ASSESSMENT OF FINANCIAL STABILITY BY THE FINANCIAL SECTOR ASSESSMENT PROGRAM (FSAP) OF THE IMF : A CASE STUDY OF IRELAND

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DECLARATION

This is to certify that the dissertation entitled 'Assessment of Financial Stability by the Financial Sector Assessment Program (FSAP) of the IMF : A Case Study of Ireland' submitted by me is in partial fulfillment of the requirement for the award of the degree of Master of Philosophy of Jawaharlal Nehru University. This dissertation has not been previously submitted for the award of any other degree in this or any other University and is my own work.

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CERTIFICATE

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To Ma and Bapi

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List of Abbreviations

ABS	Asset Backed Securities.
CAR	Capital Adequacy ratio.
CBFSAI	Central Bank and Financial Stability Authority of Ireland.
CDO	Collaterized Debt Obligations.
CPI	Consumer Price Index
CSO	Central Statistical Organization.
DoEHLG	Department of Environment, Heritage and Local Government.
EEC	European Economic Community.
ECB	European Central Bank.
EMS	European Monetary System.
EU	European Union.
FDI	Foreign Direct Investment.
FSAP	Financial Sector Assessment Program
FSI	Financial Soundness Indicator.
FSLC	Financial Sector Liaision Committee.
FSSA	Financial Sector Stability Assessment.
FSR	Financial Stability Report.
IFSC	International Financial Services Centre.
IMF	International Monetary Fund.
LTV	Loan to Value.
MNC	Multinational Corporation.
NAMA	National Asset Management Agency.
NFC	Non-Financial Corporate.
NPL	Non-Performing Loan.
OECD	Organization for Economic Co-operation and Development.
ROA	Return on Assets.
SEM	Single European Market.
VaR	Value at risk.
WB	World Bank.

Chapter 1

Introduction.

The FSAP.

The FSAP or the Financial Sector Assessment Program was a joint initiative of the International Monetary Fund and the World Bank. It took shape in September 1998 when the Financial Sector Liaison Committee (FSLC) was set up, with the senior staff from the Bank and Fund as its members. It was formally launched in May 1999.

After the crisis in the Asian financial markets in 1997, the focus was to ensure that the capital flows were directed to "financially sound" economies to avoid the above agency problems and sudden withdrawals of capital. The costs incurred by such withdrawals across economies were beyond what the East Asian financial system could absorb and that meant their financial system was not stable by the above definitions of financial stability. The International Monetary Fund and the World Bank (who had agreed to conditional loans to the crisis-hit East Asian countries) were of the opinion that a financial sector assessment programme was required at the supra-national level to keep tabs on both the soundness and stability of the domestic financial systems of its member countries.

In 2006, IMF conducted an FSAP on Ireland to update the assessment it made of the financial sector in 2000. The summary findings of the FSAP report 2006 read as below:[1]

> " The outlook for the financial system is positive. As the housing market has boomed, household debt to GDP ratios has continued to rise, raising some concerns about credit risks. Stress tests confirm, however, that the major financial institutions have adequate capital buffers to cover a range of shocks."

In 2006, the increase in expectations of interest rates in the interbank market had already started the downslide of the house price bubble in Ireland. The bubble was a manifestation of expansion in the export sector brought about by large FDI flows into the country in the mid-1990s and was unsustainable in every which way. When the global crisis hit Ireland in September 2008, the drying up of liquidity from the wholesale fund market and interbank market resulted in the Irish Government guaranteeing a gross liability of banks about two and a half times the country's GDP.

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[1] Financial System Stability Assessment Update Ireland, 2006, IMF, Page 1

In this thesis, we try to find out why after an FSAP in 2006, Ireland's financial system was found to be so vulnerable? Why after being assured of 'adequate capital buffers to absorb a range of shocks' did the economy that once grew at a rate of about 10% in 1999 have to seek the second-largest European Union bailout after Greece.? In search of an answer, we first try to understand the effectiveness of the tools and techniques that the assessment program uses for its stability assessment exercise. We then try to understand how the financial sector in Ireland became unstable over the years 1999 to 2007. Finally, we analyze the assessment that the FSAP made of the Irish financial sector (largely the banking sector) in 2006 to understand if the methods of the program fell short of capturing the real problems of the sector at the time and if so then why ?.

As of December 2008, the FSAP has been conducted on more than three-quarters of its member countries including almost all the G20 countries. That the Financial Sector Stability Assessment (FSSA) reports produced by the program plays a role in providing assurance about and confidence in the financial systems of the countries is evident from this brief summary from the FSAP report in 2000:

> "The FSAP assessment in 2000 found Ireland's highly developed financial system had remained stable, even in times of international financial turmoil. The regulatory framework showed a high degree of observance of international standards and codes."[2]

The report also noted that there were already rapid credit growth, rapid rise in real estate and house prices although at 'sustained' levels in 2000.

Since this report, Ireland's banking sector had seen a sharp increase in its lending activities in the real estate sector itself, funded by capital flows from the international markets for wholesale funds.

Capital flows to a country have been dependent on such assurances ever since the fall of the boundaries of finance.

In 2002, Jean Tirole in his book on "Financial Crises, Liquidity and The International Monetary System" advocated the need for an entity to assess and monitor the international financial system. His argument was that this would solve the dual agency problem in international borrowing wherein the principal (say, a foreign lender) has to deal with the actions of the 'other' agent. For Tirole, the domestic government or in another variant form, the domestic regulators formed this 'other' agent. The Government could be encouraging channelling of investments to the non-tradables, commonly real estate. This could reduce returns and draw away investment from the tradable sector. This could also lead to maturity mismatches in the overall financial system. Given the systemic nature of failure of financial institutions, this would then increase the uncertainty of returns for the foreign investor. During the tenure of the investments, there could also be changes in institutional infrastructure and bankruptcy laws that could affect the returns to the investor but he would not be

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[2] Financial System Stability Assessment Update Ireland, 2006, IMF, Page 7

able to cover for all these contingencies through a contract with these 'other' agents. Tirole thought an international body would be able to monitor and assess such risks in the economies without bias. Huang and Lev Ratnovski (2010) showed how the private lenders of wholesale funds invest less in private monitoring when there is information like credit ratings for traded assets, performance of other banks and other sector-wide indicators publicly available and when they realise these public signals are showing noisy or negative trends they withdraw from the markets.

Both papers reflect the idea that in a world where finance is free to move across markets and economies, it tries to move to those places where its returns will not be affected by domestic actions in the financial system unknown to them and where certain indicators would keep showing the soundness of the financial system. The motivations that guide capital flows across the world have not changed over a span of ten years.

So then both for the sake of domestic investment flows within the country and capital flows across borders, it is important to ask if a program like the FSAP is capable of giving a robust assessment of financial soundness and financial stability of the economy. This is the question that what we ultimately intend to answer through a case study of Ireland.

Financial Stability

Broadly speaking, the analysis of financial stability, as most Central banks understand it, should cover "phenomena that (i) impair the functions of the financial system; (ii) create vulnerabilities in the financial system; and (iii) lead to a negative impact on the financial system and thereby on the economy as a whole."- Čihák(2006), Page 12.

The financial sector (or to use a representation, its biggest subsector, the banking sector) does not stand alone. It stands because of and for the real side of the economy. The earliest functions of the banking system had been to facilitate the payments that Italian merchants wanted to make and receive for carrying on their trade with different parts of Europe.[3] The service rendered was charged and the time before which the money was reclaimed was used to extend credit to other traders and earn interest on it. There were then other services that they began to offer like accepting deposits, both for the safe-keeping and funding their loans, and money-changing.[4]However, all of this was focussed on helping farmers and traders to buy and sell goods over time and across regions. The real economy benefited as production opportunities and activities increased. It created employment and spurred on further demand for goods and services. It encouraged entrepreneurship and innovation in industry and infrastructure. Perez (2007) lists all the technological developments in this domain from 1771 - the Industrial revolution - to 1971, the new information and telecommunications world. The bankers benefited because their

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[3] Ferguson(2008).

[4] Evidence of these activities have been found in ancient Rome and Greece as well.

lending activities ensured that their indebted counterparties - the households and firms, who also formed the rest of the economic system - had favourable financial conditions. The flow of debt repayments as well as deposits was then not at threat.

This link between finance and the real economy has time and again been weakened. The residents of the financial system have become enamoured by their own rising expectations about the performance of a certain sector or a certain financial product and continued to invest in it heavily diverting their resources away from other the sectors and products in the economy. The so-called 'performance,' after sometime, has become the result, not of the real level of production, but of the speculative betting on the 'performance' itself. Galbraith (1994) gives a description of these instances beginning with the "tulipo-mania" of the mid-1630s and how they ended in sharp falls in 'performance' when the speculative rush suddenly ebbed.

The effects of those times when the financial system ceased to reflect the growth of the real economic production have always been very severe on the real economy. The financial deprivation of the broader economy led to loss of employment and a deterioration of the financial condition of households and firms which then adversely affected their consumption and investment decisions. Their debt burdens became unsustainable and their wealth rapidly eroded as the mania spread widely and there were simultaneous efforts to liquidate all assets leading to deflation in all asset prices. The depressed demand depressed the overall economic activity. The defaults increased in scale even while the flow of deposits and other funds fell, biting into the banks' capital buffers and the banks began to tighten lending standards and to raise the cost of credit intermediation.

The credit crunch then became visible in all the lending sources of the financial system. Real investment and economic growth was further hampered and a recessionary spiral was set off.

It is the linkage of the real economy and the financial system that causes the production processes to be impeded and the related chain of events to begin if credit institutions are closed down and the lending ceases because of a shock to the system. It is this linkage that erodes the wealth of the economic agents and affects consumption and investment demand when asset prices become highly volatile due to self-correction of financial markets.

Globalization and financial liberalization have brought the economies of the world closer than they were before. Production in the real economy is now often linked to the availability of financing from financial systems other than their own.

It is then important to understand and prevent the underlying "phenomena" that might cripple the functions of the financial system by creating "vulnerabilities" in it.

Minsky's "Financial Instability Hypothesis".

The nature of financial system is such that it can itself create its own vulnerabilities. Minsky(1992) puts this system behaviour down to the profit motives of the participants of the financial system. Minsky perceives bankers[5] to be profit-seeking entrepreneurs - instead of benign financial intermediaries - who like any other entrepreneurs look to making profits out of the financing services that they provide. They constantly look for opportunities for making profit and an expansion in the real economy very often provides them with one. In these good times, consumption and investment expenditures are high. There is growing demand for credit in the economy. The increasing returns on the banks' assets allow banks to borrow funds at cheaper rates and allow the banks to continuously re-finance those funds without having to pay away all their debts at once. The banks thus have liquidity at their disposal. Liquidity is also high from the asset side as asset values rise in the markets and there is active market for trading the assets . As demand for their credit services increase, the entrepreneurial banks begin to find ways to innovate on their product.

Minsky identifies three distinct phases of these innovations –hedge, speculative and Ponzi finance. The innovation entails the change in the borrower's cash flow requirement to cover their debts. While in the 'hedge' units, the cash flow covers interest and principal payments and for the 'speculative' units cash flow covers only interest payments, for the 'Ponzi' units the cash flow covers neither and repayment of debt is dependent on expectations of rising collateral values and consequent refinancing opportunities. They move through these innovations because they expect to find takers for these products in an economy where income levels and asset values are growing and are expected to continue to do so. These takers would come from markets which had not been covered by the banks earlier. The test of innovation lies in how well the products are performing or in financial terms, how high the returns from investing in the financial units are.

However, there is an important difference between financial markets and markets for real goods. The performance of the financial product is amplified or diminished by the extent of belief of the buyers in it. The players in the financial markets then have a strong incentive to behave like their peers. Returns on investment then steadily become de-linked from the actual productive value of investment and are based only on expected increases in asset prices, i.e capital gains.. The regulators and risk-managers are also guided by these higher expectations when they assess the risks of these products because they predict the current ability to repay to hold in future. Government guarantees and re-financing opportunities for banks are easily available. If this 'period of prosperity is prolonged' , then eventually the weight of 'hedge' borrowers begin to give way to 'speculative' and 'Ponzi' borrowers because their income begins to fall short of their debt burden. The focussed flow of credit towards a single sector or an asset class has reduced production and income levels in the major part of the economy by this time and the value of the collateral stands at the margin of

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[5] Acting as representative of all financial intermediaries.

un-affordability. If there is a small step taken to curb the inflation, income of the 'speculative' units now falls short of their debt levels and they can now pay neither the principal nor the interest. The 'Ponzi' borrowers' ability to pay was based on current interest rates and price levels. They now have to sell their positions in the assets to repay the debt taken against them. As they do, the speculative borrowers who had turned into 'Ponzi' borrowers in the first place, follow them to get out of the debt before their net worth falls. And very soon the downward spiral of debt deflation begins as discussed before. Minsky's cycle - which began with the acceleration in credit growth - is thus completed. Having brought the economy's production and growth down with it, the financial system thus proves that it is pro-cyclical to the cycles of growth in the real economy.

Related Literature.

Among related literature, as discussed before, the concepts underlying this thesis are largely drawn from the concept of detecting the evolution of "Ponzi" finance that Minsky (1992) explains in his "financial instability hypothesis".

FSAP analyzes the financial sector with its two major tools of Financial Soundness Indicators and stress tests. Among the literature that covers these analytical techniques, Blaschke, Jones, Majnoni and Peria (2001) give an overview of the credit risk, interest risk, liquidity risk models that the FSAP uses and list some of the country experiences where these models have or have not been used. Sorge (2004) discusses a number of methodological challenges of stress tests. He discusses correlation of market and credit risks over time and across institutions, the limited time horizon generally used for the analysis and the potential instability of reduced-form parameter estimates because of feedback effects.

Babihuga (2007) uses the FSI metadata from IMF to run a panel regression of FSIs for 96 countries on business cycle and other macro-economic variables. The business cycle is proxied by the cyclical component of real GDP. She finds that the FSIs vary strongly with the business cycle variable and the relationship of the FSIs with other macro-variables like inflation rate and real exchange rate vary depending on financial sector size, market concentration and quality of regulatory supervision. Dovern and Weisser (2008) used monthly forecast data starting from October 1989 for all G-7 countries and analyzed the forecast errors for four macro-variables-the annual growth rate of gross domestic product (GDP), the annual inflation rate, the annual growth rate of industrial production, and the annual growth rate of private consumption expenditure. They found that the underlying macro-models did not reflect the structural changes happening in the economy, for example a move from low inflation to high inflation or shift in share of production of one sector to another or a sudden change in the distribution of income. Only after the forecasting errors start showing systematic patterns did these changes get incorporated in the models.

Apart from macro-models, there have been criticisms of the risk management models and techniques as well. Diebold, Doherty and Herring (2010) discuss the concepts of known, unknown and unknowable (KuU) in the realm of financial risk management. The discussion covers how the existing risk management literature focuses almost exclusively on K as emphasized in the probabilistic value-at-risk methods while the proportion of uU increase steadily as one moves through market, credit, operational, legal, reputational and many more yet-unrevealed sources of risks and their dynamic interactions at the systemic level. However, they believe that is possible to move from U to u with better data and better statistical theory. An event could be unknowable (U) because nothing of its kind has ever occurred before. Events leading to unexpected losses in portfolios of bank would be an example. But we are aware that this is 'unknowable' to us, as opposed to some event which it doesn't even occur to us that we should look for (the book gives 'the black hole' as an example from the past). Hence, if we try to collect precise and relevant information about the more basic reasons behind the losses like behaviour of banks and regulatory standards during previous episodes of unexpected losses, we might be able to have a theory about what events can occur . For the role of statistical theory in better explaining something that was thought to be 'unknowable' before, the paper gives example from the past about the ARCH models which brought relatively more precision to the measurement of volatility in data compared to the earlier rough estimation by squared returns.

Benmelech and Dlugosz (2009) used information on ratings decisions made by Moody's for every structured finance product in US since 1983 to 2008 and compared the ratings transition on these products during crisis with rating transitions of all corporate bonds rated by Moody's over the same period to show that the initial distribution of structured finance credit ratings was inflated. The data on corporate bonds was used as a benchmark for the true distribution of credit ratings that are based on economic fundamentals. They found that that the average change in credit rating when there is an upgrade or downgrade is fairly stable and low (average downgrade being around 1.8 notches) compared to the average downgrade of structured finance products in 2007, and during the first three months of 2008 (4.7 and 5.8 notches, respectively). In the same paper, they also found empirical evidence for 'ratings shopping' where ratings given by a particular agency saw more downgrades than otherwise.

Coming to the case study, there is literature that covers the Celtic Tiger growth process (Murphy, 2000) and the trend of financial liberalization that occurred parallel to it (Kelly and Everett, 2004). Some of the literature on Ireland's housing history has been reviewed in Chapter 3. Everett (2006) in her paper notes the difficulties of measuring the FDI flows to Ireland and defines the constituents of those flows. Kelly and Everett (2004) also describe the direction of domestic investment flows in Ireland before 2000.

Among the recent literature on the Irish crisis literature, van den Noord (2006) found that based on a regression (over 1977-2004) of house prices on fundamental factors like income, interest rates and share of population that is around the household-formation age, new prices were about 20% overvalued than what the fundamentals predicted. However, he found no reason for caution because 80% to 90% of the house price increases were due to the fundamentals and the housing market, unlike other asset markets, has price dynamics that are not symmetric. Prices would rise quickly during booms, but in a market slump most people would prefer to take their house off the market rather than sell at a loss. Also, based on a cross-country probit model for 17 OECD countries in which the probability that real house prices are at a peak depends on past price increases, a measure of the deviation of prices from their trend, and real long-term interest rates, house prices have been moving up strongly in real terms since the mid-1990s in the majority of OECD countries and that most countries would be resilient against a 1 or 2 percentage points hike in long-term interest rates if it kicked in at current real house price levels.

Kelly (2009), on the other hand uses data from 1979-2006 to look at the long run relation between size of mortgage debts and house prices (both relative to average earnings) by regressing the former on the later, the other independent variables being interest rates and population and finds a strong positive correlation between the two and a highly insignificant effect of population on rising debt levels relative to income. Waldron (2011) looks at the distribution of house demands and mortgages across geographical regions and occupation of the residents and finds the increasing incidence of the low-income occupation group in the mortgage market.

The Crisis Reports and FSAP documents reviewed for factual purposes have been referenced within the text of the chapters.

Chapter Plan.

In chapter 2, I discuss and critique the analytical methods of the FSAP and point out some fundamental flaws in what the programme has been conceived to be and why it is bound to fail in its objective of predicting the losses that can be buffered for in the economy. In chapter 3, the generation of the Minsky cycle in the Irish economy has been looked at beginning from the time the economy embarked on an accelerated growth path till the time the FSAP was conducted. If FSAP had looked at the right places and understood financial stability for what it really was, it should have been able to observe these indicators of instability. In chapter 4, I look at FSAP's assessment of the Irish economy and analyze the mistakes and assumptions in it. In chapter 5, I summarize my findings and briefly discuss some possible ways in which a domestic economy should regulate its financial system in order to prevent it from becoming unstable.

Chapter 2

The Financial Sector Assessment Program (FSAP) of IMF.

The FSAP was initiated in May 1999 in the wake of the Asian financial crisis. It was a joint programme of the World Bank and the International Monetary Fund.

Post the Asian crisis, the developed world-that formed the crux of the above institutions-thought a programme like FSAP was needed to (a) to reduce the likelihood, severity, or both, of financial sector crises and cross-border contagion and (b) to foster growth by promoting financial system soundness.

FSAP has now become the principal platform for financial sector diagnostic work at the two institutions. They are supported and helped in this effort by experts from national authorities like central banks and international standard-setting bodies.

Although country participation in the FSAP is voluntary, the program has been structured from the outset as a means to strengthen the monitoring of financial systems in IMF's bilateral surveillance through Article IV consultations (which is mandatory).

The FSAP Review 2003 prepared by IMF and the World Bank[6]lists the analytical approaches that FSAP employs for an overall assessment of the financial sector. These broadly include several elements: (i) the systematic analysis of FSIs and stress testing used to identify risks and vulnerabilities; (ii) the assessments of standards and codes used to assess institutional and regulatory structures; and (iii) the assessment of the broader financial stability policy framework which helps in the assessment of the robustness of the financial sector infrastructure. The third is supposed to consist of a broad range of analyses, including systemic liquidity arrangements, governance and transparency framework, and financial safety nets and insolvency regimes.

Analysis of FSIs and stress testing used to identify risks and vulnerabilities.
Financial Soundness Indicators (FSIs)

"FSIs are intended to monitor the soundness of the financial sector and complement macroeconomic indicators in identifying risks to financial stability"-.(FSAP Review, Page 20)

In the FSAP, FSIs are seen to be the indicators of the financial health and soundness of the financial institutions in a country. Since the health of these institutions are dependent on the health of their counterparties, the level of indebtedness and net asset worth of the corporate and household sectors are part of the FSIs as well.

Some of the FSIs are drawn from prudential and commercial measurement frameworks (CARs, average bid-ask spreads in security markets). Others are drawn from macroeconomic measurement frameworks (household debt/GDP). A list of FSIs,

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[6] Source: Financial Sector Assessment Program—Review, Lessons, and Issues Going Forward (2003), Prepared by the Staffs of the World Bank and the International Monetary Fund., Page 18.

decided by IMF, grouped into a core set and an encouraged set, is presented in Table 2.1 and Table 2.2

Table 2.1 FINANCIAL SOUNDNESS INDICATORS : Core Set

Deposit taking Institutions	
Capital Adequacy	Regulatory capital to risk-weighted assets Regulatory Tier-I capital to risk weighted assets
Asset Quality	Nonperforming loans to total gross loans Nonperforming loans net of provisions to capital Sectoral distribution of loans to total loans
Earnings and Profitability	Return on assets Return on equity Interest margin to gross income Noninterest expenses to gross income
Liquidity	Liquid assets to total assets (liquid asset ratio) Liquid assets to short-term liabilities
Sensitivity to market risk	Duration of assets Duration of liabilities Net open position in foreign exchange to capital

Table 2.2: Encouraged Set

Deposit-taking institutions	Capital to assets Geographical distribution of loans to total loans Gross asset position in financial derivatives to capital Gross liability position in financial derivatives to capital Trading income to total income Personnel expenses to noninterest expenses Spread between reference lending and deposit rates Spread between highest and lowest interbank rate Customer deposits to total (non-interbank) loans Foreign currency-denominated loans to total loans Foreign currency-denominated liabilities- to total liabilities Net open position in equities to capital
Market liquidity	Average bid-ask spread in the securities market 1/ Average daily turnover ratio in the securities market 1/
Nonbank financial institutions	Assets to total financial system assets Assets to GDP
Corporate sector	Total debt to equity Return on equity Earnings to interest and principal expenses Corporate net foreign exchange exposure to equity Number of applications for protection from creditors
Households	Household debt to GDP Household debt service and principal payments to income
Real estate markets	Real estate prices Residential real estate loans to total loans Commercial real estate loans to total loans

1/ Or in other markets that are most relevant to bank liquidity, such as foreign markets.

The core FSIs relate to five basic areas relevant from the point of view of banking business and are compatible with the so-called CAMELS methodology for the assessment of the soundness of individual financial institutions (Capital adequacy, Asset quality, Management soundness, Earnings, Liquidity, Sensitivity to market risk).The capital adequacy indicators measure the banking sector's ability to absorb sudden losses and are thus closest to the "resilience to shocks" concept, whereas the asset quality indicators are directly associated with potential risks to banks' solvency. The profitability indicators measure the ability to absorb losses without any impact on capital, while the liquidity indicators measure banks' resilience to cash flow shocks. Foreign currency exposure is an indicator measuring a bank's risk exposure with regard to movements in currency and its effect on value of bank's exposures in the international financial markets.

The list of FSIs above consists mainly of aggregate balance sheet measures. Aggregation of individual institution-level indicators (micro-prudential indicators) into financial soundness indicators (macro-prudential indicators) necessarily involves a loss of information and the distribution of prudential indicators of individual institutions is also a crucial dimension of financial stability. However, for financial system level the aggregated indicators are what FSAP looks at.

The analysis of FSIs typically involves examination of trends. Although for some indicators there exist certain "optimal" values, which are even anchored in national regulations (e.g. a threshold of 8% for capital adequacy, a value close to zero for net open positions in foreign exchange), many other indicators have no such absolute "benchmarks". The assessment should thus focus on the evolution of indicators over time and on comparisons with other countries.

