

The U.S. and Irish Credit Crises: Their Distinctive Differences and Common Features¹

Gregory Connor
NUI Maynooth

Thomas Flavin
NUI Maynooth

Brian O’Kelly
Dublin City University

March, 2010
Comments welcome.

Abstract: Although the US credit crisis precipitated it, the Irish credit crisis is an identifiably separate one, which might have occurred in the absence of the U.S. crash. The distinctive differences between them are notable. Almost all the *apparent* causal factors of the U.S. crisis are missing in the Irish case; and the same applies vice-versa. At a deeper level, we identify four common features of the two credit crises: capital bonanzas, irrational exuberance, regulatory imprudence, and moral hazard. The particular manifestations of these four “deep” common features are quite different in the two cases.

¹ Contact addresses: gregory.connor@nuim.ie, thomas.flavin@nuim.ie, brian.okelly@dcu.ie. We wish to acknowledge support from the Science Foundation of Ireland under grant 08/SRC/FM1389.

Introduction

This paper compares the two linked, but separate, credit crises in the U.S. and Ireland, explores the differences between them, and reaches some tentative conclusions about the “deep” common features which caused them. The two crises are interesting theoretically since, although they occurred near-simultaneously in two closely linked economies, from a superficial perspective they are quite different. The two main building blocks for explaining the U.S. crisis, subprime mortgages and mortgage-related securities, are almost entirely absent from the Irish capital market and from Irish financial institutions’ balance sheets. Three of the four main catalysts for the Irish crises are absent from the U.S. case: large net borrowing by the banking sector in foreign debt markets, stratospherically overpriced property markets, and very unsafe lending by the banking sector for speculative property development. A fourth catalyst was the knock-on effects of the U.S. liquidity-credit crisis, particularly its effect on the interbank borrowing market. The Irish credit environment was so precarious at the time of the U.S. crash that it is arguable that the Irish credit crisis would have occurred even in the absence of this fourth catalyst.

We explore the differences between the two crises, and argue for four common “deep” causal factors in the periods leading up to the two crises. The first is *irrational exuberance*, and associated asset price bubbles. In both countries this irrational exuberance grew during unusually benign economic climates, the *Great Moderation* period in the USA and the *Celtic Tiger* period in Ireland. The second is very low real borrowing rates sustained by international capital inflows into both countries (but inflows of different types of capital). Reinhart and Reinhart (2008a) call this a *capital bonanza* and we follow their terminology. The third is *regulatory imprudence* in response to political pressure by special interests (but different types of political pressures serving different special interests in the two countries). The fourth is *moral hazard* behaviour by agents in the financial sector and (for Ireland) in the property development industry. The particular mechanisms by which these common features caused credit crises in the two countries are surprisingly different in the two cases.

As noted by Caballero and Krishnamurthy (2008), a distinguishing feature of financial crises is that they are all superficially different, at least from the most recently preceding ones, since economic agents are well-prepared for any set of circumstances clearly similar to those in recent past crises. This lack of obvious historical repetition makes social scientific analysis more subtle, since this type of analysis relies on historical sample data to build models that explain and forecast. Explaining a particular financial crisis on a superficial level will have little relevance for forecasting or preventing future ones. Hence it is important to work at a deeper level in the search for common features. Our case-study comparison of these two crises involves too small a sample to reach definitive conclusions, but we believe it is illuminating and worthwhile. At a minimum, comparison of these two crises may persuade researchers not to draw excessively general conclusions from superficial examination of the particular circumstances of the U.S. crisis alone. Another credit crisis occurred nearly simultaneously to the more prominent U.S. one, in an economy closely linked to the US economy, and yet the specific causal mechanisms for the crisis were very different. Given this, general conclusions from the particularities of the U.S. crisis are problematic.

In a series of papers and a book, Reinhart and Rogoff (2008a,b; 2009) provide a comprehensive overview of financial crises across many countries and covering several centuries of financial history. Our paper is informed by the Reinhart and Rogoff research programme, and we use some of their taxonomy, but we compare these two crises with a finer level of granularity than their much broader coverage of global economic and financial history. Two of the four common features that we identify, capital bonanzas and irrational exuberance, appear prominently in the Reinhart and Rogoff analysis. The other two, regulatory imprudence and moral hazard, reflect the managerial, mixed-economy nature of both the US and Irish economies. In both cases, governmental and managerial errors played a key role in causing the crises, which would not be possible in the broad historical sample considered by Reinhart and Rogoff.

Section 2 compares the U.S. credit-liquidity crisis and the subsequent Irish banking crisis highlighting the substantial, somewhat surprising, differences between them. Section 3 discusses the nationwide irrational exuberance, and associated asset price bubbles, evident with hindsight in both the US and Irish economies in the periods leading up to their crises. Section 4 describes the strong international capital inflows into both countries during the pre-crisis periods, and the artificially-low real interest rates that these capital inflows generated. Section 5 looks at regulatory imprudence in the US and Ireland in the periods leading up to the crises, and how this imprudence developed in response to domestic political pressures. Section 6 looks at moral hazard behaviour by economic agents in the two countries, and discusses how this contributed to each crisis. Section 7 summarizes and concludes the paper.

2. Differences between the US and Irish Crises

We begin by reviewing some key events in each of the two crises.² The US crisis was the first to emerge. The slowdown in real estate prices and the consequent downturn experienced after 2006 led to uncertainty in the value of the mortgage pass-throughs and related securities. Investors became increasingly concerned about the valuation of these pooled and tranching products. As most risk models used inputs that were estimated during a period of appreciating property prices and favourable economic conditions, they under-estimated the true risk of the securitized assets in the face of a common shock. Coval, Jubek and Stafford (2008) argue that a neglected feature of the securitization process is that it substitutes risks that are largely diversifiable for risks that are highly systematic.

Downward pressure in asset values and credit quality led to a decrease in tranche prices. Consequently, the rating agencies were forced to downgrade many of the mortgage-backed securities, often by several notches. For example, Craig, Smith and Ng (2008) report that 90% of the CDO tranches underwritten by Merrill Lynch were downgraded from AAA-rated to 'junk'. These downgrades compounded the problems in the market as institutional investors with ratings-based mandates were compelled to sell off these assets in extremely thin markets. This further compounded the downward spiral in tranche prices.

² Brunnermeier (2009) provides a more comprehensive review of the US crisis.

Dwyer and Tkac (2009) estimate that global equity and government bond markets are approximately 100 times larger than the subprime mortgage-backed asset market. Given that the subprime mortgage market is relatively small in global terms the degree to which it transmitted across different markets and countries is somewhat surprising. Brunnermeier and Pedersen (2009) model how adverse shocks in one market can be transmitted throughout the financial system. In the case of the US crisis, three key markets were affected. One, the mortgage pass-through market, two, the credit derivatives market and in particular credit derivatives related to underlying mortgage assets, and three, related financing markets including the repo market. Many of the mortgage securities were purchased by conduits, Structured Investment Vehicles (SIV) and other types of funds. These funds financed their purchases by issuing asset-backed commercial paper (ABCP). This resulted in an increasing degree of leverage underpinning the mortgage securities markets.

The negative sentiment toward subprime mortgage assets spilled over into markets for other structured debt also. Initial liquidity shortages were exacerbated by a lack of appetite on the part of investors for commercial paper even if backed by assets other than mortgages. This caused the transmission of the crisis from institutions that were directly exposed to the US subprime market to those that relied on short-term financing to fund their operations. Many funds were forced to call on the contingent liquidity lines provided by their bank sponsor. This put further pressure on bank liquidity. As the bad news continued to flow, concern grew about the solvency of some market participants. Counterparty credit concerns caused banks to hoard liquid assets. Market liquidity evaporated and prices for all but the most liquid securities dipped. Libor rose substantially as banks were unwilling to lend to one another.

The US crisis emerged from a mis-understanding of the liquidity and credit risks associated with an abundance of complex, relatively new financial products. The US crisis also precipitated a global liquidity crisis.

While the emergence of the US crisis was evident from mid-2007 as mortgage defaults began to gather pace, the Irish crisis did not manifest itself until a year later. In common with many countries (see Ait-Sahalia et al., 2009), Ireland did not feel the full force of the turmoil until the collapse of Lehman Brothers sent shock waves through international financial markets. The drying up of liquidity exposed the fragility of the Irish financial sector. This vulnerability arose from a banking sector that had become hugely over-exposed on the asset side to the domestic property and construction sector, and on the liability side to interbank Euro borrowing markets; see Kelly (2009).

The global liquidity crisis following the Lehman Brothers collapse had severe repercussions for Irish financial institutions, who found it difficult to roll over their enormous foreign borrowings. Their problems were compounded by the rapidly deteriorating credit quality of their loan books, due to adverse conditions in the domestic property market. Falling housing and office demand and lower sales prices combined to increase the default rate of property developers on loans. Irish financial institutions came to the brink of extinction as many of their loans became impaired and significant write-downs became unavoidable.

The full extent of the crisis in Ireland was brought into sharp focus in late September 2008 when, only days after the Irish financial regulator had publicly assured investors as to the solidity of Irish banks, the Irish government had to step in and guarantee the deposits and debts of the six largest financial institutions. The guarantee covered all retail and corporate deposits, interbank deposits, covered bonds, senior unsecured debt and dated subordinated debt. Although only one bank (reputedly Anglo Irish) was clearly unable to refinance its short-term liabilities at that date, the government feared a systemic contagion if the one bank was forced into liquidation. The government took drastic action to stop such a scenario.

