow local capital markets, for example, is well documented.[3] However, for the advanced economies, the epicenter of the current crisis, IMF suggests that financial market conditions have played a far larger role than capital flows.

This paper moves further along this route by asking how the retail mortgage sector, which was small and virtually inexistent as a source of innovation and capital flows still by the 1980s, could turn into a central transmission mechanism for the global financial system. Specifically, it asks

- what has been the contribution of idiosyncratic supply and demand features of mortgage credit markets to boom and bust as well as cross-border flows (Section 2).
- what can be done to reduce the mortgage finance systems transmission character for liquidity shocks and better protect financial systems (Section 3).

The paper concludes with a specific proposal regarding the principles of mortgage finance regulations.

2 Stability Impact of Mortgage Market Structures and Regulations

2.1 Mortgage Finance System Design

European, and by extension the U.S., **housing finance systems have been actively designed** by policymakers **historically** to overcome the dearth of long-term funding sources that local markets consisting of small savers would not provide. The key principle adopted in the 19th century was to tap wealthier individuals and the beginning institutional investor sector via bonds, issued by specially chartered banks.

The **European (covered) bank bond systems** pioneered this principle: the Danish mortgage credit institution system founded in 1795, the first centralized mortgage bond issuer Credit Foncier de France in 1852, and the German system of specialized Pfandbrief issuers created as early as 1769. Of these, only the Danish was targeted from the beginning to retail mortgages; the French and German systems funded first local large investors - aristocrats and communes - and later large developers that built the rental cities of Europe.

[3] For a recent analysis see Psalida and Sun (2011).

The classical **European savings bank** and later **U.S.** the **Savings and Loan** (S&L) for a long time were the prime suppliers of retail mortgages. They would, however, demand substantial savings prior to a loan takeout, both as a creditworthiness signal and as funding. Where savings were taxed away to fund governments, as in Britain before or in Germany after WW I, specialized building societies developed on the same mutual principles. Specialized mortgage banks only after WW II gradually began to fund retail mortgages on a larger scale.

A completely new design that separated credit risk from the lender level was born under the **U.S. New Deal** of the 1930s. The National Housing Act of 1934 created the first public mortgage loan insurer, the **Federal Housing Administration (FHA)**. The FHA limited itself to insuring 20 year fixed-rate mortgages subject to interest rate ceilings and funded by Savings & Loans (S&L). S&L mortgage loans had been short-term only, which contributed to high default rates when roll-overs failed as lenders were afraid of the credit risk. Anglo-Saxon countries copied the U.S. insurance approach after WW II to establish either public or private mortgage insurance systems.

The U.S. in 1937 also had created a national balance sheet for loan purchases from local 'mortgage banks' with limited access to deposits, via Fannie Mae. The fiscal pressures of the Vietnam War forced the government to abandon funding mortgages directly and privatize and convert Fannie Mae to a mortgage bond insurer. The S&L industry in 1970 received her own bond insurer, Freddie Mac. So the U.S. system became characterized by two layers of insurance, loan and bond.

The **divergence between systems peaked in the 1980s.** The high inflation of the 1970s had caused solvency and liquidity problems for special banks. In Europe this invited commercial banks into the market; in the U.S. the S&L crisis gave rise to a new public-private partnership, between Wall Street securities firms and the bond insurers Fannie Mae and Freddie Mac. The secondary mortgage market dis-intermediating origination, packaging, structuring, insurance and funding of mortgages via securitization was born.

The de-facto **public insurance-based setup of the US housing finance system** can be seen to bear great responsibility for the U.S. mortgage market crisis. The failure to abolish the New Deal's institutions after the economy had recovered by the 1950s created a giant policy lag. Semi-privatization of Fannie Mae and the similar status of Freddie Mac made matters worse, as profits could be privatized while losses would remain socialized. As such 'government-sponsored' enterprises (GSE) spread out in what regulations defined as 'conforming' mortgages, the true private sector was left with risky niches. Private mortgage insurance since the 1970s was insuring high loan-to-value (LTV) ratio loans ineligible for the GSE. In the 1990s and 2000s the sub-prime market developed for GSE-ineligible borrowers, funded mostly through

Wall Street securitizations. And the 2000s added, again ineligible, high LTV home equity lending funded by both banks and securitizations. A substantial share of these 'private-label' securitizations funding ineligible mortgages - 18% of the outstanding, by fall 2011 – found their way to the balance sheets of Fannie Mae and Freddie Mac. Their role in inflating U.S. housing debt went beyond the already massive expansion of her 'agency' securitizations, covering eligible mortgages only (Figure 1).

[Insert Figure 1 here]

Both agency and private-label mortgage securities during the 2000s became a key driver of capital imports into the U.S. Per 2011, some 14% of agency mortgage securities and 18% of private label mortgage securities are estimated to be directly held abroad, with likely substantial additional indirect holdings via money market and other U.S.-based foreign-owned funds.[4]

While much of the US housing finance system design was copied by Canada and Australia, the **United Kingdom** after the mortgage crisis of the 1990s changed course and **turned from third-party to lender self-insurance**. This resulted in a considerable decline in the LTV-financed, and paid out in greater resilience in the current crisis (see Figure 3). Both in the UK and Ireland, the traditional housing finance system via building societies had seen a diminished role since the 1980s, vs. the rise of commercial banks.

There has only been a very limited **role of public loan, let alone bond, insurance in Continental Europe**.[5] Especially, high-LTV loan insurance is a missing element. An exception is the large, almost unconditional public insurance program run by the WSW in the Netherlands that also backs up large volumes of mortgage-backed securities issued in the country and which can be seen to have contributed to the high Dutch mortgage debt levels. The French FGAS program, in contrast, is targeted to non-prime borrowers only. In combination with a lesser role of mortgage interest deductibility in Europe, reduced and in many cases abolished during the interest rate compression phase of the 1990s, the absence of high-LTV insurance has moderated incentives favoring leverage.

The covered bonds used in Continental Europe have had a lesser funding relevance than securitization in the U.S. Only in the case of Denmark, they still funded almost the entire mortgage portfolio. In Germany, Italy, Spain and France, the historic strong reliance became diminished with the deregulation of the 1970s and 1980s, which allowed deposit-funded commercial banks to enter housing finance. Public ownership, dominating in France and Southern Europe until the 1980s, became reduced and over time the covered

4 See Dorfman (2011).

5 For greater detail on structural differences, see Lea (2010).

bond system in Europe became largely privately owned. The product started to appeal again in the 1990s, when Germany's issuers launched the '**Jumbo' Pfandbrief program** with minimum issuance size of 1 billion Deutsche Mark. The success in attracting foreign investors into a corporate bond was unparalleled. Spain and Ireland modernized or adopted their covered bond laws in the 2000s, in order to address a shortage of domestic deposits amidst the lending boom and tap international markets. The U.K. started with 'structured' covered bonds.

Quite comparable to U.S. securitization, covered bond issuance activity in Europe financed some national housing booms, via the capital account. Figure 1 highlights the Spanish case: the deposit base had been depleted by high credit growth by 2002. With heavy issuance of both covered bonds and securitizations the boom was extended until 2007. Spain is estimated to have sold some 60% of covered bonds issued in the mid-2000s to foreign investors.[6]

Yet, Figure 1 also makes the opposite observation for Hungary, where covered bonds fell back over time. Here, liquidity for the housing finance boom was created via interbank and customer deposits in foreign currency, as well as the heavy use of **swaps.** The predominant Swiss Franc lending product required at least one swap to be contracted by a bond issuer, and foreign banks were willing to aggressively price cross-border funding.

Recent IMF analysis (2011a) has singled out the role of public guarantees in mortgage credit booms. This begs the question **to what extent covered bonds are comparable** with agency securities **regarding implicit government guarantees**. Technically, the implicit support framework for the U.S. GSE has been more analogous to the regime for bonds issued by public banks in Europe (e.g. Landesbanken). However, the covered bond product is at least as important in Europe politically, and during 2008 and 2009 the implicit guarantees turned explicit: almost all European covered bond markets were temporarily de-facto nationalized via guarantee commitments or ECB intervention. The two largest German issuers Eurohypo and Hypo Real Estate were even de-jure nationalized. In France and Switzerland, joint issuance vehicles of the banking industry took much of the activity temporarily. In Denmark, the fixed-rate covered bond market stayed open while the adjustable-rate covered bond market required the support of a public pension fund. Therefore, European covered bonds can be seen as implicitly publicly guaranteed instruments.

6 See IMF analysis by Avesani et. al. (2007).

2.2 Banking and Insurance Regulation

That permitting **extreme levels of borrower leverage** has been the **central micro regulation failure leading to the U.S. mortgage market crisis** seems to be consensus today.[7] U.S. banks and thrifts had been gradually deregulated already during the 1970s. In 1971 U.S. S&Ls (savings and loans) were permitted to do 95% LTV lending, up from 80%, against protection provided by private mortgage insurance. Fannie Mae and Freddie Mac became allowed to increase their permissible loan purchase and bond insurance activities in the same way. That private high-LTV insurance provided questionable protection became clear latest with the collapse of the UK industry in the early 1990s.[8] The FHA limits were also pushed up and further into very high-LTV lending. Figure 2 on the right-hand side has an estimate by Pinto (2010) that indicates ballooning exposures already by the late 1990s.

[Insert Figure 2 *here]*

A second deregulation measure encouraged subprime lending**:** the **removal of interest rate usury limits in the early 1980s.** Rather than simply adjusting the obsolete loan interest rate ceilings from low-inflation times to higher inflation levels, ceilings were removed altogether. This permitted very high interest rate lending. Supported by generally falling rates, later administrations only demanded enhanced disclosure on these loans.

In securitization, apart from transparency standards and legal liability enshrined in bond indentures, which has been extensively used only after the system collapsed, the **private label** market never became regulated. This was exploited to create **derivative and multiplier structures.**

Since public FHA-insured and 'agency' MBS mainly provided fixed-rate mortgage (FRM) lending and were impossible to compete against, the private label market focused on **adjustable-rate mortgage (ARM) lending**. With this strategy, available international capital supply was multiplied since short-term funding for ARM requires only a short-term investor commitment. Gaining access to low 'duration' mortgage assets was attractive in particular for U.S. money market funds, i.e. a large new investor class was added to the classical spectrum. Withdrawal of these funds played the central role in the liquidity crises of 2007 and 2008.