All countries publishing FSIs should ideally use the same methodology to calculate the FSIs. Internationally comparable FSIs will then serve as a guide to regulatory authorities and monetary policy makers about the relative soundness of the financial sectors. International comparability, however, is still limited by some differences at the national level, particularly in accounting standards but also in the data collection formats needed for calculating the FSIs. While for some countries, data are provided on a consolidated basis (including affiliated domestic financial corporations and foreign branches and subsidiaries), for others countries, data are provided on an individual basis (excluding domestic and foreign subsidiaries). An example of the different methodology used for compiling some of the indicators is that in some countries liquidity indicators do not take into account some short-term deposits on both the assets and liabilities sides, while they do so in other countries.

FSIs in themselves are either backward-looking or contemporaneous indicators of financial soundness. FSAP reasons that we cannot infer the current condition of financial health by simply reading FSI data because the data often comes with a lag. So it is argued that it is necessary to examine the determinants of the FSIs, apply

stress scenarios to them and find out the effect of these stress scenarios on the FSIs. It is believed that identifying the determinants of FSIs will also help to forecast future trends of FSIs.

Given the inherently pro-cyclical nature of financial system as discussed in the previous chapter, FSAP's emphasis on using the FSI variables or their determinants - where current data on the variables are not available - to predict the direction of the system, comes as a sharp contrast.

FSIs usually move together and show inter-linkages. Analysis of inter-linkages is used in testing for shocks on the FSIs.
For trend analysis, FSIs are often complemented by various market-based indicators, which are forward-looking indicators of soundness and are available with higher frequency.

Market based Indicators.

FSAP also uses market-based indicators like market prices of financial instruments, indicators of excess yields, market volatility, credit ratings, and sovereign yield spreads to complement the FSIs because such indicators are thought to incorporate expectations of the future in them. Sovereign yield spreads are commonly watched indicators of country risk. Market price data from the stock, bond, derivatives and real estate markets are used to monitor sources of shocks to the financial sector. The Financial Sector Assessment Handbook (Chapter 3, Page 40) of IMF gives FSAP's rationale behind using these indicators as below:
"The key premise is that these asset prices contain information on market beliefs, which, in turn, contain information about the future. In particular, option prices should reflect market beliefs about the future prices of the underlying assets. This information can be used to extract a probability distribution, including the probability of default."

The quality of the market-based indicators, however, depends on the extent and quality of the financial markets. For asset prices to contain useful information, it is important that the market be robust, transparent and complete.
But more importantly, beliefs about the future will not change direction until the market has already reached the point where they cannot afford to carry on in the same direction anymore.
Before that point arrives, the sentiments would always be such that the current trends would continue as they are in the coming days as well. When they begin to expect changes in this direction, all market players do it together, precipitating a rapid and asymmetric-to-the-rise deterioration of the market prices.[7] The herd behaviour of

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[7] Similar trends were seen in the current crisis as well when the yields on 3 month Interest rate futures had started to increase in the 2006 Q3. The ECB refinancing rates and one-month interbank rates followed very soon. The unsustainability of leverage and asset prices was in line with the expectations and it was only a matter of time before the market started acting according to it.

financial market participants and the impossibility to hedge for every possible risk to make such markets complete make these market-based indicators pro-cyclical as well.

The movements of FSIs and market indicators are in sync across all financial centres in the world. This is an inevitable outcome of integration of financial markets. A higher level of diversification in such an interconnected world necessarily means that individual portfolios would eventually approach the market basket-comprising of assets of those sectors and kinds that the majority consider worth investing-and returns will become increasingly correlated for all financial actors. Individual leverage ratios—the relative amount of credit taken on—will also become more synchronized.

It would be erroneous to then think that because the FSIs and market indicators elsewhere are showing positive trends, that is the trend that will continue in future. The trend, in fact, is only as positive as the current market condition and every market, thanks to the inter-linkage, faces similar threats to that trend at more or less the same time. And when it does, the herd behavior will spread through all the markets and whatever the backward-looking FSI or forward-looking market indicators might have predicted, the trend will get reversed.

Determinants of FSI

Financial Soundness Indicators are supposed to reflect financial health of an economy. To be able to predict their trends into the future, it is necessary to know what determines their level at the macro-economy level.

How FSAP relates macro-economic factors to the FSIs can be seen with examples from two countries: UK and Ireland.

U.K.

Write-off on loans reflects asset quality of banks and is one of the core indicators of financial soundness that FSAP reviews. The Medium Term Macro-econometric Model (MTMM) of the U.K. economy was extended to include the relationship that macro-economic variables in the economy had with this financial soundness indicator in order to find the effect of stress in the domestic economic variables on the bank losses. As a first step to conducting stress tests on an FSI and to understand what variables are thought to be able to predict future trends in the FSI, it would be fruitful to study this relationship.

Sectoral write-offs are determined from variables available in the MTMM of the U.K. economy[8]. The links have been articulated as follows :

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[8] The model has been provided in Hoggarth, Logan and Zicchino,Bank of England (2005), BIS Papers No.22.

Bank losses$_i$ = pi*lgd$_i$*loans$_i$

where i refers to the sector, p is the probability of default and lgd is the percentage written off given default (ie 1 minus the recovery rate). Rearranging then,

bank losses$_i$ /loans$_i$ ≡write-off rate$_i$ = pi*lgd$_i$

Actual sectoral defaults or credit deteriorations are used to proxy pi. There are no UK data on
lgd/recovery rates, so variables that are likely to affect the recovery rate are used, in particular sectoral asset values. So the modelling strategy is:

write-off rate$_i$ = f(default proxy$_i$, recovery rate proxy$_i$)

In the corporate sector, default is proxied by the corporate liquidation rate (the number of insolvencies in the period/number of registered firms). In turn, in the MTMM the corporate liquidation rate depends positively on corporate income gearing, changes in real interest rates and changes in net corporate debt/GDP and negatively on the growth in UK output and commercial property prices. The recovery rate is proxied by commercial property prices.

For the household sector, the proportion of credit card debt in arrears is used as the default proxy in the equation for credit card write-offs. The recovery rate is assumed to be zero. Credit card arrears, in turn, depend on household income gearing ratios and the number of active credit card balances.

Both mortgage and consumer credit arrears are included in the equation for other household sector write-offs to capture the likelihood of default. In the MTMM, in turn, mortgage arrears depend positively on mortgage income gearing and unemployment and negatively on undrawn housing equity and the loan-to-value (LTV) ratio of first-time buyers (as a proxy for the credit risk of new borrowers).

Corporate income gearing, changes in net corporate debt/GDP, commercial property prices, household income gearing ratios, mortgage income gearing, housing equity and number of active credit card balances are all variables that move pro-cyclically to the business cycle. GDP and unemployment are variables that represent the business cycle itself.

The amount of gearing or leverage over and above deposits is low when the income and savings grows at tandem with the demand for credit. GDP increases outpace increases in net corporate debt during this time. But when credit expansion gains its own momentum for its own benefit rather than to provide for actual real economic growth, productivity, income and savings fall and leverage starts increasing, interest rates are expected to rise and asset prices fall. The default rates and recovery rates as

determined by above equations will then rise and fall respectively as the business cycle reverses direction.

Note that the UK macro-model uses LTV as a negative influence on mortgage arrears and hence mortgage defaults because it assumes that higher LTV means less-risky borrowers. This is an example of how only including financial sector in the macro-model may not capture the growing indebtedness in the economy. The qualitative practices carried out in the financial system - a proxy for prevailing mood of the participants in the sector - can change the connotations of variables from their usual perceptions over the course of the expansionary phase. Monitoring these instances closely rather than relying on the once-articulated model structure is then a necessary precaution.

Ireland:

An Econometric Specification of the Model that relates loan provisions to its macro-economic determinants in Ireland's economy:[9]

$$LLR_{it} = a_1 + a_2 GDP_t + a_3 UE_t + a_4 EARN_{it} + a_5 LOANS_{it} + a_6 (LOANS/TA)_{it} + a_7 CAP_{it} + e_{it}$$

Where
LLR_{it} is the value of the stock of loan-loss provisions (and for estimation purposes is normalised by the value of total loans) or is alternatively the rate of new provisioning (the provisions charge divided by total income),
GDP_t and UE_t are the annual real GDP growth rate and the unemployment rate respectively,
EARN is earnings before taxation and provisioning (and for estimation purposes is normalised by the value of total income),
LOANS is annual growth in the stock of loans,
LOANS/TA is the ratio of the value of loans to the value of total assets and finally,
CAP, is the ratio of total capital to total assets.

Earnings ratios are included to control for the presence of income-smoothing. Income-Smoothing, signalling incentives, the incentive to use provisioning to reduce taxable income or to raise low capital ratios as part of Tier 2 capital measure can, by theory, reverse the pro-cyclicality of provisions. But none of these practices were found prevalent in Ireland.

Again, the loan-loss provisions at any given time are determined by the point in business cycle at which the economy stands currently or at the previous lag period. The variables of GDP growth rate, the unemployment rate, growth rate of loans, as discussed in the U.K. case, are all indicators of the direction of the cycle.

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[9] This model is provided in Kearns, Financial Stability Report 2004, CBFSAI.

Indicators of bank efficiency are related to the macro-economy via information on interest spreads and interest margins. Interest rate spreads usually have five components:(a) overhead costs, (b) loan–loss provisions, (c) reserve requirements, (d) taxes, and (e) (the residual) profits. The effect on bank efficiency is tracked through effect of changes in business cycle variables-variables that reflect the same GDP, employment, indebtedness, interest rates that affect the bank losses-on these components.

Evidently, business cycles become an important determining factor for the FSIs in one way or the other.

The rise and fall of property prices move closely with the performance of the FSIs. The commercial property prices act as a determinant for recovery rates in the U.K. model. Real estate prices also form a part of the encouraged set of FSIs in the FSAP (Table 2.2). A long trend of average new house prices in Ireland with the country's GDP (Chart 2.1) should be able to show the pro-cyclical nature of the FSIs clearly.

Chart 2.1   Trend of House Price Growth vs trend of GDP growth.(1971-2009)

Source: DoEHLG[10], CBFSAI[11], Author's calculation.

Given the similarity in the determinants of FSIs, it is then only "natural" that they move together. The nature of this inter-linkage is used when stress testing the FSIs to understand the loss-absorbing capacity of the economy.

Stress tests

"Stress testing, in the context of financial sector surveillance, refers to a range of techniques to help assess the vulnerability of a financial system to exceptional but plausible events.

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[10] http://www.environ.ie/en/Publications/StatisticsandRegularPublications/HousingStatistics/FileDownLoad,15295,en.XLS date extracted: 15th June 2011

[11] Budget and Economy Statistics 2010, Table 13.

It is based on applying a common set of shocks and scenarios to a set of individual financial institutions and subgroups of institutions to analyze both the aggregate effect and the distribution of that effect among the institutions." – Financial Sector Assessment-Handbook (Chapter 3, Page 46).

Stress tests were originally developed for use at the portfolio level. It would measure how the value of a portfolio changes if there are large changes to some of its risk factors (such as asset prices). FSAP uses similar techniques in a broader context, with the goal of measuring the sensitivity of a group of institutions or even an entire financial system to common shocks.

In system-focused stress testing, as FSAP's method is better known, the first step is to identify specific vulnerabilities or areas of concern, the next step is to construct a scenario with the vulnerabilities in the context of a consistent macroeconomic framework. So, for example, if uncertainty in capital flows is a weak area, a scenario is to be constructed with the macro-economic variables of growth and employment reflecting a situation where the capital flows have suddenly fallen in the economy. The third step is to map the outputs of the scenario to the financial institutions' balance sheets and income statements, then performing the numerical analysis on the losses and capital requirements, considering any second-round effects, and finally summarizing and interpreting the results.

FSAP uses a range of FSIs to understand the financial system's key vulnerabilities. Qualitative information on the institutional and regulatory frameworks that govern financial activities is the other source of information.

Constructing a scenario that will form the basis of the stress test is based on an overall macroeconomic framework or model, depending on the complexity of the system and the availability of a suitable model. Drawing on the main macroeconomic vulnerabilities, the variables most susceptible to major shocks and realignments are fed into or stressed from the output of a calibrated macro-model. Depending on the structure and features of the macro-model that is available, the simulation then produces a range of economic and financial variables as outputs.

The underlying assumption here is that it is the domestic macroeconomic variables that qualify as systematic risk factors.

The CBFSAI's (Central Bank and Financial Stability Authority of Ireland) Macro-econometric model was used to construct scenarios to test for the strength of Ireland's financial system.

The econometric model of the Irish economy developed and maintained within the Economic Analysis, Research and Publications Department of the Central Bank and Financial Services Authority of Ireland (CBFSAI) originally came into being

as the Irish component of the ESCB's Multi-Country Model (MCM) project. The goal of this project has been to build a quarterly model for each Euro-system country which will allow cross-country comparability and the analysis of shocks or simulations pertaining to the euro area. These would then be used in conjunction with other tools in the Euro-system to support the formulation of monetary policy.

Due to the desire for linkages between individual country models and the need to compare or aggregate model-based results for different countries, common characteristics were employed for the full set of country models, namely, a common theoretical framework across countries and a relatively high degree of aggregation to minimise complexities of different sectoral break-ups.

The long-run steady state solution of the model does not refer to a specific time horizon. There is no inherent mechanism to ensure that there is a stable level of output in the long run which can be achieved with a certain stable level of capital or stable level of real interest rate. Thus, there is no attempt to pitch the economic variables to a certain constant expected value or constant expected path.

It, however, represents a set of long run relationships towards which the model will tend to move at any point in time. These estimated statistical parametric relationships are assumed to be stable over time because the economy in future is expected to remain structurally similar to what the model currently represents.

The model as it currently stands represents the group of macro-models which by virtue of the assumptions they make defy the intrinsic nature of an economy where as Minsky said "the past, present and future are not only related by capital assets and labor force characteristics but also by financial relations". Such an economy links the creation and ownership of capital assets to the structure of financial relations and changes in the structure. The changes are mostly driven by different behaviour during business cycles and the course of the changes in turn contributes to building the vulnerabilities that result in the business cycles. The macro-models, however, do not have the scope to show this increasing weaknesses growing in the economy.

The articulation and underlying assumptions of the model:
The model is presented in blocks, namely (1) aggregate supply and factor demands, (2) domestic demand, (3) housing, (4) external trade, (5) prices and wages and (6) government.

The supply-side of the Irish economy is treated as a representative firm operating under conditions of imperfect competition with two factor inputs - labour and capital. The quality and degree of relation between the inputs and output can differ across sectors but the coefficient of variation is assumed to go to zero as the number of sectors or economic agents goes to infinity.

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The state of technology is assumed to be given.

Non-housing investment is a function of the cost of capital in the long run and deviation from long run capital net of depreciation in the short run. The private investment deflator is a function of any deviations between domestic and imported prices.

Domestic price as represented by the GDP deflator is derived in the long run from the production function via short run marginal costs. This essentially includes wages per person employed as the principal factor in the short-run marginal costs function, together with the level of output relative to the capital stock as capital is assumed to adjust only sluggishly to change and is regarded fixed in the short run.

The underlying assumption here is that the product wages remain unchanged since increases in wages are built into increase in domestic product prices. The extent to which wage increases influence prices would also depend on the changes in productivity of the stock of capital in production as is mentioned above and on changes in the productivity of labor in production.

The model doesn't allow us to see how the distribution of non-housing investment across sectors moves over time. The decrease in productivity of both labour and capital in some sectors would increase product wages and decrease employment in those sectors but this skewed growth in economy would remain masked by very high productivity and hence employment growth in one or two sectors.

The role that expectations about the performance of the economy can play in the above relations is assumed away. The parametric statistical relationship between cost of investment and level of investment may well change over time for some sectors because expectations about future potential are not bright and credit, however cheap, doesn't flow there. On the other hand, investment might actually rise even when domestic prices rise relative to import prices in the non-tradable sector because credit is readily available and more and more credit is readily lapped up even at higher costs.

Exports and imports are modelled as functions of respective prices and demands. Net factor income is a function of exports.

The assumption here is that trade finance and leveraging in this sector is not significant.
In this context, it can be pointed out that the absence of macro-financial linkages in the model makes it incomplete.

As it is important to know the investment trends and output growth in each sector, it is important to know the level and kind of indebtedness of each sector. As in the U.K. model of bank losses seen above, gearing ratios, growth of debt and additionally

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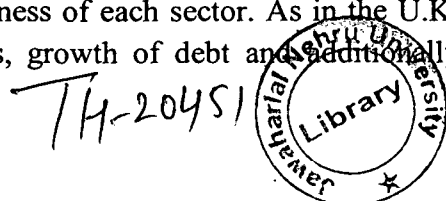
average maturity of debt and debt service ratios should be considered while calculating the income growth in any sector.

In the absence of accounting for this macro-financial linkage, the effect of falling competitiveness on exports will be under-estimated. The higher debt burden accruing to the sector should be studied against its falling contribution to GDP due to uncompetitive exports.
This is important to understand the growing gap between income and debt in a sector.

Housing investment has been considered separately and is a function of house prices. House prices in turn are function of user cost, income and housing stock. The assumption here is that all the above are variables reflecting the fundamental state of supply and demand in the housing market.

User cost however is a function of mortgage interest rates net of house price inflation with a lag. Also, aggregate income of household sector does not net out the accumulating interest burden of households at any given time. It is important to consider the total debt burden accruing along with the current interest payment against that burden because current banking practices might postpone or lighten the interest burden to make loans attractive.

House prices being a function of such an user cost means in an expansionary environment when interest rates are not rising, rising house price inflation taking on from higher incomes of household and then building on higher and higher expectations (as discussed in chapter 1) about future housing demand-more than the current fundamentals would support-will lead to higher levels of real estate investment. This higher investment demand increases current and projected GDP. But again due to absence of financial variables like mortgage debt as a share of disposable income and amortization rates in the housing investment function, the effect of increasing cost side to this investment is not captured.

The absence of such variables and a separate banking sector does not allow for effects of feedbacks of the financial sector to the real sector and back.

A bank loss model as above can bring the effect of falling income against increasing debts to the performance of banking sector. The value of total deposits net of deposit insurance in the consumption function of the economy can then take back the loss of income from lost deposits to the real sector.

Banking sector solvency can be modelled as a function of returns from its investments to different sectors, increasing maturity gaps between its liabilities and assets, interest costs and probable losses.

But, again, the changing concentration of investment in different sectors and changing competitive and institutional environment will constantly tend to drive the model away from the set relations. In case of the first, the weights for returns would have to change for the sectors. The changing relation of LTVs with default rates would be an example of the second. The laxity in monitoring lending practices of banks would mean that an increase in mortgage/corporate/personal debts would have a higher impact on default rates than before.

Ireland's macro-model does not consider the monetary policy transmission mechanism since the policy autonomy does not lie with the national monetary authorities.

Direct, Indirect taxes and Government transfers enter the consumption function and affect the aggregate demand through their changes.

But above all, the implicit assumption that such models make is that the statistical relationships estimated prior to a crisis also describe the economy adequately during a crisis i.e. the model is robust.

The dynamics of an economy is driven by the changing behaviour of the economic agents over time. There are estimated statistical relationships that, as we saw in the model above, would in all probability keep changing as an economy takes off from its financially stable position.

From a stress testing perspective, it is especially important to ask whether such changes are likely to occur in an abrupt manner during crisis periods. If so, the models will not be robust. Crises are associated with an abrupt change in the behaviour of economic agents. Independently of whether crises are assumed to be driven by fundamentals or not, observables change suddenly and dramatically during crisis: depositors withdraw all their money, the interbank market freezes, banks ration credit, etc. And large public interventions are often the policy response that follows.

The sudden change means the statistical relation between investment and rate of interest breaks down. No amount of relaxation of interest rates can boost investment, even in sectors where it was previously concentrated. The market sentiment will be against it. The monetary policy transmission mechanism breaks down.

The statistical relationship between house prices (asset prices) and housing investment (asset investment) would change and so would the relation between financial variables like bank losses and its macro-determinants like GDP and unemployment. The decrease in prices would be accompanied by much larger fall in asset investment than the parameters in the housing investment equation warrant because liquidity will dries up much faster than it would under normal circumstances.

It is important to note that more than the declines in GDP, unemployment and income that are relevant in this context. It is the herd mentality that additionally drives asset prices down and drives liquidity away. Hence the effect of GDP and unemployment on loss variables will much more than the parameters in the model suggest.

Finally, large public stimulus will not increase aggregate demand by as much as the statistical relationship between government transfers and consumption demand would suggest, as has been clearly seen in the aftermath of the crisis of 2007.

The breaks in relationship are not permanent and resume when the economy is back to the pre-crisis levels but using the model to predict the magnitude of change in variables during the crisis would be a deviation from reality.

However, despite these limitation, s these are the macro-models that FSAP uses to simulate large shocks to fundamentals that it believes will cause crisis-like impacts on economy.

Coming to the other considerations of constructing these shock scenarios besides the macro-model, FSAPs intend to construct scenarios that are severe yet plausible.

The baselines of macro-variables from which they are supposed to deviate to shock the economy are usually the projections and forecasts obtained from macro-models like those described above.

Shocks are either calibrated on historical experience (e.g., largest change over the chosen time horizon seen in the past 10 years), or expressed in terms of high multiples of standard deviations of the historical distribution (for example, shocks used for the UK IMF Financial Sector Assessment Program broadly corresponded to events three standard deviations away from the mean of a particular variable. The statistical distributions, in turn, were based on the error variance of the Bank of England's macro model[12]) or can be set on the basis of a hypothetical scenario (e.g., a 20 percent fall in the exchange rate).

Historical experience may be more intuitive and easier to justify, but major structural changes may invalidate historical calibration.
A shock scenario might be calibrated as per the largest change in the key risk factors in the past 10 years. But if the last 10 years had been a continuous, glorious stable run for the economy, then the distribution of macro-economic and financial variables would look very different from their trends and variability over a longer and full business cycle.

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[12] Hoggarth, Logan and Zicchino, Bank of England (2005)

Haldane (2009) takes the case of U.K and illustrates this small sample problem by comparing the distribution of key macro-variables over what he calls the Golden Decade (1998-2007) to the period 1857-2007. He finds the long-run standard deviation of UK GDP growth has on average been 4 times greater than during the Golden Decade; for unemployment 5 times greater; for inflation 7 times greater; and for earnings 12 times greater.

Even when the pre-crisis period contains information on a previous crisis, there is evidence that a historical perspective does not always provide the right framework for scenario construction unless the macro-conditions preceding the crisis are already weak.

Alfaro and Drehmann (BIS,2009) estimated a different model for each crisis in each country, using only data up to the crisis itself. For example, for the two crises in the United States: the savings and loan crisis in the late 1980s and the current episode, one model is estimated with US data up to 1988, whilst the second model includes all information, including the past crisis, up to 2007. As stress scenario, they used the worst negative forecast error of the crisis specific models, regardless of whether this coincided with a banking crisis or not. They shock the models with these scenarios four quarters before the beginning of the crisis and compare the maximum drop in GDP growth during the stress test with the maximum drop during the actual episode to the minimum GDP growth two years after the crises. They find that in nearly 70% of all cases the hypothetical stress scenarios fell short of the severity of actual events. 30% of the cases included countries with only the current crisis (all of whom show the result) and the rest had countries with a previous crisis experience (56% of them show this result).

But, could the boom period influence be avoided by taking a longer term perspective into history, as Haldane suggests?

The variability of the key variables is surely greater over the longer time period. We may take a certain multiple of standard deviation from the mean of these variables over this period as the amount of shock that can be expected. Alternatively, we might consider the maximum variation in the variable during the entire period as the standard shock. The maximum variation would however reflect the structure and composition of the economy at the time and the mean would be an average representation of the economy over the time.

But how could we assume that the world financial economy has not evolved since the time when the United States did not have the IT revolution and its commercial banks could not, by virtue of law, indulge into investment banking activities? Has the worldwide financial de-regulation not transformed the interrelations within the banking system more recently causing manifold increases in network externalities?

The magnitude of variation in macro-variables that can be brought about by a highly integrated and super-fast financial economy has not been seen in history before.

Ireland, for example, had experienced housing bubbles before in 1970s and 1980s that had seen sharp falls. But the bubbles took place in an environment of rapid general inflation as opposed to increases in only house prices in the form of investors' assets. Real repayment of mortgage loans was in such circumstances front-loaded so that, by the time that bubble burst and house prices were falling in real terms, the real value of the remaining debt for most borrowers was low. Ireland's bankers and regulators actually looked back into history and anticipated a similar situation in today's Ireland.

But banks had not even been the main players in the residential mortgage market until the late 1980s in Ireland. So, the effect of increasing competitive pressures of global world of finance on banking conduct could not have been observed.

As will be seen below, FSAP almost always uses hypothetical values for shock scenarios for the majority of its assessments.
Shocks, thus calibrated, are applied on macro-model projections.