It is not clear that Anglo Irish Bank represented a systemic risk. Anglo Irish Bank had a limited retail presence; it operated by making large-scale commercial loans funded by institutional borrowing. Other banks may have wanted Anglo Irish included in the government support schemes since, as was subsequently revealed, many developer loans with different banks were secured with the same collateral, creating a complex web that would be difficult and costly to unwind if Anglo Irish alone were allowed to fail.

The blanket liability guarantee of all domestic banks created a contingent liability for the state of approximately 200% of GDP. Irish creditworthiness on international financial markets was dealt a massive blow. The five-year credit default spread on Irish government debt (i.e. the cost of insuring against a default) increased by over 300 basis points between September 2008 and January 2009. Furthermore, the blanket guarantee created political tensions for Ireland as many of her European neighbours were unhappy with Ireland's unilateral action. Ait-Sahalia et al. (2009) report that such liability guarantee programmes tend to send mixed signals to market participants and raise fears about the health of the international financial system.

As well as the blanket guarantee, the government also promised to recapitalize the banks if and when it was deemed necessary. Initially, the major banks expressed confidence that this course of action would not be required. Speaking at the Oireachtas³ Committee on Finance and the Public Service, Donal Forde, managing director of AIB, said: "We are not all the same. AIB has made it clear we don't feel we need capital". However, this optimism was proved to be misplaced when in January 2009, Bank of Ireland and Allied Irish banks received capital injections of €3.5 billion each. Even a capital injection could not save Anglo Irish bank, which had to be nationalized.

An obvious big difference between the US and Irish crises is the troubled assets behind them. The US 2007-8 credit-liquidity crisis followed a period of rapid financial innovation, during which many complex new products were introduced. The true aggregate risk profile of several technically complex, interlinked US financial markets were not properly understood by regulators and participants, precipitating a credit-liquidity crisis. In contrast, the Irish crisis evolved from a traditional credit boom and bust. Irish domestic financial institutions availed of cheap short-term funds using Euro-denominated bonds and interbank borrowing from Euro-area banks. The Irish banks used these funds to extend excessive credit to domestic property developers. Irish banks' loan books were also poorly diversified, with an over-

³ Oireachtas is the Irish term for parliament.

concentration on speculative development loans in an over-heated Irish property market, while their liabilities included a large proportion of “hot money” interbank deposits. These features made the Irish banks extremely vulnerable to the global liquidity crisis.

Irish domestic banks were not involved in financial securitisation to any great extent. At the time of the crisis, Irish banks had not yet adopted the ‘originate and distribute’ model for mortgage financing which was dominant in the US. Irish banks still overwhelmingly employed the more traditional ‘originate and hold’ model. Approximately 75% of all bank loans were held on-balance sheet and consequently the credit risk remained with the originating bank. Unlike in Germany and Japan, Irish financial institutions also did not have any significant exposure to US-based mortgages or other US-based securitized assets in their investment portfolios. A related difference between the two crises was that the subprime mortgage market was in its infancy in Ireland when the US crisis hit. Although mortgage quality had declined in Ireland during the latter part of the Irish credit boom, the relative credit quality of most new mortgages was still relatively high by contemporary US standards.

3. Irrational Exuberance

As Reinhart and Rogoff (2009) make clear, the causal factors behind financial crises typically lie in the boom periods preceding them. Irrational exuberance is a term popularized by Greenspan (1996) and Shiller (2005); it refers to the behavioural anomaly of intermittent periods of aggregate over-confidence and over-optimism in security markets. Irrational exuberance, leading to over-inflated asset prices and excessive aggregate risk-taking, is a clear common feature of the both the US and Irish crises. This common feature is quite similar between the two crises.

US financial markets were relatively tranquil during the early years of this century. Also, the speed with which they recovered from adverse shocks, such as the collapse of the dot.com bubble, served to imbue a feeling of invincibility among market participants. Furthermore, the bailout to the US financial system in the wake of the LTCM collapse (see Lowenstein, 2000) served to reinforce the belief that certain participants were ‘too big to fail’ and would receive government support if trouble flared. US financial institutions proceeded to pursue riskier strategies in the search for higher yield and from 2002 to 2007 they were largely successful. Financial services industry common stocks enjoyed large returns in both the US and Ireland.

Figure 1 presents the cumulative increase in the market-wide equity indices in the US and Ireland from 1995-2009. Clearly, stock markets in both countries enjoyed a sustained period of success up to 2007. However, these gains were not uniformly distributed across all sectors, with the financial sector in both countries out-performing the rest of the domestic market. This is captured in Figure 2, which shows the relative performance of the financial sector to the total domestic market for both the US and Ireland. In both countries, financial stock prices grew rapidly relative to the total market index until the present crisis began to unfold. The Irish financial sector increased in value about three times more than other domestic stocks, compared to about 1.5 times in the USA. This period of sustained price increases contributed to the mood of irrational exuberance in market participants in both jurisdictions.

Figure 1: US and Irish Total Market Price Indices

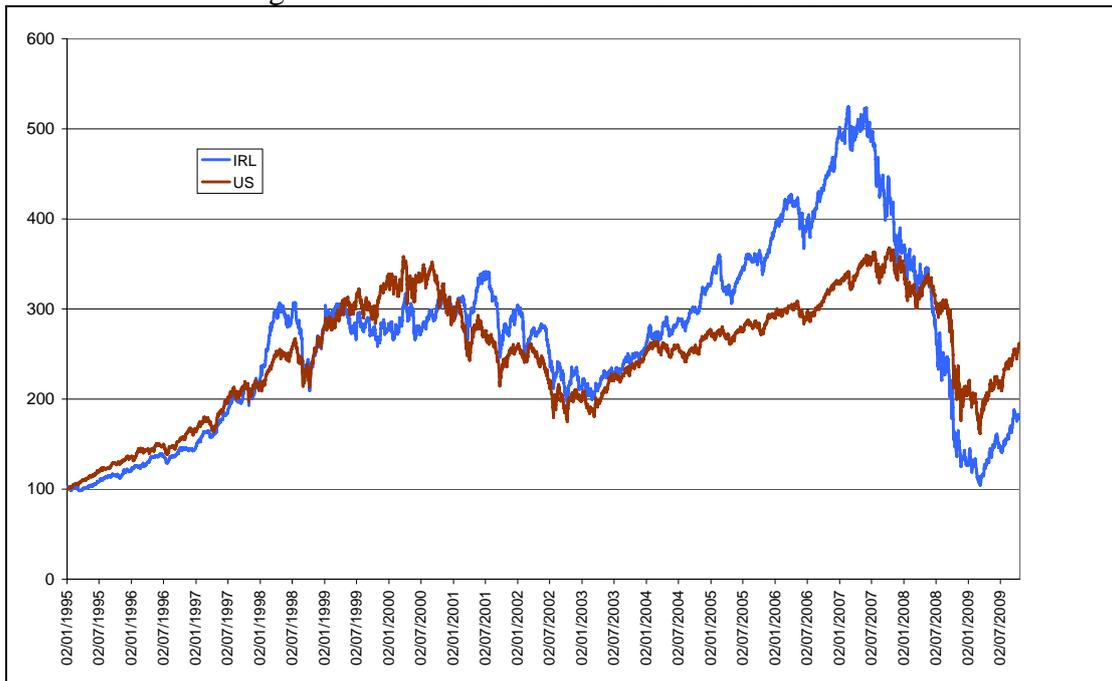
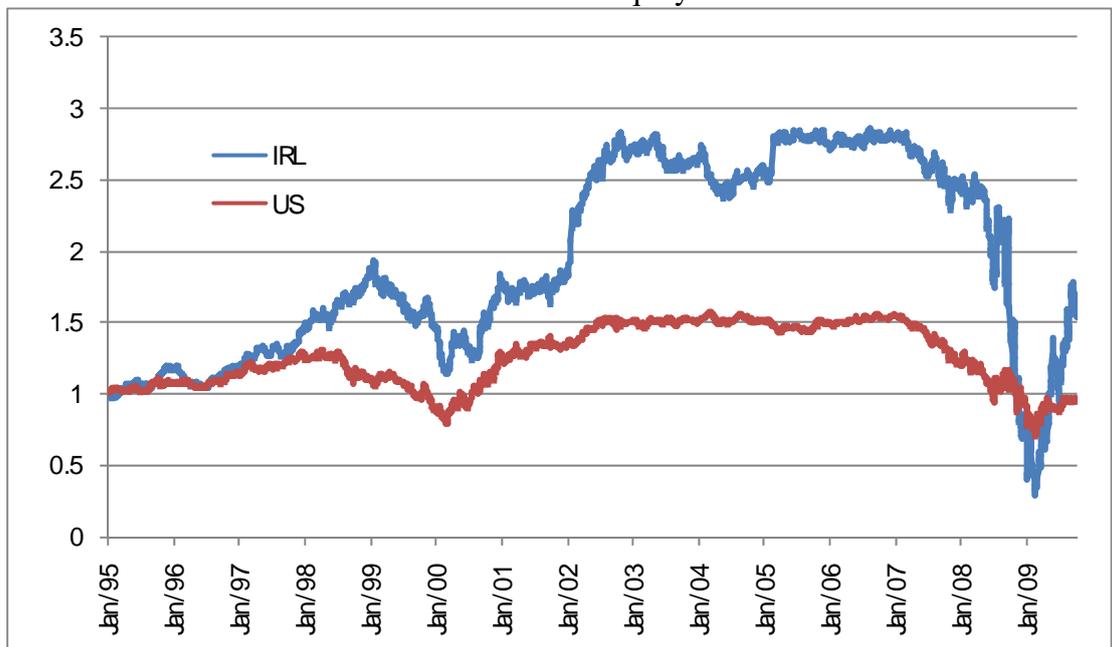