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7 See e.g. Leviton and Wachter (2010) and Villani and Hendershott (2012), from opposite sides of the political spectrum.

8 Calls on mortgage insurance contracts in particular by Fannie Mae and Freddie Mac were very limited during the current crisis, despite high default levels. Instead, loan originators and servicers were sued for mis-selling of loans. An immediate collapse of the mortgage insurance industry amidst declining house prices would have meant stopping high-LTV lending when it was needed most. Nevertheless by early 2012 all but one private insurer have exited the market.

A second type of multiplier was credit-related: when 'BBB'-rated securitization tranches **packaged into new mortgage products** became more highly rated, the cost of credit protection of AAA-tranches was reduced. Questionable rating methodologies stipulated diversification effects where there were none. This meant that higher loan volumes could be funded.

The new types of bonds were finally sold by Wall Street to **an increasingly diversified global investor base**, i.e. global funding channels parallel to the GSE's distribution were created. A prominent investor was the system of **ABCP conduits** run from offshore places such as Ireland that was sponsored primarily by European banks.[9] Banks acting as investors in the U.S. in this way enjoyed funding privileges (e.g. German Landesbanken) or had unprofitable core business or exacerbated return on equity goals (most European wholesale banks).

Some of the innovation seen goes back to a presence of unstable and costly **unsecured bank funding** conditions that weakened U.S. banks. In particular long-term bank bonds have hardly been used in the system, partly as a result of the powers given to the public deposit insurer Federal Deposit Insurance Corporation by the 1933 Glass-Steagall Act over bond investors. The introduction of covered bond legislation in the U.S. is trying to rebalance this.

Mortgage banking deregulation in Europe took place mostly in the 1980s. The UK had lifted LTV limits on building societies and admitted commercial banks to the mortgage market in 1984. This led directly to the Lawson boom of the late 1980s. The median LTV ratio on new loans increased within only five years during the early 1980s from 70% to 90% (see left-hand side in Figure 3). House price inflation combined with high-LTV lending resulted in a mortgage credit crisis unfolding after 1990.

Loan-to-value limits in seemingly conservative jurisdictions were liberalized at the time as well: in Germany, total LTV ratios were allowed to be higher than the Pfandbrief senior funding LTV limit of only 60%. Bausparen, a contract savings scheme inherited by Germany from the historic British building society model and designed to deliver safe high-LTV mortgages, came under pressure in the aftermath from cyclical high-LTV lending by both Pfandbrief issuers (mortgage banks) and commercial banks. In Denmark, commercial banks had been permitted to give personal loans to fill the gap left by the 80% LTV limit for covered bond funded loans, leading to an implicit rise in total LTV.

[Insert Figure 3 here]

[9] See Arteta et al (2009).

Outside the Netherlands, Ireland, the United Kingdom and Spain, **securitization has played a minor role in Europe**. MBS have in some markets not grown beyond the small high-risk niches, e.g. of non-performing (Italy) or high-LTV (Germany) lending. This has resulted in partial stigmatization of the product. European banks generally have preferred to keep high-quality loans on balance sheet, in particular those that use extensively covered bonds requiring high asset quality. In Ireland and Spain, the role of MBS has been considerable in attracting cross-border capital flows (see Figure 1). The impairment levels of European MBS have been low compared to the U.S., essentially for three reasons: very limited structuring, a selection bias in volume towards the more stable mortgage markets UK and Netherlands, and absence of high rate lending. There have been mispricing problems, however. In particular, Spanish and Irish MBS were endowed with too little subordination – lower than AAA-rated tranches – which mismatched with the increasing loss risk as house prices ballooned.

Mortgage funding stability of banks in Europe has been historically high as European states implicitly guarantee covered bonds and senior unsecured funding. The main mechanisms are high levels of overcollateralization accepted for covered bonds, and the absence of a seniority ranking for deposits (outside the U.K., which reformed only in 2011) expressed most clearly in the priority of general bank rescue funds over deposit insurance funds. The crisis has amply revealed the scale of this support, which in a negative feedback effect has weakened it via a decline in sovereign rating and prompted central bank interventions. Even before, long-term bank bond instruments were insufficiently used as a result of regulation failures allowing for mismatches. These are partly addressed with Basel III: McKinsey (2010) estimates that the top-12 European banks would need to issue €1.34 trillion in long-term bonds to fulfill the proposed 'net stable funding ratio' (NSFR)[10] requirements.

The **British case** is the most interesting when discussing the case for re-regulation after a crisis. At the peak of the house price cycle in 1989, median underwriting LTV stood at 85% with many lenders going beyond 100%, supported by mortgage insurance. With the subsequent collapse of house prices and rising defaults, in particular of high-LTV loans to 'right-to-buy' tenants, the mortgage insurance industry disappeared. Many building societies also went bankrupt, had to merge, or convert to universal banks. Lenders henceforth had to **self-insure against high-LTV risks**. Some learning effect on the part of the industry can be discerned from a closer inspection of Figure 3: after a short-term increase in LTVs in the immediate aftermath of the crisis resulting from falling house prices, LTV dropped back to almost pre-liberalization levels (of the 1980s) during the late 1990s. Even in the 2000s, characterized by strong house

[10] The NSFR compares credit and investment commitments of a lender with maturity greater than 1 year with his availability of funding with maturity greater than 1 year.

price inflation, LTV remained conservative compared to the 1980s.[11] This feature may have saved the U.K. from a full-blown mortgage credit crisis.

2.3 Competition Environment

Low regulation and competition levels do interact. A substantial contribution to the credit boom in the U.S. was made by '**charter competition'**. Between 1980 and 2007 this supported the survival of the least regulated lender; the most prominent example being the rise of Fannie Mae and Freddie Mac which were completely unregulated until 1992 and later only lightly regulated. Many had blamed the S&L crisis on 50 years of rigid regulations leading to amnesia regarding interest rate risk in mortgages.[12]

Competition also intensified throughout the value-added chain and created the linkage between finance companies and investment banks, both e.g. exempt from capital requirements and operating under transparency regulations only. Insurers, usually tightly regulated, ventured from their core business areas into mortgages (esp. the large holding AIG, and the bond insurer MBIA). Both added pressure on banks.

Loan spreads over GSE funding cost for a long time were therefore near zero. Loan originators started living from points charged up-front instead, these were financed by being added to the debt consumers owed[13]. **Servicing cost** funded by the remaining spread were driven down by highly competitive specialists, such as Countrywide Financial. Banks promptly after the crisis absorbed these. The servicers had played their own crisis genesis role by arbitraging the multiple funding exits available. For this purpose often borrowers were intentionally misclassified (e.g. from prime into subprime).

State Codes of Conduct governed the U.S. mortgage broker industry, but their existence could not prevent the active participating role of many brokers in misclassifying borrowers or selling high interest rate or risky products. Appraisal standards following the 'open market value' helped to maximize both intermediary and appraiser fees.

Europe during the boom years saw **aggressive foreign market entry** first in those markets traditionally open to competition, e.g. Britain, Ireland and Germany. In all three, brokers played a substantial role in altering the league tables. There was a surge of non-regulated finance companies in Britain, creating the 'non-conforming' market, and in the Netherlands. The British FSA holds them as co-responsible for

[11] A drawback of self-insurance is lesser crisis resilience: in the current British mortgage market downturn the high-LTV market collapsed. The government in 2011 has been discussing public high-LTV insurance programs.

[12] This argument overlooked the impact of the Garn-St.Germain Act of 1982 that permitted the S&Ls to engage in their terminally fatal activity: commercial real estate lending.

[13] This is different in most European countries, where regulation or market standards pre-empt this practice.

declining lending standards. In Central and Eastern Europe, aggressive foreign entry brought product innovation with declining standards: examples are Swedish banks in the Baltics introducing Euribor lending, and a large Austrian and a large Portuguese bank introducing the new Swiss Franc product in Hungary and Poland, respectively. The desire to grow fast from low market shares has been a key motivation. The same banking groups showed both - aggressive and passive – entry strategies, depending on whether their investment in a given market was Greenfield or whether they took over established lenders.

Brokers have a more limited, although increasing, distribution role in Europe. In the UK, brokers were given incentives similar to the U.S. for selling the most profitable loan products and misclassifying customers. Brokers also are often tied by lenders in forms not directly visible to consumers. In some jurisdictions, such as Spain, Ireland or Poland, they have targeted the lower end of the credit curve not served by bank branches; in Germany, in contrast, primarily high income clients use brokers. Stability detriment was introduced under the 'bankassurance' concept: in Austria and the Netherlands, brokers charged commission for originating interest-only loans for banks and repayment vehicles for insurers or funds that were created to protect the loan principal repayment.[14] A holding company owning both bank and insurer could also book profit on two contracts.

2.4 Consumer Protection Regulation

2.4.1 Cyclical Leverage Changes

Loan officer survey data show that leverage in mortgage underwriting **cyclically increases with house price levels.**[15] Especially the equity of first time buyers that does rarely come from selling existing property does not keep pace with prices. At the price peak in 2006, an estimated 30% of US new home purchase borrowers put no money down, and 40% had loan-to-value ratios in combination with other loans above 97%. Non first-time buyers withdrew their equity via second mortgage and home equity lending, which together reached some 40% of new originations in 2006. Figure 2 shows the cyclical nature of very high-LTV lending.

There is similarly considerable evidence for European cyclical LTV increases during the last credit boom. In Ireland, typical first-time buyer LTVs prior to the house price collapse were 95%, based on highly inflated house prices.[16] Spanish lenders had gradually abolished conservative LTV policies in the late

[14] The bankassurance concept postulated mergers between banks and insurance companies on the basis of synergy effects, including joint distribution of financial products to consumers.

[15] See Dübel and Rothemund (2011a) who find this for both European crisis and non-crisis countries.

