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ARE IRISH HOUSEHOLDS AND CORPORATES OVER-INDEBTED— AND DOES IT MATTER?

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Abstract: Household and corporate indebtedness has soared in recent years and is now at historically high levels. The market for credit today is unrecognisable compared with just 30 years ago when, in the national economic interest, the rate of credit growth was controlled centrally. The central questions addressed in this paper are whether households and corporates are over-indebted now and why this might be a worrying development? Previous authors have suggested that over-indebtedness may have severe consequences: (i) higher rates of arrears and bankruptcies, (ii) sharp contractions in investment and consumption, and (iii) increased fragility in the banking system. The aggregate evidence on indebtedness is contrasted with micro-data on households, corporates and credit institutions. This paper concludes that households and corporates may not be over-indebted when (i) account is also taken of improvements in their debt-service capacity and (ii) micro-data is used to qualify the aggregate indebtedness data. Furthermore, credit institutions appear to be well insulated against severe shocks that could potentially arise from households or corporates.

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1. INTRODUCTION

Household and corporate indebtedness, measured as the value of debt to gross domestic product (GDP), has soared in recent years and is now at historically high levels. The debt-to-GDP ratio changed little over the 45 years prior to the mid-1990s and what change there was occurred gradually over many years. But the experience since the late 1990s has been very different. Aggregate indebtedness has increased from approximately 45 per cent of GDP in 1994 to over 110 per cent in 2002. The Irish private sector debt-to-income ratio is relatively high now by international comparison; Ireland now ranks ninth in terms of indebtedness in a sample of 29 OECD countries (up from thirteenth in 1995). The central question addressed in this paper is whether Irish households and corporates are now over-indebted.

Previous authors have suggested that over-indebtedness, (i.e. where the level of an agent's indebtedness exceeds significantly their ability to repay) is important in three respects. First, it is suggested that increasing indebtedness is an important determinant of the rate of bankruptcy among companies (Wadhwani, 1986; Davis, 1987; Vleighe, 2001) and arrears among households (Whitley *et al.*, 2001). Second, investment and consumption growth can depend very significantly on credit. Were credit rationing by the credit institutions to be implemented due to the fact borrowers are already over-indebted, and are beginning to default in significant numbers, this might reduce economic growth. Finally, corporate failures and household arrears in sufficiently high numbers can be a source of instability in the financial system by forcing banks to write off bad debts and thereby reducing their profitability (IMF, 2001). The coincidental occurrence of all these events could have a dramatic adverse effect on economic growth (Hoggarth *et al.*, 2002).

The paper has three sections. Section 2 presents descriptive aggregate statistics on indebtedness over recent years. Several plausible explanations for these trends are identified in Section 3. Section 4 discusses three broad categories of risks that are believed to increase with an economy's level of indebtedness: the rate of corporate bankruptcies and household arrears; and the potential adverse knock-on effects on both the rate of economic growth and the health of the banking system. We attempt to answer in Section 5 whether the private sector is currently over-indebted by developing an indicator labelled 'debt-at-risk', using household-level and corporate-level data, which takes account of the repayment capacity of the most heavily indebted borrowers. This paper concludes households and corporates may not be as over-indebted as the aggregate indebtedness figures suggest when micro-data is used to examine the repayment capacity of indebted households and corporates only, rather than the entire private sector.

## 2. QUANTIFYING THE RECENT GROWTH IN INDEBTEDNESS

Aggregate private sector data and international comparisons

The Irish private sector[1] is now highly indebted by historical standards. The debt-to-GDP ratio changed little over the 45 years prior to the mid-1990s and any change that did occur did so gradually over many years [Figure 1].[2] Indebtedness reached historically low points in the mid-1950s and again in the 1970s. But the experience since the mid-1990s has been very different. It is the first significant and rapid rise in indebtedness since records began in 1948.

Households and corporates resident in Ireland are highly indebted by international comparison. The data suggest that Ireland was probably under-indebted for several decades by comparison with the median OECD economy until the mid-1990s and finished relatively more highly indebted at the turn of the century [Figure 2]. A

ranking of countries by the indebtedness of their private sectors suggests that Ireland has joined the second tier of relatively indebted economies. The country-level data in Figure 3 suggest that Ireland's situation is similar to that of Germany, Spain, New Zealand, Korea and Austria but still lags behind the UK, the Netherlands and Switzerland [Figure 3]. The proportionate increase in the debt-to-GDP ratio since 1995 has been relatively greater in only four of the other 28 countries (i.e., Denmark,
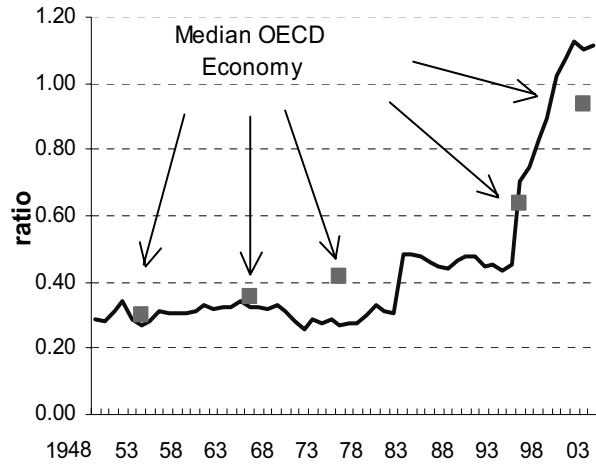
Figure 1: Irish Aggregate Debt-to-GDP Ratio
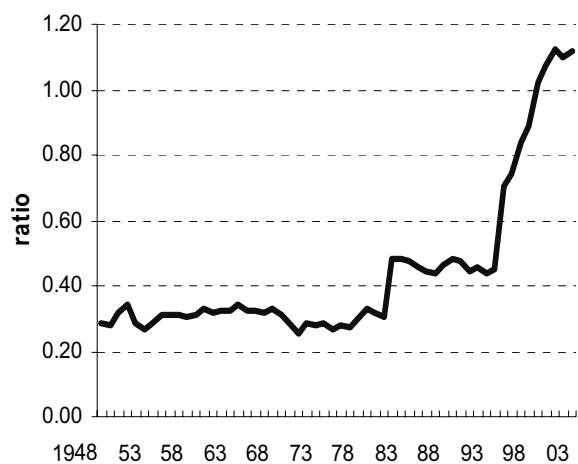
Source: IMF and Author's Calculations.
Note: There is a structural break in the series in 1982 caused by a revised questionnaire.
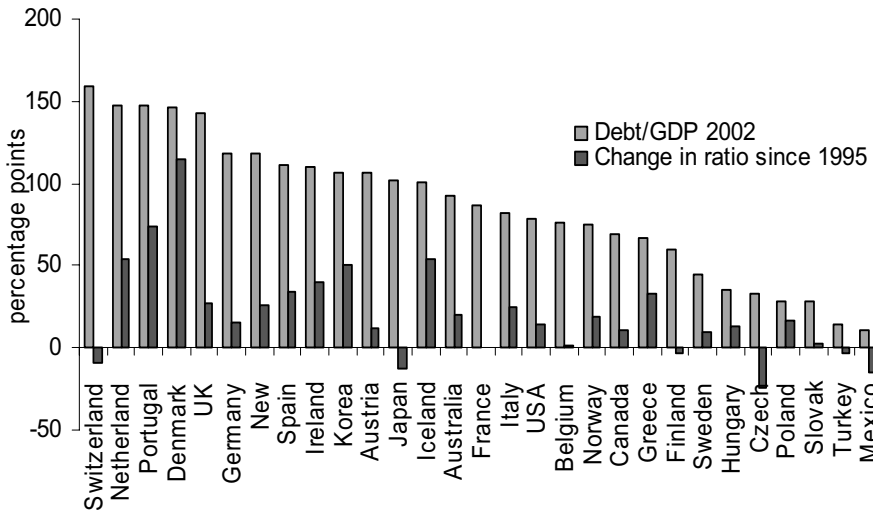
Figure 2: An International Comparison of Irish Indebtedness