The effectiveness of applying the stress scenarios is further dependent on the following aspects:

What is the time horizon of the simulations? In other words, when would the shocks begin to take effect? A quarterly model produces forecasts over the next six to eight quarters. The shock may be calibrated from the baseline forecast of this model and the aim is then to see what happens to the financial sector's balance sheet when there is a shock to GDP some three quarters later. If, as FSAP assumes that institutions will not adjust their balance sheets or their portfolio mix during this time. When credit is growing rapidly in an economy, the time horizon of even one quarter used when the scenarios are applied to individual balance sheets may lead to miscalculation of actual losses.

What policy responses are assumed? The macro-model may have policy reaction functions like Taylor rule embedded in it. While assessing effects of a stress scenario either no change in policies may be used or an assumption of a monetary policy reaction that tempers the impact of shocks maybe used (as was done in UK FSAP, Hoggarth, Logan and Zicchino, Bank of England (2005),).
That there will be different effects under these different policy assumptions is again based on the implicit assumption that policy transmission mechanisms will work smoothly under the crisis, much as it could have worked in the pre-crisis period. The fallacy of this assumption has been discussed in the critique of statistical robustness of macro-models.

What are the second round effects of stress tests? Contagion risks and second-round effects have typically not been addressed in many FSAPs, data availability being a key factor. The absence of macro-financial linkages that can acts as feedback loops from financial to real sector in the models being another.

This may be justifiable for an individual institution that does not have a large effect on the financial system or the macro-economy, that is, the feedback effects are relatively small. However, once the time horizon of a scenario or shock extends, the assumption of no behavioural response becomes harder to justify.

In the exercise on shock magnitudes above, it is the inability to account for negative feedback effects that spiral from the financial sector to the real sector in the macro-models that result in some of the departure of calibrated shock value from the actual event.

Similarly, for systemically important institutions or systems as a whole, the assumption of no feedback effects may be an oversimplification. The policy environment may also change over a longer horizon as monetary or supervisory authorities react to shocks.

Once a set of adjustment scenarios has been produced in a consistent macro-framework, the next step is to translate the various outputs into the balance sheets and income statements of financial institutions. There are two main approaches – "bottom-up" and "top-down" approach.

Under the bottom-up approach, individual financial institutions apply the shocks to their portfolios and balance sheets and the results about losses and capital requirement are then aggregated across the institutions to represent the losses for the group as a whole that would result from those shocks.

The discrepancy that may arrive in the results if individual institutions provide their own estimates is over-looked to simplify calculations. But unless supervised there would be inconsistencies in the methods of application of the scenario by different institutions.

The results from the individual institutions help to understand how the effects of the shock would vary across the institutions and give an idea of where the systemic risk lies. But very often the institutions will not have the incentive to produce the fair result about their debt positions because that would mean that their lending activities and growth would be restricted. The systemic consequences of bank failure assure them about a bail-out if their losses pile up. Even after the Bottom-Up stress tests in Ireland in 2006, the Anglo Irish Bank was found unable to cover its debts the moment there was a shock to liquidity in the re-financing markets.

The top-down approach estimates the effect of a stress scenario on an aggregate group as a whole. Under this approach, the estimate of the shock is applied to all institutions in the data set to arrive at an aggregate estimate.

Supervisors need access to disaggregated data on individual portfolio structures and positions to use this approach. Where financial institutions have diverse portfolio structures in interlocking networks, aggregating across bank exposures to the interbank market may give a small figure for net exposures when the gross figure might be quite large.

FSAP intends to formulate the effect of above stress scenarios on all kinds of risk factors that can threaten the stability of the financial system in order to get to the final effect of the stresses on the portfolios of the financial institution.

The extensive list of risk factors that it considers includes: Interest rate risk, foreign exchange risk, credit risk, liquidity risk, equity risk, commodity price risk and the all-encompassing market risk. These factors together are supposed to cover all possible threats to the financial system.

When the concern is being able to account for all losses that the shocks to the economy can lead to by increasing the risk contribution of these factors to the system, some facts and assumptions about how the role of these factors are envisaged in the system needs to be observed.

Tables 2.4 to 2.7 give snapshots of some of the stress tests for specific risk factor that FSAP had conducted by 2001. [13]

Table 2.3: Interest Rate Risk Stress Tests as conducted by FSAPs.

Data	Models	Scenarios
-In ten out of the twelve reports, individual bank data for all banks or for those banks concentrating more than 50 percent of bank deposits, assets, or loans were used. − In two cases, aggregate data for the overall financial system or for distinct groups of banks were used.	-In four of twelve countries, vulnerability to change in interest rates was analyzed using duration analysis. Maturity buckets and gap analysis were used in 6 cases. A relatively sophisticated VAR scenario model was used in one case. No interest rate risk stress test was conducted in one country.	-Impact of hypothetical interest rate increases was examined in eight cases. Changes in interest rates assumed were ad hoc. Parallel shifts in the yield curve were examined in three of five cases. − Two reports investigated the impact of an increase in interest rates equivalent to the largest shock observed over a given time horizon.

[13] Source: Blaschke, Jones, Majnoni and Peria (2001).

Table 2.4 : Foreign Exchange Risk Stress Tests as conducted by FSAPs.

Data	Models	Scenarios
-Ten out of the twelve reports, used individual bank data for all banks or for those banks concentrating more than 50 percent of bank deposits, assets, or loans. – Aggregate data for the overall financial system or for distinct groups of banks were used in two cases.	- In most cases, the impact on capital of a shock to the net foreign currency position was examined. – Value at risk was used in the case of one country. - No tests were conducted for one country.	- In eight out of twelve cases, ad hoc devaluation scenarios were used. – In three reports, the impact of large historical shocks was evaluated.

Table 2.5: Credit Risk Stress Tests as conducted by FSAPs.

Data	Models	Scenarios
-Ten out of twelve reports, used individual bank data for all banks or for those banks concentrating more than 50 percent of bank deposits, assets, or loans. – Aggregate data for the overall financial system or for distinct groups of banks were used in two cases	-In five out of twelve cases, regression analysis and simulations were used to examine the response of non-performing loans to future macroeconomic shocks. The remaining FSAPs evaluated changes in bank solvency resulting from pre-determined modifications in the extent of provisioning or from an ad hoc deterioration in the quality of the loan portfolio.	- In one case, Monte Carlo simulations of shocks to interest rates, exchange rates, and inflation, based on the historical covariances, were used to examine the simultaneous impact on the value of bank's capital. –In eight cases as hoc assumptions extent of under-provisioning, the future behaviour of non-performing loans, and the size of the macro shocks that could affect the loan portfolio of banks. – In the remaining cases, the scenarios used were chosen based on the shocks observed historically.

Table 2.6 : Liquidity Risk Stress Tests as conducted by FSAPs.

Data	Models Used	Scenarios Considered
Ten out of the twelve reports used individual bank data for all banks or for those banks concentrating more than 50 percent of bank deposits, assets, or loans. Aggregate data for the overall financial system or for distinct groups of banks were used in two cases.	- in four out of twelve cases, the impact on liquidity of various definitions of liquid assets was examined. – No analysis was conducted for the remaining countries.	- In cases where liquidity risk stress test were conducted, these involved making arbitrary re-classification of the assets that can or should be considered liquid.

The common factor in all these stress tests are the ad hoc assumptions made about the magnitude of the shocks, the definition of available data ("arbitrary re-classification of assets that can or should be considered liquid") and the estimates of the parameters like rate of provisioning, default rates in future. The underlying assumptions made vary broadly from the methods of calculating these risk factors to the way their effect on portfolio value is formulated.

To begin with, maturity gap analysis is assumed to give a good approximation of interest rate risk. A maturity gap model is based on the concept of the gap between weighted average maturity of assets and liabilities of the financial institutions. But a bank that matches its maturity on assets and liabilities can still be subject to losses from interest rate risk if the timing of cash flows from assets and liabilities are different.

Duration gap analysis is conducted to overcome this problem wherever data is available. Duration is calculated as the weighted average time-to-maturity using present value of cash flows at each time-to-maturity period as the weights. It can be derived to represent the interest elasticity of price of asset to the interest yield. But this linear relation will tend to underestimate the rise in prices of assets for large interest decreases and vice-versa because of the otherwise convex relation between prices and yields. Duration also assumes that the discount factor used to derive the present value of cash flows remains constant over the period of analysis.

Duration can be linked in a linear relationship to capital adequacy ratio to calculate the loss of capital caused by interest rate risk. [14]
If duration can be expressed by the formula below:

$$\frac{\Delta A(r_A)}{A(r_A)} \cong \frac{-D_A \Delta r_A}{(1+r_A)}, \quad \frac{\Delta A(r_L)}{A(r_L)} \cong \frac{-D_L \Delta r_L}{(1+r_L)},$$

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[14] The formulae for interest rate risk, as used in FSAP are provided in Financial Sector Assessment-Handbook. Page 385.

where $A(rA)$ and $A(rL)$ are market values of assets and liabilities of a banking system, where r_A and r_L are annual interest rates on assets and liabilities and DA and DL are the duration of all assets and liabilities respectively.

Capital(C) is defined as $A(rA) - A(rL)$, and expressed as a ratio to risk-weighted assets (A_{RW}). Differentiating capital with respect to the interest rate on assets, and substituting from formula of duration above, the sensitivity of the C/A_{RW} ratio to interest rate changes can be expressed as

$$\frac{\Delta[C(r_A,r_L)/A_{RW}(r_A)]}{\Delta(r_A)} \cong -\frac{(L/A_{RW})}{1+r_A}\left(D_A - D_L\frac{1+r_A}{1+r_L}\frac{\Delta r_L}{\Delta r_A}\right)\frac{1-\frac{\Delta A_{RW}}{A_{RW}}\frac{C}{\Delta C}}{1-\frac{\Delta A}{A}\frac{C}{\Delta C}}.$$
$$- 2$$

Where $L= A(rL)$

The direct relationship that summarizes the effect of interest rate stress test on capital adequacy FSI is then conceived of as below:

$$\frac{\Delta[C(r_A,r_L)/A_{RW}(r_A)]}{\Delta(r_A)} \cong -\frac{(L/A_{RW})}{1+r_A}GAP_D,$$
$$- 3$$

Where GAPD is the duration gap, defined as

$$GAP_D = D_A - D_L\frac{1+r_A}{1+r_L}\frac{\Delta r_L}{\Delta r_A}.$$
$$- 4$$

The effect on capital adequacy is then a product of the shock and the "interest rate exposure FSI". The "interest rate exposure FSI", is the duration gap that is a function of the two duration FSIs.

This direct but approximate relationship is obtained after subjecting equation 2 to simplifying assumptions, such as the risk-weighted assets move proportionately to total assets, that is, $\Delta A_{RW}/A_{RW}=\Delta A/A$.

The assumption that total assets move proportionately with risk weighted assets considers a certain way in which riskiness of all the assets are adjusted when changes to value of all assets are being observed. In other words, it makes a blanket assumption about how the risk management practices of all countries work for the purpose of arriving at a practically feasible evaluation method of effects of stress in the interest rate risk.

Similar assumptions are made to quantify the direct effect of stresses in exchange rate risk on capital adequacy FSIs. The linear approximation also assumes that the banking sector is not very active in options markets because if banks have large positions in foreign exchange options, the relation between the exchange rate change and the effect on capital can become highly nonlinear.

The indirect exchange risk of banks' counterparties and, therefore, the aggregate risk of banks through changes in credit risk resulting from changes in the exchange rate have not really been addressed in FSAPs. The corporate sector's net foreign exchange exposure to equity is one of the encouraged indicators but FSAP missions have not been able to collect comprehensive data on this variable[15]. The calculation of the indirect effect, where made possible, has relied on additional assumptions about the sensitivity parameter that reflects the effect of the corporate sector's increasing leverage on the banking sector's share of non-performing loans, the loss-provisioning rate, and the ratio of the total loans to risk-weighted assets.

Credit risk is usually measured by two approaches – the Default Mode approach defines credit losses as that caused by default events taking place in a pre-defined period or by the Mark-to-Market approach which also takes into consideration variations in a borrower's credit-worthiness that may affect the value of its debt position.

While for the first the probability of default is either estimated from its links to macro-economic variables over the preceding period or simply replicated from average historical values, for the latter a matrix of transition probabilities to show the probability of migrating from one credit rating to another is employed.
The volatility of these expected frequencies is used to quantify the range of losses but there is no one way in which the dispersion is measured.

One of the models that FSAP uses is known as the CreditRisk+ model[16] which assumes that the loan default events are independent i.e. no correlation between any pair of loans and that individual loan defaults are random events driven by a Poisson process[17]

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[15] Source: Financial Sector Assessment-Handbook.

[16] Blaschke, Jones, Majnoni and Peria (2001).

[17] A Poisson process is a collection $\{N(t) : t \geq 0\}$ of random variables, where $N(t)$ is the number of events that have occurred up to time t (starting from time 0). The number of events between time a and time b is given as $N(b) - N(a)$ and has a Poisson distribution. The default time of each loan i is assumed to follow a marginal homogenous Poisson Process with a parameter λ_i. A homogeneous Poisson process is characterized by a rate parameter λ, also known as intensity, such that the number of events in time interval $(t,t + \tau]$ follows a Poisson distribution with associated parameter $\lambda\tau$. This relation is given as

$$P[(N(t+\tau)-N(t))=k]=\frac{e^{-\lambda\tau}(\lambda\tau)^k}{k!} \qquad k=0,1,...,$$

where, $N(t + \tau) - N(t)$ describes the number of events in time interval $(t, t + \tau]$.
The rate parameter λ is the expected number of "events" or "arrivals" that occur per unit time. In a homogenous poisson process the λ is assumed to not vary with space and time; i.e. it is assumed to remain constant with change in the state of the loan and with the passage of time.

A homogenous poisson process has the property of memorylessness-mathematically speaking, inter-arrival times between events are exponentially distributed with parameter λ-which requires that the number of arrivals occurring in any bounded interval of time after time t be independent of the number of arrivals occurring before time t.

In the context of defaults on a loan, this means the event of one default on the loan or a group of defaults on the loan at time t is independent of the event of another default or group default that happened before t. Given the herd mentality of financial players, this does not seem to reflect reality, especially during times of panic when defaults happen in quick succession specifically driven by previous incidences of default.].

The flaw in trying to predict default rates of a class of securities from past performance as done in risk-management tools can be understood from an analysis on the default rates of CDO assets in ABS CDOs by year of origination done by Barnett-Hart (2009). The same assets had had different default rates in the past and this difference was quite random. For example: in 2000, they had a default rate of 7%, in 2002 they had a default rate of 4% and in 2004 they had a default rate of 11%.

Clearly, the performance in the past for a certain cohort of assets can have very different correlations with the actual performance of the asset over the course of a business cycle.

In such a scenario, it would be wrong to assume that the measure of riskiness of the assets in the past can be a good predictor of its riskiness in future and that prediction can then be made the basis of pricing those assets. But this is precisely what is assumed in this DM approach of measuring credit risk.

To measure the value at risk (VaR) for a portfolio during the time it is held, models use the credit ratings, transition matrix frequencies, average recovery rates and yield spreads to derive a measure of the price and volatility for any group of credit instruments for a given time.

However, in reality most of the instruments are not tradable and neither their prices nor their volatilities can be observed and hence matched to the prices and volatilities that are calculated from and predicted by ratings assigned by agencies.

Also the grades given by rating agencies refer mostly to bond-issuers and although borrowers categorized into homogeneous product groups, bank borrowers differ much in terms of size, market access and financial infrastructure.

Market risk can be defined as the risk of losses on a portfolio arising from movements in its market prices or broadly as the risk that a change in liquidity or in the level of one or more market prices, rates, indices, volatilities, correlations or other market factors will result in a loss in a specified position or a portfolio.

FSAP uses the VaR methodology to deal with aggregating over multiple risk factors.

In view of the widespread use of the Value-at-Risk (VaR) method of assessing risk of a portfolio in FSAP stress tests, a closer look at how this measure works is in order.

Value at Risk measures the potential loss in value of a risky asset or portfolio over a defined period for a given confidence interval. Thus, if the VaR on an asset is $ 100 million at a one-week, 95% confidence level, there is a only a 5% chance that the value of the asset will drop more than $ 100 million over any given week.

While VaR can measure probable losses to the portfolio from market risk as well as firm-specific credit risks it is defined in a way that it measures only 'normal' risks.

Formally, given a confidence level $\alpha \in (0,1)$, the Value-at-Risk of a portfolio at α over the time period t is given by the smallest number $k \in \Re$ such that the probability of a loss over a time interval t greater than k is α.

i.e, $VaR_{(\alpha)}(X) = -\sup\{k \mid P[X \leq k] \leq \alpha\}$

where X is the random variable that represents future value of profit/net returns for the portfolio.

The three broad methods of calculating VaR draw from historical data in some way or the other and make some assumptions about the return distribution of the portfolio.
The Variance-Covariance approach assumes that returns of the portfolio are distributed normally and uses the historical variance and covariance of the returns on underlying assets for the common market risk instruments that these assets are exposed to and then calculates the variance parameter for the normal return distribution of the portfolio for a combination of these market risks.
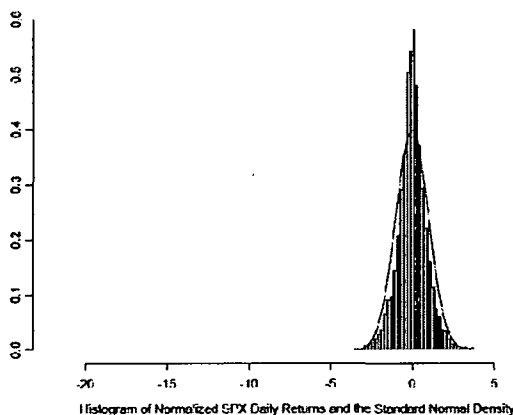
The historical simulation approach assumes that past return distributions of an asset is a good representation of its future return distribution irrespective of changes in the risk scenario in the system.

The Monte-Carlo simulation method makes subjective assumptions-which are again based on historical experience-about all kinds of distribution of all the market risk factors and runs simulations to find what the portfolios return distributions would be in each scenario.

Limitations of the VaR measure:

There is substantial evidence that returns are not normally distributed and that not only are outliers (fat tails) more common in reality but that they are much larger than expected, given the normal distribution. Comparison of the histogram of the normalized daily returns of S&P 500 index (from Jan 2, 1980 to Dec 31, 2005) and the density of N(0,1) is shown in Chart 2.2. The feature of a high peak and two asymmetric, heavy tails (i.e. the leptokurtic feature) is quite evident.

Chart 2.2   Asymmetric distribution for asset returns

Histogram of Normalized SPX Daily Returns and the Standard Normal Density
Source: Kou(2006) Page 1.

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Since VaR is concerned with only the threshold of the possible α% losses, VaR is indifferent of how serious the losses beyond that threshold actually are. Banks that use VaR to measure their risk exposure would be under prepared for large and potentially catastrophic events that are extremely unlikely in a normal distribution but seem to occur at regular intervals in the real world.

Historical data do not exist for financial innovations. Where they do exist, if that time period was a relatively stable one, the computed Value at Risk will be a low number and will understate the risk looking forward. Conversely, if the time period examined was volatile, the Value at Risk will be set too high.

Measures of Value at Risk are conditioned on explicit estimates of correlation across risk sources which are based upon historical data and are extremely susceptible to change under situations of crisis or generally over time as character of risks change.

VaR can provide incentives for sub-optimal decisions. Basak and Shapiro (2001) note that managers will often invest in more risky portfolios when they use Value at Risk as a risk assessment tool since they are much more focused on avoiding the intermediate risks (under the probability threshold), but that their portfolios are likely to lose far more under the most adverse circumstances.

Haldane (2009) plotted the unconditional 90th percentile VaRs for a selection of UK banks, based on their equity returns up until end-July 2007 and then extended to include the present crisis. These unconditional VaRs for UK banks increase, on average, by almost 60% once the sample is extended; and for some banks these risk measures more than double.

The other risks that FSAP tries to quantify need two things to be in place for a fair calculation:

data knowledge on all net open positions in all kinds of financial products both on and off-balance sheet and at every node of the financial network; and correct timeliness of the data, because (as discussed above) the financial system is always in a flux and all open positions are prone to change constantly over very short periods of time.

Assessment of observance of international standards and codes.

The standards typically assessed under FSAP consist of the: (i) IMF Code of Good Practices on Transparency in Monetary and Financial Policies (MFP Code); (ii) Basel Core Principles for Effective Banking Supervision (BCP); (iii) Core Principles for Systemically Important Payment Systems (CPSIPS); (iv) International Organization of Securities Commissions (IOSCO) Objectives and Principles of Securities Regulation (IOSCO Principles); (v) International Association of Insurance Supervisors (IAIS) Insurance Core Principles (ICP); and (vi) the Financial Action Task Force (FATF) Recommendations for Anti-Money Laundering and Combating the Financing of

Terrorism. In addition, other standards, principles and guidelines may be used to facilitate the analysis in the FSAP. These include: (i) the OECD Corporate

Governance Principles; (ii) World Bank Principles for Effective Insolvency and Creditors Rights; (iii) CPSS-IOSCO Recommendations for Securities Settlement System (RSSS);and (iv) International Accounting and Auditing Standards.

Quantitative analysis of FSIs is thus complemented with information from assessments of the effectiveness of financial sector supervision. The rationale behind these assessments, as FSAP understood it, can be seen to be the following in the context of the banking sector. First, BCP assessments can clarify the definition of data being used to compile FSIs by, for example, indicating the quality of capital. Second, they can help establish the underlying cause of observed movements in FSIs when there are competing explanations, such as whether a fall in the capital ratio might be supervisory action rather than rapid balance-sheet expansion. Third, they provide information on risks, such as operational and legal risk that cannot be captured adequately using FSIs. Fourth, they provide information on how effective the banks' risk management is and, thus, how effectively the banking system is likely to respond to the risk associated with particular values for FSIs. Finally, they indicate the responsiveness of the supervisory system to emerging financial sector problems, which reveals how quickly vulnerabilities identified by FSIs are likely to be corrected. A lack of compliance with many of the BCP would suggest that the banking sector vulnerabilities detected using FSIs may be more serious than in a financial system with good compliance.

FSAP asserts that adhering to the standards can adequately compensate for such serious threats to bank stability as poor lending practices, weak-in-practice-than-on paper loan evaluation and loan provisioning practices in a country.

The crucial assumption upon which FSAP's rationale stands is that the standard ratios and principles decided upon internationally are arrived at by robust methods that can take into account all kinds of risks in every kind of economy and financial system.

The core Basel principles have been criticised fairly often. Basel lays down a standard Capital Adequacy Ratio (CAR) to be followed by all commercial banks across the financial centres as an indication of sufficiency of capital buffers against all stress scenarios. The VaR method of calculating risk that was evolving in the late 90s is used in the general as well as internal bank-specific risk-management models to measure risks of the assets to set aside capital to cover for any losses. The VaR method, as discussed before, uses historical values of asset risk correlations and does not account for unexpected losses from the portfolio. Additionally, the history is drawn from industrialized countries and from times that can be structurally and integrally very different from the time to come. VaR measures that assessed the risk of financial products in the recent crisis did not have any past reference of variance-covariance of returns for these products. Times had changed from when financial globalisation had not led to different degrees of asset co-movements and various financial innovations. In view of the failure of Basel rules to account for the

accumulation of risk through off-balance sheet securitization and failure to understand and incorporate the actual asset correlation parameters the above assumption by FSAP surely lacks credibility.

A country where FSAP was conducted twice-the second time being just before the crisis hit-is Ireland. Ireland has suffered greatly in the crisis despite optimistic reviews of its financial sector by FSAP. Had FSAP reviewed the financial sector with an eye on evolving vulnerabilities within it, would it have found some serious imbalances creeping into the system that, by their very nature, could lead to extensive losses with the slightest change in market sentiment? We try to understand this in the next chapters.

Chapter 3

Financial Stability of the Irish Economy 1999-2006.

Ireland was the poorest country in rich North-west Europe in 1988. Its GDP was a mere 64% of the European community average. Unemployment amounted to 18% of labour force and national debt amounted to 125% of GDP. (All data from budget and economic statistics table, CBFSAI, 2010)

Since independence in 1922, Ireland has struggled with sluggish growth performance, chronic budget deficits, high levels of indebtedness, high levels of unemployment and heavy net emigration flows.