Figure 2: Performance of the US and Irish financial services sector indices relative to their national market equity indices



In Ireland, the over-confidence was generated by a sustained period of economic growth, leading Ireland to be internationally acclaimed as the ‘Celtic Tiger’. Over the period 1994 – 2006, the Irish economy grew rapidly with an average annual growth rate of approximately 7% and unemployment fell to around 4% (near full employment). Ireland began to experience net inward migration; the population increased by about 20% to 4.2 million. The economic boom and the subsequent ‘feel-good factor’ that it generated contributed to a period of irrational exuberance among

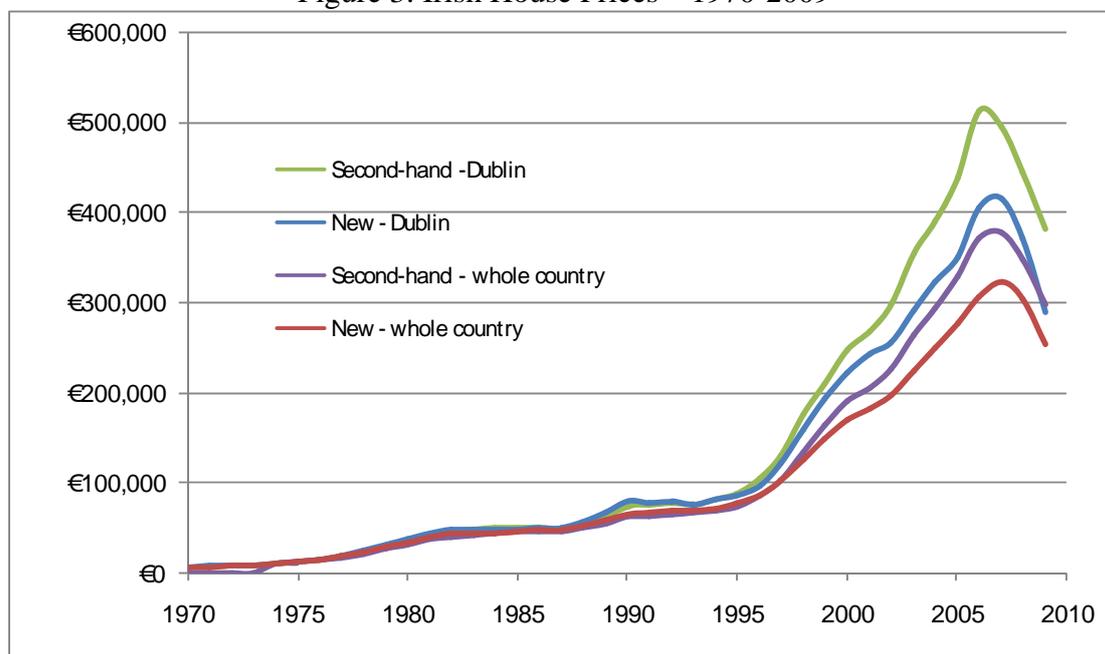
many players in the financial and property markets. This was the explanation offered to angry shareholders by AIB chairman, Dermot Gleeson, in May 2009:

“We drank too deeply from the national cup of, I suppose, confidence ... The national mood of self-confidence brewed itself up into overdrive.”

One effect of this irrational exuberance was a sustained period of real estate price appreciation in both Ireland and the US. In Ireland, residential and commercial property experienced huge price increases. Figure 3 shows average residential house prices from 1970 to the present. Figure shows that this increase was large even by international standards. We present house price indices for Ireland versus those for California, New York and the whole US market from 1996 - 2009. It is clear that Irish house price appreciation was rapid and excessive even compared to regions which were also experiencing a property boom.⁴

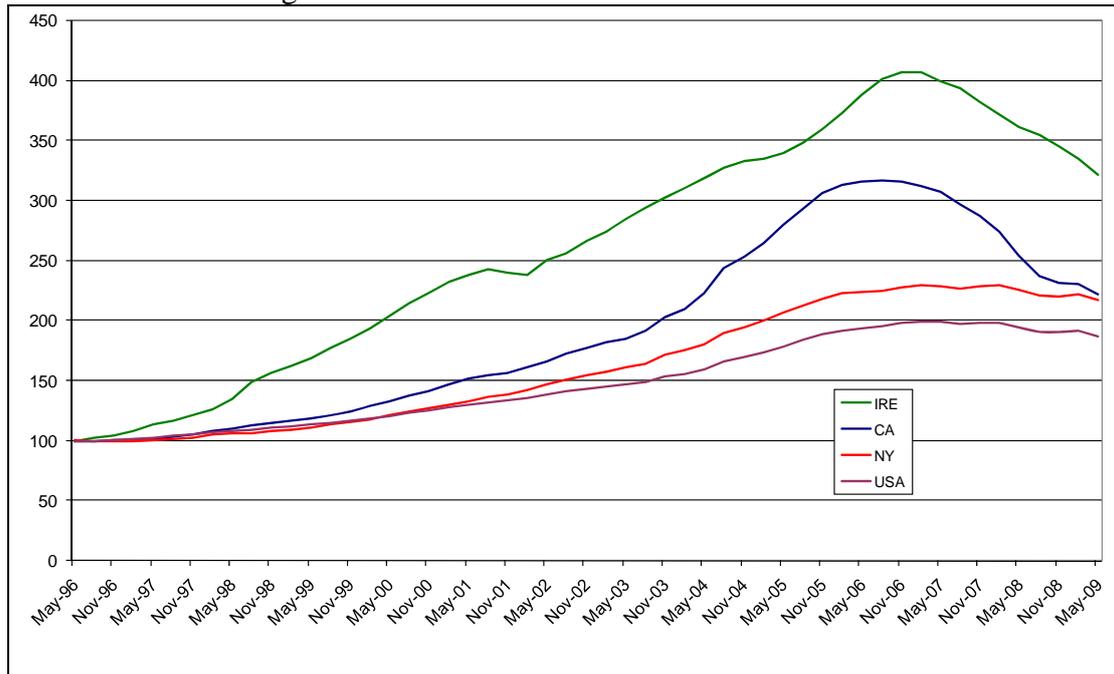
For the US, many commentators have noted (e.g., Gorton (2008)) that the subprime mortgage market was fundamentally built on the assumption of ongoing house price increases. A typical subprime mortgage was structured to refinance after a two- or three-year period. Such refinancing was only possible if the house price had increased. In this way the irrational exuberance generating excessive mortgage lending fed upon itself, since the growth of mortgage lending increased housing prices, justifying the assumption of further house price growth.

Figure 3: Irish House Prices – 1970-2009



⁴ These are nominal price indices; we do not have data on California-only or New-York-only inflation rates and in any case they would only serve to distort the picture, analogously, correcting for Irish-only inflation within the Eurozone is inappropriate. The US national inflation rate and Eurozone inflation rate (not shown) are both low over the time period.

Figure 4: Irish vs US House Prices – 1996-2009

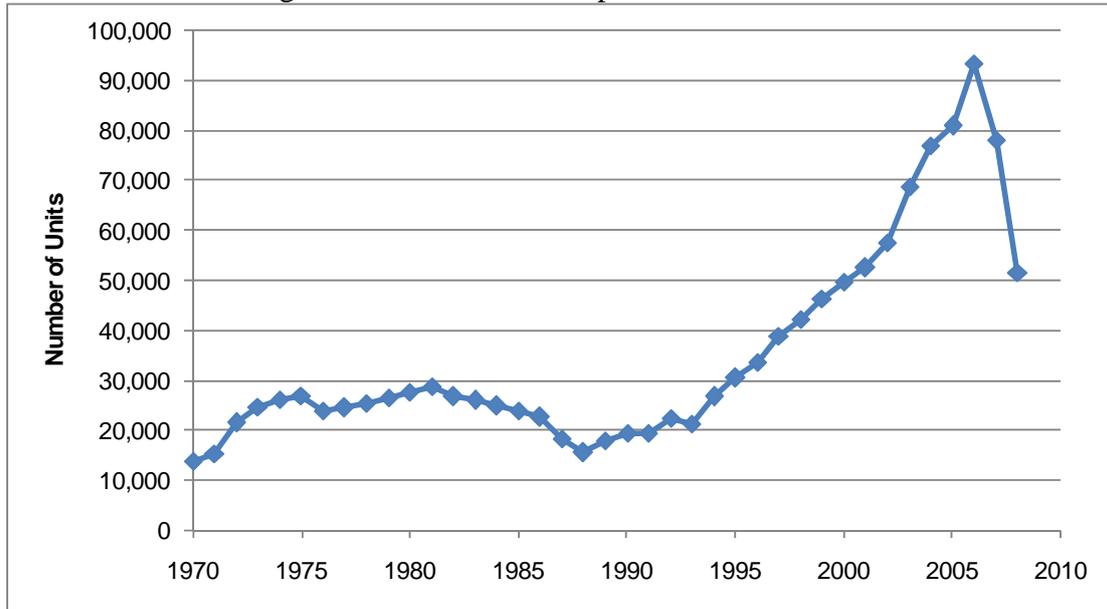


It is interesting to note that the property price boom in the US seems mild (or nonexistent) by Irish standards. From May 1996 until the current peak of US house prices in May 2007, average US house prices doubled. This same percentage increase occurred in Ireland in the much shorter period from May 1996 until May 2000. One can make a convincing case that this late-1990s house price doubling in Ireland was **not** a property bubble, rather, it represented a rational revaluation of Ireland’s housing stock.⁵ What allows us to treat the same percentage increase in average US house prices over a much longer time period as a “housing bubble”? The sobering answer is that the US “housing bubble” is defined to some extent ex-post by the subsequent occurrence of the crisis.