Figure 3: International Comparisons of Private Sector Debt-to-GDP ratios

Portugal, Iceland and the Netherlands). These rankings are somewhat sensitive to using GDP as the benchmark. The ratio of debt to gross national product (GNP) increases Ireland's ranking. However, Ireland remains ranked behind the UK and the Netherlands on this measure also.

The aggregate indebtedness data, reported above for Ireland and other countries, underestimates the private sectors' 'potential' indebtedness. A correct measure of potential indebtedness would include not only the value of outstanding debt, as reported above, but would also include the value of irrevocable guarantees to provide further finance. There are several examples of these guarantees: agreed over-draft limits, maximum credit card balances and back-up lines of credit extended to corporates. We do not know what the value of outstanding indebtedness could be if both households and corporates took advantage of their pre-arranged credit facilities and drew down their full entitlement. The value could be substantially greater than reported above. For example, the current value of back-up lines of credit provided by US credit institutions to US corporates exceeds the actual value of outstanding debt from those institutions to the same corporates.[3]

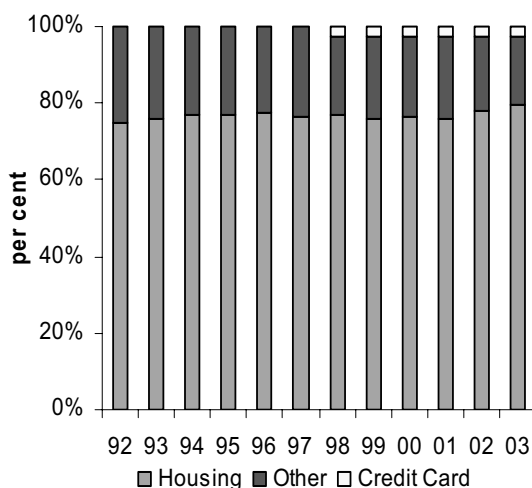*Household sector data and international comparisons*

Households' indebtedness approximately doubled during the 1990s and is now almost ninety per cent of personal disposable income [Figure 4]. The value of

Figure 4: Personal-Sector Credit as a % of Personal Disposable Income
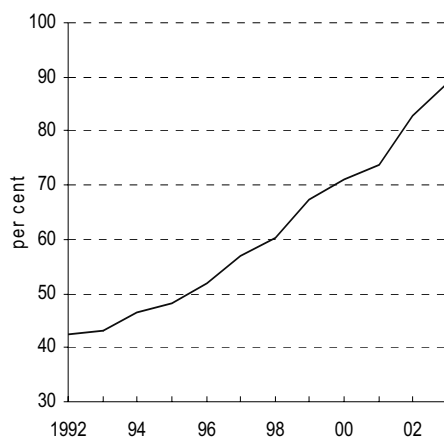
Source: CSO and author's calculations.

Figure 5: Type of Personal-Sector Credit

outstanding personal-sector credit has increased by almost six times since 1992 and stands at €64bn in 2003. There has been a more modest growth in disposable income, approximately two and a half times, during the same period. There is some evidence to suggest that Irish households are now at the Euro area average household's level of indebtedness. Personal-sector credit is forecast to be approximately 48 per cent of GDP in Ireland in 2003. The corresponding estimate for the Euro area is 50.8 per cent.[4]

Personal-sector credit in Ireland is extended predominantly for housing-related purposes. Eighty per cent of personal debt is housing related with a further 18 per cent non-housing related debt and two per cent credit card debt [Figure 5]. These shares have remained unchanged since the early 1990s. There is some evidence to suggest that the housing-related share of personal-sector credit in Ireland is high by Euro area standards. The latest ECB data suggest approximately 70 per cent[5] of loans to Euro area residents is housing-related.

Corporate sector data and international comparisons

Irish non-financial companies appear to have become increasingly indebted in recent years. The debt has been acquired from three sources: resident monetary financial institutions (MFIs), non-resident MFIs and the capital markets. Reliable data is available for the first two sources only (i.e., bank-sourced debt).[6] Non-financial corporates had gross loans outstanding at end-2002[7] from both resident

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and non-resident MFIs[8] of approximately €90.2 billion or 67.2 per cent of GDP. In 1995[9] these loans totalled €30.6 billion or 58.1 per cent of GDP [Figure 6].

In recent times businesses have sourced an increasing share of new loans from resident MFIs. The ratio of gross loans outstanding from resident MFIs to GDP ratio was 24.1 per cent in 1995. The corresponding ratio for non-resident MFIs was 34.0 per cent. These positions had reversed somewhat by 2002. The gross position for corporates vis-à-vis resident MFIs at end-2002 was 35.3 per cent [Figure 7] by comparison with 32.1 per cent for non-resident MFIs.

The lending by resident credit institutions is predominantly to businesses operating in property-related sectors. Approximately 52 per cent of all loans have been made to the real estate and construction sectors. The remaining loans are split quite equally across other sectors. For example, the corresponding estimates are 9 per cent for manufacturing businesses, 11 per cent for hotels and restaurants and 12 per cent for the wholesale and retail trade sector.

