Profiling the indebtedness of Irish SMEs

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Abstract

While much is known of the magnitude and performance of SME debt in Ireland, up to this point no measure of SME indebtedness has been available for a representative sample of the population. Survey data on the ratio of Debt to Turnover (DT) for Irish SMEs in 2012 and 2013 are presented here, with the data revealing that one third of SMEs carry no debt, while 84 per cent of SMEs have a DT of less than one third. 7 per cent of SMEs have a DT of greater than one, with a small percentage of firms having debt levels that are orders of magnitude larger than turnover. An analysis of the impact of DT on financial health indicates that, as DT gets larger, solvency and default risk deteriorate, even at low levels of DT. The impact tapers among firms with the very highest levels of DT - among these heavily indebted firms whose default risk is higher than firms at all other points in the DT distribution, an increased DT does not act to further increase default and solvency risk.

Keywords: Debt Overhang, SMEs, Default risk, Financial Stability.

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1 Introduction

The over-indebtedness and resulting loan arrears of Irish Small and Medium Enterprises (SMEs) are issues of crucial policy importance, with far-reaching macroeconomic implications: international evidence suggests that recoveries following financial crises are more protracted the larger the extent of pre-crisis debt accumulation,[1] while SMEs with large debt burdens are more likely to enter arrears or liquidation, to shed employment, and are less likely to invest and expand.[2] To date, information has been available on the loan *performance* of firms in Ireland. As of 2013 Q4, the impairment[3] rate on Irish SME and Corporate lending by domestic banks was 32.4 per cent, indicating significant distress in the sector.[4]

Loan-level data from banks can only provide part of the picture on firm indebtedness: loan level data represent a sub-sample of the SME population in that all firms not carrying bank debts are excluded from the data by construction. Further, a lack of SME balance-sheet information in the data available to the Central Bank of Ireland has meant that while information on *debt levels* of SMEs banking with domestic[5] Irish banks is available, no measure of *indebtedness* is available for a representative sample of Irish SMEs. Such a measure requires a firm-specific denominator against which to measure the debt level of the firm, such as turnover or assets. The Red C SME credit demand survey, carried out six-monthly on behalf of the Department of Finance, allows this information gap to be filled.

This Letter presents introductory descriptive statistics on the Debt to Turnover ratio (DT) for a representative sample of Irish SMEs in 2012 and 2013. The data reveal a number of novel findings:

1. 34 per cent of SMEs report having no debt.
2. 84 per cent of SMEs have a Debt to Turnover ratio of less than one third.
3. 7 per cent of SMEs have a Debt to Turnover ratio of greater than one.
4. Medium-sized[6] firms are more indebted than Micro and Small firms - 11 per cent of these larger SMEs have a DT greater than one, versus 5 and 6 per cent for Micro and Small firms, respectively.

A profile of the DT distribution of Irish SMEs provides novel and interesting information for policy makers. However, such analysis can be complemented by an attempt to identify the relationship between DT and firms' financial health, which allows us to broach the question of whether high levels of DT should pose concern. The Red C data do not provide an adequate measure of financial health with which to carry out such an analysis. Two additional data sources with information on DT are examined with both showing a consistent pattern of increasing DT leading to increased default risk and decreased SME solvency. The data do not, however identify a "tipping point" beyond which the nature of the relationship between DT and financial health changes. Rather, increases in DT appear to incrementally negatively impact firm financial health, even at low levels of DT.

Section 2 describes the Red C data; Section 3 reports descriptive statistics on the Debt to Turnover ratio for Irish SMEs; Section 4 analyses the relationship between DT and financial health; Section 5 concludes.

2 Data

The Red C *SME Credit Demand Survey*, commissioned by the Irish Department of Finance, is carried out on a six-monthly basis. Each survey wave contains responses from an employment-weighted

[1] The Task Force of the Monetary Policy of the ESCB (2013) provide a summary of evidence from a range of previous financial crises. Data is also presented on pre-crisis debt accumulation and post-crisis investment levels. A clear negative relationship is exhibited, with Ireland being the euro area country with the largest debt accumulation to 2008 and largest subsequent investment collapse.

[2] Coulibaly and Millar (2011) show that the chief determinant of a marked decline in investment in the aftermath of the Asian financial crisis was the balance sheet restructuring of firms. Lawless, O'Connell and O'Toole (mimeo) show that firms with a higher ratio of Debt to Turnover in Ireland are likely to have lower employment and investment levels.