Chart 3.1 Economic growth in Ireland 1971-2000 (Real GNP and GDP).
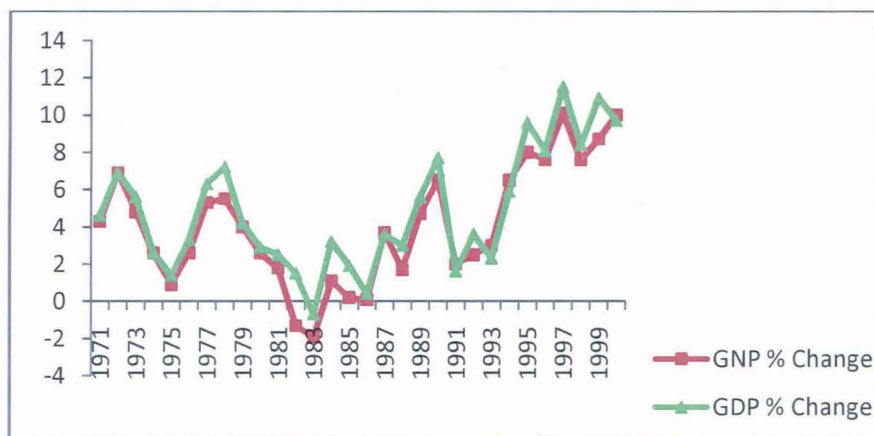
Source: Budget and Economic Statistics table, CBFSAI, 2010: Table 13.

In the first ten years of its independence, the Irish economy maintained its free trading relationship with U.K. Its banking system was closely linked to that of U.K. and its capital and labour moved freely to the U.K. and U.S.

In 1932, a new government assumed office and cut down on the openness of the economy. It was the era of protectionism and high tariffs against U.K. were announced to attempt build infant industries. The Control of Manufactures Act was introduced to prohibit foreign ownership of the Irish industry. Capital was however allowed to flow out of the country and in 1940s and 1950s, the banking sector invested a considerable portion of its deposits in external assets like British Government Securities instead of the domestic industry. Aside from the lack of development, the domestic economy was also thought to have missed out on the European post-war boom. It also suffered net annual emigration of over 40,000 over a single decade.

From then on, Ireland consciously began to court various degrees of openness. The Control of Manufactures Act was abolished in 1957. Moves toward free trade were initiated through the signing of the Anglo-Irish Free Trade Agreement in 1965 and Ireland's joining of the European Economic Community (EEC) in 1973.

This process was accelerated by Ireland's decision to join the European Monetary System in 1978. Ireland, however, could not let go its main trading partner-U.K. As the one-to-one parity with Sterling broke off in 1979-U.K. was not part of the ERM-the Irish pound found itself floating against the Sterling like the other ERM currencies and in an effort to protect the Irish currency against the stronger Pound while keeping the tie with U.K., the Central Bank introduced exchange controls limiting capital transactions with the Sterling area.

But commitment towards the European Monetary Union was growing stronger. From 1977-1981, Ireland resorted to an expansionary macro-economic policy led by large scale government expenditures along with tax-cuts. This produced some growth in the short term but gave rise to high public sector debt (around 120% of GDP), high balance of payments deficit (14.6% of GNP from 5.3% in 1977). Due to the high marginal propensity to import of Ireland, most of the budgetary stimuli leaked out of the country. There was high inflation (20.4% against EU average of 12%) by 1981. From 1981-87, attempts towards fiscal retrenchment were rendered unsuccessful by political logjam. Fear of the inability to roll-over the rising sovereign debt in financial markets finally led to the retrenchment in 1987.

Ireland looked towards anchoring its currency to a European common currency bloc to lower its inflation. It would gain wider markets for trade and capital flows and would be able to reduce its dependency on U.K. The benefit was not really felt then since the Pound became stronger than ERM currencies but when EMU gathered momentum at Maastricht with the low inflation/fiscal discipline approach, all exchange controls were dismantled and by 1992, with the introduction of the Single European Market (SEM), Ireland became a fully open economy for not only commodities and labour, but also for capital.

As financial markets became more integrated, for most countries in the EMS, reliance on direct credit and interest rate controls declined and money market policy assumed a larger role (Kneeshaw and Van den Bergh, 1989). In reflection of the significant changes in the international financial environment during the early years of the European Monetary System (EMS) Ireland's financial sector was liberalised with respect to interest controls and liquidity ratios in quick succession.

Table 3.1 provides an overview of the steps of Ireland's financial liberalization.

In 1987, the International Financial Services Centre was set up. The IFSC had a special tax regime-initially a zero % corporate tax on profits on manufacturing exports and later a 10% corporate tax on profits on exports of both manufacturing and internationally traded services. . It was meant to encourage FDI so as to bring in the employment that low levels of Ireland's domestic industrialization could not. The lack of industrialization drove Ireland to offer a tax rate that was much higher than the tax rates for the industrialized countries like France or Germany. The average corporate tax regime for the euro region is shown in Chart 3.2.

Table 3.1   Stages of Financial Liberalization in Ireland.(1973-1999)

Credit Policy	Feb-73	Banks advised not to increase private-sector credit to non-productive sectors (i.e., financial,property companies and personal sectors).
Credit Policy	Jun-74	Credit restrictions on banks reinforced by provisions for special deposits at non commercial rates of interest.
Credit Policy	Oct-78	Stricter credit guidelines, including a specific, more restrictive guideline for the personal (excluding housing) component of private-sector credit,backed by supplementary noninterest bearing deposits, applied to banks.
Exchange Controls	Dec-78	Exchange controls extended to transactions with the UK, in preparation for EMS membership.
Interest Rates	Jun-79	Short-Term Facility introduced, permitting secured borrowing by banks under a quota system overnight and up to seven days
Reserve Requirements	Nov-79	Primary liquidity ratio unified for all banks at 10 per cent.
Credit Policy	Feb-81	Explicit sectoral credit guidelines discontinued.
Credit Policy	Apr-82	Specific guidelines reimposed on banks' sectoral lending.
Money Market	May-83	Introduction of sale and repurchase agreements in respect of Government securities, for supplying liquidity to the interbank market.
Credit Policy	Feb-84	Formal guidelines for bank lending to private sector ended. Instruments of liquidity management and interest rate policy to be used increasingly to influence monetary conditions.
Interest Rates	May-85	New interest-rate arrangements to facilitate greater competition among banks at retail level. Each bank was free to decide on the level of its lending and deposit rates, subject only to a maximum related to the level of money-market interest rates.
Credit Policy	Mar-86	Issue of indicative credit guidelines to banks ended. Primary reliance placed on liquidity management and interest-rate policy.
Exchange Controls	Jan-88	Major relaxation of exchange controls.
Exchange Controls	Jan-89	Restrictions on purchase of medium- and long-term foreign securities removed.
Interest Rates	Mar-91	Formal trigger mechanism for changes in retail interest rates suspended.
Reserve Requirements	Mar-91	Primary liquidity ratio reduced from 10 per cent to 8 per cent.
Exchange Controls	Jan-92	Restrictions on non-residents holding Irish pound (IR£) accounts and obtaining (medium-term) IR£ loans removed. Limitations on FX borrowing by residents removed.
Reserve Requirements	Feb-92	Primary liquidity ratio reduced to 6 per cent. Secondary liquidity ratio: required holdings of Government securities frozen at end-December 1991 levels.
Exchange Controls	Jan-93	Remaining exchange controls removed on schedule. Corporate Budget 1993 Stamp duty on most corporate bonds abolished in the Finance Act.
Interest Rates	Feb-93	Following the resolution of the currency crisis, the Short-Term Facility is restored.
Reserve Requirements	Nov-93	Primary liquidity ratio reduced to 4 per cent.
Reserve Requirements	Jan-94	Reduction in primary liquidity ratio to 3 per cent. Secondary liquidity requirement abolished.
Reserve Requirements	Jan-99	Reduction in primary liquidity ratio to 2 per cent.

Source : CBFSAI, Quarterly Bulletins and Kelly and Everett (2004).

Chart 3.2

Statutory corporate tax rates In the European Union
(Incl. Local taxes and surcharges)
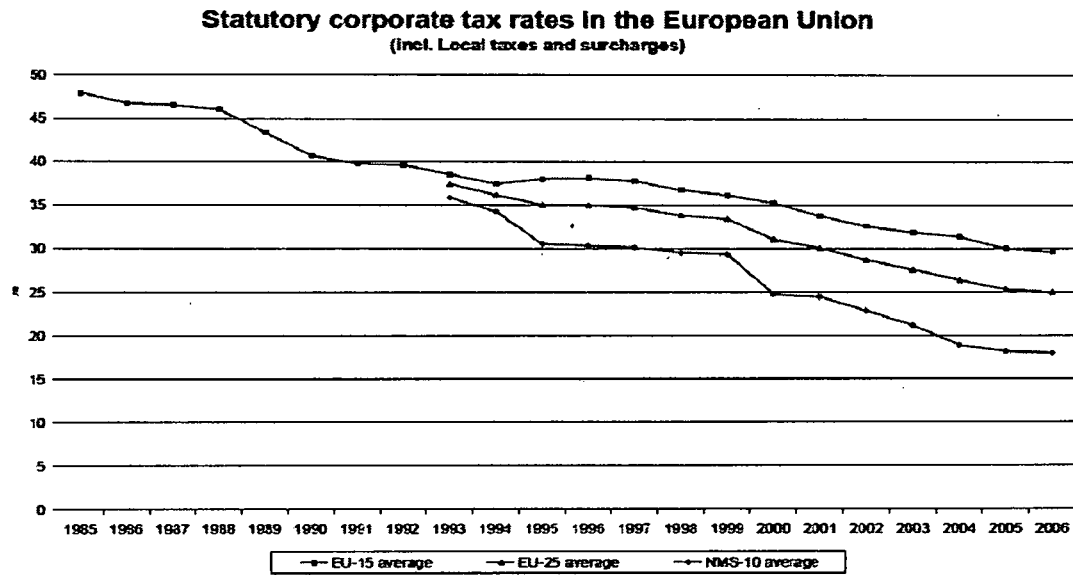
Source: European Commission. The rates include local taxes and applicable surcharges.

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EU-15 area countries are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom.
EU-25 area countries are: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, UK.
NMS-10 area countries are: Poland, Czech Republic, Slovakia, Hungary, Slovenia, Estonia, Latvia, Lithuania, and the island nations of Cyprus and Malta.

The IFSC attracted many of the world's major international banks as well as the principal Irish banking institutions who began to offer services like international banking, corporate treasury, life and non-life insurance business, collective investment schemes, the service providers to such schemes, securities trading, brokerage operations, financial advice and back-office operations. The majority of the licensed banks in the IFSC concentrated on granting relatively low-risk, low-margin credit facilities to high-quality international corporate customers, central and regional governments and banks. For the most part, funding was obtained from wholesale sources and from parent banks. The IFSC was meant to provide a wide range of efficiently priced financial services to the euro financial market and to the non-resident firms that were being attracted to invest in Ireland.

The competitive credit and financial services market, the low tax rates and Ireland's increasingly computer literate, young, English speaking labour force who were easy to mould into a national pay agreement in the absence of better domestic employment opportunities finally brought the flow of FDI that Ireland was counting on to embark on the path of more rapid growth.

This also was the time when Silicon Valley had started to invade Europe and the new high-tech U.S. MNCs were looking for a European base from which they could sell their commodities in the SEM. The Industrial Development Authority (IDA) of

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[18] Mooij and Nicodème (2007), European Commission, Economic Papers. Page 6

Ireland had always believed in the efficiency and effectiveness of foreign capital in contributing to the economy's growth and had begun targeting the emerging U.S. MNCs in the 1970s and 1980s, particularly high-tech sectors like computer software, computers, pharmaceuticals and chemicals (Murphy, 2000)19. The new MNCs added more sophisticated computer programmes, portable computers, CDs, mobile telephones, internet facilities and a wide range of new pharmaceutical products to this platform. According to OECD's Economic Survey of Ireland in 1999, during 1991-1993, U.S. Investment in Ireland had tripled and by 1997, Ireland was ranked fifth in terms of destination for U.S. investment.

That the growth in the economy had been boosted thereafter is evident from the GDP/GNP growth table above. The sector that saw simultaneous growth during the time and can therefore be considered as a driver of GDP growth was the export sector. Chart 3.3 shows the share of international trade in GDP from 1980-2008.
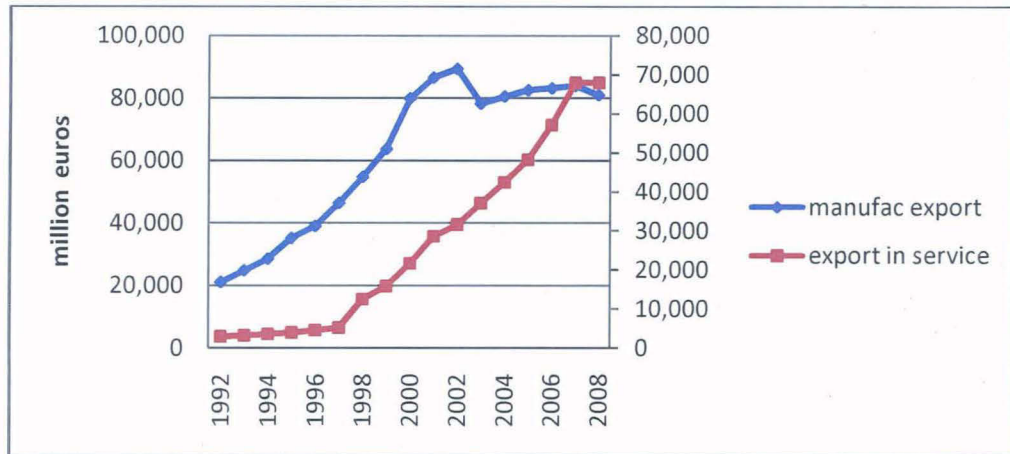
Chart 3.3
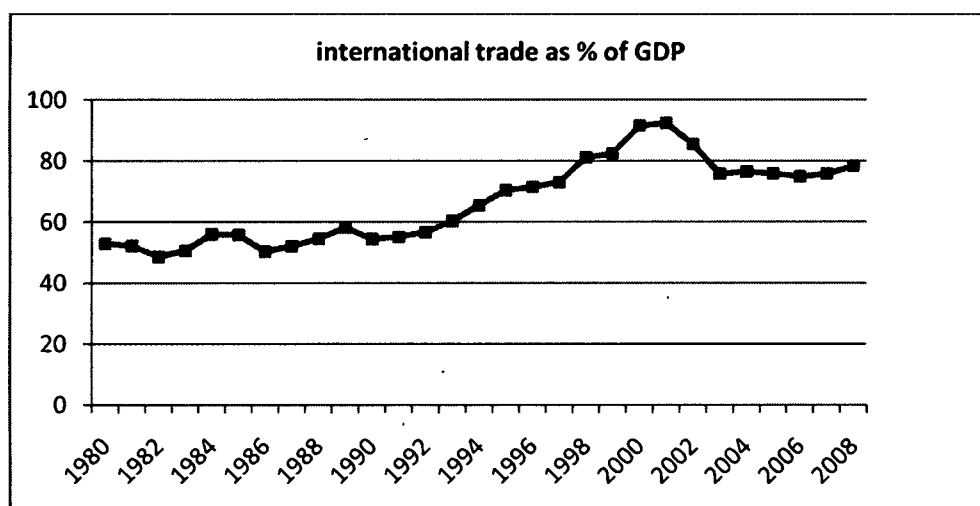
Source : OECD . http://stats.oecd.org/Index.aspx?DatasetCode=CSP2010# Data extracted on 20th Jun 2011

The manufacturing sector-led by a small group of MNCs in the high tech sectors of Misc edible products-cola concentrates, Organic Chemicals, Medical & Pharm. Equipment, Office/data processing machinery (computers), Recorded media(computer software)-formed the bulk of the exports initially, but by 2007, the service sector exports had increased considerably to almost equivalent levels.(Chart 3.4)

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[19] The IDA's belief in FDI can be observed from this excerpt from their strategy document in 2000: "IDA Ireland works closely with the overseas companies already located in Ireland to maximise their potential by assisting them in upgrading their facilities and in moving their operations higher up the value chain. IDA believes it is essential that these companies must continually develop and grow in order to maintain competitiveness and to prosper."

Chart 3.4 Exports in Manufactures and services (1992-2008)

The rising export sector created employment opportunities-as was expected-both directly and indirectly. Total unemployment fell from about 12% in 1995 to about 5% in 1999(Chart 3.5). Over the period of 1995 to 2001, share of employment in manufacturing affiliates under foreign control in total employment grew from about 45% to 50%.[20]

Chart 3.5
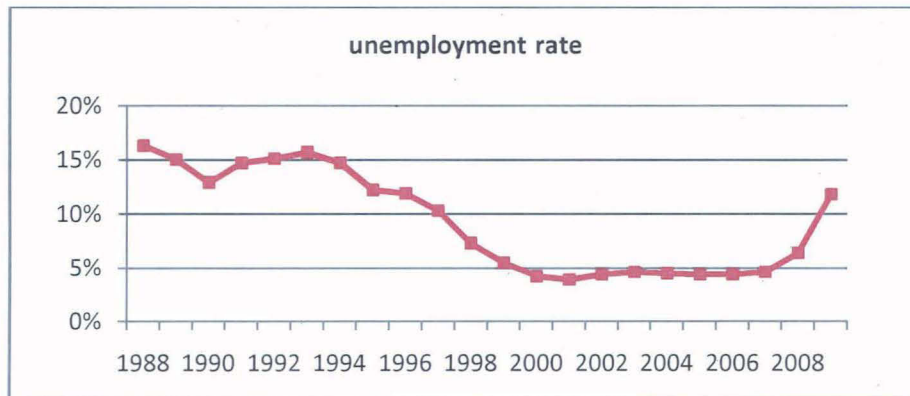
Indirectly, this boosted the demand for a wide variety of services like housing, hospitality, finance, legal skills etc.in the economy and helped create employment in those sectors as well.[21]

The surge in net in-migration from an emigration of 2000 in 1995 to a net migration of 17000 in 1999[22], was a sign of the improvement in the employment scenario.

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[20] Source: OECD http://stats.oecd.org/Index.aspx?DatasetCode=CSP2010# Data extracted on 20th Jun 2011

[21] Dornbusch (1998) and others say that income rises can change the ratio of demand for goods and services (tradable and non-tradable sectors). This is because services tend to be superior goods, which are consumed proportionately more heavily at higher incomes.

[22] CBFSAI, budget and economic statistics.Table 63.

This increased employment then generated tax revenues both through direct sources and indirect sources. The revenue generated by the 10% corporate taxes increased by about 335% by 1998 as against a rise in income tax revenue by 89% from the 1990 levels. It was £475 million in 1990 and rose to £2.1 billion in 1998 (data from Murphy, 2000).

As Ireland grew, the demand for the products and services of the non-tradable sectors began to increase. That Ireland was witnessing a spill-over demand for the non-tradable sector is visible from the growth in real personal consumption expenditure in the economy. In 1995, the real personal consumption was growing at an annual rate of 4% and the growth rate had increased to 10% in 1999.[23]

This began to put upward pressure on the prices in the economy. By 2000, the economy had almost reached the coveted level of full-employment (4.20%) (Chart 3.5) and as the non-tradable sectors began to expand during this time, this pushed the labour costs in the economy up as well. The Charts 3.6 and 3.7 show the indices for Consumer Price Index (CPI) and Labour Compensation per unit of labour input for Ireland and the other EU-15 members who use the euro.[24]From 2001, prices in Ireland rose at a rate higher than every other member except Spain and Portugal, the two countries that were already experiencing high inflation in 2000 due to a growing housing boom and a growing fiscal deficit respectively.
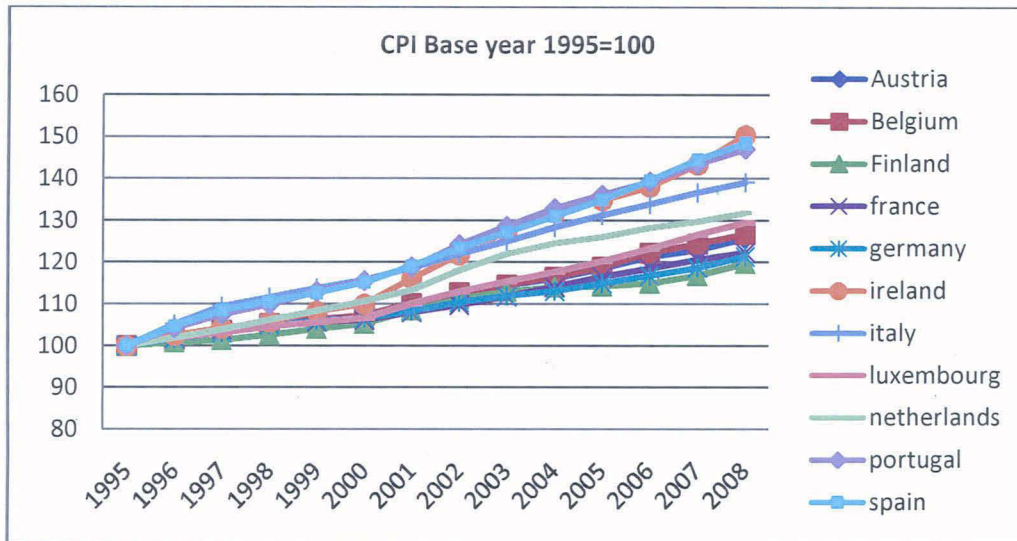
Before 2000, from about 1995, Ireland's real effective exchange rate had been steadily depreciating. Since 2000, the euro, which Ireland had adopted in 1999, saw a steady appreciation against the dollar brought on by the increased flow of capital from the U.S. to the SEM. As the nominal effective exchange rate for Ireland appreciated, the real effective exchange rate appreciated at an even higher rate fuelled by the steep increase in the price levels in the Irish economy. Consequently, Ireland began to lose its competitiveness in the EU-15 zone for rises in domestic price levels.

Chart 3.8 shows the relative rate of increase of the two rates.

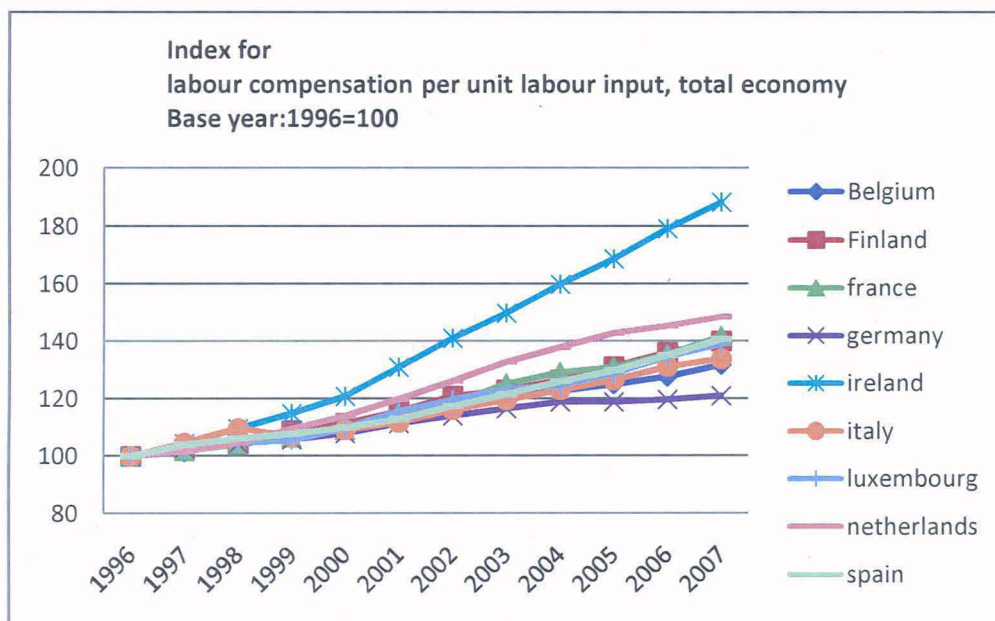[23] Financial Stability Report(FSR) 2007, CBFSAI, Page 22

[24] Some countries and dates have been dropped in the labour cost chart because either the countries didn't have a complete dataset or Ireland did not have data for those years.