A substantial share of corporate bank debt is due within one year. Approximately 40 per cent of the value of corporate loans is due to be repaid within one year. A further thirty per cent of loans is due within 1-5 years with the remaining 40 per cent due to be repaid after 5 years.[10]

Figure 6: Total Corporate Borrowing from Resident and Non-resident MFIs
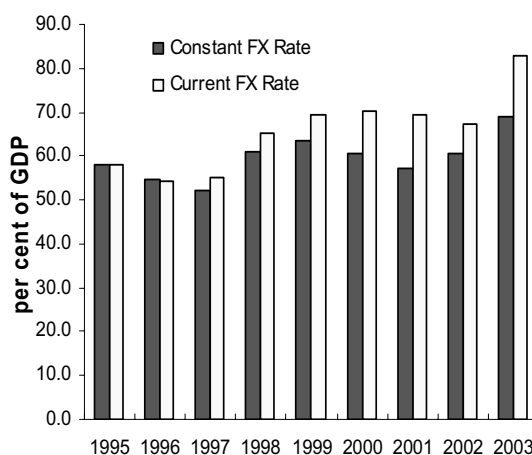
Figure 7: Text
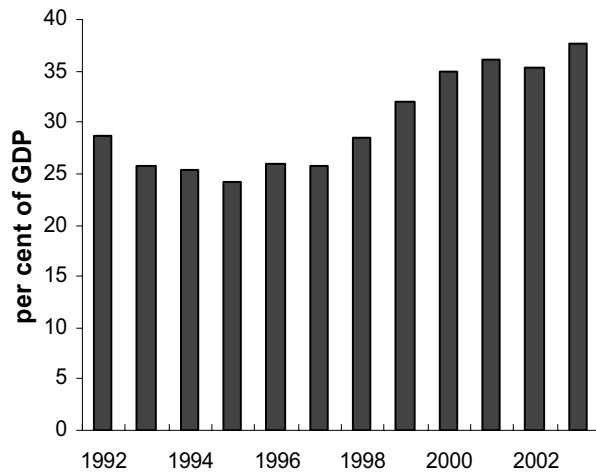
Note: Resident MFIs conduct business through a branch subsidiary physically located in Ireland.

3. EXPLAINING THE GROWTH IN INDEBTEDNESS

The reasons for the recent growth in indebtedness can be classified as to whether they relate to the demand for or supply of finance. The demand for finance has been driven by population growth (i.e. a record 8 per cent growth ord 0.be the 6(em)3(i)4(ed)61990s)r and
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came to the fore in the mid-1950s when it was suggested that liquidity problems in commercial banks were a major cause of balance of payment difficulties at that time. The following years saw the introduction of minimum liquidity ratios and restrictions on credit growth in order to stabilise the liquidity problems in the commercial banks. Credit was restricted to the non-productive sectors (i.e., financial, property and personal sectors) of the economy. These restrictions were relaxed in the mid-1980s. Subsequent deregulation of exchange controls in 1988 and 1992 facilitated borrowing from overseas banks. The persistent decline during the 1990s in the minimum liquidity ratio facilitated greater credit creation by the banks. Finally, the institutional arrangements for setting interest rates began to be dismantled in 1985 and was completed in 1991 [Figure 1]. The net effect of these developments is a credit market that may be more responsive to the prevailing demand for credit.

Historically low credit risks

A by-product of historically high economic growth is lower aggregate credit risk. Credit risk can be most easily thought of as the probability that a borrower will fall into arrears or will default. Credit institutions can be expected to extend greater values of credit when credit risk is relatively lower. Formal models of credit risk for corporates would, for example, include variables such as equity prices, existing indebtedness (most likely measured against the market value of fixed assets), profitability and liquidity (Tudela and Young, 2003; Bunn and Redwood, 2003). All of these relevant variables are more likely to improve during an economic upswing. Credit risk fell during the late 1990s for both households and corporates. The rates of corporate failure and household arrears are indicators of 'realised' credit risks (i.e., the risks materialised). The rate of liquidation of potentially insolvent corporates [Figure 8], defined as those liquidated companies with outstanding unpaid debts[11], fell almost continuously during the 1990s and reached a twenty-year low in 1999 (0.21 per cent). The short-run series on mortgage arrears available for the mid-1990s onwards suggests that mortgage arrears fell also during this period [Figure 9].

Figure 8: Corporate Liquidation Rates
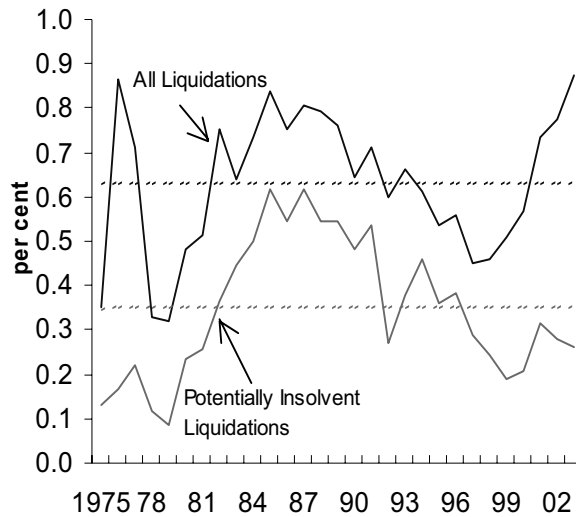
Evolving credit institutions

Irish credit institutions still obtain the majority of their income from the traditional business of intermediating savings and granting loans (i.e., 66 per cent of income in 2001 was interest income) (Doran and Fitzpatrick, 2003). However, there have been a number of innovations in financial markets that facilitate a greater rate of loan growth than would otherwise have been traditionally possible. These innovations allow banks to generate extra funding to facilitate additional lending. The development of securitisation and derivatives are two examples of such innovations. Securitisation is the process of turning non-traded cash-generating assets, such as mortgage loans, into securities that are sold to investors (Fitzpatrick, 2002; Doran