[3] Loan impairment is defined here as 90 days past due, or where the obligor is deemed by the lender to be unlikely to repay its debt to the bank without giving up any pledged collateral.

[4] The Central Bank of Ireland *Macro-Financial Review* 2013-II reports the corresponding number for 2013 Q3.

[5] The term "domestic bank" refers here to those institutions subject to the 2011 Financial Measures Programme.

[6] Micro firms are those with less than 10 employees, Small firms have between 10 and 49 employees, while Medium firms have between 50 and 249 employees.

representative sample of 1,500 SMEs, with information provided on firm characteristics, demand for external financing, approvals of applications for external financing, and awareness of governmental supports. The most recent wave available for research covers the period March - September 2013.

3 The DT distribution

Information on both Debt and Turnover is available for 2,508 firms in the three survey waves March 2012 to September 2013. Table 1 reports the breakdown of the Debt to Turnover ratio (DT) into four categories:

1. Firms with no debt
2. Firms with $0 < DT < \frac{1}{3}$
3. Firms with $\frac{1}{3} < DT < 1$
4. Firms with $DT > 1$

The numbers reported in Table 1 show that overall, one third of Irish SMEs carry no debt. This number is similar for firms classified as Micro, Small or Medium. In the absence of a literature on DT as an indicator for sustainable enterprise debt burdens, firms are categorised as having a DT below or above one third, as this is a ratio typically used as a threshold for sustainable mortgage payments to monthly income in the literature on household financing. The data show that in Ireland, 83.7 per cent of SMEs have a DT of less than one third. Of the 16.3 per cent of SMEs that have a DT greater than one third, 7 per cent have a DT that is greater than one.

Observing the categories of DT split by company size, the data show that Medium-sized firms are those with the highest debt burden. 11.7 of these firms have a DT greater than one, compared to 5.9 and 5.4 per cent for Micro and Small firms, respectively.

Table 2 reports the differing patterns of indebtedness across sectors of the economy. The Hotels and Restaurants sector is the sector with the highest share of high-DT firms, with 29.3 per cent of firms have a DT greater than one third, as opposed to an economy-wide average of 16.3 per cent. Zero-debt firms are most prevalent in the Financial and Real Estate sector, while highly indebted firms are least prevalent in the Construction and Wholesale and Retail sectors, both of which have 13.1 per cent of surveyed firms with DT levels greater than one third.

Figure 1 plots the full distribution of DT, with dashed vertical lines marking DT levels of one third and one. The picture confirms the concentrated nature of the distribution, with the majority of firms having relatively low DT levels, while extremely high levels of DT are found among a small percentage of the overall population

4 Does high DT matter?

Previous literature has not normally focussed on DT as a measure of financial distress or debt sustainability for SMEs. Traditionally, measures such as Debt Service Cover Ratio (net operating income divided by total debt service), EBITDA[7] or the interest coverage ratio[8] are used in the banking industry to analyse the ability of a firm to repay its debt. As discussed in the introduction, due to data availability in Ireland, the DT ratio that can be calculated using the Red C SME surveys is the only measure of indebtedness available for a nationally representative sample of firms.

Having documented the degree of indebtedness of Irish SMEs in Section 4, we now attempt to answer the question: *Does it matter if a firm has a high DT ratio?* Given that international academic literature has not generally used DT as a predictor of firm financial distress, it is not possible to point to previous work to allow us to identify relationships and tipping points between DT and distress. Due to limitations in relevant data availability in Ireland, two separate analyses are carried out here using independent data sources:

1. A loan-level data (LLD) sample of 7,000 large SME loans at December 2010 submitted to the Central Bank of Ireland as part of the 2011 Financial Measures Programme. Financial distress is captured in this data set by an indicator for Basel II default (loans greater than 90 days past due, or deemed unlikely to repay without giving up collateral). In Figure 2 the DT distribution is plotted for the Red C survey's indebted firms, and the

[7] Earnings before interest, tax, depreciation and amortization.
[8] Earnings before interest and tax, minus interest expenses.

LLD. The distributional plots reveal that, despite the LLD's skewing towards larger companies, the shape of the DT distribution is similar to that in the representative sample.