[16] See Doyle (2009).

1990s when house price inflation picked up. Three years before the price peak, in 2004, regulations were pro-cyclically relaxed, leading to a quarter of loans originated in 2006 with original LTVs over 80%. In the UK, the median LTV had been lower in the 2000s than in the 1980s, even though with 80% it was still higher than in Spain. Still we can see marked cyclical increases in LTV in the early 2000s that are a parallel to the increases during the Lawson boom of the late 1980s (see Figure 3).

2.4.2 House Price Valuation

LTV regulations rely on the ability of commonly applied valuation techniques to isolate the long-term value – the 'V' in LTV - from cyclical price changes. Appraisals in non-income generating mortgage lending generally adopt the **open market value approach**. This is empirically preferred even where rental market data is available that would allow for an indirect income valuation method using rent values for comparable housing units. For example, in Germany with its deep rental market lenders usually take sales contract values and deduct small haircuts only. Retail housing finance standards are thus less protective than those in commercial real estate finance, where both lenders and investors universally insist on the income valuation method.

The disconnection between house price and rent or income inflation undermines the regulation quality of the LTV indicator. All house price inflation countries have in common that loan-to-income ratios rise faster than loan-to-value ratios. This gave rise to low-(income) documentation lending, which in the U.S. became endemic in coastal regions as 'liar loans' and in Europe arose in pockets, usually combined with high LTVs. In the UK, for example, in 2007 in 15% of financings with an LTV greater than 95%, borrower income was not verified.

A number of European countries are also characterized by extreme scarcity of publicly available house price data, which renders even an open market valuation difficult; examples are Belgium and Ireland, most Eastern European countries, or the large German states Bayern and Baden-Wuerttemberg. The huge house price swings in Ireland have been widely attributed to the data opacity of the market that misled both lenders and consumers.

2.4.3 Maturity Extensions and Negative Amortization

Maturity extensions tend to come late in the mortgage credit cycle. The past cycle in the US saw noticeable increases in **initial interest-only (IO)** lending in ARM products during 2005 (20% IO share) and in FRM products in 2006 (6% IO share). At the price peak in 2007, some 30% of total new originations were IO, with initial periods varying typically between 5 and 10 years. U.S. ARM lenders after 2005 tried to further reduce initial payments in areas with high house price inflation through 'option

ARM'. In reality the borrower simply paid what he could afford in an inflated housing market and the residual payment due would be capitalized into the balance until a pre-specified amortization trigger was hit. Upon such a 'recast' event, the amortization would switch to regular and typically make the loan unaffordable.[17]

[Insert Figure 4 here]

Maturity extensions were both pervasive and played a crucial role in gradually increasing debt service risk in Europe, which is characterized by a higher ARM product share than the U.S. (see below). As amortization declines, the impact ('pass-through') of an interest rate shock on borrower debt service increases. The typical maturity of Irish amortizing mortgages according to the Central Bank of Ireland increased from historically ca. 20 to 30 years by 2007. Interest-only mortgages rose from virtual insignificance in 2001 to 15% of new business in 2007. The typical maturity of loans in Spain, according to Fitch (2007) had increased from 17 years to 28 years within the decade before 2006, with maturities of 35 years becoming available in the end. In the Netherlands and Austria, a high share of interest-only loans was created through income tax preferences and combination with insurance products.

Negative amortization in local currency lending in Europe has been limited to Iceland, where accumulating mortgage balances in combination with a collapsing housing market significantly contributed to the banking crisis. However, foreign currency credit in Eastern Europe, and in particular Swiss Franc lending in Hungary and Poland, led to significant negative amortization in local currencies. The outstanding increased by 56% and 65% between 2007 and October 2011 in these two countries. It has been estimated that some 60% of Polish borrowers face negative equity as a consequence. Hungary in December 2011 was forced to restructure her entire Swiss Franc mortgage portfolio.

2.4.4 Adjustable- vs. Fixed-rate Mortgages

Adjustable-rate mortgages (ARM) have **gained in market share in the United States since 1990**, with both a trend and cyclical component. In the 1990s, the market share had still been sensitive primarily to the yield curve – a proxy for the relative price of FRM vs. ARM. In the 2000s, the house price boom put additional pressure on borrowers to lower initial payments by using ARM: the industry responded by adding initial teaser rates (e.g. 2/28 ARM), and so the ARM share rose even as the yield curve flattened. Structural factors contributed: the FHA de-facto withdrew from FRM low-income housing finance in 2003 and the opportunistic use of multiple funding exits by the private label securitization industry

[17] Ironically, the recast thresholds used usually observed the historical U.S. federal negative amortization regulation limit of 120%, which had been lifted in the late 1990s.

combined with generally higher margin achieved by intermediaries on ARM created mis-selling incentives. ARM were the basis product for risk layering with interest-only amortization or payment options. Most second mortgages and home equity loans at high LTVs were ARMs. ARMs were clearly mis-sold to low-income households with the least ability to withstand a rate shock, in addition with very low teaser rates for short periods. These loans were the first to default during 2007 and triggered the subprime crisis.

Regulations bear their share of responsibility: **FRM is expensive** in the US, since the product - in contrast with most of Europe carries a full prepayment option without indemnities via de-facto or de-jure prohibition of indemnities. The associated reinvestment risk for lenders raises borrowing cost for FRM – beyond the yield curve difference - on a 30-year loan by somewhere between 70 and 100 bp. In market stress situations as occurred after the refinancing wave of 2002/3 the option cost can be higher. A deeply divided market is the result that tends to allocate the 'more expensive', but protective product to upper income households and the 'less expensive' and less protective to lower-income households. A mezzanine product balancing risk and price of both extremes, such as e.g. a 5 or 10 year roll-over of fixing periods typical e.g. for Canada and Germany is not a widely offered in the U.S..

[Insert Figure 5 here]

ARM is already **dominant in most European markets,** outside the core of France, Germany, Belgium and the Netherlands where lending is mostly in FRM. While the U.S. ARM share in new lending averaged 25.9% over 2003-2008[18] the figure for the Eurozone was 59.8%. Adding the two largest European retail mortgage markets, both outside the Eurozone – the UK and Denmark, the ARM share in Europe should be closer to 70%. In transition countries, the predominant lending form of foreign currency (FX) lending can be interpreted as a form of ARM – in addition to the variable exchange rates, interest rates in the foreign currency are also generally variable. European borrowers thus are exposed to far greater market risk than their U.S. counterparts.

ARM or FX products not only permit maximal pass-through of falling interest rates 'benefiting' consumers (against inflating prices). Many European countries had pursued **active policies discouraging FRM**, which in the context of high inflation in local currency had required substantial subsidies. In Spain, as in many Southern European countries, in the 1980s the system was still dominated by a centralized mortgage bank, Argentaria, that was a quasi-monopolist and exclusively offered subsidized FRMs. Commercial banks entering the market around 1990 in the absence of long-term funding instruments –

[18] See Dübel and Rothemund (2011a).

covered bond issuance then was a monopoly of Argentaria – lobbied strongly for the use of ARM. In 1994 Spain permitted ARM in a sweeping reform; since then, ARM using the interbank index Euribor have been dominating. Spain also capped prepayment indemnities for FRM at very low levels in order to facilitate borrower switching. This resulted in its disappearance from the market; even a flattening yield curve during the 2000s did not bring the product back. When the covered bond funding instrument became universally available it was issued as fixed-rate and swapped back to match the cash flows of the Euribor trackers.

Similar supply change, deregulation and subsidy issues supported FX lending in Hungary. Before Swiss Franc loans were introduced by foreign banks in 2003/4, Forint loans of domestic lenders had been deeply subsidized. Ballooning fiscal cost had forced the government to abandon these, leaving borrowers with no affordable alternative other than FX loans with low interest rates, but high negative amortization risk. That risk materialized with the financial crisis from 2008 onwards.

Cyclical factors stimulating the growth of ARM as in the U.S. were present also in Europe. Yield curve sensitivity can be shown for a number of countries. The stimulating impact of house price increases, as for the U.S., can be shown for Ireland, where the ARM share increased within six years from 60% (1999) to 80% (2005).

The **'savings' in initial payment** that ARM provide **come against future payment shock risk**: in Spain, Euribor interest rates almost doubled between 2005 and 2007 and with them the interest burden of practically all existing mortgage borrowers. This happened although Spanish lenders were obliged to cap interest rates contractually; however, the typical cap was fixed at double-digit interest rate levels rendering it economically pointless. In Ireland, rates in the unilaterally reviewable section of the portfolio ballooned after 2008. In Hungary, both negative amortization risk and interest rate risk materialized, as Swiss Franc loan rates were unilaterally reviewable by the lender.

[Insert Figure 6 here]

Figure 6 on the ri**ght-hand side suggests that caps** protecting against such market risk are available in Europe **only in markets that have larger FRM** shares, i.e. are used to provide consumers with protection. This is most prominently the case in Belgium and France where permissible rate increases under an ARM are tightly limited. A Danish capped ARM market existed after 2000, but has disappeared later in the house price boom, as increasing prices reduced the willingness to pay for the additional spread cost of the cap.

The behavioral change of both consumers and lenders that the described product changes induce cannot be underestimated: in markets switching permanently from FRM to ARM, housing tends to be priced by buyers over the far more volatile and lower short end of the yield curve. This renders the discount factor in a discounted cash flow house price valuation formula more volatile. The result is higher house price volatility for countries dominated by ARM. While research remains to be done in this direction, early BIS analysis has already suggested such an effect.[19]

Volatility was exacerbated when index trackers replaced traditional unilaterally reviewable instruments, which allowed lenders to control the variations of rates according to cost changes and smoothen the interest rate cycle. The UK and Ireland started the 2000s with portfolios dominated by the latter product; in new lending those loans were almost entirely replaced by **index trackers** with declining spreads as house prices ballooned (see left-hand side of Figure 6). Often, governments or courts suspicious of banks motives have demanded index-trackers for consumer protection reasons. Hungarian borrowers since 2008 were severely hit by reviewable CHF interest rates saddled with increasing bank funding cost while their Polish counterparts simultaneously enjoyed falling CHF index tracker rates. Default rates in Poland have been consequently significantly lower than in Hungary, even though the CHF appreciation shock was similar. Regulators do therefore differ in their perspective of index trackers.