The Irish housing boom began as a rational response to increasing demand. Ireland experienced net inward migration, and there also was a desire by the indigenous population to upgrade the existing housing stock in response to increasing per-capita income levels. During the early part of the Celtic Tiger period, increases in supply (see Figure) were unable to match this demand and hence prices began to increase sharply. This price trend was exacerbated during the later years from 2000-2006 when over-aggressive bank lending flooded the market with property developers and speculative investors; see Kelly (2009).

⁵ For example, Kelly (2009) differentiates between the real-efficiency-based Irish growth phase of the late 1990s and the Irish property and construction bubble of the early 2000’s. Although he does not provide an explicit turning point, Kelly makes a convincing case that the second, subsequent doubling of house prices in Ireland (from 2000 to 2006) was a credit-fuelled price bubble.

Figure 5: Irish House Completions – 1970-2008



In summary, it is clear with hindsight that both the US and Ireland experienced bouts of irrational exuberance in the periods prior to their crises (additional evidence will be presented in the following sections). Asset price increases, for housing indices, national equity market indices, and financial services sector sub-indices, are substantially more extreme in the case Ireland; in the case of the US the evidence for asset pricing bubbles, as opposed to irrational exuberance in the form of excessive risk-taking, is somewhat less compelling.

4. Capital Flow Bonanza

According to Reinhart and Rogoff (2009), a common feature in banking crises is a sustained surge in capital inflows in the run-up period before the crisis. Reinhart and Reinhart (2008a) call this a *capital flow bonanza* and we follow their terminology. They show that the probability of a banking crisis conditional on a capital flow bonanza in the preceding period is substantially higher than the unconditional probability. The US and Irish crises share the common feature of a capital flow bonanza in the periods prior to their credit crises. However, it is notable that this capital bonanza took quite different forms in the two cases.

In the US, large current account deficits throughout the run-up period were offset by large capital account surpluses, with foreign funds flowing into US government debt securities and into mortgage-based securitized assets. Reinhart and Reinhart (2008b) show that countries experiencing banking crises tend to have large, sustained current account deficits during the pre-crisis run-up period. The U.S. had this experience in the period prior to the crisis.

In the case of Ireland, the capital bonanza was mediated by the Irish commercial banks. In 1999, Irish banks were funded primarily from domestic sources; see Table 1. By 2008, Irish customer deposits provided just 22% of domestic bank funding. Over 37% of the funding was obtained in the form of deposits and securities from the international capital markets. Directly in response to this capital inflow, the balance

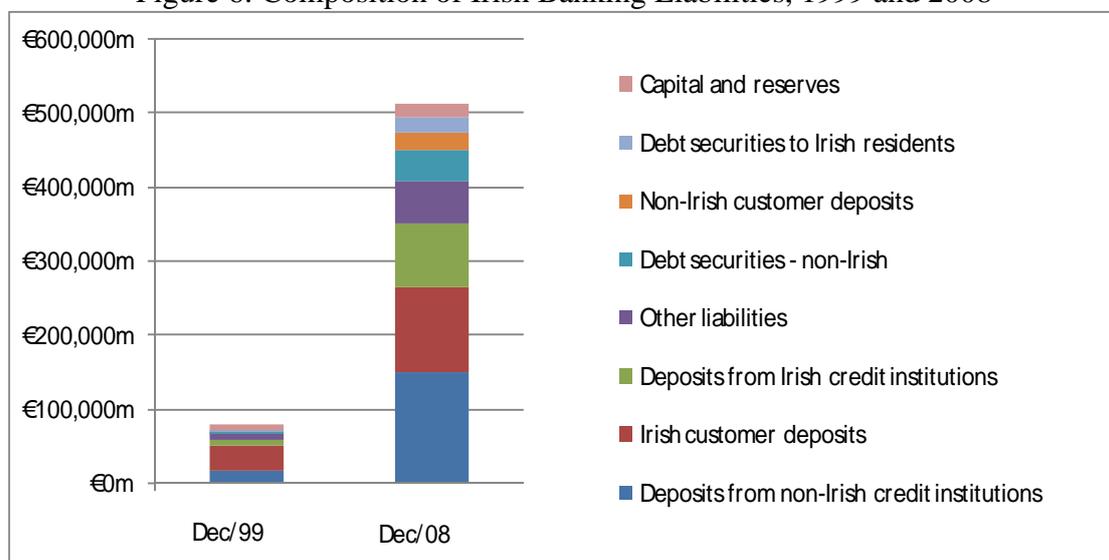
assets of the Irish banks increased more than six-fold in the period 1999 to 2008. Lending to the non-financial private sector had grown to more than 200% of GDP by end of the period, approximately twice the European average (see Figure).

Table 1: Composition of Irish Banking Liabilities, 1999 and 2008

	Dec-99	Dec-08	Dec-99	Dec-08
Deposits from non-Irish credit institutions	15,542	149,465	19.8%	29.1%
Irish customer deposits	35,142	114,235	44.8%	22.2%
Deposits from Irish credit institutions	6,472	87,196	8.2%	17.0%
Other liabilities	9,671	57,227	12.3%	11.1%
Debt securities - non-Irish	71	43,574	0.1%	8.5%
Non-Irish customer deposits	4,336	23,415	5.5%	4.6%
Debt securities to Irish residents	241	19,092	0.3%	3.7%
Capital and reserves	6,990	19,746	8.9%	3.8%
	78,465	513,950	100.0%	100.0%

Source: Central Bank and Financial Services Authority of Ireland. Table C4, Quarterly Bulletin

Figure 6: Composition of Irish Banking Liabilities, 1999 and 2008

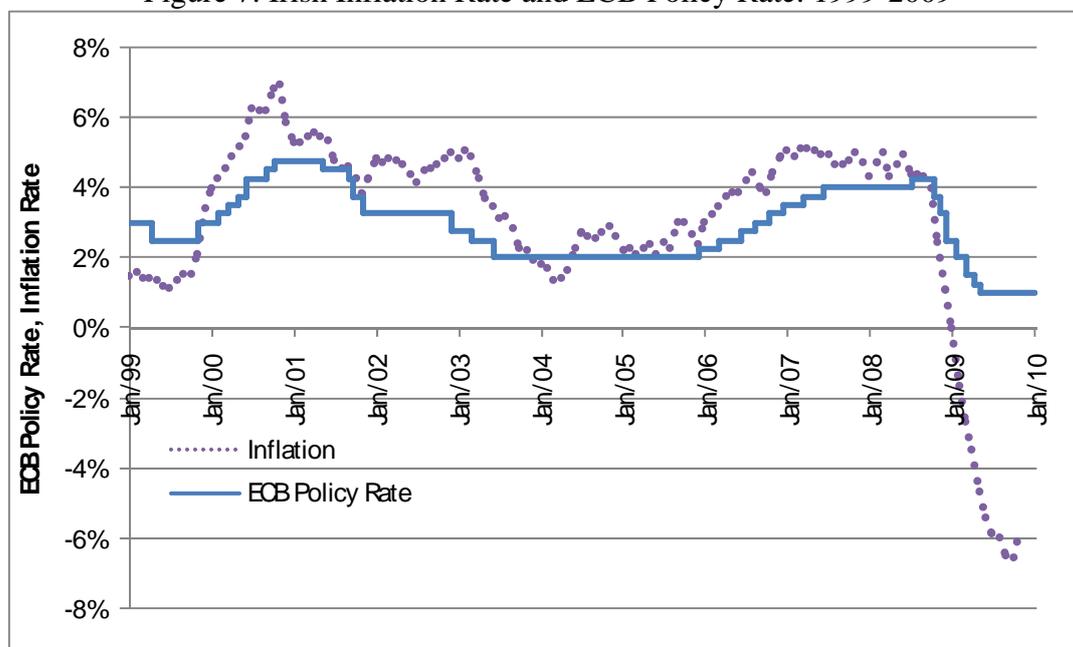


Intimately related to the capital bonanza in the US was an unusually low real rate of interest and low risk-adjusted required rates on risky investments. US monetary policy was notably accommodative during the US crisis build-up period; Taylor (2008) argues that this was the main causal factor in the US crisis.