Chart 3.6 CPI-Ireland vis-vis other EU-15 countries (except U.K.) (1995-2008)

CPI Base year 1995=100

Legend: Austria, Belgium, Finland, france, germany, ireland, italy, luxembourg, netherlands, portugal, spain

Source: OECD . Author's Calculationhttp://stats.oecd.org/Index.aspx?DatasetCode=CSP2010# data extracted: 21ˢᵗ Jul , 2011

Chart 3.7 labour compensation per unit labour input-EU-15 countries (except U.K.) (1995-2008)

Index for
labour compensation per unit labour input, total economy
Base year:1996=100

Legend: Belgium, Finland, france, germany, ireland, italy, luxembourg, netherlands, spain

Source: OECD . Author's calculation.http://stats.oecd.org/Index.aspx?DatasetCode=CSP2010# data extracted: 21ˢᵗ Jul , 2011

Chart 3.8

Real and Nominal effective exchange rates (CPI based)
Base Year: 2005=100
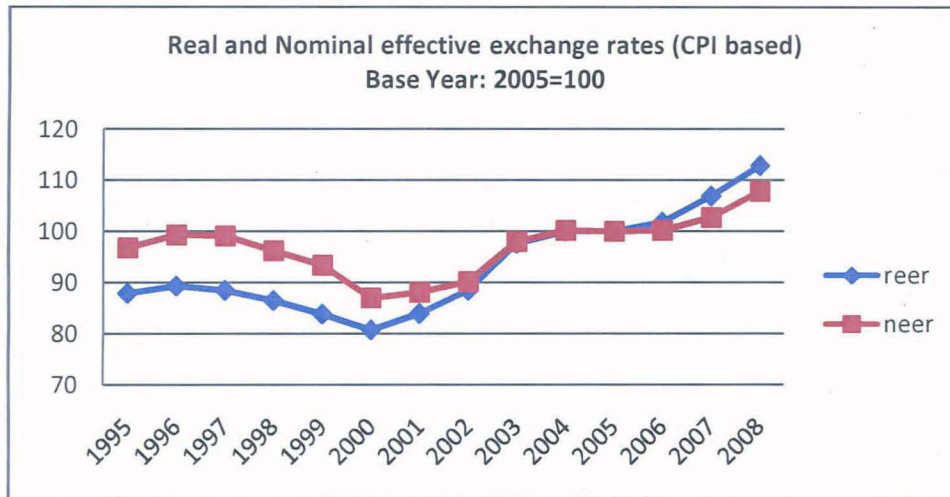
The effect that the exchange rate appreciation had on exports is discussed in more detail below.

The one non-tradable sector that predictably saw high growth was the real estate sector. The growth in the working age population as a result of net migration and the fast rising income levels as seen in Chart 3.7 had triggered off a rising demand for houses and rented property. Chart 3.9 shows the effect of this emerging demand on the price of new houses.[25]

Chart 3.9

Average new house prices
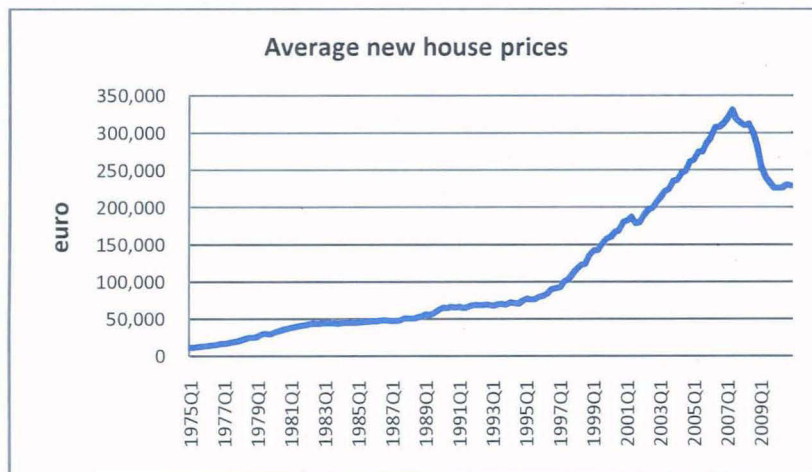
With the existing stock of housing taking time to catch up with the initial spurt of demand, growth in house prices were peaking at 8% from 1996-1999. As the real effective exchange rate got more and more overvalued, investment in real estate

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[25] Private houses form about 90% of all property.(CSO, Construction and Housing 2008,Page 33)

became more and more lucrative. More so, because this was a market that had not been let open to investors and commercial banks earlier for free play of interest rates and prices.

There is a wide range of literature that documents the mortgage history of Ireland.

Kemeny (1981) found that in 1971, 61 per cent of Irish households were home owners compared to 50 and 35 per cent of their counterparts in Britain and Sweden respectively. The inclination to own houses have been high in Ireland for a very long time. But the mortgage market was traditionally dominated by public and subsidized, non-profit groups like Building Societies(BS). (Murphy, 2004). Regulation was strict and one could not get a loan greater than two and a half times their income from the BS and three times their income from the public companies. This limit was quite below the multiple of income that the then average house prices would be. (Baker & O'Brien, 1979).

This remained the norm till the 1980s. The local government sector lent to the lower income households (about 30% of the mortgages by value) and the BS lent to the middle to higher income households (about 65%). Only one third of the home-owners bought houses with mortgages because of stringent lending policies. (Fahey, et al, 2004). After the public debt crisis in the early 1980s, local governments largely withdrew from the mortgage markets. Since then the public sector has provided only less than two per cent of mortgage loans by value (Norris & Winston, 2004).[26]

In order to fill this breach and encourage competition to be in line with the movement to EU, the commercial mortgage sector was deregulated as part of the wider process of financial liberalization (see Table 3.1). On the other hand the Building Societies Act (1989) allowed these agencies to operate in the wholesale money market and gave them freedom to develop a wider range of property and financial services and provided for their conversion to public limited status. In 1980 there were 16 building societies; at the start of the 1990s there were 10, and by 2000 there were only 3. The decline in numbers resulted from transfer of engagements (mergers) or demutualization (involving converting to a bank). The main reason for the latter has been the restrictions which mutual status places on the ability of an institution to expand its capital base. The largest of the building societies, Irish Permanent, converted to a public limited company (plc) in 1995. It subsequently merged with the largest life assurance company, Irish Life, in 1999 to form Irish Life & Permanent, the third largest financial institution run by the State in terms of asset size.

Commercial banks became involved with mortgage lending on a significant scale in the mid-1980s after the withdrawal of fiscal subsidies to the Building Societies. (These institutions once enjoyed a tax advantage in deposit collecting relative to banks but this was removed in the 1986 Budget.) Between 1985 and 1987, the commercial banks' percentage of the mortgage market grew from 8.3 per cent to 36.9

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[26]The review of Norris and Whinston (2004) and Fahey et al (2004) is taken from Norris (2011).

per cent but according to Murphy (1994) this failed to promote the liberalisation of lending criteria among the population which was still used to the stricter norms requiring sufficient income buffers.

Against this backdrop, the Irish banking sector - predominantly commercial, owned mostly by individual and institutional shareholders as opposed to the savings banks, mutual societies and State-owned banks that still formed a part of Continental Europe - found opportunities for profit in lending to the housing sector that has traditionally seen demand preference and now had rising income levels and rising value of collateral to back it.

In 1990s, the physical infrastructure of banking in Ireland was dominated by the five clearing banks which accounted for about 83 per cent of the employment of licensed banks and 90 per cent of branches and sub-offices. These institutions also accounted for 40 per cent of total resident assets of all credit institutions at end-1999, with the two largest banks accounting for 83 per cent of this[27]. Of the largest banking institutions, Bank of Ireland, AIB and Irish Life and Permanent were publicly quoted and widely held. Two of the clearing banks were subsidiaries of foreign banks: Ulster Bank owned by the Royal Bank of Scotland, and National Irish Bank owned by National Australia Bank. The Irish banking sector was certainly contestable with a number of institutions arriving in the 1990s due to the International Financial Services Centre (IFSC).

There was one bank, however, that already had a substantial presence in the property lending market at the time. The Irish Times while trying to understand the rise and fall of Anglo Irish Bank, noted on its website[28] in September 4, 2010:

> "In 1986 Anglo Irish Banking Corporation had ushered in a culture previously unseen in Irish banking. Entrepreneurialism was the key, with the ability to get done in a day big deals that would have taken other banks weeks. Paying its staff and executives well became another feature of the bank. Unlike established banks, where employees had to serve their time before landing senior positions, Anglo promoted a youthful culture."

With this profit motive in place, Anglo pursued the rising real estate tide of the late 1980s and by mid-1990s it emerged as a major property lender lending to the niche market of property developers with a predominantly sterling loan book.

In 1999, banks like HBOS and RBS stepped into the 'contestable' Irish residential mortgage market to take advantage of the Irish property market with highly competitive mortgage lending rates. However, by 2009, the share of domestic banks in the Irish mortgage market had come to be around 66.8%-with AIB, Irish Life and Permanent and Bank of Ireland holding an average 18.5% each. Among the foreign

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[27] Department of Finance Ireland. http://www.finance.gov.ie/

[28] http://www.irishtimes.com/newspaper/weekend/2010/0904/1224278175197.html. Date accessed: 20th Jun 2011.

banks, RBS had an equal share as these banks (about 15%). Among the Building Societies, EBS had the highest share (9.8%).[29]

The figures above when seen in unison with Chart 3.10 would give some idea about how the domestic banks and even the building societies managed to fight the competition in the mortgage market from AIB and the foreign banks to uniformly increase their share in the total assets and asset growth from 1999 to 2006. The rising concentration of property loans over this time, which will be considered subsequently, would mean that the asset growth here is a reflection of the growth of the banks in the property loan markets as well.

Chart 3.10 Asset growth of the six major Irish Banks and BS in the property market 1999-2008.

09), Page 218.

There was then need for the other domestic banks to resort to banking practices that would keep them in the competition for the property lending market. But to go for an aggressive lending policy, they would first need a source for continuous flow of funds. How the individual banks proceeded to arrange for funds is not known but the trend in the banking sector could be observed. Deposits were a potent source but they failed to grow as much as or as consistently as the credit to the private sector grew. So, while the loans grew from 120% of GNP in 2000 to 175% of GNP in 2006, deposits grew from 75% of GNP to about 100% of GNP over the same time period.[30](Deposits depend not only on income but also on the cash to deposit ratio. It is likely that in the new spending era of Ireland, cash to deposit ratios might be higher than previous levels.[31]) Even before the demand for credit to property sector began to gather momentum, a good portion of the banks' funding came from external borrowing from wholesale markets for credit through interbank borrowing and bonds.

In the first half of 1998, the countries which would participate in EMU were announced, and it was also decided that their currencies' euro conversion rates would be based on their EMS central rates. This virtually eliminated exchange-rate risk and the need for security or cover on borrowings in major EU currencies. On an average real interest rates on short-term wholesale (interbank) funds fell from about 7 per cent in the decade after 1983 (and about 3 per cent in the 1990s after the collapse of the narrow-band ERM) to negative territory as EMU began(CBFSAI Crisis Report,2010) . Rates on bank loans followed suit. Table 3.2 shows the one month interbank rates, Irish clearing banks prime rates and mortgage rates in Ireland from 1984-2009.

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[29] Source: (Waldron 2011) Page 21

[30] Source: Kelly (2009) Page 7.

[31] The Special Savings Incentive Accounts (SSIAs) scheme was introduced following the 2001 Finance Bill. Generous incentives were provided to encourage uptake: the Government tops up saving into the accounts by 25 per cent of the value of monthly subscriptions. In order to avail of the Government's top-up, the account must be held for five years from the date of the first subscription.

The Irish Government, at the same time, was taking steps that would give cost incentives to the construction sector to increase their housing supply and income tax incentives to mortgage borrowers that would allow them to take on more and more mortgage repayment burden. Ireland had some of the most generous tax provisions for owner-occupied housing throughout the 2000s. The ceiling on the income tax deductibility of mortgage interest for owner-occupiers was increased in 2000, 2003, 2007 and 2008. The tax relief was at the standard rate and not at the income-based marginal tax rates and from 2002, the tax relief was granted at the source by the mortgage provider and netted out of the monthly mortgage repayment. This gave the full value of tax credit to a person even when the tax relief by standard rate was more than what his income would allow. The 100% tax relief for first time buyers however turned to 80% after 5 years[32].

Table 3.2 Selected Lending rates (End of Quarter)

End of Year/ Period	One month Interbank Rate (%)[1]	Clearing Banks Prime Rate (%)[2]	Mortgage Rate (%)[3]
1984	15	14.8	11.75
1985	10.4	10.5	9.75
1986	14	13.50-14.00	12.5
1987	8 ·	9	9.75
1988	8	8	8.25
1989	12	11	11.25-11.95
1990	11.1	10.5	11.00-11.70
1991	10.7	11.3	10.75-11.45
1992	18	19	13.75-14.45
1993	6.6	7.00-7.40	7.75-8.45
1994	5.75	6.21-6.25	6.85-7.25
1995	5.45	6.00-6.13	6.85-7.79
1996	5.74	6.25-6.29	6.60-7.00
1997	6.43	6.81-7.00	7.10-7.85
1998	3.23	3.88-4.06	5.60-6.35
1999	3.54	4.00-4.12	3.69-4.39
2000	4.86	5.49-5.63	5.59-6.15
2001	3.31	3.93-4.00	4.25-4.75
2002	2.88	3.50-3.58	3.85-4.70
2003 Q1	2.55	3.12-3.21	3.68-4.23
2004 Q1	2.02	2.50-2.65	3.30-3.60
2005 Q1	2.11	2.63-2.65	3.25-3.60

[32] All data on taxes are from different years of Budget Statistics published by Department of Finance, Ireland.

2006Q1	2.65	3.13-3.19	3.49-3.99
2006Q4	3.63	3.75-4.25	4.49-5.03
2007Q1	3.86	3.95-4.41	4.74-5.28
2007Q4	4.29	4.60-5.19	5.10-5.53
2008Q3	5.05	5.15-5.50	5.50-6.10
2008Q4	2.6	3.37-3.88	3.75-5.79
2009Q1	1.12	1.68-2.90	2.75-4.40
2009Q4	0.45	0.75-2.00	2.45-5.90

1) EURIBOR interest rates are shown from 1999 onwards. EURIBOR is the rate at which euro interbank term deposits are offered by one prime bank to another, within the euro area.

2) Rates shown for period prior to 1991 are AAA category overdraft rates. From 1991 the rates shown are representative of those charged to large commercial customers for short-term borrowings.

3) The Central Bank quotes a range of representative mortgage rates. Mortgage interest rates from 1984 to 1996 are representative of the rates of building societies. Post 1996 the rates are representative of all mortgage providers. These are the standard variable mortgage rates for "Credit Institutions: Mortgage Lenders" reporting to the Central Bank and Financial Services Authority of Ireland.

Source: Budget and Economy Statistics,CBFSAI,2010.,Table 75. The quarters are selectively shown to reflect the overall movements in the rates over the year.

Van den Noord (2006) finds that despite these measures the size of the tax bias[33] in Ireland has been reduced over time as the ceiling on mortgage interest deductibility has not kept pace with the increase in house prices. An increasingly smaller size of tax bias, despite repeated revisions in tax-deductibility limits on interest payment should have been an indicator that the then-current house prices were moving very much away from the range of affordability.

There were also no property taxes, no taxes on imputed rent and taxes on capital gains on principal owner-occupied dwelling.[34] Capital gains tax on disposals of qualified residential land was reduced from 40% to 20% in 2000. Different schemes of investment products were designed for the construction sector and period over which capital allowances were made for the construction projects like the "Urban Renewal Scheme", "Park and Ride" etc was frequently extended. The rates of stamp duties were lowered several times in the 2000s (in 2001, 2002, 2003, 2005, and 2007).

House price inflation stalled in 2001 and there was a 5% fall in the house prices in 2001 Q3.[35] It is reasoned by Van den Noord (2006) that this was due to the effect of tax measures that the Government had taken up in 1998 and 2000 to deflate the housing prices that were rising steeply since 1997. In both 1998 and 2000, stamp duty

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[33] Tax bias refers to the benefit that tax deductions on interest payments give the borrower measured by difference between after-tax and pre-tax real interest rate on mortgage loans. The lower this difference in absolute terms the lower is the benefit to be had from tax deduction.

[34] To put this in perspective, In 2006, Finland, Portugal and Spain were the only other countries in OECD, which, like Ireland, gave a tax deduction for mortgage interest payments but did not tax imputed rent or capital gains on the principal owner-occupied dwelling. However, all three had municipal taxes on property values ranging from 0.4% to 1%).(Van den Noord,2006)

[35] Source: Department of Environment, Community and Local Government (DoEHLG). Author's calculation.

http://www.environ.ie/en/Publications/StatisticsandRegularPublications/HousingStatistics/FileDownLoad,15295,en.XLS

on new houses that were not owner-occupied and purchased for rent was increased. Tax breaks for rental income were removed in 1998.[36] All these measures were directed towards residential investors because their activities were thought to be overheating the market. After 2001, as rents began to rise (see chart on rental yields of Irish investors later), the stamp duties were reduced to be in line with second-hand non-first time home owners.

That the upward momentum in house prices in 1997 had attracted residential investors who then became the main drivers of the prices could be made out from the effects that the duty and tax cuts had on house price inflation. With the policy changes after 2001, the share of these investors grew again, taking about 20%[37] of all residential mortgages in 2006.

The tax policies ,however, did not affect Ireland's budget balance. From 1998 to 2006, Ireland maintained a positive general government balance[38] of around 2% of GDP. Although, the current government revenue fell from 37.7% of GNP in 1999 to 34.7% in 2003, the current government expenditure having fallen from 39.7% of GNP in 1996 to 28.9% in 2000, remained consistently below the revenue level at an average of 30% of GNP. According to (Boyle et al., 2004 and Kelly et al., 2008) public sector wages formed the most part of this government expenditure.

The stage was thus set for the Minskyian cycle to take off. The macro-economic processes of capital flows and its effect on the non-tradable sectors had opened up an opportunity of profit for the financial system. The financial processes were being helped by the same process of liberalization that allowed those capital flows into the real economy. The policy environment was helping to create more profits out of the opportunity. The financial system naturally sought out this opportunity and bet on it to yield the promised profit. In the process the opportunity yielded more but that would be a product of the bet on it, not what it was actually worth.

Irish banks began to undertake aggressive lending policies to gain market share in property lending as their access to the cheap and liquid wholesale fund markets increased because of the returns they thought these loans with highly-valued collaterals would yield. The non-performing loan ratio for the Irish economy and return on assets (ROA) of the domestic banks in Ireland that the Financial Stability Reports of the Central Bank published as indicators of financial sector stability guided them on. In 2000, the non-performing loans formed only 1% of gross loans in Ireland

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[36] Comprehensive Budget data is not available before 2000.

[37] Source: DoEHLG Annual Housing Statistics Bulletin 2006, Page 19

[38] Total government revenue – total government expenditure.

and this number was gradually falling. By 2005, it had become 0.7%. The operating profits on assets[39] had risen from about 11.3% in 2000 to 18% in 2003.[40]

That these indicators were only as good as the current economic conditions and that the currently rising average earnings was the result of a prolonged expansionary phase of a business cycle that might dip when the expansion slows down, were both overlooked. But this is perhaps why the level of securitization of mortgages has been quite low since then (5% in 2005). It suggests that the focus was on making money out of securitization in the short run to avoid long term uncertainties of the risky portfolios.[41]

To make their loans more attractive, banks frequently began to offer exceptional Loan to Value ratios. The distribution of loan-to-value (LTV) ratios for the number of new loans during the peak of the crisis 2004 onwards show a sharp jump in high LTVs in 2005 and 2006: by 2006, fully two-thirds of loans to first time buyers had LTV in excess of 90 per cent; one-third were getting 100 per cent LTV loans.[42]

While LTVs for first time buyers (who accounted for about 40% of all house purchases, while the rest was divided between mortgage refinances and residential investors not always differentiable) increased, average mortgage maturities grew from around 20 years to 27 years over the period 2000 to 2004.

By 2006, 37% of all mortgages had a value greater than €250,000, 31% had a maturity period of more than 30 years[43] and the FSAP report had found that banks had started to issue new products like interest only mortgages (12.6% of all mortgages). The proportion of variable rate loans in all property loans approved increased from about 30% in 1997 to about 65%,[44] in line with the expectation for low interest rates that persisted in the new euro economy.

On the qualitative side, the internal lending policies were being regularly worked around to accommodate more and more mortgages on their books. Some of the main findings of an inspection report of credit risk management at a bank[45] that took place in July 2005 are the following:

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[39] ROA is broadly defined as the operating profit net of taxes and provisions. Given the low corporate tax rates on private sector profits and the pro-cyclicality of the provisions, the ROA would have looked very favourable.

[40] Source: Bankscope data. All Bankscope data have been provided by Prof Mario Tonveronachi, University of Siena, Italy.

[41]It is interesting to note that towards the third quarter of 2006 when the house prices were about to begin the slide downwards in response to market expectations about rising interest rates, the rate of securitization had shot up to 8% of all mortgage credit).
Source : FSR 2006,CBFSAI

[42] Source : DoEHLG. Annual Housing Statistics (various years).

[43]Source: Central Bank (Various Years), Department of the Environment, Heritage and Local Government (various years) and author's calculations.

[44] Source : DoEHLG. Annual Housing Statistics (various years).

[45] Please see footnote 29 below.

- the lack of an overall defined credit policy;
- the lack of a provisioning policy;
- no procedures for identifying and dealing with problem credits;
- reliance on implicit indirect guarantees for public sector entities or utilities;

Excerpt from the inspection report[46] of a portfolio in 2007 that was eventually purchased by NAMA for a discount:

"all institutions confirmed to the inspectors that they have no concerns with the current or future repayment capacity of any of the borrowers included in the inspection to which they are exposed."

"it appears that there is no comprehensive review of Group exposures conducted on an annual basis.
Rather reviews concentrate on an ongoing high-level review of exposures and do not appear to involve a review of documentation such as Audited Financial Statements, Cash Flow Statements etc."
"The inspectors were advised that certain valuation updates are based on 'management estimates'. However, such estimates (which may be performed by the [identified senior management officer]) do not appear to be recorded."

"The inspectors noted that institutions have been unable to obtain a Net Worth Statement from [Mr. X], as he is unwilling to disclose such details in writing. In addition, the statements provided by [Mr. Y and Mr. Z] have not been certified by a third party".

"[Bank A] does not review the overall indebtedness to all credit institutions of [Mr. X] and the [Z] Connection, as [Bank A] focuses only on its own exposures and related security in these cases."

"The inspectors were advised that the calculation by [Bank E] of [Mr. X]'s net worth included [an amount in excess of €100 million] which represents working capital facilities provided by the bank. It was not clear to the inspectors how such debt increases [Mr. X]'s net equity."

On the other hand, even as net interest margins for banks fell, the borrowing on the wholesale markets kept rising. In 2004, 60% of the non-capital liabilities of the banks had maturity period less than 2 years, while the loan book comprised mainly of mortgages with average terms of 20-30 years. The funding of domestic lending by Irish credit institutions via domestic retail deposits declined from 76.9 per cent in

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[46] The Inspection Report findings and excerpts have been sourced from The Central Bank Governor's Report on Crisis to the Ministry of Finance. Pg 70-71. They originally belong to the Financial Regulatory Authority of Ireland and are not publicly available. No names of banks have been mentioned in these reports.

2000 to 54 per cent in the second quarter of 2006. By 2007, the share of interbank and bond market borrowing together constituted 56% of the banking system's liabilities. The net interest margins fell as mortgage interest rates dipped. From being about 4% of assets in 1993 they went to 1.5% in 2006[47]. This further propelled the drive to gain more share in the in the property market.

The regulatory body (CBFSAI) did not restrict banks from resorting to such aggressive lending norms. They paid no heed to the credit inspection reports quoted above. All they wanted the Irish banks to do was to comply with the Basel norms. Part of the reason the Irish Government thought the banks were so stable was that banks complied with minimum acceptable standards of liquidity, capital and corporate governance.

Donal Forde of Allied Irish Bank noted at a public finance committee:
"Part of our dilemma as banks is that we are trying to maintain the competence of the international system because we are relying on that system for funds and money. Part of the reassurance they take about the standing of Irish banks is that we do have a high quality regulatory regime. It forces us to apply the dimensions of Basel II and gives transparency to our business. They can then evaluate our business and can compare it with the business of other banks across the world, and find comfort that we are what we say we are — robust and stable,"

This robustness and stability however depended on the good faith of individual banks.

The Financial Stability Reports published by the Central Bank presented the aggregate solvency ratio for the banking system annually.
The solvency ratios are shown by own funds and Tier 1 capital of banks as percentages of the banks' risk-weighted assets. In early 2000s, banks were maintaining the ratios at an average 11% and 8% respectively even as their level of loss provisioning was falling from 110% of all non-performing loans in 2000 to 85% in 2005. [48]If capital buffers of banks as seen by own funds were stable and provisioning which forms a crucial part of it as well as of Tier 2 capital (provisions to a value of 1.25 per cent of risk-weighted assets are considered part of Tier 2 capital) is falling and assets are growing as seen by the previous charts, this would mean risk weights are falling. This in turn means that the CBFSAI's faith in the internal risk management models of banks was misplaced. The dip in Tier 1 capital ratio at the peak of the lending boom to 7%- when assets were being priced based only on expectations on higher future returns and without proper assessment of their risks - only confirms this point.

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[47] CBFSAI, FSR, 2006, Page 47 and CBFSAI, FSR 2007, Page 51,53.

[48] CBFSAI, FSR 2007,Page 49,52.