Finally, Europe as the U.S. has seen strong use of **low introductory 'teaser' rates, a** practice still widespread in the UK, and to a lesser degree in Ireland.

2.4.5 Transparency vs. Material Consumer Protection

The analysis suggests a high causality of product innovation, deregulation and certain types of intermediation for mortgage boom and bust. Against this background, the **traditional transparency focus of US consumer protection** appears remarkably misguided. The country had pioneered the Annual Percentage Rate of Charge (APRC) in the 1960s under the Truth in Lending Act and developed a detailed loan disclosure system in the 1990s. Today insight has grown that the arbitraging issues facing APRC and other loan disclosure regulations are so massive that the usefulness of the concept for many practical purposes is doubtful.[20] Also, criticism has been loud in the U.S. for years now that the focus on transparency has led to over-information, an issue that Europe has tried to address with the European Single Information Sheet (ESIS) summarizing relevant mortgage product information on a single page.

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19 E.g. Tsatsaronis (2005).

20 Dübel and Rothemund (2011) have a detailed discussion from the European perspective.

Responsible lending rules guiding loan originators that were embedded in dozens of U.S. Codes of Conducts on the state level before the crisis proved toothless. During the liberalization phase, important federal material consumer protection regulation in the U.S. had been lifted that made future abuses possible. Usury rules lifted in the 1980s could have contained the subprime market, and negative amortization caps lifted in the late 1990s limited the near-prime market (option ARM). Other material consumer protection that remained in place proved counterproductive, e.g. the de-facto prohibition of prepayment indemnities that instead of targeting high-risk situations increased the cost of fixed-rate lending for all borrowers.

Europe, and most notably Ireland and Britain, had copied many of the U.S. transparency and Code of Conduct approaches. On the European Union level, years were spent on discussions about a **European Code of Conduct** centering around the ESIS. Product regulations were never addressed on the European level with the argument of national funding idiosyncrasies, and, half a century after the pioneering U.S. law, not even a harmonized European APRC exists. In the meantime, national consumer protection legislations have fanned into multiple directions regarding material protection issues.[21] Britain's industry had to some extent successfully self-regulated into lower LTV lending, as seen above, so pressure to regulate was deemed as less acute; however, after the crisis the policy discussion remains hot on potentially toxic products such as un-capped index tracker mortgages that are likely to fuel house price inflation, and the exact approach towards avoiding risk layering.

2.5 Housing Affordability Policies

2.5.1 Non-Prime Lending

Borrower selection policies in the US have been dominated by the politicized system set-up, and despite rhetoric in Codes of Conduct, the system lost track of responsible lending standards. When FHA was kept from increasing their house price limits for low-income households in 2003 by the Bush administration, the resulting gap was quickly occupied by private **subprime lending**. Subprime lenders overwhelmingly used ARM instead of FRM – the product to which FHA had been confined, creating risk layering.

As house prices further inflated, **'Alt-A' lending** by the private sector replaced direct Fannie/Freddie lending to prime credit. Prime credit borrowers became classified as 'Alt-A' if they failed to meet one or several check boxes on Fannie/Freddie loan purchase checklists. Fannie/Freddie then purchased many 'Alt-A' bonds, i.e. de facto circumventing their own underwriting rules. Those bonds contained many 'liar' loans, with income quotes 'adjusted' to match runaway price levels.

[21] See again Dübel and Rothemund (2011) for areas such as early repayment, interest rate adjustment and responsible lending.

Loan originators and servicers gamed the different capital market exits – prime, subprime, FHA, 'Alt-A', jumbo, bank balance sheets – to maximize profit. **Investment loans** to retail customers ('condo flippers') made up 1/3 of subprime market. Finally, the scoring system failed in parts, e.g. by excluding credit-relevant factors such as LTV that could be indicative of the borrower leverage situation.[22]The labeling of the U.S. crisis as 'subprime' is oversimplifying and representative at most for the initial phase. Creditworthiness effects of rising house prices need to be separated from the structural effect of the additional credit curve penetration through subprime, the former could be called 'endogenous' subprime. This holds true both on the loan as well as mortgage securities market level.[23]

Borrower selection policies have been generally less aggressive in Europe compared to the US. Far fewer households are borrowers, and young and low-income households are typically renters. However, the **claim that there have been no subprime practices in European markets would be incorrect**. In the UK, a market with analogous structures existed officially as 'non-conforming' and was funded dominantly by similar securitization deals. Lending especially to previously bankrupt borrowers, according to FSA (2010), has been a key contributing factor to elevated mortgage defaults. In Ireland, at least one large building society and a foreign entrant have been widely held to be engaged in lending activity to credit-impaired and vulnerable borrowers on a large scale. In Spain, a factor increasing defaults has been a wave of lending to immigrants to the big cities with scant or no credit histories that were served in particular by local Cajas. Spanish lenders have argued that such lending at low Euribor interest rates prevailing during 2005 and 2006 did not violate formal underwriting standards, which assumes the same low rate levels in perpetuity. Hungary and Poland in contrast have been portrayed as 'subprime' for some time, even though lending there primarily targeted higher-income groups.

Empirically more relevant for Europe than a narrow technical definition of subprime as lending to low-score borrowers has been **risk layering** for what under normal house price levels were creditworthy borrowers. These practices could be called **the European version of 'Alt-A' lending**. Versions of risk layering have been recorded essentially for all European countries with inflated house prices, and described above.

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22 In the loan purchase and guaranty rules of Fannie Mae and Freddie Mac, scores were used together with LTV. However, both credit factors were treated as independently distributed, which ignored systematically the interaction effects ('risk layering').

23 BlackRock data looking into MBS rating transitions from AAA to junk in the private label universe reveal that the scale of subprime MBS downgrades was on par with the rest of the U.S. MBS portfolio for the house price peak vintages 2006 and 2007. For loans originated in those years, negative equity overrode all underwriting policy differences as risk determinant. The truly negative surprise of the crisis for MBS investors has been the performance of Alt-A, where AAA tranches were supported by little subordination.

2.5.2 Fiscal Incentives for Leverage vs. Savings

Since the U.S. had experienced permanent house price appreciation since the 1940s, taking out insurance in order to increase leverage was widely seen as preferable to greater savings, which would have meant deferring the house purchase and forfeiting capital gains. Firmly established in U.S. system design and financial regulation, leverage in addition was stimulated by fiscal measures such as **mortgage interest deductibility**. Saving for housing purposes ranked only sixth in a set of eight motives for savings quoted by US households in 2010; in Germany, with a far lower homeownership rate than the U.S., it is routinely the third most important after cash for retirement and precautionary savings motives (see right-hand side of Table 1). Both the FHA and the housing ministry HUD operated in the past 20 years without a single savings program for low-income borrowers.

The countries with the highest tax subsidies for mortgages in Europe, the Netherlands and Denmark, are similarly those with the highest mortgage to GDP ratios, both in excess of 100%. Where subsidies have been cut back, as in Britain after the housing market crisis of the 1990s, LTV has declined. However, without sufficient cash savings either reliance on housing capital gains as the chief source of borrower equity, or pressure to borrow more, remains high. Table 1 on the left-hand side compares available survey data on British and German sources of equity. In the British case, proceeds from the sale of a previous home dominate while in Germany it is cash and Bausparen, a form of contract savings for housing.

[Insert Table 1 here]

2.5.3 Broader Housing Policy Design

The **expansion of the mortgage credit curve** since the 1980s has been the **mirror effect of lower housing subsidies** to lower-income households, on both sides of the Atlantic.

The US government had actively discriminated against urban tenement housing since the 1930s: FHA from its creation was prohibited to insure private multi-family buildings**.** The urban riots resulting from decay and neglect at the end of the 1960s led to a temporary increase in public housing construction, which was terminated again in the 1990s in the context of welfare reforms. Today rental housing in the U.S. is supported via insufficient local programs and tax credit systems for landlords. Regulations permit short-term and symmetric termination options in rental law, providing only limited tenure security for solvent households which seek to buy as soon as possible.

Because rental housing is scarce, the first-time buyer age is low. This group needs a combination of high leverage, insurance support and direct subsidies. Examples for the latter in the U.S. are large property

registration (stamp duty) and property tax exemptions. Once the first home has been bought, households rely on 'climbing the property ladder', i.e. producing early capital gains to fund down-payment for the next home. Such a system presupposes the presence of permanent house price inflation. Down-payment savings programs are ineffective in this context. Total recurring housing policy costs for the U.S. are safely in excess of 2% of GDP, most of which is spent on interest tax deduction and the cost of fixing the broken insurance system.

[Insert Figure 10 here]

In **Europe, housing policy budgets also steeply declined in the 1990s** stimulated by the interest rate compression trend and Maastricht fiscal austerity requirements. Permitting ARM maximized the relief that the lending boom provided for state budgets because it meant immediate access to credit for many more households with risk being pushed into the future. Total housing policy program costs in European countries, including tax subsidies, today officially range between 0% (Italy) and 1.63% (France) of GDP, with a median below 1%.[24] Subsidy programs in the range of 3-4% of GDP were no rarity in the 1970s and still in existence in the 1980s (e.g. Germany, Netherlands, most of Scandinavia, France). While some mortgage subsidies were cut, too, these trends have in particular gone to the expense of public rental housing.

The picture is not uniform: Spain has been struggling with the long-term effects of decades of rigid rent controls. This has reduced the share of non-owner-occupied tenure beyond what would be indicated by the structure of the building stock (see right-hand side of Figure 7). Many young households and migrants were forced to buy apartments rather than renting. There has been no comprehensive public strategy to revive rental housing apart from some legal reform steps. The UK, in contrast, after the crisis of the 1990s has successfully increased rental tenure, after the right-to-buy policy for tenants of the 1980s had reduced it to virtual inexistence. The subsequent governments were acutely aware of the causal relation between rental policy and subprime lending and supported the creation and funding of rental housing associations. These essentially replaced 'council' housing, and also private rental housing experiments. The improved rental sector conditions helped to expand first time buyer age and supported the reduction of LTVs.