A significant factor in the creation of the Irish property bubble was the relatively low interest rates following Ireland admission to the Euro currency union. The effect of the reduction in nominal interest rates was further compounded by Ireland's high economic growth over the period from 1995-2005. This sustained period of growth

far outstripped its larger European neighbours. Consequently, with nominal rates set to cater for the entire Euro zone, Ireland had great difficulty reining in its inflation, leading to a period of very low and sometimes negative, real interest rates. The ECB policy rate was less than Irish inflation rate for most of the ten years prior to the crisis; (see Figure).

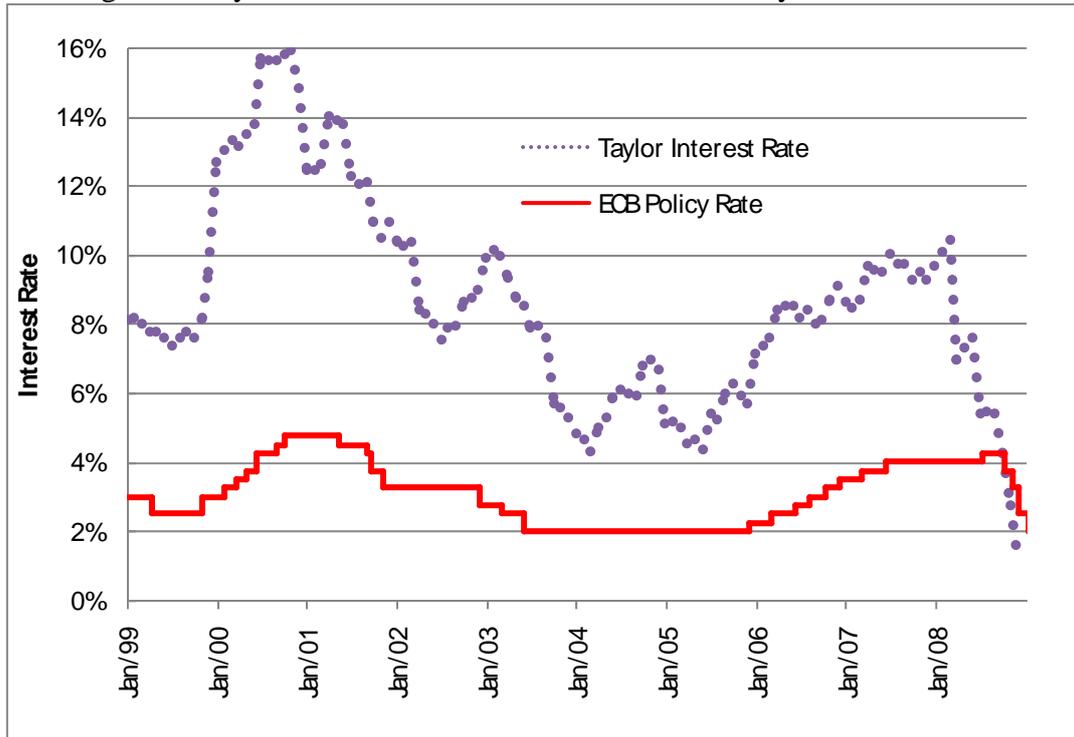
Figure 7: Irish Inflation Rate and ECB Policy Rate: 1999-2009



After Ireland's entry to the Euro zone, Irish banks funded much of their lending with short-term foreign borrowing. This allowed Irish financial institutions to extend much larger volumes of credit to borrowers at lower cost, as evidenced by Figure . As a small member of the Eurozone, Ireland does not have control of its interest rates, but Figure 8 shows an Irish target rate calculated from a standard Taylor rule. We set the target rate equal to $1/2 (\text{GDP growth rate} - 3\%) + 1/2 (\text{inflation rate} - 2\%) + 1\%$. Had Eurozone interest rates been set in accordance with a Taylor rule for Ireland, the interest rate would have been almost 6% higher on average during the period, and up to 12% higher in 2000.

In addition to the distortionary effect of too-low interest rates, there was also the large flow of credit into Ireland associated with this distortion. Kelly (2009) argues that this enormous inflow of credit into Ireland, rather than the low level of interest rates, better explains the housing and construction bubble. As we discuss in the next section, and as noted by Kelly (2009) and Honohan (2009), there was a lack of regulatory or central bank action to stem this dangerous international credit inflow.

Figure 8: Taylor Rule Rates for Ireland and ECB Policy Rate: 1999-2009



5. Regulatory Imprudence

An important common feature of the two crises was regulatory imprudence. In both countries, policymakers and regulators allowed the risk profiles of their financial services sectors to evolve in very dangerous ways, influenced by strong domestic political pressures. Interestingly, the nature of the political pressures that swayed policymakers in the two countries was quite different, and the detailed nature of the policy and regulatory errors was also quite different.

The seeds of the U.S. crisis lie in the subprime mortgage market. It is important for comparative purposes to note that this market is almost uniquely American. The subprime mortgage market serves a politically important role in U.S. housing policy. In effect, it supplements or replaces the burdensome government expenditures on social-housing programmes that are common in other developed nations (including Ireland). During the Bush administration, the social goal of broadening home ownership through subprime lending was very successful. In March 2000, Fannie Mae announced its *American Dream Commitment*: an aggressive corporate strategy to purchase \$2 trillion in mortgage loans for poor and minority households over the following ten years. The period 2000-2007 saw a strong trajectory toward meeting this target. Home ownership in the US grew from 64% in 2004, where it had been for almost two decades, to 69% in 2007, a spectacular increase of 5% in five years, with particularly high rates of increase among Blacks and Hispanics. From the perspective of increasing homeownership as a political and regulatory goal, the pre-crisis period was an outstandingly successful period. However, to quote Shiller (2010):

“Encouraging homeownership is a worthy and admirable national goal. It conveys a sense of participation and belonging, and high homeownership rates are beneficial to a healthy society. ... But the subprime housing dilemma in the United States points up

problems with over-promoting homeownership. Homeownership, for all its advantages, is not the ideal housing arrangement for all people in all circumstances. And we are now coming to appreciate the reality of this ...”

Analysts now accept that during the pre-crisis period the securitized mortgage market grew excessively. This excessive growth can be traced, at least in part, to political pressures (Issa, 2009). Many subprime borrowers had poor credit histories and undocumented income. They lacked the two essential ingredients normally demanded of borrowers: a substantial down payment and a verifiable source of steady income to meet the ongoing repayments.

Securitized subprime mortgages represented an entirely free-market solution to a social problem. Securitization was viewed as a positive development which gave the benefits of credit risk diversification and the expansion of trading opportunities. The consequent increase in moral hazard problems (discussed in the next section) was downplayed or ignored. Reinhart and Rogoff (2009) refer to the “this time is different” cognitive error, in which economic agents convince themselves that new technologies have eliminated traditional sources of financial risk. This type of cognitive error was clearly a feature in regulatory and managerial responses to the enormous growth in mortgage-related securities markets during the early years of the new century. With hindsight, the diversification benefits seem to have been exaggerated due to the similarity of the securitised products and the credit and liquidity risks arising from cross-holdings of assets by large financial institutions. Many of these products were so complex, that much of the cross-holdings may have arisen not by construction but inadvertently. Kiyotaki and Moore (2002) show that high correlations may arise through interlinkages which are not at first apparent to the market due to their complexity.

In the US, in addition to political pressure to increase homeownership, there was purely self-interested lobbying by business interests involved in the lucrative mortgage securitization process and in mortgage-security-related trading. Igan, Mishra and Tressel (2009) find evidence of attempts at regulatory capture in the U.S. They find that the lenders who lobbied most intensively on specific issues related to mortgage lending were those who originated mortgages with higher loan-to-value ratios, securitised a faster growing proportion of their loans and had faster-growing loan portfolios. They suggest that lobbying was linked to lenders expecting special treatments from policymakers, allowing them to engage in riskier lending behaviour. They further suggest that lending behaviour was affected by the politics of special interest groups. Dell’Aricia, Igan and Laeven (2009) present evidence that lending standards declined in regions where the credit boom was larger, that lower regional lending standards were associated with a faster rate of house price appreciation, and lending standards declined more in regions where new competitors entered the market and where a larger proportion of loans was securitized.