Banks, on the other hand, were using grades from the rating agencies to keep the flow of uncovered borrowing from the wholesale funds market strong. The foray of professional credit-rating agencies into Ireland's financial sector began during early 2000. The biggest property lender, AIB made extensive use of their services on its way to gathering the biggest property exposure on their loan book.

From the Annual Report of AIB, 2001[Page 9]:
"The Board was pleased to note the decision by Moody's, the international ratings agency, in April 2001 to upgrade the Bank's long-term deposit credit rating to A3. This is in recognition of the strength and quality of our business franchise and the diversification we have achieved in our business operations."

From the Annual Report of AIB, 2002[Page 13]:
"We are delighted that the Bank received yet another upgrade of its credit ratings, most recently in February this year by Fitch Ratings, the international rating agency. The Bank's long and short term ratings now stand at A and F1 respectively."
Rating agencies mostly use the Default Mode approach and Mark-to-Market approach for credit risk assessment and the VaR method for measuring market risk of a financial product. Apart from the technical problems of their risk assessment methods which comprised of all the credit risk and market risk models discussed in the last chapter, one cannot rule out the possibility of the conflict of interest that the agencies had in trying to give honest ratings to these big banks. The ratings were particularly required to facilitate uncovered borrowing by the banks from the bond and interbank markets. While, given the restricted number of agencies recognized by international financial markets, the agencies make an oligopoly, there is fierce competition among their own selves for market share. The financial incentives for selling their ratings services to the profit-driven financial institutions are high. The incentive might however be linked to how favourable the ratings are to the products of the institution. The risk assessment of the financial health of a product or an institution will then be biased towards giving the ratings that suit the institution rather than the ratings that suit its actual financial health. In 2006, the banking system of Ireland was given a 100% rating by the Fitch Rating Agency.[49]

All this eventually led to an excessive amount of lending to property markets, often at the expense of the other sectors of the economy. Property lending rose to 62% of the banking system's loan book in 2006. To put this into perspective, from 1992-1998, the property loans formed an average 40% of the total loan book. In 1999-2000, it was around 36%. The banking system itself grew at a robust average rate of 20%; this being the highest in the Euro Area.[50]

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[49] CBFSAI, FSR 2006. Page 48.The ratings were not necessarily conducted on all the banks in the country.
[50] CBFSAI, FSR 2007, Page 48. CBFSAI, FSR 2006, Page 42..

On a macro-economic level, this brought about a visible change in the sectoral distribution of credit. Private sector credit in 1994-1998 was growing evenly for both the non-tradable service sectors and tradable manufacturing sectors. Most sectors remained stable in their share of credit except Agriculture(6.3% to 4.8%) and Personal Credit(44% to 39%). But the growth in credit share was relatively pronounced for the financial sector (17.8% to 27.5%) because it was a source of credit for the non-bank IFSC companies (in 1994, 42% of the financial sector's credit went to the IFSC companies which became 60% in 1998) and also acted as an important conduit through which credit was passed to other sectors. A good example of this was lending to leasing companies. The leasing of assets by sectors such as manufacturing, distribution and transport, in turn, acted as a substitute for direct lending to these sectors.[51]

However, from about 2000 lending to personal sector started outgrowing lending to private non-financial sectors. The growth rate of former was 15% in 2002 and 30% in 2005 while the same rate for the latter was about 8% in 2002 but climbed to about 32% in 2005. The rapid growth in non-financial sector credit was fuelled by the real estate and construction sectors that began to gain prominence in the sectoral distribution of loans in the non-financial sector. These two sectors had a combined growth rate of credit of about 6.5% in 2002 and this increased to about 25% in 2005. The credit growth to agriculture and manufacturing saw an average growth rate of - 2.5% during the period of 2002-2004. The role of private sector credit in financial intermediation fell drastically. From 2002-2004, the growth in credit for reasons of financial intermediation was on average -10%.[52]

McElligott and Stuart(2007) present a snapshot of how the investment scenario in the Irish economy eventually looked very different and more skewed in 2007 than it did in 1999. Credit flowing to Manufacturing had reduced from 19% to 6%. Credit flowing to all other sectors including agriculture (13% to 3%), business (9% to 5%),transport(6% to 2%) and hospitality services(12% to 7%) had gone down. Only the real estate sector(15% to 50%) and the construction sector(9% to 17%) had increased their shares in credit flow over the period 1999-2007.

The Irish banking system at one time would invest in the mortgage markets of other countries - mainly U.K – for want of smoother access to the domestic mortgage market. By 2004, the banks resumed their lending to "Non-residents" . In 2006, about 50% of these banks (excluding those located in the IFSC, whose focus was anyway international) had outstanding private sector loans, as well as a subset of residential mortgages with the non-residents. U.K. remained the dominant borrower with almost a 50% in the total foreign exposures.[53]

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[51] Data from Kelly and Everett (2004). Page 106.

[52] CBFSAI, FSR 2007,Page 45.CBFSAI,FSR 2006,Page 44

[53] Data from Kearns,2007, Table 1.

Kearns (2007) in his paper used data from OECD and IMF to calculate the correlation between U.K. and Irish economic variables over an average period of 1970-2006. Almost every variable-Real GDP growth (0.32),unemployment rates (0.86),real retail interest rates(0.91),property prices(0.19)-is significantly correlated except Industrial Production.

The exact volume of exposure or the lending criteria for overseas loans are not known, but considering that a parallel trend of rising mortgage debt and house prices was unfolding in U.K. at the time, it would probably have been wise for regulatory bodies to understand if the banks were only trying to get a share of another overheating property market. With the high level of co-movement in the economic variables, a reversal of house price trends in U.K. would reverse the buoyant market sentiments in Ireland. As rate-hikes and fall in demand follow, the trend of price rise would be reversed and further rate hikes would follow. Incidences of non-performance on loans would increase in the domestic property market and the property loans held by the non-Irish residents would have already begun to perform poorly. The channel for capital inflows and outflows would thus transmit the vulnerabilities of the foreign economy to the domestic markets.

The banks never questioned if this business model could be sustained in the long run or whether if at some point it might become likely that the credit growth becomes higher than the growth in income of the borrowers (house prices, personal disposable income, rents).

Property lending was distributed among residential mortgages - consisting of principal dwellers and buy-to-let residential investors - real estate and construction loans (commercial property loans or developer loans). Loans to the construction sector in general could again represent lending for residential activities. Residential Mortgages outgrew real estate and construction loans. According to CBFSAI, FSR 2007 data (Pg 48), in 2006 personal housing related credit accounted for 54 per cent of property-related lending with the remainder accounted for by real estate activities (34 per cent) and construction (11 per cent).

The share of housing finance in personal sector credit increased from 75 per cent in the early 2000s to a peak of 84 per cent in 2006Q1, [54] with the largest category of housing finance being that of home owners. In 2004-05, principal dwelling houses comprised of about 80% of all housing loans.[55]

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[54] CBFSAI,FSR 2006,page 34.

[55] Source: DoEHLG Annual Housing Statistics Bulletin 2006, Page 19

In the household sector, as house prices started rising and mortgage rates fell an individual found himself or herself borrowing a much higher multiple of his/her average earnings than before to buy a house. Calculations from DoEHLG data show the size of mortgages increased from being 2.5 times of a worker's annual earnings in 1998 to being 4.7 times of it in 2000 and then rising to about 12.5 times of it in 2006.[56]
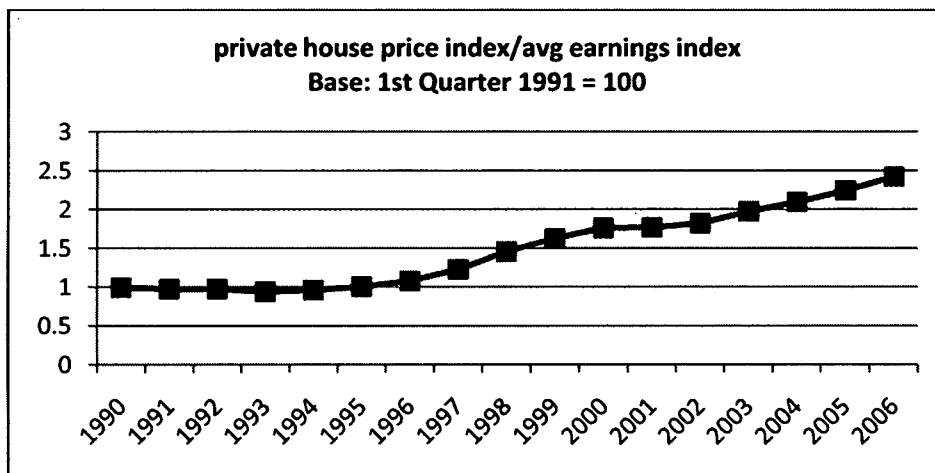
This was because house prices were increasing at an increasingly higher rate than their income.

Chart 3.11 shows the divergence between the growth rates of average earnings and house prices from 1990 to 2006. The two indices moved together over their base period values till 1995 and then started diverging. House prices kept growing at a rate faster than the average earnings from that point (except in 2001, reason having been explained before) and by 2006, the house prices had grown to 4.5 times the 1991 levels while average earnings had grown only about 1.8 times.

[56] DoEHLG.
http://www.environ.ie/en/Publications/StatisticsandRegularPublications/HousingStatistics/FileDownLoad,15295,en.XLS

Chart 3.11 Relative growth rates of prices and income.

private house price index/avg earnings index
Base: 1st Quarter 1991 = 100

Kelly (2009) calculated that in 1995, the average price of a house in Ireland (new or second hand, in Dublin or elsewhere) was equal to 4 years' average annual earnings in industry. At the peak in late 2006, new house prices nationally had risen to 10 times annual earnings, while Dublin second hand prices had risen to 17 times annual earnings. While this may have been because the demand for housing and hence lending was generated from the higher income groups only, this was not actually the case.

The aggressive lending policy of banks and tax policies of the government had given increased access to mortgage finance for lower income groups and the opportunity to finance higher share of house prices with borrowed money at the same level of credit-worthiness. Waldron (2011) analyses the change in distribution of home loan borrowers in different income groups from 1994 to 2004.

Banks and building societies were clearly betting on house prices to keep rising in future as they lent to meet the increasing housing demands of the lower-skilled occupational groups (25% in 1998 and 40% by 2002) even while the share of the high income group in the mortgage market decreased (53% in 1998 to 40% in 2004). The households were then guided by the markets to believe in the affordability of mortgages and in spite of the growth of their average earnings increasingly falling short of growth in the house prices, more people wanted to own houses[57]. The rise in demand caused prices to rise further. The first-time-buyer's mortgage was now an even higher multiple of his average earnings. But the banks were willing to lend more too and so the cycle continued. The size of mortgages being approved and the house prices fed into each other. The house prices moved proportionately to the size of the FTB mortgages which increased more than proportionately to the demand for houses and income levels. Hence, while the number of mortgages approved increased 2.4

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[57] The population of Ireland being largely formed by immigrants, creates a uniquely large source of default risk in emigration. Assuming the affordability of loans become easy where strategic default becomes compellingly easy and the possibility of walking away on a deeply underwater property loan to start off overseas is a doable option.

times from 1996 to 2006, the value of loans approved increased eleven-fold during the same time.[58]

Kelly (2009) ran an OLS regression of ratio of new house prices to average earnings of households on the ratio of FTB mortgages to the average earnings, real mortgage interest rates, and population over the period 1979-2006. He found strong short run and long run relationships between the growth of size of loans and house price increases with a €1 rise in mortgages increasing house prices by €1.13. Interest rates, on the other hand, had a modest effect. In order to cause the ratio of price to earnings to rise by one (say, from 4 to 5 years' earnings), it took a fall of nearly 9 percentage points in mortgage interest rates. He also found that population growth had a mild and insignificant effect on the ratio of new house prices to average earnings in his model. This is possibly because in Ireland net migration has been a major reason behind population growth and Ireland has seen net migration flows whenever the potential to earn more has increased in the economy.

Alongside increasing demand, the supply of houses, though sluggish initially, was increasing at a rapid pace to catch up and reap the benefits of increasing profit margins of higher house prices and construction costs-labour and material costs assumed to move with average earnings. In fact, the rate of house completion exceeded the rate of increase in profit margins from 2003 (again in expectation of higher demands in future) (Chart 3.12). However, this did not have any dampening effect on house prices.

Chart 3.12 House completion index vis-a-vis price to earnings index.(1996-2006)

If increasing values of mortgages were fuelling the house price increases, it was necessary to ask how long the rising mortgage debt repayment burdens would remain

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[58] DoEHLG.
http://www.environ.ie/en/Publications/StatisticsandRegularPublications/HousingStatistics/FileDownLoad,15295,en.XLS

affordable for the households. Mortgage repayment burdens steadily increased as % of average household disposable income from 2000.

The Department of Environment, Heritage and Local Government in Ireland calculates an affordability index for mortgage repayments of households. This index assumes a two earner household where one person is earning the average non-industrial wage and the other is earning the average industrial wage and their repayment on a 20-year mortgage, 5% interest rate and an average national house price of €322,634.

The Chart 3.13 is provided by DoEHLG (Annual Housing Statistics Report, 2007. Page 17) and it shows how affordability of such a mortgage had fallen since 1994.

Chart 3.13

Mortgage repayments as % of net income (2 earners)
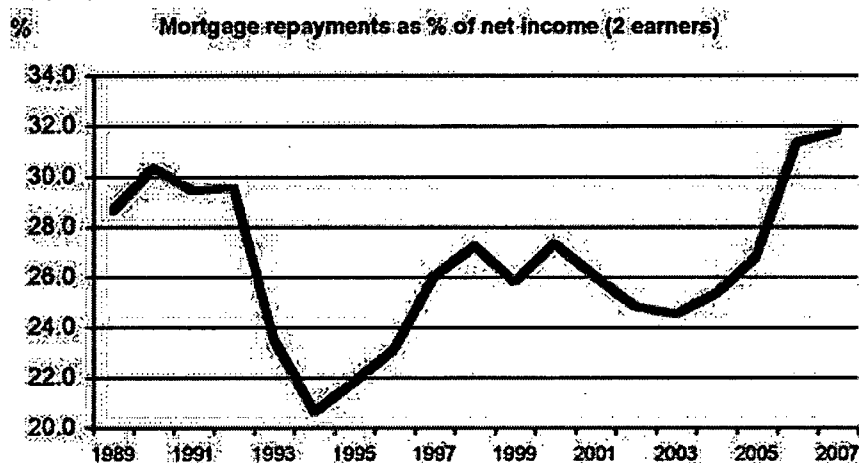
Given that most of the mortgage loans issued by Irish banks by this time were variable rate loans and of higher terms, the interest burden would see significant increases if contrary to expectations of continuing low interest rates, the rates started moving upwards in future. In 2006, given the current credit expansion scenario, expectations of interest rates were beginning to rise as reflected by the yield on 3 month interest rate future (3.7% in 2006 Aug to 4.2% in 2006 Dec)and the parallel response of the ECB Main Refinancing Rate to it.[59]

The CBFSAI conducted an exercise in its Financial Stability Report 2006 to look at affordability with rising interest rates. The repayments associated with an annuity mortgage (92 per cent loan-to-value ratio, 40 year term) on an average house price (as at August 2006) were calculated for a scenario where house prices continue to rise but interest rates increased responding to expectation. This calculation gave the repayment burden or the share of income that would be required to make the repayment. The data in the Table are the estimated repayment burdens for each group of households and the repayment burden is lower for relatively higher income households. A mortgage was assumed to be unaffordable when the repayment burden

[59] CBFSAI,FSR, 2007,Page 39.

exceeded 40 per cent of disposable income, as that was considered as the commonly applied yardstick for the maximum mortgage available to households[60]. With this criterion only the top 50 per cent of households ranked by income had repayment burdens less than 40 per cent on an average house and if the trends in interest rates and house prices continued after 3 years only 30% would be able to pay for it.

The affordability in this scenario was based on the income of households, but the net worth of households would also include their overall financial asset positions.

Excluding housing equity, the distribution of Irish households' assets consisted of transaction-based currency and deposits (30%), shares (quoted and unquoted)(30%) and insurance technical reserves - the illiquid claims to life insurance and pension funds (40%)[61]. Over 2001 to 2005, these assets grew at a much lower rate than household liabilities.

Net worth of households would of course have grown much faster than liabilities if housing equity were considered. But as house prices rose, the shortfall in average household disposable income would make it increasingly difficult for households to afford houses. In CBFSAI's exercise, this problem of affordability would set in at some point even if there were no rise in interest rates. As demand fell, house prices would plummet. As the value of their collateral began to erode, banks would resort to hiking rates. Neither the income nor the asset book (devalued by the falling markets) of the households would have any buffers to maintain the increased interest burdens.

Despite all this, the proportion of buy-to-let residential investors began to grow in the property loans market precisely because they were betting on higher and higher price of houses and wanted to make capital gains out of it. Even for international levels their growth was quite steep. In 2006, of all new lending in mortgage markets, 12% were recorded as buy-to-let kinds while the same number for Ireland was 19%.[62]

It did not matter that the Irish rental yields-rents as a % of house prices-had been consistently falling since 1995 (about 12% in 1995 to 4% in 2006)[63], the time when the demand for house ownership started rising and that rental income was beginning to fall short of the mortgage repayment burden. Annually, the gap between the debt servicing cost and rent income for an investor with a loan issued in 2002 rose from €3000 in 2003 to €10,000 in 2006. [64]

The relatively much larger property market for commercial loans was also governed by the same capital gains motives. The commercial property prices moved in line with

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[60] On an average the FTB's current repayment burden happens to be around 28% of an average household's disposable income as the DoEHLG Chart 3.14 shows.

[61] Average over the period 2001-2005. Source: CBFSAI, Quarterly Bulletin,2007 Q3, page 113.

[62] Source: CBFSAI, FSR 2007, Kearns (2007).Page 91.

[63] Source: CBFSAI, FSR 2007, Page 32.

[64] Source: CBFSAI, FSR 2006, Page 26.

the new house prices[65] while the yields - net income divided by the gross value of the properties – fell for all the three sectors of office, retail and industry by an average of 2 percentage points.[66]

Since commercial property sector was the fastest growing subsector of the NFC sector in terms of credit growth, for lack of more specific data, the increase in indebtedness of NFC would suffice to show the rising gaps between income and indebtedness in this sector. In 2005, Ireland was the third most indebted European NFC sector when measured by debt to GDP (52%), after Spain and Portugal. The total bank debt as a percentage of GDP rose from about 65% of GDP in 2001 to about 139% of GDP in 2006. Relative to deposits, the growth in bank loans was such that it was 3.4 times the deposits in 2006 as opposed to 1.5 times in 2001.[67]

To investors, the high house prices would seem justified if they expected the current rental income to continue in the future with the interest rates (acting as the discount rates) remaining at the same levels as they were during the expansionary phase. However, the present value of property might seem overvalued if the discount rate were to reflect the expectations of interest rates rising in future. The CBFSAI (FSR 2007, Page 28) calculated the present value of property using the expected ECB repo rate of 3.25 per cent as discount rate; this approach suggested a misalignment of approximately 68 per cent. Discounting by the current rate of 3.75 per cent suggested a level of overvaluation in the range of approximately 75 per cent.[68]

Both the residential investors and developers, unlike owner-occupiers, posed a crucial risk to the stability of the housing market insofar as they would attempt to exit the market completely and at short notice if they sensed a change in direction in market sentiments. Commercial property investment made for purpose of infrastructure need to be segregated from that made for speculation although it is quite possible to be serving both purposes at different times. In Ireland, vacancy rates in the Dublin office area rose sharply from 2% in 1999-2000 levels to about 15% post 2000 and hovered around 12% before coming down to only 10% in 2007.[69]

Vacancy rates for dwelling stock were also rising throughout the period of credit expansion. Kitchin, R., J. Gleeson, et al. (2010) in their paper cited data from CSO to demonstrate this rising gap between housing demand and supply. While 553,267 housing units were built between January 1996 and December 2005, the number of households grew by only 346,400 between April 1996 and April 2006. An additional 244,590 units were built between January 2006 and December 2009, and yet the

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[65] Kelly(2009),Page 9.

[66] Source: CBFSAI, FSR 2007, Page 33

[67] Source: CBFSAI, FSR, 2007, Page 39, Page 41.

[68] It is a different issue that based on the housing equation in its macro-econometric model-that models house prices as functions of lagged house prices and lagged stock of housing along with the fundamental variables of income and interest rates-it found the house prices perfectly aligned to fundamentals. The model has been critiqued in the Chapter 2

[69] CBFSAI,FSR, 2007,Page 33

number of households did not increase by anywhere near the same amount. All through the boom years the vacancy rate was rising - in 1996 the rate was 8.5%, in 2002 it was 9.8%, and in 2006 it was 15% (includes holiday homes). The 2006 rate was double the EU average rate of 7.3% (skewed upwards by Spain, Portugal and Ireland) and is way in excess of what one would expect as an acceptable base rate (3-4%). Even accounting for obsolescence and replacement and holiday homes, it is obvious that an oversupply of houses were building up in the market which would bring the prices down sooner or later.

The classic Minskyian cycle had begun to set in the Irish economy. A sector's returns had now been inflated by rising expectations and the sector has grown to account for a large part of investment in the economy. The balance sheets of all counterparties of the financial system in that sector were beginning to show deep wedges in their ability to cover their debts. And the financial system's ability to cover for its own revolving debts was dependent on upward movement of market sentiments. But how were these financial processes effecting the growth and production of the real economy? As the debts surpassed income in all parts of the real economy involved in the real estate sector, would the rest of the economy have been able to generate enough income to be able to cover for the income-debt gap?

The one sector that grew on the steam of the overvalued prices was the construction sector. Growth in GNP and GDP post 2000 was not at the levels of 1995-2000 but there was a steady rise in growth rate. (Chart 3.14)
The construction sector's contribution to GDP steadily went up from 5 % in 1996 to 10% in 2006 and from employing about 7% of the population it was employing over 12 % in 2006.[70]

As the construction sector expanded, the number of people engaged, as per the data calculation methods of CBFSAI in 2006, in the two other important sectors of manufacturing and transport first slowed down at a rate of -1.5% in 1999 and then consistently fell from 2002 (-11.7%) till 2005(-3.5%). The number of 'employees' continued to fall till 2008. [71] On the other hand, the share of international trade in GDP fell from 92% in 2000 to 75% in 2006 (Chart 3.3) and the current account went from being a surplus 3% of GDP in 1996 to a deficit of 5% of GDP in 2006.(Chart 3.15)

The disaggregation of the trend of current balance in Chart 3.16 shows how trade in goods and services and net factor income behaved over the period to lead to this level of current account balance.

The appreciation in the real effective exchange rates in Ireland (Chart 3.8) and the shrinking flow of domestic credit to the manufacturing sector had begun to affect the

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[70] CBFSAI Crisis Report, 2010, Page 25.

[71] Budget and Economy statistics, CBFSAI,table 53.

trade balance in goods in the early 2000s. The increase in labour compensation in Ireland (Chart 3.7) perhaps did not cause much damage to the country's competitiveness since the trade balance of the relatively more labour-using service sector had steadily improved from 2000 in spite of that. Although more capital-intensive than the services sector, the manufacturing sector did not see much investment input into it since 2000. Even as the credit from domestic sector was drying up, the sector which was held primarily by foreign-controlled firms found the FDI inflows into reversing its direction. In 2004-05, this reversal was so huge that there were actually net outflows of FDI from the country (outflows being net of inward flows from foreign affiliated companies and outward flows from Irish companies) (Chart 3.17).