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Figure 9: Total Value of Mortage Arrears at Year End (as a % of Total)
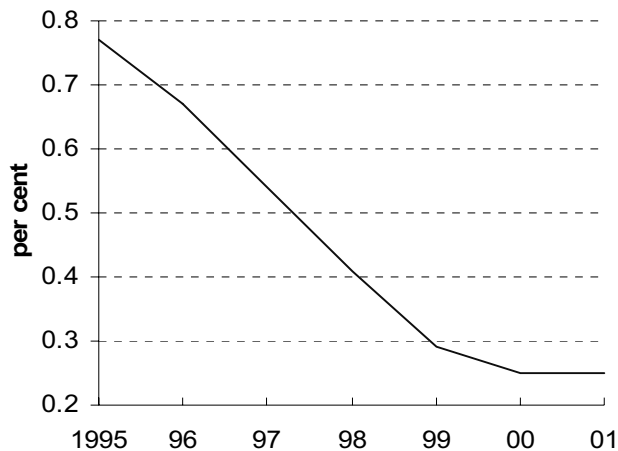
and Fitzpatrick, 2003). One of the benefits of securitisation is access for the institutions to further funding on the basis of which the institutions can offer new loans. This increase in funding occurs because there is an income from the investment bank who purchase the pool of securities (i.e., mortgage loans), the institution is required to hold less capital and/or the institution may receive a fee for continuing to service the loans (i.e., collect the mortgage payments) .The limited available data suggests that securitisation of mortgage loans by Irish credit institutions has grown significantly in recent years. The rate of securitisation reached a peak in 2001 at 11.3 per cent of mortgage loans. Furthermore, it is suggested that this is a higher rate by comparison with other European countries (Doran and Fitzpatrick, 2003). The rating agency Moodys (2003) confirmed that smaller credit institutions without significant retail funding bases have fewer funding difficulties because they can securitise their lending. A very similar story can be told for derivative products which allow a bank to hedge various types of risk in a way that consumes less of the bank's own funds than was the case with traditional hedging strategies (See Brewer *et al*. (2000) for the US evidence).

We now consider certain demand-side changes in the market for credit.

Figure 10: Average Real Corporate and Mortgage Lending Rates
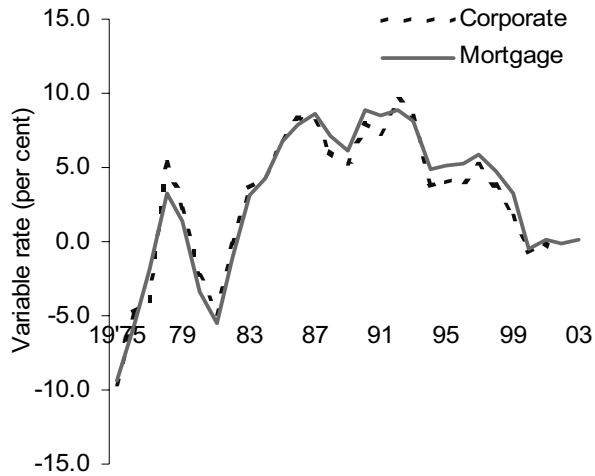
Source: IMF, CBFSAI and author's calculations.
Note: Lending rate is the bank rate that usually meets the short- and medium-term financing needs of the private sector.

Figure 11: Share of Irish Population at Household Formation Age

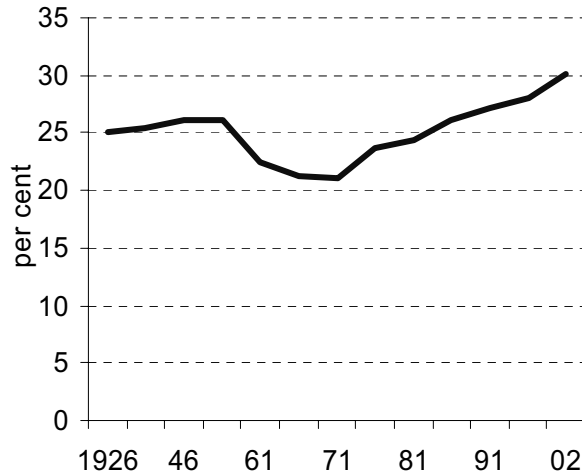*Source: CSO.*
Note: Defined as share of population between 25 and 44 years of age.

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Declining cost of borrowing

The cost of credit declined steadily throughout the 1990s and is very low today by historical standards. Both corporate and mortgage lending rates, in nominal terms, are approximately a quarter of the levels charged between the early 1970s and 1980s. Real corporate and lending rates have declined steadily through the 1990s and are negative today [Figure 10]**.**

A cultural change in appetite for debt

There is some suggestion that there has been a cultural change in Irish society on the issue of personal indebtedness. In essence, it is believed that individuals are more comfortable with higher levels of indebtedness by comparison with their peers in previous decades. This apparent willingness to accept a higher level of personal indebtedness is evident for some recent entrants in the mortgage market. For example, new mortgage applicants in 2000 were borrowing higher debt-to-income ratios from credit institutions by comparison with their peers in the mid-1990s. The median new mortgage applicant accepted a mortgage value equivalent to 1.3 times gross household employment income in 1994 [Table 1].[12] This value had increased to 2.0 times by 2000. The top 10 per cent of new mortgage applicants in 1994 had a debt-to-income ratio of at least 2.6 times. This share had increased considerably by the year 2000 where 20 per cent of households (i.e., the 80th percentile) had a debt-to-income ratio in excess of 2.9 times. Finally, 10 per cent of new mortgage holders had a debt-to-income ratio of at least 4 times gross employment income. Table 1 includes also the debt-to-income ratios calculated on a disposable income basis. Household disposable income is net of income taxes but also includes income from non-employment sources. The same pattern emerges from analysing these data. The debt-to-disposable-income ratios had increased considerably since 1994 and at least 10 per cent of new mortgage holders in 2000 had a debt-to-disposable-income ratio of at least 4.9 times.

Population growth

A recent historic rise in population began in the mid-1990s. The latest census results (www.cso.ie) shows that the population has grown by over 8 per cent since 1996—the second highest increase since 1926. However, whereas the 13 per cent increase recorded in the 1970s, the previous record increase in population, occurred through a natural increase (i.e., the increase in the population was mainly of births), much of the recent increase, slightly more than half, has been through inward migration (i.e., many people of working age). A key observation is that many of the migrants, in addition to many of the resident population, are in the household formation age group. It is suggested that people in this age category are likely to have a relatively higher demand for loans by comparison with older people. The life-cycle hypothesis

Table 1: Distribution of Mortgage Debt to Income Ratios for New Mortgage Holders

Denominator	Debt to income ratio Household gross employment income		Household disposable income	
Distribution	1994/95	1999/2000	1994/95	1999/2000
20th	0.8	1.4	1.1	1.4
40th	1.2	1.8	1.5	2.0
Median (50th)	1.3	2.0	1.8	2.3
60th	1.6	2.2	2.0	2.5
80th	2.2	2.9	2.5	3.3
90th	2.6	4.0	3.0	4.9

Source: Table B in Kearns (2003b).

Note: The 20th percentile shows that 20 per cent of households had an outstanding mortgage debt to income ratio of 0.8 times or less or alternatively, that 80 per cent of households had ratio greater than 0.8 times. The 40th percentile shows that 40 per cent of new mortgage holders had a debt-to-gross-income ratio of 1.2 or less or alternatively that 60 per cent of the group had at least a ratio of 1.2. Each of the other points on the distribution (50th, 60th, 80th and 90th) should be interpreted in a similar fashion.