In Ireland as in the USA, political pressures skewed the financial regulatory setting, but in very different ways. Starting in the early 1990s, the Irish government made a strategic decision to become a world-leader in “offshore” financial services. For foreign financial services firms willing to set up operations in Ireland, the main attractions were an educated, English-speaking workforce, a Western European location, and light-touch, almost nonexistent, tax and regulatory oversight. This very

lax supervisory regime led *The New York Times* to call Ireland “the wild west of European finance.”⁶

An unintended consequence of the extremely light-touch financial regulatory regime in Ireland was to hobble Irish regulators in their oversight of domestic banks. The actions of the Irish financial regulator are secretive with limited public disclosure. In a recent appearance before the Irish parliament, the newly appointed head of the Irish Central Bank called for an official investigation into bank regulation during the bubble period, modelled on the US Financial Crisis Inquiry Commission. At present, most of what is known was revealed inadvertently or through leaks to the media. Ross (2009) conducts an investigative study and argues that the regulatory regime for domestic Irish banks during the pre-crisis period was extremely weak and ineffective. As Ross recounts, the only aggressive actions of the Irish financial regulator seemed to be directed at media leaks; its relationship with the financial services sector was very accommodating and compliant. For example, for eight years, the board chairman and other directors at Anglo Irish Bank hid very large personal loans by temporarily transferring them just prior to accounting year-end to other banks complicit in the scheme, and then by pre-agreement rolling the loans back into Anglo Irish immediately after the publication of the annual accounts. It is not yet clear⁷ whether the regulator approved, ignored, or missed this subterfuge, but no regulatory action was or has been taken. Also, Anglo Irish Bank deliberately understated its loans-to-deposits ratio through sham transactions – this took the form of agreed interbank lending by Anglo to another Irish domestic bank just before reporting year-end, and then immediately accepting the funds back from the other bank as “customer savings deposits.” In this case there is considerable evidence (obtained via media leaks) that the Irish financial regulator informally approved of the stratagem.⁸ In 2007, Anglo Irish became aware that a large shareholder was preparing to sell a 10% position in Anglo Irish shares. To prevent this share sale from impacting its share market price, Anglo senior management organized a secret circle of ten wealthy bank clients, lent each of them €30 million for the purchase of Anglo shares, with limited recourse on the loans beyond for the purchased shares as collateral. Since the loans were without recourse to the borrowers, Anglo was the at-risk investor in the shares, and was essentially using €300 million of its depositors’ funds to secretly purchase its own equity shares. Again, there have been no prosecutions, and there is (disputed) evidence that the financial regulator was at least dimly aware of this share manipulation scheme.⁹

In addition to ignoring, or even condoning, fraudulent accounting, the financial regulator and Irish central bank made strategic errors in not responding to the build-up of systemic risk to the banking system. Honohan (2009) provides a careful analysis of the major policy errors by the Irish financial regulator and Irish central bank during the pre-crisis period. He notes that rapid balance sheet growth of financial institutions – usually interpreted as growth of more than 20% per annum *in any year* - is a basic warning sign used by financial regulators. The balance sheets of Anglo and Irish Nationwide expanded by an *average* of 36% and 20% per year over the ten-year period from 1998 to 2007. Honohan argues that, using standard procedures, the Irish

⁶ Lavery and O’Brien (2005).

⁷ See Weston (2009).

⁸ See Lord (2009).

⁹ See O’Brien, Ryan and Rogers (2009) and Oliver (2009).

financial regulator should have acted on the systemic risk generated by these extremely high balance-sheet growth rates. Furthermore, the overly-concentrated focus of the banking sectors' lending activities on property development should have been acted upon. In addition to inadequately responding to system-wide distortions, the Irish regulator overlooked obvious distortions in the risk profiles of individual banks. For example, Irish Nationwide is a building society established to provide mortgages to its members. Yet it was allowed by the regulator to put its members' funds at risk by lending 80% of its funds to a small number of property developers. By 2006, only a small proportion of its loan book consisted of retail mortgages; although providing these retail mortgages was its purported institutional mission.

The dramatic growth in lending to the Irish residential property sector was fuelled partly by looser lending criteria. As Anglo Irish Bank and Irish Nationwide pursued very aggressive lending policies, more traditional banks responded by being more accommodating to potential borrowers. Increasing rivalry between institutions for market share is cited as a reason for the parallel decline in standards; see Honohan (2009).

Although the major sources of systemic risk were the overuse of interbank borrowing and the over-concentration on very risky property development loans, the credit quality of new residential mortgages in Ireland also declined substantially during the run-up period. Figure 9 shows that more mortgages were for higher loan-to-value; the percentage of mortgages for greater than 95% of the property value increased from 6% to 16% in the period 2004 to 2007. Likewise, Figure 10 shows that the maturity of the mortgages lengthened, with the percentage of loans with a maturity of greater than 30 years jumping from 10% to 35% in the period 2004 to 2007.

Figure 9: Composition of Irish Mortgages by Loan-to-Value: 2004-2007

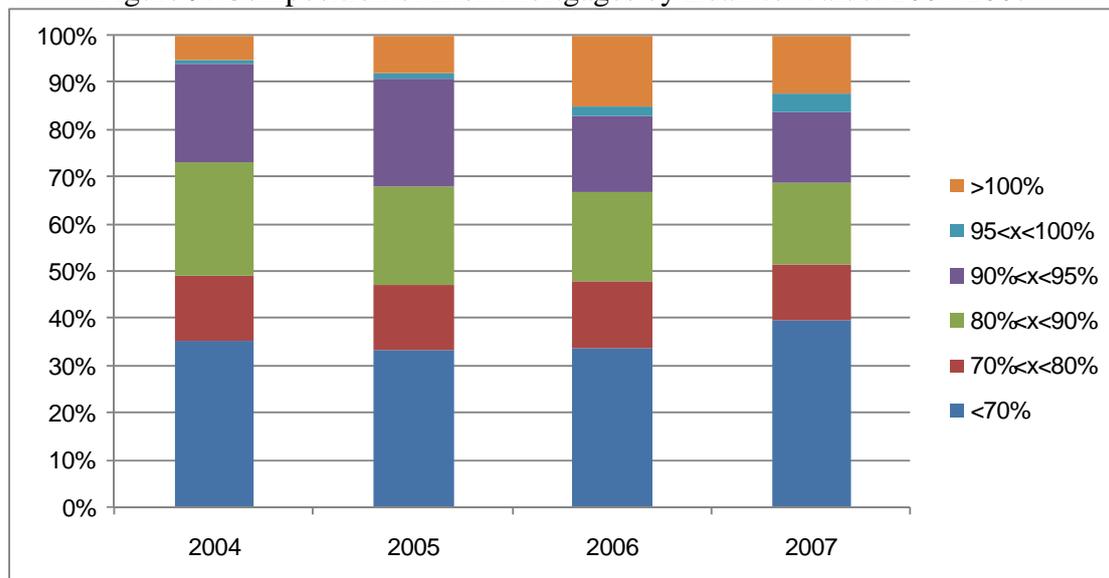
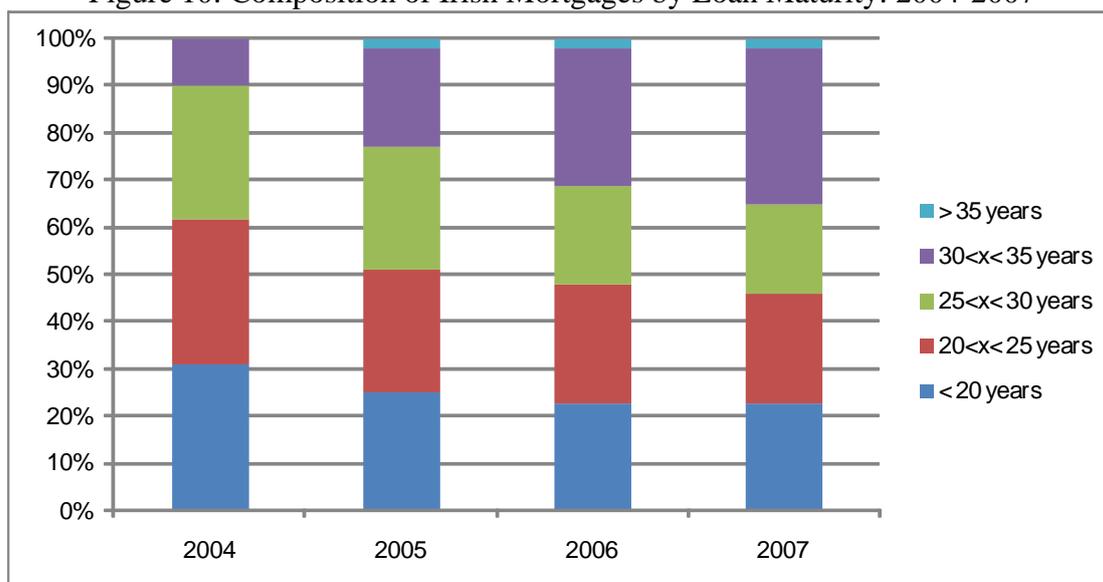


Figure 10: Composition of Irish Mortgages by Loan Maturity: 2004-2007



Woods (2007) reports that, as a proportion of lending to the private sector, property-related lending grew from 38% in 2001 to over 62% in 2007. With the enormous growth in property- and construction-related lending, the loan books of the Irish domestic banks were becoming increasingly undiversified. While prices continued to surge in the commercial property market up to 2006, rental income did not follow suit. This resulted in low income yields in Ireland relative to European neighbours. Consequently, investors in this sector were relying heavily on capital gains for their prospective returns.

Another source of regulatory imprudence in Ireland was the long and close relationship between the Fianna Fáil political party (the dominant party in coalition governments during most of the pre-crisis period) and the Irish property development industry; see MacDonald and Sheridan (2008) for a detailed discussion. Also, the public exchequer was becoming ever more reliant on taxes from this sector. The tax take from stamp duty on the purchase of property was, at the peak of house prices in 2006, accounting for about 17% of all tax revenues. When one adds on the income tax paid by construction workers and VAT collected on property sales, the industry was contributing about one-fifth of all government tax revenue. The government did not have the political will to dampen the sector.

In addition to the enormous credit inflow, the over-heating of the property markets was exacerbated by government legislation that encouraged people to invest in property through a series of tax-incentive schemes. For example, generous tax relief was available to investors in hotels as the government sought to increase the stock of hotel rooms and hence tourism; similar breaks were available to individuals who built houses in seaside towns and in rural areas. The stated aim of these programmes was to instigate 'rural re-generation', but there is little available evidence that they delivered sustainable benefits to the sparsely populated regions earmarked by the programmes. Following the crisis, Ireland struggles with an enormous glut of hotel rooms and newly-built, vacant rural housing.