There are clearly limits to rental policies. Countries with low urban densities such as Ireland or parts of the U.S. will build less apartment housing, have higher homeownership rates and remain more vulnerable to mortgage crises. Yet, the ongoing urbanization trend tends to support rental housing. Such corporate

[24] See Ministry of Infrastructure of the Italian Republic and Federcasa (2006). Because of fears regarding the potential cost of housing policy programmes, there is no formal responsibility of the European Union in the sector.

mortgage finance, via housing associations and private investors, in the current housing crisis has shown to be less vulnerable than retail mortgage finance.[25]

3 Lessons for Financial Stability Policy

We started by asking how macroeconomic imbalances interact with structural and regulation features to explain the dimensions of mortgage credit boom and bust seen in Transatlantic economies. The evidence presented supports the view, expressed e.g. by the IMF (2011a, b), that **both scale and length of boom/bust in these more developed economies must be seen as highly endogenous to structural and regulation features of the mortgage credit markets.** Moreover, the fiscal policy setup stimulating or discouraging credit demand matters and both borrower and intermediary levels need to be taken into account. Table 2 provides a synoptic summary of the analysis by financial structure and regulation area.

[Insert Table 2 here]

The findings shed more light on the role of the **portfolio investment channel of the capital account** in determining macro imbalances and debt levels**.** Innovation in mortgage finance has enhanced global portfolio investment options drastically. With declining government issuance during the 2000s, mortgage securities took central stage as investment vehicles in many Western economies. A mirror effect has been that capital exporting countries have experienced mortgage credit deflation**.**[26]

[*Insert Figure 8*]

Such autonomous portfolio investment extended the U.S. housing bubble well beyond its natural peak ca 2005 into what could be called a 'AAA bubble' that collapsed finally only in 2008. Similarly, the Spanish house price appreciation was extended from ca 2004 to 2008. The two iconic capital market innovations further enhancing the portfolio channel were the 'alchemistic' structured finance products wrapping BBB mortgage risk into AAA in the U.S. and the 'Jumbo' nature of U.S. agency and European covered bond debt. Issuers of instruments had greater interest in expanding funding liquidity, globally than they had in credit risk mitigation. Intra- and interbank wholesale funding substituted securities, where markets were not suitable (e.g. in Hungary), or insufficiently developed.

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25 In the UK, insurance companies have progressively driven banks out of rental housing association funding because of lower perceived risk than direct or indirect (MBS) investment in retail mortgages.

26 It provides also support to findings e.g. by Aizenman and Jinjarak (2008) that identify a strong influence of the current account balance on house price growth.

Contrasting with IMF (2011a), in the Transatlantic perspective the author finds **little evidence for a strong causal role of explicit public guarantees and ownership of intermediaries** for credit boom and bust, given that credit expansion was funded through all securities categories. There is little evidence of systematic bias also on the level of intermediaries: private and public owners alike failed to 'lean against the bubble' by tightening credit. Whether public intermediaries should have pulled out earlier should depend on their specific role, as investors or intermediaries, as well as their governance.[27]

In **capital markets** the key differences between the U.S. and European performance can be seen rather in the **amount of leverage used, not the amount of liquidity**. Europe adopted generally more conservative LTV policies and European capital market products used to inflate e.g. Spain or Ireland had also only little leverage built into. In contrast, Wall Street products sold to European banks used mostly large leverage to sell large amounts of U.S. credit risk via limited funding volumes (misleading diversification controls of investors), or vice versa max out the credit leverage effect of a the same funding volume.

Primary **mortgage market regulation failures** can be seen as ***causal* for the credit boom and bust** in this vein to the extent that they facilitated the pass-through of these capital market conditions into house prices. Three factors excel: the first two are central to the leverage-adjusted duration gap (LDG) formula used to determine capital risk for an investment, a proxy for house price risk:

- **High borrower maturity mismatch**, i.e. where the duration of liabilities (loans) is far shorter than the duration of assets (income, or saved rent payments). Low duration ARM instruments eliminate market risk for intermediaries using short-term funds (money market or deposits) and – more subtly – help to inflate lending volumes with limited additional investor commitment in terms of duration. On borrower balance sheets, ARM create a mismatch with the basically fixed income and saved rent stream of borrowers, which would broadly match with FRM. The mismatch can be even stronger for FX lending. Using ARM implies positive capital risk / house price increases when short-term rates are lower than long-term rates (a proxy e.g for saved rents). ARM vice versa implies a straightjacket for central banks and governments once prices and debt

[27] A comparison between Landesbanken and FHA, whose debt was both explicitly guaranteed by governments, highlights the point. The former institution group was autonomously investing German tax funds as an end investor in the global (mostly U.S.) capital markets, hence stopping this policy would have reduced credit boom and bust. The latter institution was operating as an intermediary in a competitive environment, with relatively safe products. Limiting her role has given rise to the (even) lower lending standards of the private label subprime market, and has unlikely to contributed to lower credit creation.

levels have been inflated: raising short-term rates would mean immediate negative capital risk / falling house prices.

- **High borrower leverage**. High leverage policies have helped some countries to avoid housing and social policy transfers as long as house price inflation was positive. A short-term fiscal gain was substituted by long-term fiscal cost. Yet, high leverage increases capital / house price risk even in a matched financing situation through the 'leverage effect' multiplying the difference between interest paid and income or saved rent payments. Combining both, high leverage and mismatch, multiplies capital risk.
- Flawed **house price valuation methods** simply tracking asset price inflation rather than attempting to assess long-term values (e.g. by simple metrics such as house price to rent or house price to income ratios). Inflated appraisal support both short-term industry profits and government revenue and generate direct capital risk for borrowers.

The conclusion is that in the extreme, regulation failures can set up **borrowers financially as the miniature version of a highly leveraged hedge fund** operating with questionable collateral. The liquidity or employment shock needed to provoke both cash flow and capital risk and hence a credit crisis is far smaller than in the alternative of a highly capitalized and maturity-matched borrower.

Unfortunately, one factor, the inadequacy of house price valuation standards is universal in mortgage finance. Europe and the U.S. then at least have one other riskfactor in place: the still lower share of ARM in the U.S. in comparison to Europe has been 'compensated for' by substantially higher leverage than what is typical in Europe (with the named exceptions). Remarkably, while Britain de-facto abolished high leverage lending in the 1990s, the United States still almost two decades later kept pursuing it. A stylized facts selection on both sides of the Atlantic is presented in Figure 9. It suggests that avoiding only one of the two factors in the LDG formula does not greatly matter for stability: **given even moderate macroeconomic shocks**, **either high leverage *or* high borrower mismatch in isolation establish sufficient conditions for a mortgage credit crisis**.

[Insert Figure 9]

Basic regulation failures are manifested in today's housing finance systems since generations, and frequently not even subject to serious debate among regulators.[28] Other mortgage market exuberances that

[28] The October 2011 Financial Stability Board Consultation Paper on Principles for Sound Residential Mortgage Underwriting Practices may serve as an example. While the paper issues warnings against high leverage, it does propose no specific limits and explicitly suggests the route of mortgage insurance for high-LTV lending. The paper's other than mentioning risk is silent on specific measures curbing borrower mismatch via ARMs. It proposes open market valuation as one of several valuation methods.

have featured more prominently in the public debate, in contrast, are likely rather hard to avoid consequences of the credit boom and house price inflation (see Figure 4). These include in particular the hugely criticized **mortgage product innovations and deeper credit curve penetration.**

- Mortgage product innovation can be shown to rise with credit booms with the aim to squeeze the last borrower cohorts into an inflated housing market. It is an open question to what extent such practices forced by inflation can be regulated away, since they have been a recurring feature over a long time and across very different market structures and shock situations. Surely, risk layering caused by innovation can be taxed by regulators.
- Finally, excessive credit curve expansion can be both causal for and follow credit booms, as many prime borrowers over time 'fall down the credit curve' as a result of rising house prices (e.g. U.S. Alt-A market). A suitable test limiting expansion would measure affordability under underwriting standards prevailing in normal times, sufficient borrower equity and products protecting fully against interest rate risk. Rejecting lending despite a negative test can be difficult in economies lacking rental accommodation, especially for the young and migrants; insofar much of the causality for credit booms comes from structural housing policy failures. If these cannot be addressed, this speaks in favor of focused low-income insurance or subsidy solutions rather than an aggressive regulatory approach.

4 Concluding Remarks

Mortgage credit boom and bust cannot be completely eliminated. Reducing systemic risk to more manageable levels has to be the goal. This implies measures that go beyond regulation, at least into monetary and fiscal (housing) policy, and possibly into redesigning the mortgage finance system, which was the historic approach.

The central focus of regulation reform should be to promote the shock absorption capacity of the system against a given liquidity shock, domestic or cross-border. Former U.S. Federal Reserve Chairman Paul Volcker has proposed a strict separation of proprietary trading by banks from their credit operations. The same reason can be applied to the mortgage sector with its specific long-term risk structure.

- **First Volcker Rule for Mortgages: "Discourage leveraged interest rate risk speculation by borrowers with their most important financial asset, equity in housing"**

Housing is a long-term asset promising fixed real returns whose financing should be matched and proportionally amortizing. This implies that the cash flow profiles of products should meet the utility

stream in terms of saved rents derived from the property. Where markets are not in the position to produce mortgages with rates fixed to maturity, non-callable 'roll-over' FRM fixed e.g. for 5 or 10 years and ARMs with narrow caps should be second best. Demanding a minimum of protection will introduce risk pricing and reduce pass-through. Capital requirements should be raised for products carrying greater interest rate risk, and by implication borrower default risk.

Minimum borrower capital should be a sine-qua non condition. High leverage amplifies all house price and interest rate shocks on the borrower balance sheet. Many regulation proposals shy away from demanding a hard minimum. Government programs can support at least first time buyer equity to make this feasible.