Income is measured as the sum of both the chief economic supporters and spouses' income. Disposable income is net of income taxes but includes all income from non-employment sources.

New mortgage holders are mortgage holders who have lived in their residence for one year or less.

These data are based on 99 observations (unweighted) in 1994/95 survey and 152 (unweighted) in the 99/00 survey.

would suggest that it is during the household formation age that expenditure is most likely to exceed income. A comparison of the census data since 1926 suggests that the share of the population in the household formation age category is now at a historically high level [Figure 11].

4. WHY IS OVER-INDEBTEDNESS IMPORTANT?

There are three broad categories of potential consequences arising from an increased level of indebtedness among households and corporates. Initially, there is an increased probability for highly-indebted households and corporates to fall into arrears and ultimately default on their debt service costs in the event of an adverse income shock or an adverse shock to the cost of the debt. However, it is suggested that there are important second-round effects also on macroeconomic growth, and ultimately the stability of the financial system, which may arise from a higher level of arrears and bankruptcies.

Micro-effects (corporate bankruptcies and household arrears)
        (a) Corporate bankruptcies
Previous authors have suggested that indebtedness is an important determinant of the rate of failure among companies (Wadhwani, 1986; Davis, 1987; Vleighe, 2001; Bunn, 2003). A higher level of debt finance increases the vulnerability of firms to adverse income shocks. This is because a higher level of debt finance imposes obligatory interest and principal repayments on firms. A common defensive reaction of firms that have suffered an adverse income shock is to reduce discretionary expenses, for example, investment, wages and/or dividend payments (Fazzari *et al*, 1988; Bond and Meghir, 1994; Bernanke *et al*, 1996; Benito and Young, 2001). But the obligatory principal and interest payments have to be met regardless of the state of the firm's income. Thus highly indebted firms can more easily fail under the weight of debt service costs that cannot be met out of current income or cash reserves.

An empirical analysis of company failure in Ireland shows, perhaps co-incidentally with the higher level of indebtedness, that the rate has begun to rise recently after several years over which time the rate halved. However, our econometric analysis, using aggregate annual data for the period 1975 to 2001, suggests that indebtedness has not been a significant determinant of the rate of company failure over the last 25 years (Kearns, 2003a).[13] Our ability to test for this effect in an Irish context is limited by the small number of time series observations and the aggregate nature of the indebtedness data. But the insignificance of the growth rate of indebtedness in explaining the growth rate of the aggregate liquidation rate is in stark contrast to the findings of several previous studies (Wadhwani 1986; Davis 1987; Vleighe 2001; Bunn, 2003). Vleighe (2001) suggests that indebtedness was the key factor driving the rise in the UK liquidation rate in the early 1990s (i.e., when the rate of corporate insolvencies almost tripled). Bunn (2003) conducted a firm-level study in the UK and suggests that the elasticity of the probability of failure with respect to the level of indebtedness (measured as the debt-to-assets-ratio) is approximately 0.4.

        (b) Households' arrears
Similar arguments concerning the impact of households' indebtedness on arrears and the knock-on effects of these arrears on other agents can also be made. Previous analysis suggests indebtedness has been important in increasing the probability of households falling into arrears. Kearns (2003b) used household-level data to explore the reasons why households fell into mortgage arrears during the 1990s.[14] The analysis suggests that a household's mortgage repayment burden, determined in large part by the size of mortgage, was a significant factor in increasing the probability a household would fall into arrears on their mortgage repayments during this time. Several other important and more significant factors by comparison with the repayment burden were also identified. The more significant of these factors were being unemployed (or experiencing a significant drop in household income), having other debt repayments and having other non-mortgage arrears.

Macroeconomic growth

The macroeconomy can depend on the availability of credit. Specifically, it is suggested by 'financial accelerator models' of economic growth that investment and consumption growth can depend very significantly on credit (Bernanke *et al.*, 1998). An important role of the loan market is to help the non-financial sectors of the economy to smooth expenditures in the face of shocks to the economy. However, a reduction in the wide-spread availability of credit can have, through its influence on aggregate levels of consumption and investment, adverse macroeconomic effects. For example, we expect credit institutions to become increasingly fragile during macroeconomic downturns because the value of bad debts is expected to increase during economic slowdowns as income shocks hit both corporates and households. Financial institutions can respond to their increasingly fragile financial situation by curtailing the supply of lending. This restricted supply of finance for corporate investment and household consumption might further reduce aggregate demand. Benito and Young (2002) used firm-level data for the UK to explore how firms adjust to high levels of indebtedness. These authors find that capital investment responds negatively to the stock of debt and to the level of borrowing costs. Furthermore, the level of dividend distributed to shareholders is negatively related to indebtedness and thereby further reduces the income of other agents in the economy. Several authors have attempted to explain the severe UK recession in the early 1990s by reference to the historically high indebtedness of the corporate sector at that time (Young, 1996; Hall 2001).

Banking fragility and financial crises

Corporate failures and household arrears in sufficiently high numbers can be a source of instability in the financial system by forcing banks to write off bad debts and thereby reducing their profitability (IMF, 2001). In an extreme scenario, albeit a rare outcome in a developed economy, these losses could precipitate a banking crisis with substantial costs to the economy (Krugman, 1999; Hoggarth *et al.*, 2002). The average cost of a banking crisis, proxied by the cumulative loss in GDP growth, has been estimated to be equivalent to between 15 and 20 per cent of GDP (Hoggarth et al., 2002). There have been 117 systemic banking crises in 93 countries, defined as any crisis where all or nearly all bank capital was eroded, and a further 51 non-systemic banking crises in 45 countries since 1970 (Caprio and Klingebiel, 2003). Several of the systemic crises occurred in European countries: Spain 1977-1985, Norway 1987-1993, Finland 1991-1994 and Sweden 1991. One of the factors believed to be instrumental in causing these crises is a period of relatively fast credit growth, possible accompanied by rising asset values, in the time period immediately prior to the crisis (Demirguc-Kunt and Detragiache 1997, 1998). It is further suggested that the resolution cost of any bank crisis is higher for crises occurring in bank-oriented economies (i.e., economies where the bulk of intermediation of

savings to investors is completed through banks as opposed to financial markets) such as Ireland (Hoggarth and Saporta, 2002). Well-developed financial markets can intermediate the pool of savings to investors when an adverse shock to banks' financial health weakens their ability and/or willingness to intermediate savings to investors (i.e., a credit crunch). Greenspan (1999) highlighted how markets provided funds in 1990 when banks stopped lending in response to the collapse in the value of real estate collateral. He termed the phrase "spare wheel" to describe the importance of well-developed banks and financial markets to each other.