As fears for the health of domestic banking systems gripped many countries, the Irish sector was initially quite bullish about their ability to remain outside of the turmoil. The chief financial regulator, Patrick Neary, assured concerned parties in September 2008 that it is "...important to point out that Irish banks have only very limited exposures to US subprime losses and related credit products." While this statement was true, it missed the Irish economy's over-dependence on a domestic property market bubble. He went on to say "Irish banks are resilient and have good shock absorption capacity to cope with the current situation."

As mentioned above, considerable decline in lending standards occurred in the Irish mortgage market; an increasing proportion of lending was done at higher loan-to-value, higher income multiples, longer maturities, and with interest-only periods. The only step the regulator took to stem the sharp decline in lending standards was to increase to 100% the risk-weighting on the portion of a residential mortgage written above an 80% loan-to-value threshold. As Honohan (2009) notes, this was a weak and ineffective response.

In summary, regulators and policymakers in both countries made erroneous decisions in response to political pressures. The specific nature of the errors, and the types of pernicious political influences, differ substantially in the two cases. Another notable distinction is in the nature of the regulatory policy errors in the two jurisdictions. US regulators (along with a substantial proportion of the economics research community) failed to appreciate the dangerous fragility of the extremely complex interactions linking several technically sophisticated US financial markets. The economic research community is now building theoretical models which explain the ensuing credit-liquidity gridlock. In contrast, in Ireland, the regulatory mistakes were simple misjudgements, obviously flawed relative to standard regulatory procedures widely available at the time.

6. Moral Hazard

Moral hazard occurs when an agent has an incentive to take economically inefficient actions because the agent is insulated from the risky consequences of his behaviour. Moral hazard problems played a big role in both the US and Irish crises, but in quite different forms.

As discussed in Section 2, the US credit-liquidity crisis had its origin in a large increase in the stock of poor-quality mortgages in the USA during 2000-2006. This unsustainable increase in low-credit-quality mortgages can be traced back, at least in part, to the severe moral hazard problems in the originate-and-distribute mortgage generation system dominant in US banking. Under this system, mortgage originators sell mortgage loan assets on to other parties who then securitize them and re-sell them in packaged form. Mortgage originators have little or no incentive to monitor credit quality of individual mortgages or to rigorously enforce purported credit standards. Dell'Arricia, Igan and Laevan (2009) demonstrate convincingly that this moral hazard problem contributed to the decline in mortgage credit quality in the US during 2000 – 2006. They show that the relative credit quality decline during this period was highest in regions with the highest proportion of securitized mortgages (op. cit. Section V.F, Table 12). Rajan, Siru and Vig (2008) show that as the percentage of securitized loans increased in regional areas, loan originators created a bias in the perceived credit

quality by substituting “hard” credit information on borrowers (information which could be documented and used in the securitization process) at the expense of “soft” information about the true credit quality of individual borrowers. In a related paper, Keys, Mukherjee, Siru and Vig (2008) show that loan originator laxness in screening mortgage applicant credit quality is directly related to the probability that a given loan will be securitized. See also Diamond and Rajan (2008) on the importance of the mortgage credit quality decline, caused by the originate-and-distribute lending system, as a causal factor in the ensuing US credit-liquidity crisis. Despite its centrality to the US crisis, this particular moral hazard problem has no relevance to the Irish credit crisis. Throughout the bubble period Irish banks used the originate-and-hold lending system, for both residential mortgage and business lending. Almost all the loans that the Irish banks generated remained on their own balance sheets. This crucial component of the US crisis is virtually absent in the Irish case.

The moral hazard problem associated with performance-related pay in the financial services industry was another key driver of the US crisis. Kashyap, Rajan and Stein (2008) note that the imperfections linking management true performance and long-run share value mean that managers are over-incentivized to hold “tail risk” – essentially, traders are incentivized to have a portfolio or trading strategy earning a reliable stream of modest insurance-premium-like income in exchange for accepting (on behalf of their firm) a small-probability risk of a very large loss. If, during the career of a trader, a tail event is realized, he/she can exercise his/her “trader put option” and resign from the firm (or be fired), leaving firm shareholders to cover the large loss. This type of tail risk is exactly the structure of return payoff generated by the mortgage-related securitized assets and credit derivatives common in the originate-and-distribute system in the USA. Franke and Krahen (2008) argue that misaligned incentives in financial-management compensation, along with the moral hazard problem in the originate-and-distribute loan generation system, were the two basic underlying causes of the US crisis. Brunnermeir (2009) shows that the incentive for excessive risk-taking by investment managers is worsened in a low-interest-rate environment. Unusually low interest rates characterized the pre-crisis periods in both countries. On a separate but related point, Agarwal and Wang (2009) show that performance-related compensation for middle managers in the US mortgage-generation industry also contributed to the decline in average credit quality.

The moral hazard problem associated with performance-related compensation in financial services also has relevance in the Irish case. As discussed earlier, Irish banks borrowed cheaply in the interbank Euro market and invested these borrowed funds in loans to domestic property developers. On the one hand, the risk-return distribution of this very risky strategy does not have the classic “tail risk” pattern of securitized mortgage assets and related credit derivatives. On the other hand, when the strategy went badly wrong, the “trader put option” was successfully exercised by many senior executives in the Irish domestic banks. Recall from section 2 above that there were two rogue institutions, Anglo-Irish Bank and Irish Nationwide Building Society, who stoked the fires of the bubble with particularly reckless lending practices. Each of these institutions was controlled by a single, powerful and long-standing chief. When the magnitude of the bad loans at the two institutions became clear, along with a host of accounting and share trading irregularities, both of these bank heads were forced into retirement. Both of the two rogue-bank heads retired with their large fortunes intact, and there is little or any hope of financial recourse by taxpayers or others.

Of course, both the US poor-credit mortgages and Irish risky property development loans involved conscious decisions by borrowers as well as lenders. In the case of poor-credit-quality US mortgages the borrowers were individual households with relatively low incomes; they might arguably be treated as an exploited group, encouraged by over-aggressive mortgage originators into making bad borrowing decisions. The property loans issued by Irish banks were obtained by wealthy property developers, arguably well-informed, rational actors with considerable business acumen. It is not clear whether a moral hazard argument can explain their behaviour. Personal guarantees were a standard component of property development loan contracts in Ireland during the bubble period, so most of these developers did not have recourse to the trader put option. Irish property developers are legally liable for the “tail risk” in the net value of these loans, including *de jure* claims against their personal assets.

This brings us to another potential source of moral hazard: weak law enforcement. This was likely an important source of moral hazard in the Irish case. The legal framework for personal bankruptcy in Ireland is antiquated and rarely activated. Although property developers signed *de jure* claims against their personal assets as part of their bank loan contracts, many commentators believe that these claims are *de facto* unenforceable in Ireland. There is also the concern in Ireland that politically powerful agents have the ability to manipulate regulatory and legislative processes to their advantages. Most large property developers in Ireland have been very closely connected to the ruling political party, Fianna Fáil. Kelly (2009) uses the term “too connected to fail” for this feature of the Irish business environment.

With regard to weak law enforcement, the situation in Ireland is dramatically different from that in the USA, where corporate, financial regulatory, securities and bankruptcy laws are enforced with unusual strictness and severity by international standards. This is a distinctive difference between the two crises.

There are other moral hazard problems statistically linked to financial crises which may or may not have had some role in the two cases under consideration here. Moral hazard problems associated with bank deposit insurance have been exhaustively studied. On the one hand, deposit insurance is a powerful tool in preventing bank runs. On the other hand, guaranteed liability holders have no incentive to monitor bank riskiness or to shift their deposits (or other insured liabilities) away from errant banks. This gives banks and other financial institutions a moral hazard incentive to increase the riskiness of their balance sheets unduly. Moral hazard behaviour associated with deposit insurance is widely assigned a large role in the US savings and loan crisis of the early 1980s, e.g., Keeley (1990). It had no obvious role in the more recent US crisis. Attention has shifted toward the implicit liability guarantees which will exist whenever the ex-post optimal government response to an existing crisis would be to insure or save large, ailing financial institutions. Some commentators argue that the U.S. government’s decision to step in and save Bear Sterns worsened the magnitude of the ensuing crisis since it led other financial services firms to believe that they had an implicit bail-out guarantee and could act accordingly, e.g., Cohan (2010).

Did the moral hazard associated with liability-guarantees or bank bailouts have an influence on Irish bank behaviour? During the bubble period, Irish banks had access

to only limited government-supported deposit insurance. However, the government's first action after the Lehman Brothers collapse was to institute with immediate effect a government-funded blanket guarantee of all domestic Irish banks' liabilities. The Irish government's ex-post guarantee even covered equity holders since, as mentioned earlier, as the banks' core equity capital deteriorated, the government supplied equity capital directly to the banks. It also set up the National Asset Management Agency with the explicit goal of overpaying for banks' distressed assets, in order to keep the privately-owned equity capital in the banks from collapsing in value.

Ex post, Irish domestic banks were blessed with extremely generous bailout policies by the government. Was this "implicit guarantee" foreseen by the banks ex-ante, and did this affect their behaviour? For the two largest Irish domestic banks, there was probably some foresight that if their reckless actions during the bubble period led them into trouble, the government would step in and save the institutions. This certainly turned out to be the case, and such an outcome seems predictable ex-ante. So the "too big to fail" implicit guarantee moral hazard problem seems relevant to the Irish crisis, with "too big to fail" recalibrated to the small absolute size of the Irish banking system.