Stability-oriented house price valuation standards will be tied to regional rent and income levels as well as replacement cost. Reliance on open market valuation just tracking inflation should be discontinued for credit purposes. Reformed valuation standards would make a constant LTV rule anti-cyclical and a more useful measure for regulation.

- **Second Volcker Rule for Mortgages: "Discourage (leveraged) interest risk speculation by mortgage lenders and force interest rate risk to be taken by institutions."**

While we still have no systematic approach to borrower equity in most countries, governments are starting to demand higher minimum capital from mortgage lenders. Preferential treatments of residential mortgages should be discontinued in light of the crisis. Capital requirements should be differentiated by the risk profile of the product and risk layering features.

The key point of the rule is to discourage intermediaries from interest rate risk speculation to subsidize deficient credit risk margins and ultimately overbanking. Historic mortgage banking rules sought to achieve exactly this, by requiring full matching (S&Ls) and reserving the privilege for issuing specially designated covered bonds to special banks (special European mortgage banks). Analogous regulations can be constructed for today's universal banks; a first, albeit insufficiently calibrated, step 'back to basics' is the Net Stable Funding Ratio agreed on under Basel III.

Such moves could help to support the business of specialists, especially second tier lenders, and put the initial secondary mortgage market concept back on its feet. In this concept, credit risk would remain local and interest rate risk would be transferred to investors, via secondary market institutions or wholesale banks issuing covered bonds. Europe could develop cross-border specialist solutions going forward, given the small scale of national markets. These steps could reduce the role of commercial banks in mortgage finance again. They would also help to reduce interconnectedness between banks.

One attractive structural development option is a specialist system along the lines of Danish mortgage credit institutions that issues every loan directly on the capital market while retaining credit risk. Danish borrowers are protected by the market via prepayment options and the option to buy back their debt, potentially even below par if interest rates have risen (and house prices fallen). This structure avoids large wholesale banks and cleanly separates interest rate risk from credit risk at birth of the loan.

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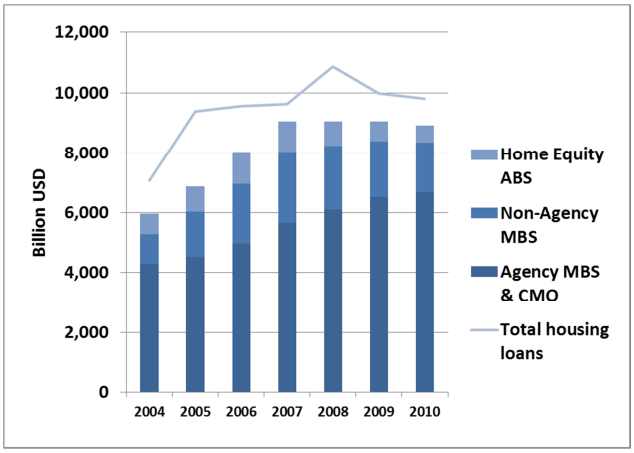
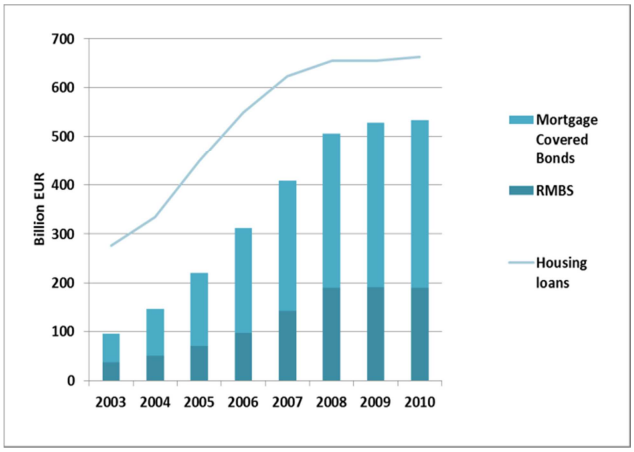
6 Figures

Figure 1 Liquidity Generation via Capital Markets in the U.S. Insurance vs. European Bank-based Housing Finance Systems experiencing Housing Loan Booms

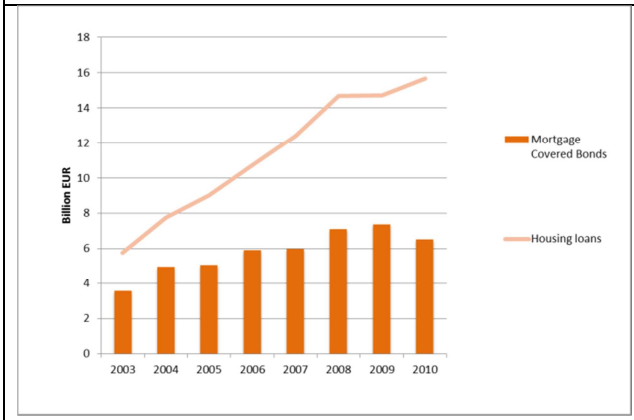
U.S. Mortgage-related Securities Outstanding, 2004 - 2011



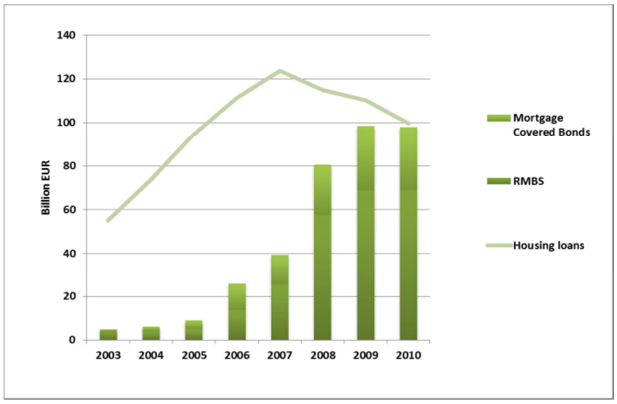
Spain Mortgage-related Securities and Housing Loan Outstanding, 2003 - 2010



Hungary Mortgage-related Securities and Housing Loan Outstanding, 2003 - 2010



Ireland Mortgage-related Securities and Housing Loan Outstanding, 2003 - 2010



Source: SIFMA, European Covered Bond Council, CEPS, author's computations. *Notes:* the assessment is highly approximative as disaggregated funding analysis of the national housing loan portfolio is unavailable.

Figure 2 Insurance-Based Housing Finance System and Leverage - United States

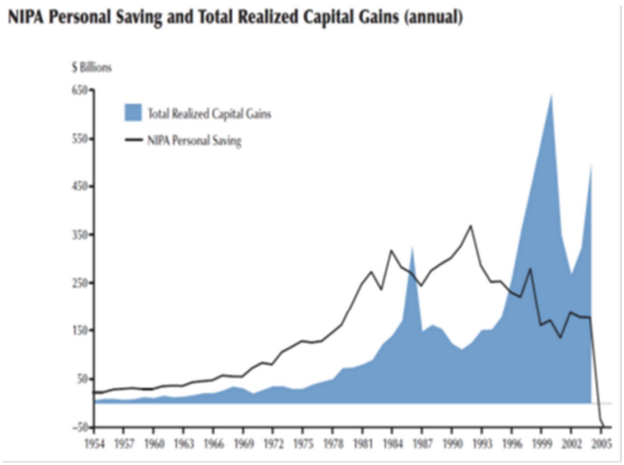
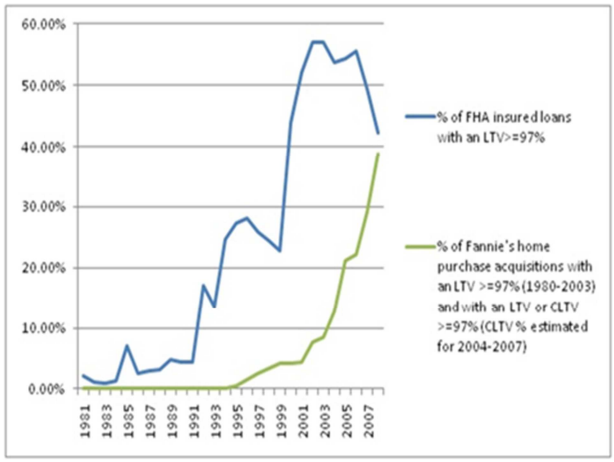
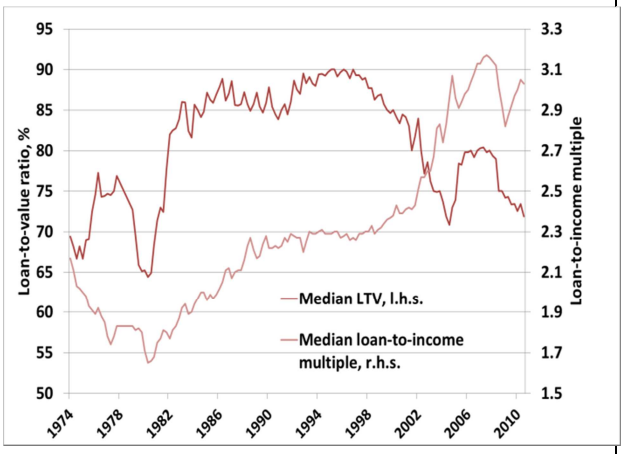
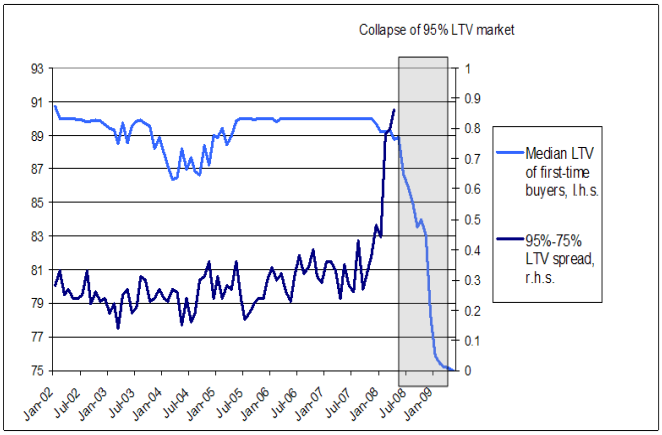
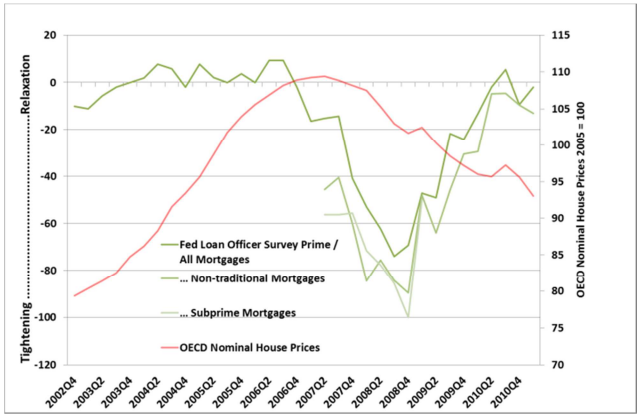
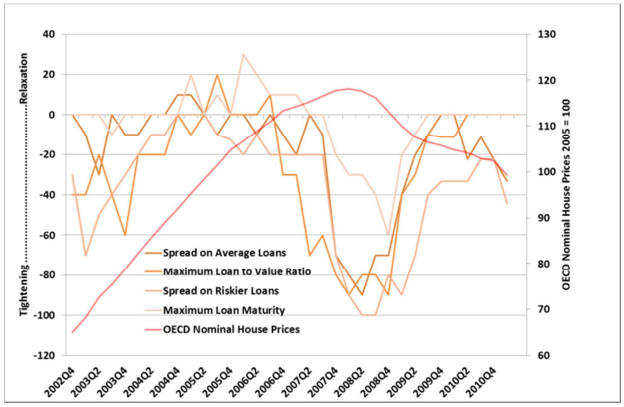
Personal savings and capital gains in the U.S., 1954 – 2005	Very high-LTV lending supported by public and GSE insurers, 1980 - 2009
	