5. ARE HOUSEHOLDS AND CORPORATES NOW OVER-INDEBTED?

The aggregate indebtedness figures reveal unambiguously that the private sector is more indebted now than at any previous historical moment but the question remains as to whether the growth in indebtedness has been excessive. It would appear to be relatively easy to identify an over-indebted individual borrower. For example, any corporate or household is over-indebted if they appear to have a relatively high probability of falling into arrears or to ultimately default on their existing repayments. It is a greater challenge though to aggregate across households and corporates and to arrive at a decision on whether, in general, the private sector is over-indebted. There are three broad approaches to tackling this challenge. The first two approaches are discussed only briefly because they may be less informative than the final approach.

i)   There are suggested indicators to measure the repayment capacity of any group of agents (IMF, 2001). For example, indicators for the corporate sector are the aggregate sum of current assets (cash and bonds) or the average profit margin. Both of these indicators suggest the repayment capacity of the corporate sector in Ireland has improved in recent times. Aggregate indicators such as the unemployment rate and income gearing (the share of income spent on servicing debt) suggest the repayment capacity of households may be good by historical standards. However, the aggregate indicators are very limited because they aggregate over households and firms with varying levels of indebtedness and indeed over households and corporates with no outstanding debt whatsoever. For example, it is impossible to tell from the aggregate unemployment data whether the newly unemployed are predominantly highly indebted or less indebted individuals. This makes it difficult to assess the impact of any increase in the unemployment rate on the debt-servicing capabilities of the household sector.

ii)   An alternative approach is to analyse the question from the perspective of the lending institutions. The private sector could be

very indebted by comparison with its level of aggregate income but the value of outstanding debt could be relatively small by comparison with the lending institutions' level of provisions and capital. Would this particular example of an economy be identified as over-indebted? This approach is the essence of the stress-testing on lending institutions carried out by financial regulators and central banks. Certainly the stress-tests carried out on the Irish credit institutions have suggested that the institutions would not be adversely affected by even a fairly extreme shock, or even a combination of severe shocks, to the debt-servicing abilities of the private sector.[15]

iii) Our preferred approach involves using household-level and corporate-level data to qualify the aggregate data. An over-indebted private sector is defined as one where borrowers with relatively high probabilities of arrears hold a substantial proportion of the total value of outstanding debt. Therefore, we require a summary indicator, using household-level or corporate-level data, which estimates the share of the value of all debts outstanding in households or corporates with a relatively high probability of falling into arrears. We term this measure "Debt at Risk (DAR)."

Debt-at-risk is a summary indicator of the healthiness or otherwise of the existing stock of outstanding loans at any point in time. It is a summary indicator because it is determined by both the repayment capacity of the borrowers as well as the value of their outstanding debts. The construction of a total household or corporate debt-at-risk measure requires substantial corporate-level or household-level data on arrears, indebtedness and various demographic and financial characteristics. It is possible to find comprehensive data, albeit released with a significant time lag, for households' mortgage indebtedness, mortgage arrears and their financial and demographic statistics.[16] There is less data available for corporates but a rough guesstimate of corporate-debt-at-risk can be made.[17]

Mortgage-debt-at-risk

We can use the example of households with mortgage debts to illustrate the essence of the DAR measure and how it summarises three sets of information in one measure (Figure 2).[18] The first set of information is to identify households with mortgages (i.e., mortgaged households). The financial health of non-mortgaged households is not directly relevant when assessing the debt-servicing capabilities of mortgaged households.[19] The second set of information is to identify the small number of households that hold a disproportionately large share of all outstanding mortgages. In general, these would be households with relatively new mortgages. The third set of information is to identify mortgaged households with relatively high probabilities of being in arrears. MDAR identifies those households that are in all

three information sets, specifically heavily mortgaged households with relatively high probabilities of arrears.

The mathematical calculation of MDAR requires substantial household-level data but can be completed in a few steps. Mortgage-debt-at-risk is the percentage share of the total value of outstanding mortgage loans that are at risk of being in arrears at a point in time. MDAR is calculated by assigning a probability of arrears to every outstanding mortgage. We then multiply the value of each outstanding mortgage by its probability of arrears. This is the value of the debt-at-risk on this particular mortgage. This will be a large figure if the outstanding mortgage is relatively large and the probability of being in arrears is also relatively large. Alternatively, the value could be relatively small if the value of the outstanding mortgage is relatively low and/or the probability of arrears is relatively low. This calculation is computed for every mortgage. We then sum all of these values and then we have an aggregate value of mortgage debt that is at risk of arrears. We then calculate this aggregate value as a percentage of the total value of outstanding mortgages. The key advantage of a measure such as MDAR is how it measures a central concern over residential mortgage lending; in essence, whether the largest mortgages have been borrowed by households with the greatest probabilities of arrears.

The value of MDAR, as well as its importance by comparison with the stock of outstanding mortgage loans, can change over time. Figure 3 is a simplistic description of why MDAR might change between two points in time. First, MDAR can increase from a low level to a relatively higher level because new mortgage lending is being made to households with relatively higher probabilities of arrears. Second, households with a given probability of default are being advanced a much higher value of mortgage loans by comparison with a similar household (i.e., households with similar levels of the probability of arrears) in previous years.

The share of the stock of mortgage loans at risk of arrears has fallen in Ireland between 1994/95 and 1999/00. The data in Table 2 show the aggregate share of the value of all mortgages outstanding that are at risk of arrears. There was 5.6 per cent of the aggregate value of mortgages outstanding at risk of arrears in 1994/95. This share had fallen to 5.0 per cent by 1999/00. Therefore, despite the comparatively large growth in mortgage lending over this time, it does not appear that the new mortgage lending became any more concentrated among households with higher probabilities of arrears.

Table 2: MDAR in 1994/95 and 1999/00

Category	1994/95	1999/00
Total mortgage outstanding (€ billion)	11.35	24.5
Total mortgage-debt-at- risk (€ billion)	0.632	1.23
MDAR (%)	5.6	5.0

Source: Author's calculations.

There are three steps to understand why MDAR has fallen over this period:

i) although the total number of mortgages had increased quite considerably between both surveys (19.7 per cent), the share of mortgaged households in the state has increased only marginally;

ii) the distribution of mortgage debt had become more concentrated in a small number of households by 1999/00 and their demographic and financial characteristics became disproportionately more important when assessing the risks to the total stock of outstanding mortgages; and

iii) the probability of arrears is lower because several of the determining factors have improved between both surveys and especially for the subgroup of 'heavily mortgaged households'[20],

How many households are mortgaged households?