In summary, moral hazard problems played a big role in both crises, but in surprisingly different forms. The moral hazard problem in the originate-and-distribute mortgage system played a central role in setting the stage for the US crisis. This market feature was almost entirely absent in Ireland where an originate-and-hold loan generation system was dominant. The moral hazard in performance-related-pay had a role in both the US and Irish crises. Weak law enforcement was another source of moral hazard in Ireland, but this does not apply in the USA where the enforcement of corporate and financial regulatory law and personal bankruptcy law is unusually strict by international standards. Whether the moral hazard problems associated with financial firm bailouts had a role in the two crises is difficult to discern with any confidence.

7. Summary and Conclusions

The US credit-liquidity crisis of 2007-8 and the Irish credit crisis of 2008-9 are nearly contemporary, and also have some causal connections, since reverberations from the US crisis precipitated the Irish crisis. Nonetheless, at a superficial level they are surprisingly different. This paper explores the similarities and differences between the two crises. We identify four broadly-defined common features in the causal foundations of the two crises. The four common features are irrational exuberance, capital bonanzas, regulatory imprudence, and moral hazard. Looking in more detail at each of these four common features, we find that their particular manifestations are quite different in the two crises.

This modest two-crisis comparison cries out for more research. Are the four common features that we identify present in a broader sample of financial crises in recent decades? Are there additional common features that we have missed, or alternative taxonomies? We find in our comparison of the US and Irish crises that the particularities of the crises are very different. In a broader sample of crises, is there a similar diversity in the specific causal mechanisms generating the crises?

References

- Addison-Smith, D., K. McQuinn and G. O'Reilly (2009). "Modelling Credit in the Irish Mortgage Market," *Economic and Social Review* 40: 371-392.
- Aït-Sahalia, Y., J. Andritzky, A. Jobst, S. Nowak and N. Tamirisa (2009). "How to stop a herd of running bears? Market response to policy initiatives during the global financial crisis". IMF Working paper WP/09/204.
- Bernanke, B.S., M.Gertler, and S.Gilchrist (1999). "The financial accelerator in a quantitative business cycle framework." In *Handbook of Macroeconomics*, vol. 1, edited by Taylor, J.B. and M.Woodford. Amsterdam: Elsevier, pp.1341-93.
- Brunnermeier, M. (2009). "Deciphering the Liquidity and Credit Crunch 2007-08," *Journal of Economic Perspectives*, 23 (1).
- Cabellero, R. and A. Krishnamurthy (2008). "Collective Risk Management in a Flight to Quality Episode," *Journal of Finance*, 63, 2195-2229.
- Cohan, W.D. (2010). "The Three Magi of the Meltdown," *The New York Times*, January 7.
- Conefrey, T., and J. Fitzgerald (2009). "Managing Housing Bubbles in Regional Economies under EMU: Ireland and Spain," working paper no. 315, Economic and Social Research Institute, Dublin, Ireland.
- Coval, J., J. Jurek and E. Stafford (2008). "The Economics of Structured Credit." Harvard Business School Working Paper # 09-060.
- Craig, S., R. Smith and S. Ng (2008). "Merrill Aims to Raise Billions More: Firm Dumps Mortgage Assets as Crisis Drags On." *Wall Street Journal*, July 29th.
- Crouhy, M., R.A. Jarrow, and S.M. Turnbull (2008). "The Subprime Credit Crisis of 2007." Working paper, Johnson Graduate School of Management, Cornell University.
- Dell'Arriccia, G., D. Igan, and L. Laeven (2008). "Credit Booms and Lending Standards: Evidence from the Subprime Mortgage Market," Working Paper 08-106, International Monetary Fund, Washington, D.C.
- Diamond, D. and R. Rajan (2008) "The Credit Crisis: Conjectures about Causes and Remedies," working paper, University of Chicago School of Business, Chicago, IL.
- Dwyer, G. and P. Tkac (2009). "The Financial Crisis of 2008 in Fixed Income Markets". Working paper 2009-20, Federal Reserve Bank of Atlanta.
- Eichengreen, B, and K.J.Mitchener (2003). "The Great Depression as a Credit Boom Gone Wrong." BIS Working Paper No. 137, September.
- Franke, G. and J.P. Krahenen, "The Future of Securitization," Working Paper #2008/31, Center for Financial Studies, Goethe University, Frankfurt, Germany.

Goggin, J., and L. Seidschlag (2009). "The International Transmission of Business Cycles between Ireland and Her Trading Partners," working paper no. 279, Economic and Social Research Institute, Dublin, Ireland.

Gorton, G. (2008). "The Panic of 2007." Federal Reserve Bank of Kansas City Symposium 2008. <http://www.kc.frb.org/publicat/sympos/2008/Gorton.10.04.08.pdf>

Greenspan, A. (1996). "The Challenge of Central Banking in a Democratic Society," Speech at the American Enterprise Institute, Washington D.C. December 5th.

Honohan, P. (2009). "Resolving Ireland's Banking Crisis," *Economic and Social Review*, 40 (2), 207 – 231.

Honohan, P. and B. Walsh (2002). "Catching Up with the Leaders: The Irish Hare," *Brookings Papers on Economic Activity* 33:1-78.

Igan, D., P. Mishra, and T. Tressel (2009). "A Fistful of Dollars: Lobbying and the Financial Crisis," Working paper presented at the 10th Jacques Polak Annual Research Conference, November 5-6 2009, International Monetary Fund, Washington, D.C.

Irish Financial Regulator, 31/March/06. "The Risk-Weighting of Residential Mortgages" <http://www.financialregulator.ie/press-area/press-releases/pages/riskweightingofresidentialmortgages.aspx>

Issa, D. (2009). "The Role of Government Affordable Housing Policy in Creating the Global Financial Crisis of 2008", U.S. House of Representatives Staff Report, 111th Congress, Committee on Oversight and Government Reform, July 7.

Kaminsky, G.L. and C.M.Reinhart (1999). "The Twin Crises: The Causes of Banking and Balance-of-Payments Problems." *American Economic Review* 89 (3): 473-500.

Keeley, M.C. (1990). "Deposit Insurance, Risk and Market Power in Banking," *American Economic Review* 80: 1183-1200.

Kelly, M. (2009). "The Irish Credit Bubble," working paper 09/32, School of Economics, University College, Dublin, December.

Keys, B.J., T. Mukherjee, A. Seru and V. Vig (2008). "Did Securitization Lead to Lax Screening?: Evidence from Subprime Loans," working paper, London Business School, London, December.

Kiyotaki, N. and J. Moore (2002). "Balance Sheet Contagion," *American Economic Review*, 92 (2), 46-50.

Lavery, B. and T.L. O'Brien (2005). "Insurers Trails Lead to Dublin," *New York Times*, April 1st.

Lord, M. (2009). "A Nod is as Good as a Wink to a Cornered Banker or Blind Regulator," *Irish Times*, February 25th.

- Lowenstein, Roger (2000). *When Genius Failed: The Rise and Fall of Long-Term Capital Management*, Random House, NY, USA.
- O'Brien, P., C. Ryan and S. Rogers (2009), "Regulator Accepted Anglo's Word that €300 Million Share Deal Was Above Board," *Irish Examiner*, February 18th.
- Oliver, E. (2009). "Anglo Believed Financial Regulator Approved Share Deal," *Sunday Tribune*, February 22nd.
- Rajan, U., A. Seru and V. Vig (2008). "The Failure of Models that Predict Failure: Distance, Incentives and Default," working paper, University of Chicago, Chicago, IL., December.
- Reinhart, C.M. and V.R. Reinhart (2008a). "Capital Flow Bonanzas: An Encompassing View of the Past and Present," in *NBER International Seminar in Macroeconomics 2008*, edited by J. Frankel and F. Giavazzi, Chicago University Press, Chicago IL.
- Reinhart, C.M. and K.S. Rogoff (2008b). "Is the 2007 U.S. Subprime Banking Crisis So Different: An International Historical Comparison," *American Economic Review* 98: 339-344.
- Reinhart, C.M. and K.S. Rogoff (2009). *This Time is Different: Eight Centuries of Financial Folly*, Princeton University Press, Princeton NJ.
- Ross, S. (2009). *The Bankers: How the Banks brought Ireland to its Knees*, Penguin Press, Ireland.
- Schularick, M. and A. M. Taylor (2009). "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870-2008," working paper 15512, National Bureau of Economic Research, Washington, D.C.
- Shiller, R.S. (2005). *Irrational Exuberance*. Second Edition. Princeton University Press, Princeton N.J.
- Shiller, R.S. (2009). *The Subprime Solution: How Today's Global Financial Crisis Happened and What to Do About It*. Princeton University Press, Princeton N.J.
- Taylor, J. B. (1993). "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, 39: 195-214.
- Taylor, J. B. (2008). "The Financial Crisis and the Policy Responses: An Empirical Analysis of What Went Wrong" Working paper, Hoover Institute, Stanford University, Palo Alto, CA.
- Woods, M. (2007). "A Financial Stability Analysis of the Irish Commercial Property Market," Financial Stability Report, Central Bank of Ireland.