Source: LHS - Guidolin & de Jeunesse (2007), RHS - Pinto (2010). Note: LHS - NIPA – National Income and Product Accounts.	

Figure 3 Universal Bank System and Leverage - the British market

Median underwriting LTV and LTI in the U.K. 1974 - 2010	Collapse of the U.K. high-LTV market (lender self-insurance) during the financial crisis 2008/9
	

Sources: Bank of England, Council of Mortgage Lenders, Finpolconsult computations, Dübel (2011a). *Notes*: LHS: median LTV and LTI for all loans for house purchase. RHS: median LTV of first-time buyers and 95%-75% LTV interest rate spreads for 5-year initial fixed-rate periods 1995-2009. LTV – loan-to-value ratio, LTI – loan-to-income ratio. British mortgage insurers ceased new underwriting in 1990, initial LTV increase after 1990 was driven by falling house prices.

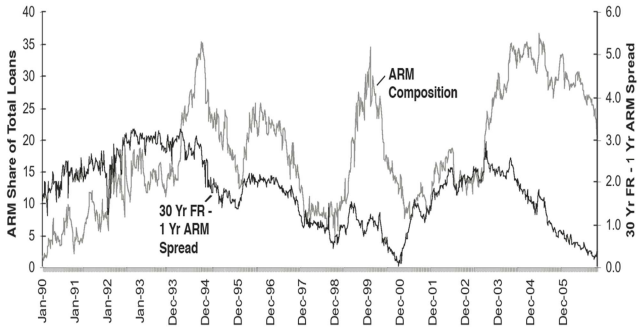
Figure 4 Cyclical Relaxation and Tightening of Mortgage Underwriting - United States vs. Spain

United States	Spain
	

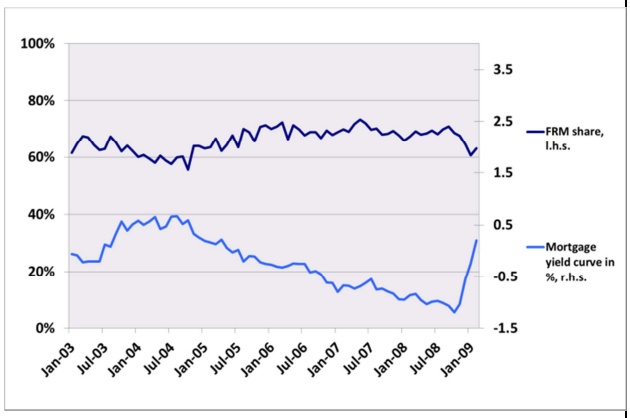
Sources: OECD (house prices), LHS – Federal Reserve Senior Loan Officer Opinion Survey on Bank Lending Practices, RHS - Bank of Spain Bank Lending Survey, author's computations. *Notes*: LHS & RHS – left-hand side: net percent of respondents reporting relaxation.

Figure 5 Market Shares of ARM vs. FRM and Mortgage Yield Curve

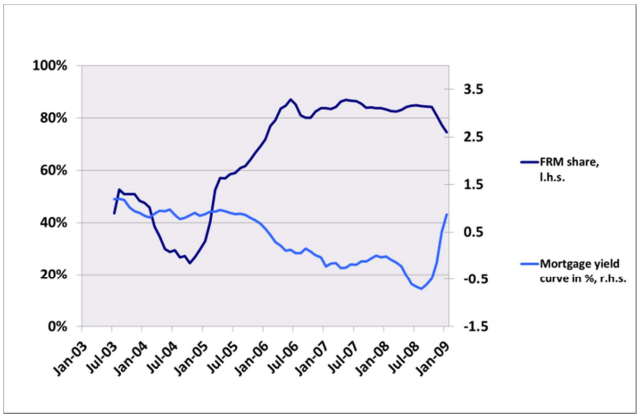
United States, 1990 - 2006



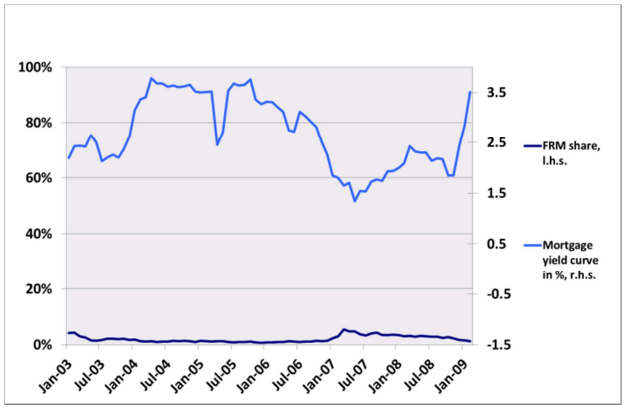
Germany, 2003 – 2009



Belgium, 2003 - 2009

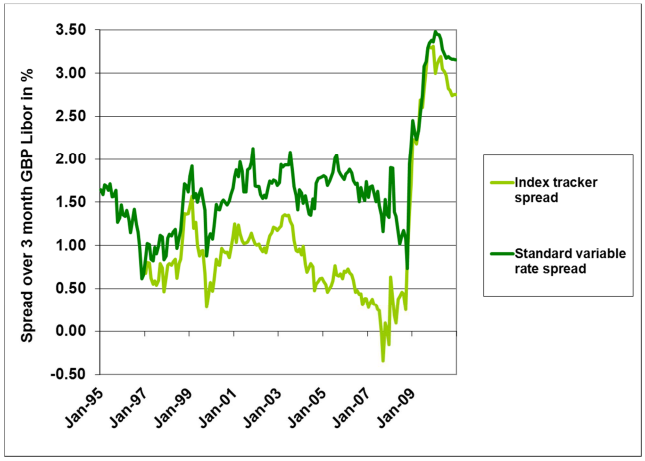
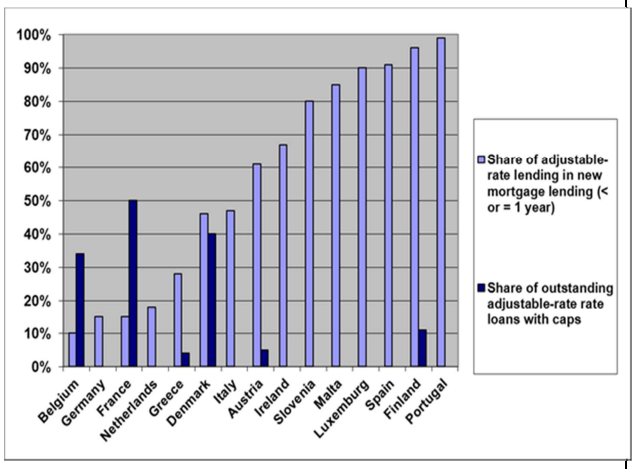


Spain, 2003 - 2009



Source: Upper LHS – MBA Weekly Application Survey, all others – ECB, author's computations. *Notes*: Except upper LHS – Market share of FRM with initial interest rate fixation period > 5 years (light line) vs. mortgage yield curve (interest rate differential of 5-10 yrs vs <1yr) (bold line).

Figure 6 ARM Regimes: Pricing of Index-Tracker vs. Reviewable and Use of Caps

ARM pricing – United Kingdom	ARM use of caps
	

Source: LHS - Bank of England, author's computations. RHS - Table 2 of Drudi et al. (2009) / European Central Bank, author's rearrangement.