Mortgaged households are a minority of all households in the state. The surveys suggest that the share of all households who own their house outright has increased slightly to almost 48 per cent between both surveys [Table 3] with the remaining share of households either with a mortgage or renting. Approximately one third of households have a mortgage on their residential property but this total includes mortgages sourced from local authorities. Just over one quarter of all households had a mortgage sourced from a Building Society or a Bank in 1999/00. The comparable estimate in 1994/95 was almost 22 per cent.

The disproportionately important 'heavily mortgaged households'

A minority of mortgaged households hold a disproportionately large share of the value of mortgages sourced from banks and building societies. In general, these will be newly mortgaged households where the majority of the principal is still outstanding. The distribution of the value of outstanding mortgages was very

uneven across households and became more uneven through the 1990s. A small number of

Table 3: Household Tenure

Category	1994/95	1999/00
	% share	
Owns outright	44.5	47.7
Mortgage	32.3	32.7
Rent and TPS	23.1	19.6
All households	100.0	100.0
of which mortgages:	32.3	32.7
- Building societies[a]	14.6	16.4
- Bank and other	7.2	9.7
- Insurance and HFA	1.1	0.7
- Local authority	9.5	6.0
Memo:		
Number of households	1,039,978	1,229,892

Source: CSO's Household Budget Surveys & author's calculations. Note: (a) When mortgage was issued.

Table 4: Distribution of the Value of Mortgage Debt Outstanding Across Households

Cumulative share of mortgage debt outstanding – %	Cumulative share of the number of mortgaged households – %	
	1994/95	1999/00
10	3.5	1.7
20	8.2	5.1
30	13.7	9.3
40	20.0	14.5
50	27.2	20.9
60	35.3	28.4
70	44.8	37.5
80	56.0	48.5
90	69.6	63.6
100	100.0	100.0

Source: CSO's Household Budget Surveys & author's calculations.

households accounted for the majority of mortgage debt outstanding. Table 4 shows the cumulative distribution of the value of mortgages outstanding across households. In general the data show that:

> i) very few mortgaged households account for a disproportionately large share of the mortgage debt outstanding at both points in time and

ii)that the mortgage debt became more concentrated after the 1994/95 survey.

The data show 1.7 per cent of households held 10 per cent of the value of mortgages outstanding and that half of all mortgage debt was held by almost 21 per cent of households in 1999/00. The comparable estimated shares were higher in 1994/95. For example, 3.5 per cent of households, approximately double the 1999/00 estimate, held 10 per cent of the outstanding mortgage debt. This skewed distribution is important because it implies that the default risk of a substantial portion of outstanding mortgage debt is dependent on the characteristics of a small number of mortgaged households.

The probability of arrears in 1994/95 and 1999/2000

The probability of arrears, estimated using a model that looked at the characteristics of households in mortgage arrears during the mid-1990s[21], had fallen for most households between 1994/95 and 1999/00. The average probability was 5.8 per cent in 1994/95 and the comparable estimate in 1999/00 was 5.3 per cent [Table 5]. The decline in the average probability was reflected across the entire distribution of mortgaged households. Interestingly, when we just look at the subgroup of heavily mortgaged households, the probabilities of default dropped more substantially over time by comparison with all mortgaged households. In the earlier survey, this subgroup of mortgaged households had an average probability of default just marginally smaller by comparison with all households. However, the data suggest that the average probability of arrears for this subgroup has become significantly smaller by comparison with all households. The average probability of arrears was 4.6 per cent and this was almost three quarters of a percentage point lower by comparison with all mortgaged households.

Table 5: Distribution of Probabilities of Arrears of Mortgaged Housholds

Probability of Default:	All Mortgaged Households		Most heavily mortgaged households	
	1994/95	1999/00	1994/95	1999/00
Average	5.8	5.3	5.6	4.6
Distribution:				
20th Percentile	1.2	1.1	1.3	1.1
40th Percentile	2.2	2.0	2.4	1.9
Median	3.1	3.0	3.5	2.6
60th Percentile	4.5	4.1	5.6	3.7
80th Percentile	9.2	8.2	10.7	8.4

Source: Author's Calculations

A change in the probabilities of arrears over time is driven by changes in the underlying demographic and financial characteristics of each mortgaged household. The data in Table 6 summarises the characteristics pre-disposing households to fall into arrears during the mid-1990s. The left-hand side of the table shows the percentage of all households with a particular characteristic (for example, the chief economic supporter is unemployed) that fell into mortgage arrears in the next year. The right-hand side of the table shows the corresponding rate for a benchmark group of households (for example, we compare unemployed households with households where the chief economic supporter is professionally employed). The data in this table suggests that unemployed households were eight times more likely, by comparison with a professionally employed household, to subsequently fall into mortgage arrears. Several other factors in increasing a households' probability of falling into arrears were also identified. The more significant of these factors were having non-mortgage arrears and not saving regularly

Table 6: Characteristics Pre-disposing Households to Fall into Mortgage Arrears

Characteristic:	Rate of arrears	Comparison Group	Rate of Arrears
	%		%
Unemployed	10.5	Professional employed	1.3
Unskilled manual worker	9.1	Professional employed	1.3
In arrears on other debts	8.8	Not in arrears on other debts	2.4
In arrears on utility bills	7.2	Not in arrears on utility bills	2.3
Not regular savers	3.9	Regular savers	0.7
> 30% repayment burden	2.8	<10% repayment burden	2.1
Mortgage 1 to 5 years old	2.6	Mortgage 11+ years	2.3

Source: Kearns (2003b)

The combination of all the factors listed in Table 5 determines a different level of probability of arrears for each individual household. The aggregate probability of arrears fell between both surveys because several of the determining factors had improved and especially for the 'heavily mortgaged households'. Specifically,

i)   repayment burdens had lightened,

ii)   the propensity to save had improved,

iii)   mortgages were more concentrated among
        professional/managerial grades of employees, and

iv)   households' income remained overwhelmingly composed of
        employment income as opposed to property or other investment
        income.