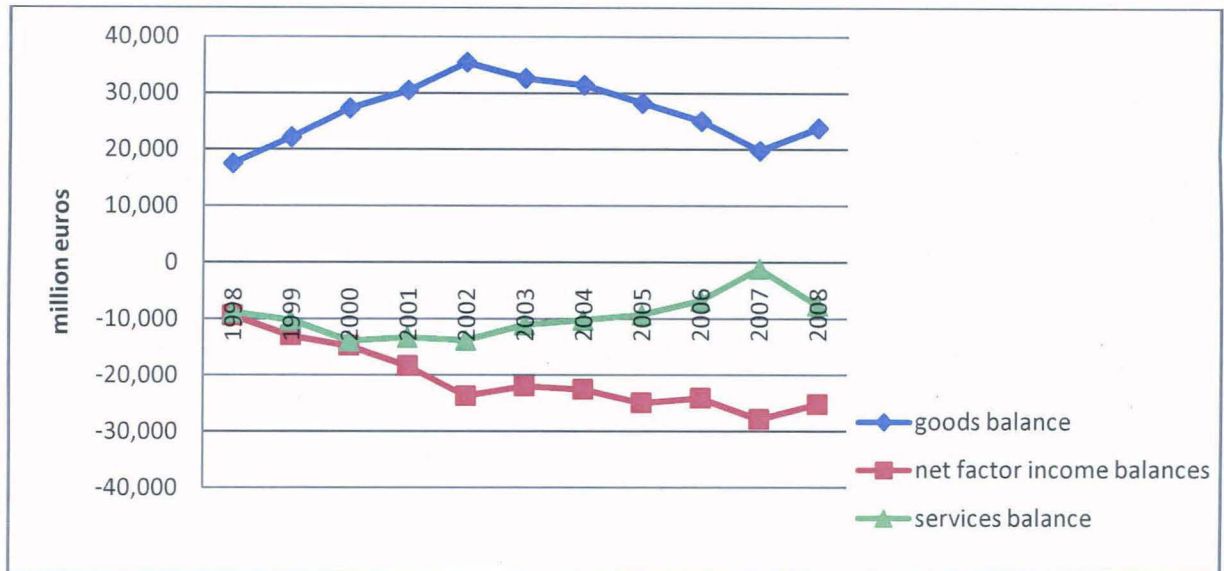Chart 3.14 Economic growth of Ireland (2001-2009)
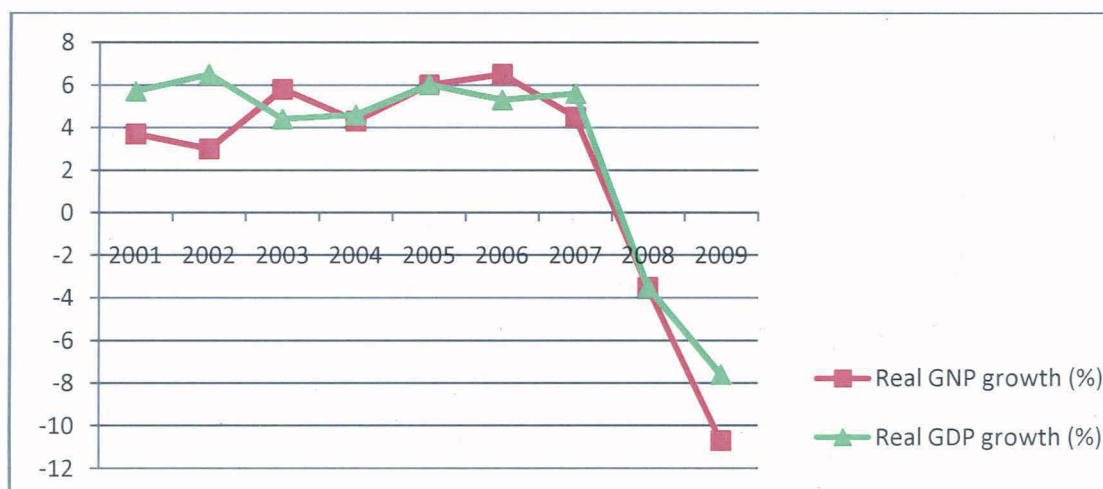
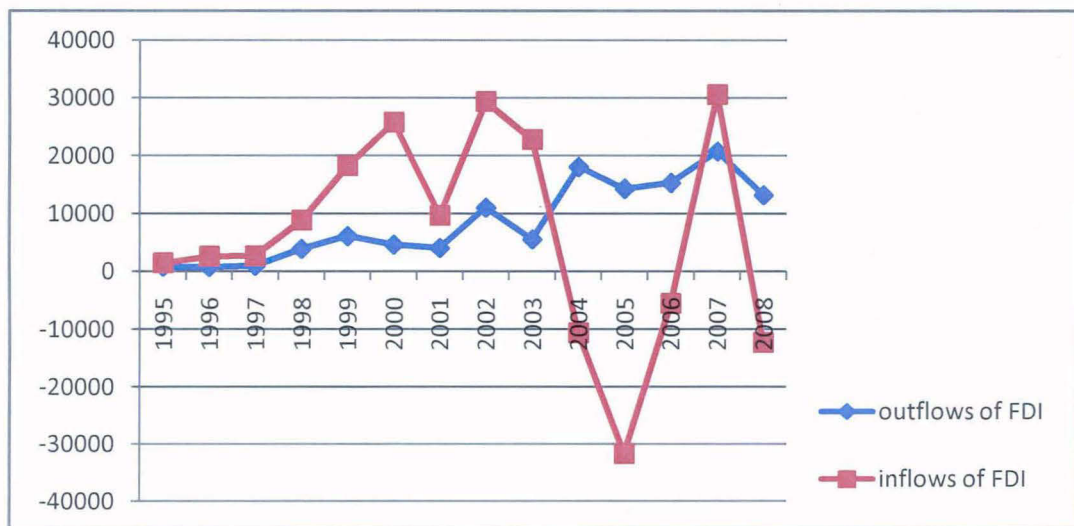Source: Budget and Economy Statistics, CBFSAI, 2010,Table 13

Chart 3.15
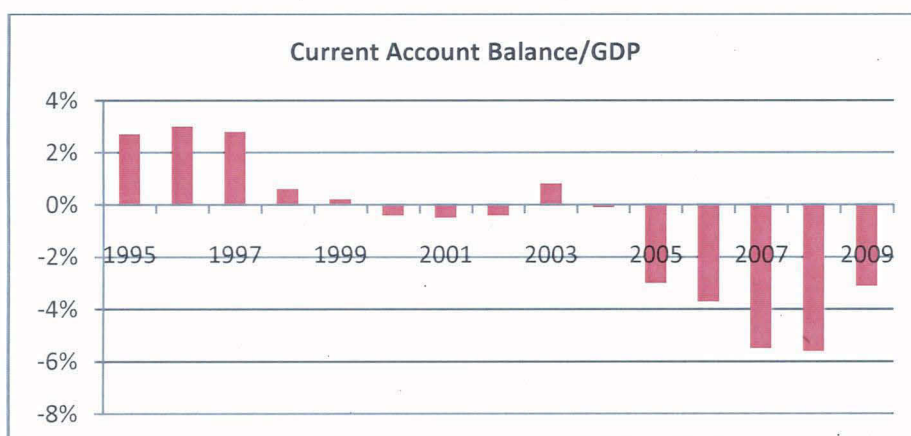
Source: OECD http://stats.oecd.org/Index.aspx?DatasetCode=CSP2010# Data extracted on 4th Jul 2011

Chart 3.16 Goods, Services, Net factor Income balance (1995-2009)

Chart 3.17 FDI inflows and outflows (1995-2008).

Inward FDIs to Ireland are broadly measured under the heads of equity capital, re-invested earnings and 'other capital'-consisting of loans between affiliates within a group structure. The contraction in FDI inflows came from all three counts in 2004-2005. In 2004-2005, the contraction in FDI inflows came from a lower reinvestment of earnings and could be explained by an increase in distributed dividends and branch profits to the parents of group structures-in other words, a large decrease in the net factor income. There was a drop in equity capital. There was also a substantial drop in the 'other capital' component.[72] The volatility of this 'other capital' would be a major

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[72] Data on reduction in FDI components taken from Everett (2006), Table 3.

deterrent to the consistency of FDI inflows to the country. It depended not only on the financial market conditions, liquidity, interest rates etc. of the parent country but also on the prevalent company laws and tax regimes there. For Ireland, the steady increase in the deficit in the net factor income balance from 1998 contributed to the increasing current account deficit alongside the deficit in the trade balance for goods.

In 2000, the manufacturing sector forming the major part of the trade sector then, had created a productive capacity that could bring unemployment level to a minimum of 4%. But the consistent retrenchment of the total number of people financially dependent on this sector since 2000, shows that sector had reduced much in size since then. Post 2000, as the dot com bubble burst, capital was beginning to chase other shorter term profit opportunities and everywhere there was an effort to secure enough capital to be able to do that (creating similar Mynskian cycles in the process). The real exchange rate appreciation in the Irish economy coincided with increasing returns to finance capital in the financial centres of Europe and U.S. The dependence of the manufacturing export sector on FDI flows meant that the focus was not on improving the health and growth of the manufacturing sector whenever they suffered so that it did not have linkage effects in the real economy. In fact , when the American Jobs Creation Act 2004, a piece of US legislation, allowed for a temporary tax 'holiday' for foreign subsidiaries of US multinationals to repatriate funds held abroad back to the US at a reduced rate of corporation tax to which the MNCs promptly responded.

But, off course, the financial processes in the domestic economy had acted in a way that had left manufacturing and other sectors of the real economy with not much of a capacity to act as alternative sources of employment when the construction sector would eventually face a simultaneous fall in its profits and contraction in lending from the financial system. A 'Ponzi' situation had formed in the overall economy .In 2006, private sector indebtedness stood at 183% of GDP, household debts were 90% of GDP and the general government balance was about 2.9% of GDP and the GDP was growing at an average rate of 5% over the 2000s. A slight change of mood would reverse the returns and the systemic effects would reach out to all of the economy and even beyond. Absence of strong growth in other sectors would aggravate the negative expectations and the debt deflation spiral would begin. There would be wide-spread loss of employment and fall in net worth of individual households at the same time. There would also be the possibility of sudden withdrawals of the FDI flows that form a crucial part of the income-generating real sector. [73].

In the next chapter, I look at FSAP's assessment of the Irish economy as on 2006. What were the findings? What was missed? And why FSAP's reliance on the shock-absorbing capacity of a 'stable' financial system is mis-placed ?

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[73] Irish mortgages did not have a high level of self-cure because transitions from unemployment to employment status was made difficult by the loss of competitiveness in the economy and the fact that many of the unemployed from the building industry had little formal education.

Chapter 4

The IMF FSAP assessment of Ireland's financial sector

By 2006, Ireland was trying to balance several macro-economic and financial imbalances at the same time. The dynamics in the economy were such that a slight change in the mood of the market could trigger a destabilising chain of events. The very high levels of indebtedness and leverage and low rates of saving that were overshooting all other Euro-zone countries in 2006 needs to be understood with these economic dynamics in the background.[74]

This is when IMF conducted the second updated assessment of its financial sector - the first having been done in 2000 - with the help of its Financial Sector Assessment Programme (FSAP).

The assessment followed the usual procedures of the FSAP.

(i) an analysis of FSIs and stress testing used to identify risks and vulnerabilities;

(ii) the assessments of standards and codes used to assess institutional and regulatory structures;

(iii) comments about the broader financial stability policy framework.

A summary overview of FSAP's recommendations on the Irish Economy as of 2006 in the words of the report is given below:[75]

> *"The key macro-relevant findings of the FSAP Update are:*
>
> *The Irish financial sector has continued to perform well since its participation in the Financial Sector Assessment Program in 2000. Financial soundness and market indicators are generally very strong.*
>
> *The outlook for the financial system is positive. That said, there are several macro-risks and challenges facing the authorities. As the housing market has boomed, household debt to GDP ratios have continued to rise, raising some concerns about credit risks. Further, a significant slowdown in economic growth, while seen as highly unlikely in the near term, would have adverse consequences for banks' non-performing loans. Stress tests confirm, however, that the major financial institutions have adequate capital buffers to cover a range of shocks.*
>
> *Good progress has been achieved in strengthening the regulatory and supervisory framework, in line with the recommendations of the 2000 FSAP. The strategy of creating a unified approach to risk with common elements across different sectors where appropriate, but differentiated where necessary, is being put into practice well. Improvements could nonetheless be made to enhance some aspects of supervision especially as regards supervision of insurance and reinsurance."*

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[74] In 2006, Bank Lending as % of GDP for Ireland was 90% compared to the Euro Average of 50%., the % of Loans to NFCs out of GDP was 75% compared to the EU average of 45%. Savings rate was 4th lowest at 5% and the Ratio of loan to deposit was 0.6 when the EU average was 0.8

[75] Financial System Stability Assessment Update Ireland, 2006, IMF, Page 1.

That these findings of FSAP had a reassuring effect on the conduct of the financial system of the economy was acknowledged in the Central Bank's report on crisis given to the Ministry of Finance.

"In particular, the unwarrantedly favourable FSAP Update Report by the IMF in 2006 –offering a financial system stability assessment – was unhelpful."

The FSAP report noted the strong growth of credit in the economy happening at a rate twice that of Euro area banking system average. However, analysis of FSIs, simultaneously led to the observation that – "**Banking system profitability and capitalization are strong and NPLs are low**".

The financial soundness indicators in the Irish economy in 2005 were only as good as the performance of the economy at the time. Ireland was at the peak of its expansionary phase in 2005 and given the pro-cyclical nature of the FSIs - discussed in Chapter 2 - it is not surprising that the indicators of asset quality, profitability and capital adequacy for Ireland were looking their best at the time.(See Chart 4.1,Chart 4.2,Chart 4.3).

Chart 4.1

non-performing loans/gross loans(%)
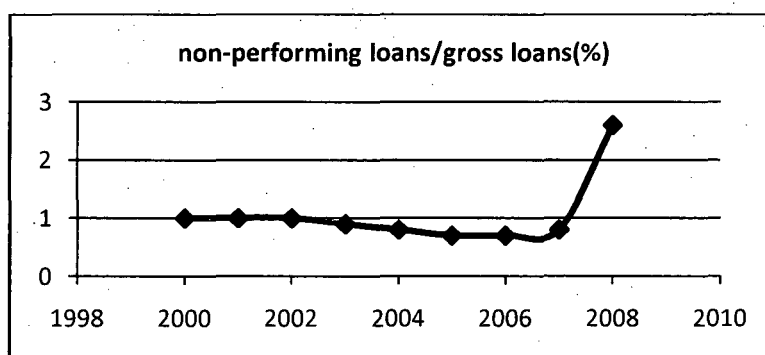
Source: Bankscope data[76]

Chart 4.2

operating profit/average total assets(%)
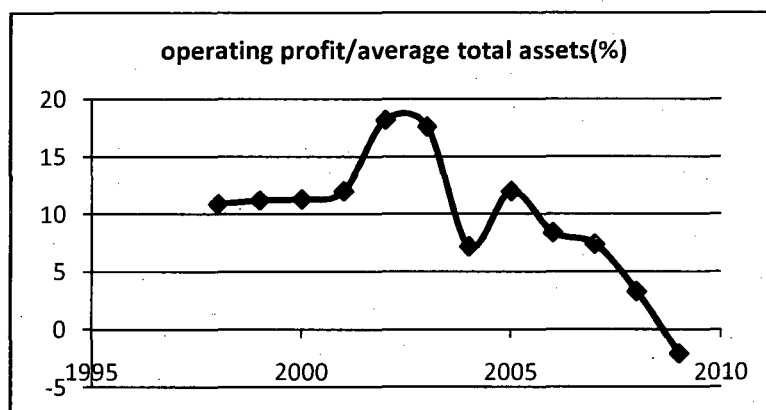
Source: Bankscope data

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[76] All Bankscope data have been provided by Prof Mario Tonveronachi, University of Siena, Italy.

Chart 4.3 Solvency Ratio.

However, as discussed before, FSAP actively promoted the monitoring of FSIs as a measure for indicating the upcoming health of the financia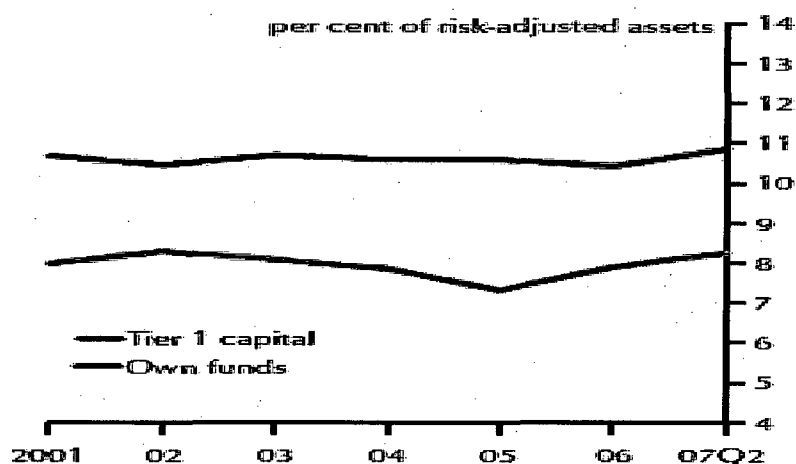l system and found it a comforting improvement that the "the authorities have strengthened their analysis of systemic indicators" through the publication of a regular Financial Stability Report (FSR) in pursuing its mandate to contribute to the stability of the financial system.

The FSAP report did note some of the jarring features of the credit growth in the Irish banking system at the micro-level but either failed to realize their implications for the broader macro-economy or decided that the banking system had enough capital buffers should any of those become cause for losses. The stress tests they conducted assured them of the latter.

FSAPs comments on the banking sector:

Even though credit growth of banks was concentrated in the real sector - growing fastest for personal and commercial real estate finance - the record increases in mortgages, which were generally low risk, benefitted the profits of the banks, making them among the highest in the Western Europe.

There was a heavy reliance on wholesale funding from other financial institutions, including from off-shore for funding this lending growth as it exceeded deposit growth for some time, but the potential liquidity risk was not seen as a threat as the off-shore funding was diversified. However, FSAP's own data show that though funding for the banks' activities came from interbank markets in various locations in Europe and bond markets in Europe and U.S.A., U.K. remained the largest creditor (41%)[77] just as it was the dominant borrower with a 50% share in all foreign

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[77] FSAP Report 2006, Page 9

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exposures in the mortgage lending market.[78] It was believed that the potential interest rate risk due to the wide mismatch between maturities of the assets and liabilities could be managed with the existing capital position of the banks because the stress tests proved so.

Level of household indebtedness were on the rise — primarily in the form of house mortgages - and it was observed that the house prices had increased faster than disposable income increasing mortgage repayment burdens for first time buyers. But then according to the report, house buyers were able to offset the "the impact of higher prices by increasing loan-to-value ratios (LTVs) and lengthening the term of loans". This essentially meant that the house prices were being fuelled or houses were being made available not by level of income but by the amount of mortgage. This should have served as a point of caution had the FSAP been able to understand that by the standards of then banking regulation, higher LTV did not necessarily mean a loan more secured by the ability to pay of the borrower.

With most mortgages on variable rather than fixed rates, recent first-time house buyers could come under financial stress if Euro interest rates rose more than expected in the near term. But it was thought that the effect of the stress would be concentrated only within the group of the first time buyers and that too was adequately provisioned for. While the effect of the growing number of mortgages was being understated, the fact that the rise of interest rates would be built into repayments of all mortgage holders - because that was what variable rates meant - was completely overlooked.

Increased competition in the mortgage market, especially from new entrants seeking to gain market share, led to innovative mortgage products, such as 100 percent LTV and interest-only mortgages, but the actual incidence of these products was largely under-estimated probably due to absence of data. It was stated that, although between 26-33 per cent of the stock of banks' residential mortgage loans had LTV ratios above 75 per cent, only 1.6-6.1 per cent had LTV ratios over 92 per cent. But in fact, in 2005 about 30% of mortgages had 100% LTVs.

After having noted that the market share in property market was largely skewed in favour of a few large financial institutions, the FSAP comment was that since the debts of these institutions were mostly held abroad, this reduced financial stability implications for Irish economy. Indeed, the FSRs of CBFSAI said as much as well. Stress tests made to proxy the effect that a check on liquidity on account of debt default might have on the highly leveraged debt market were found to be highly favourable. In fact, even with 35-50% of debts held in uncovered, short term wholesale funds, the banking system was found to be "highly liquid" and any shocks that might occur would be more likely to result in some increase in funding costs

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[78] Please see Chapter 3. Page 18.

rather significantly reduced access since Irish banks' funding needs were small relative to the size of the liquid Euro market (where much of the funding was raised).

FSAP commented on the observance of prudential regulatory standards in the economy and hailed the creation of the Ireland Financial Services Regulatory Authority in 2003 for supervising the up-keeping of those standards. However, it failed to point out the lax credit policy of the banks that the domestic regulator did not pay any heed to.

FSAP's comments on the macro-economic risks in Ireland:

The following excerpt from the report summarizes FSAP's positive outlook for the Irish economy and its domestically originated macro-risks.

> "The economy's momentum has been driven by strong employment growth which, in turn, has been boosted by record migration and increased participation. Going forward, the economy will be supported by continued strong employment and income growth, fiscal stimulus in 2006, and withdrawals from maturing special savings incentive accounts (SSIAs) that will begin in the middle of this year. Business investment is expected to remain robust while residential investment is expected to expand further in 2006 before levelling off in 2007."[79]

Having said that, it noted some possible events that could result in a sharp slowdown in growth, with a consequent deterioration in financial institutions' asset quality, with the qualification that those events were at that point not seen as likely, given the positive economic outlook.

> Substantial increases in Euro interest rates, in excess of the 200 basis points generally incorporated in banks' stress tests of individual loans, would pose risks given household indebtedness levels.

> House prices were possibly becoming overvalued, though much of the growth in housing construction, and the extended boom in house prices, could still be explained by fundamental factors of catch-up and immigration. The outlook on the effect of the house price rise was as below:

> "The central expectation is for an orderly slowing in the housing market. A sharp correction cannot be ruled out, however, and would have adverse consequences for employment and growth, and thus for debt servicing capacities for both households and the corporate sector."[80]

> A continued deterioration in competitiveness could dampen external demand and foreign direct investment.

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[79] Financial System Stability Assessment Update Ireland, 2006, IMF, Page 12

[80] Financial System Stability Assessment Update Ireland, 2006, IMF, Page 13

However, FSAP tested the effect of stresses in these macro-variables on the banking system and commented that the banking sector seemed resilient enough against all such stresses.

But was FSAP's immense faith in stress tests justified?

Stress tests by FSAP:

FSAP conducted stress tests on the Irish banking system using both "bottom up" and "top down" approaches. [81]
The Bottom Up tests were conducted by 11 Irish retail institutions comprising 9 banks and 2 building societies that have 95 percent of the mortgage market and 88 percent of the non-government deposit market in Ireland, using two scenarios calibrated from a macro-econometric model developed by the central bank, using on- and off-balance sheet data for end-2005 data.

The CBFSAI, in consultation with the FSAP team, used prudential data collected by the Financial Regulator, institutions' annual accounts, and the Central Bank's money and banking statistics. It took the Top Down approach and conducted a set of sensitivity tests and scenario analyses (based on one of the scenarios for the Bottom Up tests) on the same set of retail institutions to validate the Bottom Up results.
The shock scenarios were based on baseline forecasts made by the Central Bank's macro-econometric model. This underlying macro-econometric model has been critiqued in Chapter 2 for not having the mechanism to capture the endogenous building up of stress in the economy and its lack of robustness at times of crisis.

One of the shock scenarios was supposedly based on extreme realizations of historical data[82]—a sharp downturn in world trade by 6%, a significant (25%) appreciation of the Euro, a sharp reduction in foreign direct investment resulting in machinery and equipment investment being 25% lower than in the baseline (with a strong negative impact on Irish exports), a reduction in housing output to 50,000 units from the current 80,000 units was considered. Separately, a 40% decline in house prices was built into this scenario based on real disposable income growth.
Policy interest rates and the stance of fiscal policy were assumed unchanged.

The other scenario was less extreme but the magnitude of shocks was assumed on an ad hoc basis. An appreciation of the euro of a lesser (10%) magnitude, contraction of housing construction and of FDI of the same magnitude but more gradually than in the first scenario, a steady rise in nominal short-term interest rates, which was

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[81] These approaches have been discussed in Chapter 2.Page 29.

[82] Joint occurrence of these events was considered to have a probability of less than 1%. FSAP's recommendations always remained very re-assuring because it undermined the linkages in the economy-real and financial and how these linkages got truly exposed at times of crisis.

assumed by banks to yield a cumulative increase of either 1.25 percentage points or 2.50 percentage points above the current level was considered.[83]

The scenarios were to take effect beginning with 2006Q3.

To begin with, given that the share of property loans in total bank loans increased from 58% to 62% from 2005 to 2006, the result of the stress tests applied to 2005 data of banks would certainly understate the losses.

The reliance of the economy's growth on the export and construction sectors was recognized in the shock scenario. That house prices were valued more than what the parametric relation between fundamentals and prices in the model would show was also considered. However, the shocks were largely disconnected.

A sudden shock to the trade sector and construction sector in the Irish economy in 2006 would have immediate repercussions on the solvency of the banking system and whatever be the notion about its level of capitalization at the time, this would certainly see an increase in the funding costs of the banks in the wholesale market where the banks have to constantly roll-over their debt to finance their activities. There would be a shock to the interest rates almost at the same time as the shocks to the real economy took place.

The second scenario was more pervasive but the shocks still did not reflect the drastic cuts in economic performance that could happen if the economy's internal imbalances reached the Minsky moment, a spiral of debt deflation began and this got coupled with the co-movements in economies related to Ireland.

(In reality, the clearing banks' prime rates rose by cumulative percentage points of 2.87 and contraction of FDI and financial capital caused a depreciation of the value of euro against the US dollar.)