Table 1 Structural High-Leverage Policies: Sources of Equity Finance in Housing and Savings Motives

Sources of equity finance in British (England) and German mortgage banking

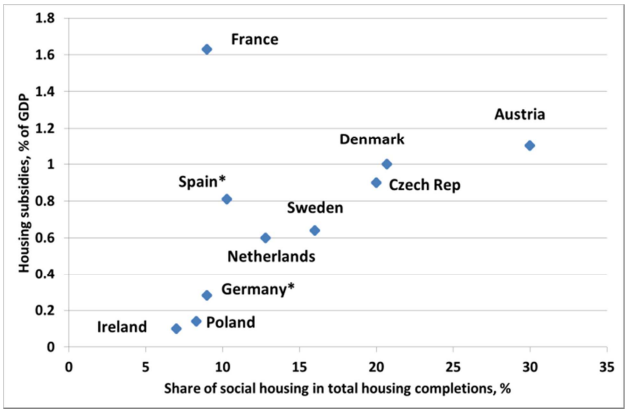
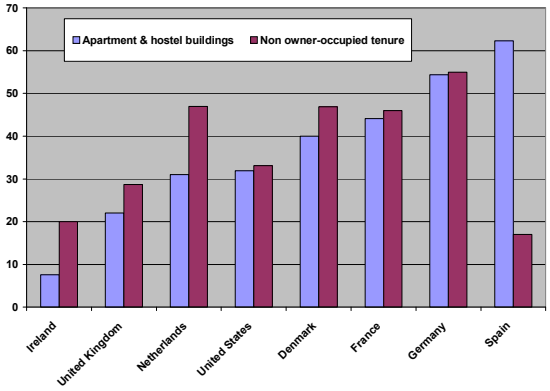
Sources of equity	England	Germany
Data source	Communities & local gov	Infratest (private)
Period	2007/08	2004/07
Survey population	Owners	Buyers
Survey size	ca 20,000	1327
Proceeds from sale of previous home	52	>11
Savings	39	>71
Gift or loan from family or friend	6	23
Inherited money	4	
Loan to cover deposit/bridging loan/Bausparen	2	34
Money paid by local authority/housing association	1	1
Windfall	1	n.a.
Money paid by private landlord	0	n.a.
Sweat money	n.a.	15
Other	3	n.a.
No other source	11	n.a.

Motives for savings given by consumers in the United States and Germany

Motives for saving	United States		Germany	
Data source	Federal Reserve SCF		Infratest	
Period	2007		2010	
	Percent	Rank	Percent	Rank
Education	8.4	4	5	5
For the family	5.5	5	n.a.	n.a.
Buying own home	**4.2**	**6**	**46**	**3**
Purchases	10	3	58	2
Retirement	33.9	1	60	1
Liquidity	32	2	4	6
Investments	1.6	7	28	5
No particular reason	1.1	8	n.a.	n.a.
Does not save	3.3	n.a.	n.a.	n.a.
Homeownership rate 2009	**67.3%**		**55.6%**	

Source: LHS - CML, Infratest, Finpolconsult rearrangements. RHS – Federal Reserve Board Survey of Consumer Finances, Infratest, Finpolconsult rearrantements. *Notes*: LHS - percentage of respondent using funding source. Comparable U.S. data not available.

Figure 7 Housing policy menu differences, selected European countries

Public subsidy budgets and social housing construction in selected European countries, 2005	Share of multi-family housing and non-owner occupied tenure in the US and selected European countries, ca. 2005
	

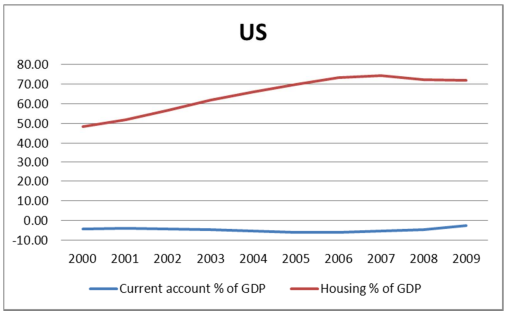
Notes: LHS – *Spain and Germany federal subsidies only, excludes public loan subsidies. RHS – percentage share in total housing stock. *Sources*: LHS – European Statistics on Housing/Federcasa (2006), RHS - Dübel et. al. (2006).

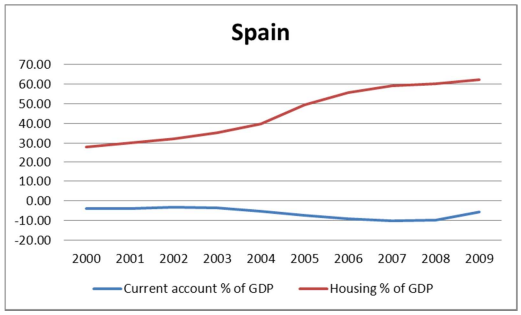
Table 2 Summary: Key Structural and Regulation Features of Mortgage Finance Systems and their Crisis Contribution – Transatlantic Perspective

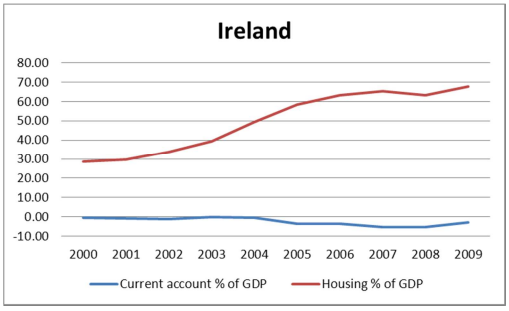
Feature	United States	Crisis Contribution	Europe	Crisis Contribution
Macro prudential regulation	Global borrowing privilege, 30 years of large current account deficits. Asset price - consumer price inflation divergence (neglected by Fed).	High	Intra-Eurozone borrowing privilege, 15 years of large internal current account deficits. Consumer and asset price inflation differences between Eurozone members (neglected by ECB).	High
Capital market and intermediation structure	International sales of MBS (non-leveraged) & structured finance/CDO (leveraged). High explicit (agency) and quasi-explicit (GSE) public guarantee share. Public (agencies/GSE) and private (finance companies, conduits) shadow banking system in parallel to banking, leading to strong funding exit arbitrage. Strong disintermediation (originators, servicers, loan insurers, bond insurers, investors) leading to control problems.	High	International sales of MBS, covered bonds (non-leveraged), limited use of leveraged instruments with European assets. Explicit public guarantees only in isolated cases (NL, FR), however, strong implicit guarantees for too-big-to fail banks (national champions). Some incidence of shadow banking in liberalized jurisdictions (e.g. Ireland, UK); however, mostly regulated banking with standard funding menu. Isolated cases of moderate disintermediation (NL, UK), mostly integrated bank intermediation.	Moderate
House price valuation	Open market method tracking inflation, fixed interest rate as implicit discount factor.	Moderate	Open market method tracking inflation, adjustable or foreign currency interest rate (lower, more volatile) as implicit discount factor in markets outside core.	High
Product structure regulation	Product dichotomy: callable FRM (fixed to maturity) for Prime, ARM with teaser rates for Subprime and with rising price level also for near-Prime / 'Alt-A' (payment shock risk) market segments. Reduced or no amortization in Subprime and near-Prime, some negative amortization ('option ARM').	High	Dominance of ARM & foreign currency loans (payment shock risk), in both Prime and non-Prime market segments. Only core (FR, BE, NL, DE) uses fixed-rate; near core countries have shifted from FRM to ARM (DK, AT). ARM interest rate caps only exist in FRM-dominated markets; foreign currency generally without caps (exception HU ex-post). Reduced or no amortization, negative amortization where foreign currency lending is used (HU, PL, AT).	High
Underwriting regulation	Structurally high LTVs (public/private mortgage insurance, regulations), access to credit as political priority. Low-documentation %, rising with house price levels. Credit intermediaries and servicers with moral hazard problems.	High	LTVs changing cyclically with house price levels (IRE, UK). Isolated structural high-LTV lending (NL, DK; tax-driven) vs housing savings programs reducing LTV (DE, and Central Europe). Limited role of low-documentation lending. Limited role of credit intermediaries, some moral hazard issues (UK, AT).	Moderate

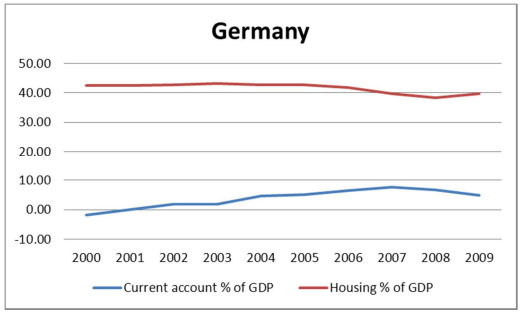
Broader credit and housing policies	Large Subprime sector, replacing historic public loan guarantees and rental housing transfers. No significant corporate housing finance (rental).	High	No or small Subprime. High shares of lending to young/ immigrants and 'Alt-A' (affordable for Prime only in conjunction with ARM) correlated with low rental housing share (ES, IRE, UK). Core (DE, NL, FR, AT), Northern Europe (DK, SE, FIN) with strong private and public rental housing shares. UK rebuilding private rental.	Moderate
Foreclosure / consumer insolvency	Fast discharge in most states. Extra-judicial foreclosure dysfunctional in crisis.	High	Mixed discharge picture, but high barriers in crisis countries (ES, IRE, HU). Foreclosure politically pre-empted via moratoria (IRE, HU).	Low

Figure 8. Current account and housing lending, United States and selected European countries



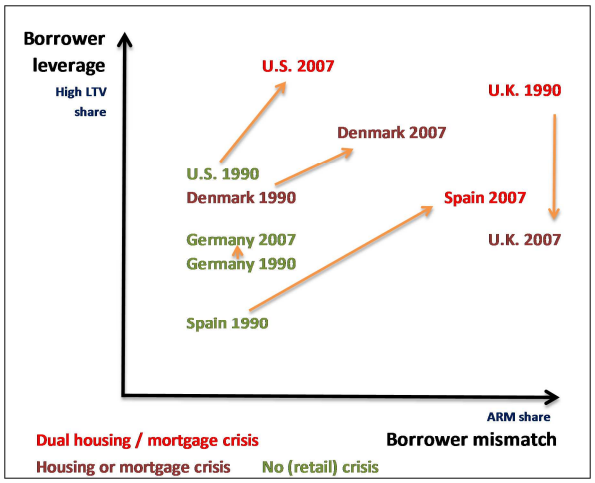






Sources: IMF, CEPS, Finpolconsult computations.

Figure 9 Stylized Mortgage Finance System Trajectories in the Key Risk Dimensions – 1990 vs. 2007



Source: author's assessment. *Notes*: ARM – adjustable-rate mortgages, LTV – loan-to-value ratio (underwriting), borrower mismatch – degree of mismatch between rather fixed income or imputed rent cash inflows and loan cash outflows, rising strongly with the share of ARM.