There was one significant factor, which determined the probability of being in
arrears and which deteriorated between both surveys. Mortgaged households had a
greater propensity to have to repay other non-mortgage debts in 1999/2000.
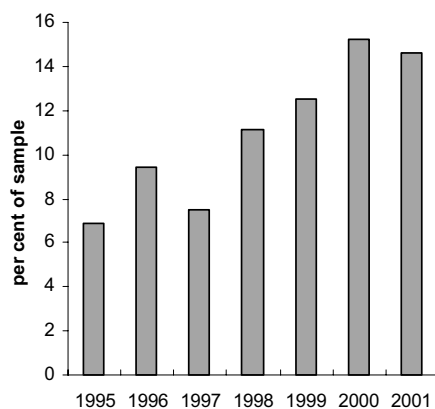
Corporate debt-at-risk

The essence of the measure of corporate-debt-at-risk (CDAR) is exactly the same as
MDAR. The aim is to estimate the share of the total value of outstanding corporate
debt that is held by corporates with relatively high probabilities of falling into
arrears. We use company accounts information to identify those corporates with
debt on their balance sheets and also those corporates with a relatively higher
probability of arrears. The data on corporates' financial accounts differs in some
respects to the mortgage-level data. First, the data is based on a sample of
companies and the sample differs across years.[22] Second, the data is available on an
annual basis and we therefore calculate CDAR on an annual basis.

We classify our sample of corporates, for each year separately, into a group of
businesses that are at risk of arrears and are not at risk of arrears. We cannot
estimate a distribution of probabilities of arrears for each firm, in similar fashion to
the approach adopted with the mortgage-level data, because we do not have any
arrears history for each firm. However, we can adopt a similar approach and predict
whether a company has a high or low probability of falling into arrears based on the
level of its gearing, liquidity and profitability. Previous authors have modelled the
failure of companies and found the probability of failure and default to increase with
the level of indebtedness and to be inversely related to the level of liquidity and
profitability (Geroski & Gregg, 1997; Benito & Vleighe, 2000; Bunn & Redwood,
2003).[23] Therefore, we rank our sample of firms according to the level of their
indebtedness, liquidity and profitability and label those firms that are among the
most indebted, least liquid and least profitable firms as those with a high probability
of failure.[24] A firm that is in all three groups is classified as 'at risk of arrears'. The
share of all firms at risk of falling into arrears has increased in recent years and was
approximately 14.6 per cent in 2001 [Figure 12].

Corporate debt-at-risk has increased in 2000 and 2001 by comparison with the
levels in the mid-1990s (Figure 13). The data in Figure 13 show the share of the
value of all outstanding debt that is held by the subsample of firms with a high
probability of arrears. This share was approximately 19.3 per cent in 1995 and
approximately 24.3 per cent in 2001. Furthermore, the share dropped to

comparatively low levels during the late 1990s. The value of CDAR in 1996 was 65 per cent. This is due to one large firm entering the sample of firms that 'were at risk of arrears'. This firm account for over half of the total value of debt-at-risk in 1996. This observation illustrates a very interesting point about corporate indebtedness in Ireland; namely,

Figure 12: Firms at 'Risk of Arrears'

Figure 13: Corporate-Debt-at-Risk
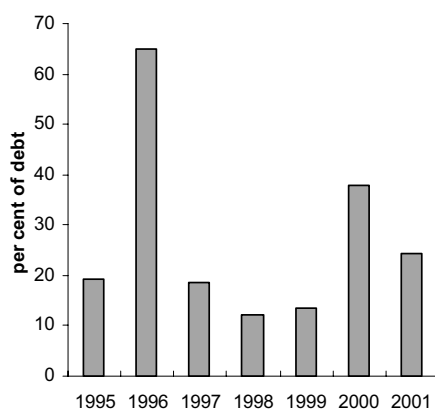
Note: Corporate-debt-at-risk is share of debt in firms 'at risk of arrears'.

that the distribution of indebtedness across firms is very skewed. Approximately, one per cent of firms account for nearly two-thirds of all outstanding debt in 2001 and ninety per cent of all debt is held by approximately 10 per cent of firms.[25]

Therefore, ten per cent of the remaining debt is spread across 90 per cent of firms. Thus the level of corporate debt at risk in the economy, suggested by this indicator, can be very sensitive to the financial health of a handful of large corporates. However, this observation emphasises the importance of using corporate-level data in any discussion of the indebtedness of the corporate sector in general.

6. SUMMARY AND CONCLUSIONS

Household and corporate indebtedness has soared in recent years and is now at historically high levels. The debt-to-GDP ratio changed little over the 45 years prior to the mid-1990s and any change occurred gradually over many years. But the experience since the late 1990s has been very different. Aggregate indebtedness has increased from approximately 45 per cent of GDP in 1994 to over 110 per cent in 2002. The Irish private sector's debt-to-income ratio is relatively high now by international comparison. The central question addressed in this paper is whether Irish households and corporates are now over-indebted.

Personal-sector indebtedness has approximately doubled over the last decade. However, the composition of the debt, namely the over-whelming share of mortgage debt, has not changed during this time. Corporate indebtedness has increased in similar fashion. The share of this debt sourced from resident credit institutions, as opposed to overseas institutions, has increased also.

There are many plausible explanations behind the recent rise in indebtedness. These explanations can be categorised as to whether they affect the supply of credit (i.e., the changing regulatory environment for credit institutions, historically low credit risks and developments in the banking business) or the demand for credit (i.e., the decrease in the cost of borrowing, a cultural change in the appetite for debt and the growth in population).

This paper assesses whether the recent growth in indebtedness has been excessive and if households and firms are now over-indebted. This is an important question for several reasons. Previous authors have suggested over-indebtedness can lead to increasing bankruptcies among firms and an increasing incidence of arrears among households. Furthermore, there may be adverse knock-on effects arising from the higher rate of bankruptcies and arrears on the wider macroeconomy and/or the health of the financial system.

There are several types of analysis that could be used to measure whether the private sector is now over-indebted. First, we could adopt the IMF approach of analysing

aggregate indicators of the private sector's repayment capacity (for example, unemployment rates or growth in disposable income etc). Second, we could benchmark the indebtedness of the private sector against the size of the financial system and test the health of the credit institutions across various scenarios of arrears and bankruptcies in the private sector. Finally, we could develop an indicator, using household and corporate-level data that summarises the financial health of the borrowers and the most heavily indebted borrowers in particular. This method allows us to gauge whether the most heavily indebted households and corporates have sufficient income or savings to justify their indebtedness. This measure is called 'debt-at-risk'.

Debt-at-risk is estimated for both households and corporates in Ireland. This analysis suggests that households and corporates may not be as over-indebted as the credit growth figures suggest when micro-data is used to examine the financial health of the most indebted borrowers. The analysis suggests that debt-at-risk among mortgaged households fell during the late 1990s because the majority of the outstanding mortgage debt was concentrated in a small number of households with relatively low probabilities of falling into arrears. In contrast, corporate-debt-risk does appear to have increased somewhat by comparison with the early and mid-1990s. However, the vast majority of corporate debt is concentrated in a very small number of firms and consequently, any change in the financial condition of these firms, has a disproportionately large impact on the 'debt-at-risk' measure.

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