These shocks were then fed into the macro-model to obtain a measure of fall in GDP, Unemployment, Private Consumption, Gross Fixed Capital Formation, Exports, Imports, Inflation and House Price Inflation.

The effects of the shock scenario could not have given a correct estimate for the above macro-variables because of reasons discussed before in Chapter 2.

For Ireland, the fall in employment in trade and construction would have had adverse effects on the banking system through loan defaults on most of their portfolio. With increasing share of NPLs on its books and highly decreased collateral values, the banking system would face higher risk premia for borrowing in the predominant source of the wholesale funds market. With already low interest margins and falling profits there would be possibilities of default on deposits kicking off another round of falling demand in various other sectors. This would affect market sentiments and values of equity and other assets would take a beating leaving more people with less

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[83] All FSAP procedures obtained from the FSAP report 2006.

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money on their balance sheet. There would be definitely be a cutback in the flow of investment - including more contraction in FDI in Ireland's case - and unemployment would eventually spread to other sectors including the financial one.

But the model would not have captured any of this because it did not account for any macro-financial linkage. It had no segregation of sectors to understand where the falls in investment, income and employment would hurt most in terms of demand and most in terms of financial sector linkages, including loan repayments, deposits, share-holdings etc. The latter would especially have been an important measure for banks when they applied these stresses to assess the change in value of their portfolios.

The statistical relationships would not hold if there was to be a co-ordinated failure in the economy. In Ireland, one relation that would additionally change was the one between net factor income and nominal exports. The export sector would see a larger increase in repatriated profits and hence lower net factor income for a given increase in nominal exports.

However, the output of this model was used to form the scenarios that were then applied by banks to their balance sheets and by the CBFSAI to a cross-country provisioning model that linked the macro-variables to logs of loan-loss reserves in percent of gross loans, used as a proxy for total loss provisions made in the banking sector. This model was built for 496 banks from EU-15 countries covering 1996–2004 excluding Ireland because it had an expansionary phase in the period and the model was meant to cover countries that had undergone recessions in the past. The model found that loan loss provisioning was most sensitive to changes in the unemployment rate (+) and much less sensitive to output growth rate (-) and real house price inflation rate (-).

In 2005, the loss-given-default (LGD) ratio in the aggregate banking sector was 50%. This was assumed to continue under stressed situations as well. This LGD ratio was then applied to the increase in provisioning and the corresponding increase in probability of default was obtained.

The above shocks in GDP and house prices, when they happened, would be expected to affect the (non-performing loans) NPLs in the sector by only as much as the model indicated. Again, there was no accounting for how the individual sectors would be affected and how herd mentality could lead to the spiralling debt deflation.

CBFSAI also conducted additional Top Down tests testing the aggregate banking sector's performance for individual risk factors. Each risk factor was linked to the probable losses and the capital adequacy ratios needed to cover them by the same linear relationships discussed in Chapter 2.

- Macro credit risk—several sensitivity tests were done assuming combinations of increasing NPLs and loss-given defaults.
- Credit risk associated with real estate prices—various house price scenarios were analyzed assuming different mortgage default rates.
- Interest rate risk—the re-pricing gap model was used to measure the effect of changes in interest rate on net interest income on banking and trading books, and on the balance sheet of banks using maturity of bond investments.
- Liquidity risk—the effect of a significant withdrawal of resident private sector deposits was tested. A second test involved a reduction ('haircut') in value of liquid assets to proxy the effect of increased funding costs stemming from a generalized reduction banking system access to wholesale markets.
- Foreign exchange risk
- Equity price risk

Results of the Stress tests.

Although the Top Down and Bottom Up approaches were conducted simultaneously to validate the results, at the outset only the credit risk tests were comparable because the banks did not test for the other individual risk factors.

But even after the stress tests were done, the results of the two approaches conveyed different stories.
While for the Bottom Up tests the NPLs rose by more than 2.5 times over 2006-2008, this was calculated with an even lower cover ratio (loan loss reserves in percent of non-performing gross loans or LGD ratio). A lower cover ratio implicitly assumes that even though the probability of default (proxied by actual nonperforming loans) is rising due to the severe downturn, the loss given default is not and this is because banks assume collateral values and collateral recovery rates would remain at current levels.

If the cover ratio was not assumed to be lower and was kept at a constant LGD of 50%, the Bottom Up tests then showed an increase in NPLs of 0.8 in 2006 to 3.13 in 2008. If this increase in non-performing loans were to be written-off from the level of regulatory capital that banks had in 2006 then the Capital Adequacy Ratios would fall by 1.04 percentage points.

But the Bottom Up tests assumed an adjustment of many variables over three years showing the CARs to be actually increasing at the end of 2008.
Whether the corresponding rise in CAR was possible to achieve was put in very vague terms-

> "Owing to a full balance sheet treatment by banks in the BU tests, the CAR is boosted by factors that still help profits grow (albeit at a slower pace); these factors would be difficult to consider in the TD tests."[84]

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[84] Financial System Stability Assessment Update Ireland, 2006, IMF, Page 40

Assuming the same LGD ratios the NPLs rose by only 79 per cent in the Top Down tests.

NPLs in the Irish economy eventually rose by 3.71 times from 2006 to 2008.

Despite a drastic reduction in asset growth, increase in non-performing loans Bottom Up tests found almost no change in profitability (as seen by calculating the Return On Assets) from the baseline. The fall in nominal profits was found to be in line with the fall in asset growth without making any changes for the performance of the remaining assets during times of crisis.

None of the other individual risk factors were found to erode CARs by alarming levels. A 400 basis point increase in interest rates was found to lower the market value of the bond portfolio resulting in a 0.62 percentage point change in average CAR, which would, it was stated, in any case be partially offset by small positive income effects in the banking and trading books. A 30 percent fall in equity prices would result in -0.62 percentage point erosion of the average CAR. A 10 percent haircut on liquid assets would push overall CAR to 9 percent.

Due to lack of relevant data, it is not possible to make a one-for-one comparison of these impacts in reality. However, that the measures for these risks are not technically adequate to give true estimation of the risks themselves has been discussed in detail in Chapter 2. The aggregation of the effects of these risk factors in a top down approach would mask, as with other risks, the deviations of measured risk from actual risk caused by the ways of calculation of individual banks. A bank calculates duration of its assets and liabilities by looking at how much their value would fall for a given change in their yield. As seen before, the measure assumes that discount rates used in the calculation would remain same. With a falling and variable interest rate structure in Ireland, this would mean duration measure would be lower than it actually is.

However, it is to be noted that FSAP assumed that the losses from interest rate increase, whatever they may have calculated it to be, would be offset by increases in interest income. This more than anything clearly shows how FSAP was completely unaware about the growing gap between the level of indebtedness of various counterparties and their ability to maintain those levels of indebtedness in Ireland. An increase in interest rates would have been a trigger for this gap to become felt across the borrowers in the economy (especially, those with property loans) and so it turned out to be. Interest rates in Ireland had begun to rise in 2006 and by the third quarter had risen to 2001 levels. This is also the time growth in house prices had begun to stall and even before the effect of the financial crisis unfolding internationally could merge with domestic banks in mid-2008[85], the growth rate had fallen to negative

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[85] The crisis became more severe on 29th September with a contraction of liquidity in the wholesale markets from the most aggressively expansionary of the Irish banks,Anglo-Irish.

territory. The market sentiments had begun to waver even when the crisis had yet to reach the Irish shores and interest rates expectations were rising.[86]

Although the tests did not find much increase in default rates for mortgages, the FSAP carried out an exercise to check if the level of existing provisions could absorb the resulting increase in loss-given-defaults at different default rates. Here, in the Report's own words – "the LGD was calculated from the existing mortgage book and applied to various default rates. To set a benchmark for the typical LGD, a hypothetical average mortgage with 90 percent LTV was assumed to originate in each of the years for the last 10 years. Then each of these loans was amortized through the years till 2006, and the outstanding LTV for each mortgage loan was calculated by using current average house price.

The actual mortgage loan book was then divided into buckets according to the years in which the loans were first originated. It was assumed that all loans in each of the buckets had LTVs 90 percent or above at the time of origination. The hypothetical LGD was then applied to the calculated LTV in each bucket under the assumptions of house price declines of 25 percent, 40 percent, and 55 percent respectively. Under various assumptions of default rates, the value of the total loss as a percent of the aggregate value of the buffer created by profits is calculated."

The test showed that the current capital buffer would absorb very high default rates and house price declines, to a combination of 10% default rate and 55% decline in house prices. It is not clear if average mortgage meant a constant average size of mortgage or what were the components of the CAR, but the loss amounts that the Irish Government had to guarantee in the wake of the recent crisis would suggest that it was not adequate.

The losses in the Irish Banking sector post the FSAP review of the financial sector.

The gross amount of liability that the Irish government had to guarantee in September 2008 was approximately €365 billion, or almost 2½ times the Irish GNP at the time. One of the biggest banks were believed to be unable to re-finance their debts at the inter-bank markets because the value of their collateral had eroded to the extent that it was not effective in covering the debts anymore. The herding behaviour of the financial system meant that the failure of the bank could lead to a domino-effect on all the other banks in the economy. According to the CBFSAI Crisis Report, the Government had provided the guarantee, even at the cost of the tax-payers money, because it had expected the run on liquidity to be a temporary phase brought about by the panic caused by Lehman's bankruptcy and the Irish banks would become solvent soon.

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[86] Please see Chapter 3. Page 62.

But this was not enough. In order to re-capitalize the banks the State also had to purchase property-related exposures at prices based on their estimated "long-term economic value" and make provision for all of their other prospective loan-losses to the extent that it now holds sizeable equity stakes in most of the banks. The adjustments that the banks had assumed would happen to increase their capital adequacy ratios during times of crisis clearly did not happen. Their equity and other capital had been reduced to the extent that the State had to write-off €25 billion of unrecoverable capital injections into two institutions – Anglo Irish Bank and INBS – whose prospective loan losses greatly exceeded their initial accounting capital.[87] The losses that the Irish Government had to guarantee in all took the general government balance as a % of GDP in the economy from 0.1% in 2007 to -14.6% in 2009.[88] And when this left the state near to bankruptcy, Ireland accepted a bailout by EU of 85 billion euros (113 billion dollars) in December 2010, 10 billion of which was for "immediate recapitalisation" and 25 billion for contingency support to its banking sector. The austerity drive that followed led to reduction in Government spending by 4 bn euros which came from about 5% reduction in public sector wages and reduction in social welfare.[89]. The employment in the construction sector fell back from about 13% in 2007 to the 1996 level (7%).The quarterly estimates of peak to trough fall in GNP and GDP in 2010 were 17% and 12% respectively.[90]

FSAP was not looking for the 'phenomena'in the Irish economy that could make the financial system fragile. Instead, it looked at financial stability as any situation that was not financial crisis and tried to ascertain how the economy would perform under the stress created by those 'phenomena'.

While the report deliberated on the banking sector's strengths and weaknesses, it did not try to understand why and how the banking sector came to be so focussed on the property sector and so much leveraged on the wholesale fund market.

Chapter 3 shows how the motivations for the Minsky cycle began in the Irish economy, what drove it further and where on the cycle Ireland was when FSAP reviewed it. The crisis hit Ireland shortly after that.
FSAP laid no emphasis on the importance of the real economy to the financial system. Its superficial view of the macro-processes in the economy led to a 'positive outlook' in the macro-economy in 2006.
The profit opportunity for the financial system came from the massive FDI inflows in the 1990s that led to increase in income and spill-over demand for non-tradable sectors like housing and other service-related sectors;

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[87] Loss data from Crisis report,2010, Page 19.,

[88] Budget and Economy Statistics, CBFSAI, 2010, Table 6. The general government balance is calculated as total government revenue – total government expenditure.

[89] http://www.bbc.co.uk/news/business-11693654

[90] Crisis Report 2010, Page 21.

The net migration and Ireland's history with housing coupled with financial liberalization made real estate profitable to banks while the real effective exchange rate appreciated with the rising prices;

Government's tax policies aimed to help the population to own houses fed into this investment drive; Lenient banking regulations and credit ratings based on back-ward looking models reflected expectations of higher and higher returns in the property markets. ;

An analysis of relative growth of debt levels vis-a-vis the growth of earnings, as has been done in Chapter 3, would then have revealed how lending more and to many became a manifestation of the expectations rather the fundamentals of the economy; how the banks drove up the house prices by increasing the value of the mortgages; how the houses, residential investors and commercial property investors were facing larger and larger gaps between their cash inflows and cash outflows; and how there would be lack of alternative employment opportunities when this over-heated property market cooled down because real exchange rate appreciation had driven the export-dependent economy to a large current account deficit and uncertain inflows of capital in the export sector meant that the rate of job creation in the sector was uncertain too.

The detailed analysis of the economy would reveal more indicators of financial instability that the Irish economy had begun to show.

There was the falling tax bias[91]; the role that the real estate investors played in boosting house prices in 1998; the increasing wedge between deposit growth and credit growth; the lack of interest on the part of the regulators of the financial system to supervise the lending criteria of the banks and tighten them to rein in the credit growth, ; the increasing vacancy rates in the existing stock of property and finally the volatility of the FDI inflows.

The focus of FSAP was too narrow compared to the wide number of real and economic factors that needed to be assessed for financial stability. Within this narrow focus, it made various erroneous judgements based on its over-reliance on FSIs, its assumption that diversification in this financially integrated world would lead to less and not more co-movements of financial product performances and finally its stress tests which gave a picture of losses far removed from reality.

These judgements could be improved upon and this issue is probably being worked upon even as I write this thesis. For a comprehensive assessment of stability, however, a close study of every aspect of the economy over a sufficiently long time is needed, with constant control and regulation of such important aspects as sectoral credit growth, lending policies, capital controls and productivity growth in the economy.

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[91] Explained in Chapter 3. Page 51.

Chapter 5

Summary and Implications

The central question that this thesis had attempted to ask was whether the FSAP of IMF, done on Ireland in 2006, was successful in assessing the instabilities in the financial system of Ireland at the time.

In Chapter 2, we looked at the methods that the FSAP employs in general for all its assessments. Both the quantitative and the qualitative procedures were critiqued but with more emphasis on the quantitative ones. This was because analytical tools and techniques like FSI trends and stress tests have played a major part in deciding the final verdict on the financial system in all FSSA reports of FSAP, including that of Ireland. A critique of these techniques entailed studying the validity and robustness of the assumptions underlying the formulation of the techniques.

In Chapter 3, we analysed the financial stability of the Irish economy over the period 1999 to 2006. The chapter followed the macro-economic and financial processes in the economy that began when the economy opened itself up to the SEM and FDI inflows came in large volumes creating an export-led growth in the economy. It especially traced those processes that lent themselves to creating the house price bubble in the economy. It then analysed the growth of income vis-a-vis the growth of debt, in the macro-economy as well as, at the micro levels, in the balance sheets of the counterparties of the financial sector.

In Chapter 4, we critiqued the FSAP's assessment of the Irish financial (banking) sector. The appropriateness of the assumptions underlying FSAP's tools and techniques was assessed in the context of the Irish economy. Its findings were compared to the observations made on the Irish economy in Chapter 3 to find out what the FSAP did not look at in its assessment.

The broader motivation behind the central question was to understand the effectiveness of any assessment program for the financial sectors that employed methods like FSAP, especially at the international level.

Ireland's domestic economy had been brewing a Minsky cycle for quite some time when IMF conducted the FSAP on it. The Financial Sector Assessment Programme had an elaborate procedure chalked out to assess the strength and stability of the financial system. It could not however assess the extent of damage the impending crisis would be able to cause in the economy immediately after it was done with its assessment. Or maybe it did and but did not want to self-impose a crisis by its disclosures? The Central Bank of Ireland conducted stability assessments on the economy every year on the same lines as the IMF and the results were published in what are known as Financial Stability Reports (FSR) for public viewing.

The crisis report of CBFSAI admits that even though they kept conveying an overtly optimistic out-look through successive FSRs[92],

> "At the same time, however, many participants -at all levels - in the FSR drafting process have indicated that the highly "nuanced" messages conveyed reflected an institutional desire at senior levels in the organisation to adopt a very cautious approach. In particular, there was a concern that the results of some of the analytical work might be described by the media as the CBFSAI conveying a "bearish" view of the property market and/or a less than sanguine view of the state of the financial system. This message was conveyed to staff working on FSR matters and, given the CBFSAI's hierarchical culture, was clearly a factor inhibiting staff presentation of alternative analyses and assessments. While this underlying feature was present in the preparation of all FSRs, it emerged most prominently in the case of the 2007 FSR, the message of which, arguably, could be characterised as reflecting a "triumph of hope over reality"."

The Central Bank had a closer view of the economy than IMF. It had a lot of data that could give it an uncomplicated yet clear picture of the growing unaffordability of debt in the economy. However, it chose to rely on the FSAP's methods of stress tests and FSIs. Consequently, based on assumptions made about riskiness of asset portfolios of individual banks, it came up with a positive but ambiguous outlook of the economy. And even when data on income and debt levels of various counterparties began to show the insufficiency of income for covering the debt levels, it did not intervene to control the excessive credit growth. In an economy where the market is allowed to play freely on its sentiments and expectations, this would have, in the words of the crisis report, "rocked the boat". The FSAP team could have similarly been wary of rocking the boat on an international level. Being a supra-national body made it more aware of the co-movement of the market sentiments across economies. But even before presuming that such constraints affected its analysis, it is important to know if it indeed had been able to truly assess the financial sector in its entirety.

Clearly, the procedures of FSAP had a very limited focus. Over a span of three chapters, we have seen that the FSAP largely overlooked the developments in the real economy and their ramifications on the financial sector and likewise, the feedback effects of the financial sector on the real economy. It did not recognize that the macro-economic and financial processes together were moving Ireland's financial sector through the phases of 'hedge', 'speculation' and 'Ponzi ' of the Minsky cycle. In fact, the programme only tracked the growth in assets and liabilities of the banking system without knowing how the assets and liabilities of its debtors and creditors were growing. Not looking at all parts of the economy related to the financial sector in

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[92] CBFSAI Crisis Report, 2010. Page 95.

unison meant that its calculations of losses from the stress tests were under-estimated. This also meant that the programme could not know the stress and vulnerability that was building up within the economy during its expansionary phase - a typical trait of the evolution of the Minsky cycle. The economy of Ireland was perfectly capable of reversing its own steam by virtue of its own weaknesses and characteristics. The significance of the rush of capital inflows leading to a boom phase in the economy was lost on FSAP. FSAP was looking at the FSIs to predict the sound performance of the financial system. But the FSIs showing asset quality, profitability, solvency and liquidity drew from the performance of the economy from the past years till the current time when the evaluation was happening. The expansion in the Irish economy since 1995, first due to the growth of the export sector and then due to the real estate boom resulting from growth in non-tradable sectors and appreciation of the real effective exchange rates, meant that in 2005-2006, Ireland's FSIs reflected low default rates, high profitability and high liquidity in the financial system .

Efforts will surely be made by IMF to improve the methods of stress testing in FSAP after its performance in the recent crisis. It is possible that macro-financial linkages will be considered, more financial variables from the encouraged set will be tracked and shock scenarios will be more historically aligned instead of being ad hoc. Efforts could be made to increase the availability of data from banks to make the "Bottom Up" and "Top Down" tests comparable. More realistic assumptions about aggregation of the test results, timing of the stress effects, sources of risk and their relationship to banks' capital could be made. However, there would also be a few caveats.

As discussed before in chapters 2 and 3, the statistical relationships derived during a period of boom would not hold when the economy crashes to a crisis. The 'history' of the economy and hence the financial system will keep on evolving as technology evolve making the type and magnitude of shocks calibrated on them redundant for future. There would always remain differences between the Bottom Up and Top Down approaches purely because of the incompatibility of incentives between the regulators and the regulated. For the same reason, there would always be deliberately hidden sources of risk[93] in the portfolio of banks that will not be accounted for by the bank's capital, and the functional relation between the known sources of risk would keep changing with innovations in financial products.[94] Adding to these, would be the IMF's possible wariness about triggering negative sentiments in the market with alarming notes in FSAP.

But if this is the case, it would never be possible to estimate correctly the magnitude of losses likely during periods of crisis. At no point of time can an economy then be content about the capital buffer its financial system has, in case there is a brake on its growing phase. It would never be fully known how far, how much and in what way

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[93] As opposed to sudden, idiosyncratic risks like risks generated from shocks external to the economy-operational risks from natural calamities.

[94] As an example, for options, the exchange rate risk or any risk that the option hedges for would have a non-linear, kinked relation between the risk factor and the associated loss.

the effects of a crash would at that time percolate the real economy and what the repercussions would be on the economies linked to it through trade and capital flows.

It would then be better to 'be safe than sorry'. If FSAP could follow the developments of the related macro and financial components of the economy closely and use them instead of FSIs to 'predict' financial stability, it could be possible to prevent the economy from moving from the 'hedge' to the 'speculative' or 'Ponzi' phases of the Minsky cycle.. In order to control the transition across phases the dynamic financial sector would, however, have to be constantly assessed, monitored and regulated as it evolves. Thus we come to the importance of domestic regulations in keeping the Minsky cycle in control. Looking at the case of Ireland, one can find the need for 'rule-based' regulatory intervention in many forms.

To begin with, the Irish Government should have known the inevitable effect that the increased capital inflows in the economy would have on the non-tradable real estate sector in Ireland, given its history with housing and given the experience of capital inflows in the export-led East Asian economies in 1997. It would perhaps have helped if it took steps to restrain the credit growth in this one sector by incentivising credit flow to the other sectors - especially the Industrial Sector - and gradually setting up sectoral lending limits for all the sectors depending on the past amount of credit growth in them. And while it made industrial policies more conducive for the FDI flows into the country, there should have been controls on the levels of profit repatriation that could depress the potential of the earnings to be re-invested into the economy.

There should have been more incentives for households to save increasing the availability of deposits for funding the lending activities of the banks. Borrowing large amounts from the international capital markets and that too in the form of short term, roll-over, uncovered bonds, commercial paper should have been restricted[95], however diversified they may have been. As with the FDI flows, there should have been measures to restrict a sudden drain on liquidity by virtue of outflows of financial capital as well.[96]

A pertinent question of moral hazard coming from deposit guarantees is often raised as an argument against the reliance on deposits. Firstly, with systemic consequences of the financial sector, the sector is aware that there would be unspoken blanket guarantees for their most of their liabilities. Secondly, this is precisely why the regulators of the banking sector can never let their guard down.

Strict enforcement on checks for credit-worthiness and corresponding lending policies should have been a must at the level of micro-prudential regulation. At the same time, there should have been less reliance on the 'rules' set by macro-prudential regulation

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[95] See Connor and Kelly (2011) for a sliding door estimate of what the Irish losses would be had there been a restriction imposed on both foreign lending and borrowing in the last decade.

[96] Dr.Y.V.Reddy discusses the feasibility of the traditional Tobin Tax in this respect in his book Global Crisis Recession and uneven Recovery (2011).

and more focus on traditional methods of loss provisioning based on credit growth (e.g. the initial form of dynamic provisioning adapted by Spain in the last decade).[97]

Regulators should have been more vigilant about the incidence of financial innovations which aimed to transfer long term risks in lieu of short term profits or allowed accumulation of debt till a certain time during the duration of loan before being paid. Such tendencies were clear indicators that expectations about future income levels were no longer playing a role in the credit growth in the economy.

When Ireland was preparing to join the SEM in late 1980s, its economy was in dire straits having registered negative growth rates in the past few years. It was mostly agriculture based and the level of domestic industrialization was low and linked to agricultural produce,[98] not unlike many 'developing' countries. The focus, both economically and politically, was to propel higher growth and productivity in the economy by integrating with the much larger global market and reaping the benefits from the resultant FDI and FII flows into the economy. Policies were directed as such. And this status quo was not to be disturbed. However, without controls on flow of domestic credit or the level of profit repatriation of foreign firms, the pervasive effect of those initial investments was difficult to maintain. The feasibility of these and other such policies in the context of political economy will always remain a point of debate.[99]And this debate will get biased away from the long run benefits of the policy to the short term political gains if a single sector is allowed to become so big at the expense of other sectors. Then we will perhaps hear things like 'political lobby' and 'regulatory capture' being blamed for the crisis. It is really imperative then that the controls are doggedly pursued right from the beginning of an expansionary phase and thereafter before such an eventuality can happen.

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[97] Around 2005, the rule of provisioning was modified to allow banks to exercise their discretion on what range of the rule would suit their risk profile.(Fernández de Lis and Garcia-Herrero, 2010)

[98] Food, beverages, tobacco etc..

[99] The Irish Government tried to introduce tax disincentives for the real estate investors in 1998 as they drove prices much higher than the ownership demand for houses would allow. The move, which led to falling house prices and rising rents was not welcomed politically and it was reversed in 2001.

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