2. A sample of 11,000 Irish firms over the years 2006-2012 from the Bureau Van Dijk $FAME$ data base. Financial distress is measured by an asset-based Solvency Ratio: $SR = \frac{IssuedCapital+TotalReserves}{TotalAssets}$

Neither of these data sets contain a representative sample of the Irish SME population, with both data sets being biased towards Medium and Large firms. However, in analysing both concurrently, common messages can be drawn from the data. Figure 3 plots the default rate in each percentile of the DT distribution from the Central Bank loan level data. The data show a clear positive relationship between DT and loan default - where DT is below one third, default rates are mostly below ten per cent. Between the two vertical dotted lines, where DT lies between one third and one, default rates range from 5 to 20 per cent. Beyond a DT one one, default rates continue to rise, ranging from 8 to 25 per cent.

The mean Solvency Ratio from the FAME data is plotted for each percentile of the DT distribution in Figure 4. The data are split between pre- and post-crisis years to allow for any structural shift in the relationship. The data show that, up to the 80th percentile of DT, firms' solvency continues to disimprove, but that among the 20 per cent most heavily indebted firms, for whom solvency ratios are extremely low, incremental increases in DT do not lead to futher sovency deteriorations.

Finally, the impact of shifts along the DT distribution on firm financial health are tested more formally using the two data sets described above. The following regression models are run on the FAME (1) and loan level data (2):

$$Solvency = Qtile_{DT} + DT * Qtile_{DT} \quad (1)$$

$$Pr(D) = fn(Qtile_{DT}, DT * Qtile_{DT}) \quad (2)$$

where $Qtile_{DT}$ is a dummy variable indicating the quartile of the DT distribution in which the firm is located, while $DT * Qtile_{DT}$ is an interaction of the quartile indicator with the firm's DT level. By including both the dummy variable and the interaction term, we test whether there is an effect of DT on financial health across quartiles, within quartiles, or both. (1) is run as an OLS model explaining firms' Solvency Ratios, while (2) is run as a logistic model of the probability of default ($Pr(D)$). The results are reported in Table 3. In both the logit and OLS models, a remarkably similar series of results are found:

1. Financial health is weaker, in increasing increments, as one moves from the first to the fourth quartile of DT. The only exception to this rule is the third quartile in the logit model.

2. Within each of the first three quartiles of the DT distribution, a higher DT is also associated with weaker financial health *within the quartile*.[9]

3. In both models, a higher DT is not associated with weaker financial health within the top 25 per cent of firms.

Clear evidence of the positive relationship between DT and financial health emerges from the models of Table 3: moving from the first to the fourth quartile of the DT distribution, Solvency Ratios are lower and default rates are higher in each quartile. Controlling for this cross-quartile incremental deterioration of financial health, a higher DT *within* a quartile is associated with an additional detrimental impact, until the fourth quartile of the distribution. For those firms with the highest levels of DT, increases in DT are not reliable indicators of further disimprovements in solvency or default risk.

5 Conclusion

In this *Letter* novel statistics on firm indebtedness in Ireland have been presented using a representative sample of SMEs from 2012 and 2013. One third of SMEs are reported as not carrying any debt. The data suggest that incidences of extremely high indebtedness (a Debt to Turnover ratio greater than one) are not as common in the Irish SME population as might be expected given the extent of difficulties in Irish SME loan repayment. Analysis of the link between DT and SME financial health shows that incremental increases in DT are associated with increases in default rates

[9] The only anomaly to this pattern is the second quartile in the logit model.

and decreases in solvency at all points in the DT distribution until the most indebted 25 per cent of firms, at which point the relationship levels off. No discrete "trigger point" values of DT can be identified in the data.

References

[1] Coulibaly, B. and J. Millar, (2011). Investment Dynamics in the Aftermath of the Asian Financial Crisis: A Firm-Level Analysis, International Finance, Wiley Blackwell, vol. 14(2), pages 331-359, 06.

[2] Lawless, M., O'Connell, B. and C. O'Toole (2014). Debt overhang and firm performance, mimeo Economic and Social Research Institute.

[3] Task Force of the Monetary Policy Committee of the ESCB, Diego Rodriguez-Palenzuela, Matthieu Darracq-Paries, Giacomo Carboni, Annalisa Ferrando, Petra Kohler Ulbrich and Marie-Denise Zachary (2013). Corporate finance and economic activity in the euro area, Occasional Paper Series 151, European Central Bank.

Tables and Figures

Table 1: Debt to Turnover by Firm Size

Size	Zero Debt	0 to 1/3	1/3 to 1	≥ 1
Micro	36.1	49.8	8.3	5.9
Small	32.2	52.9	9.4	5.4
Medium	32.4	45	11	11.7
Total	33.8	49.9	9.3	7

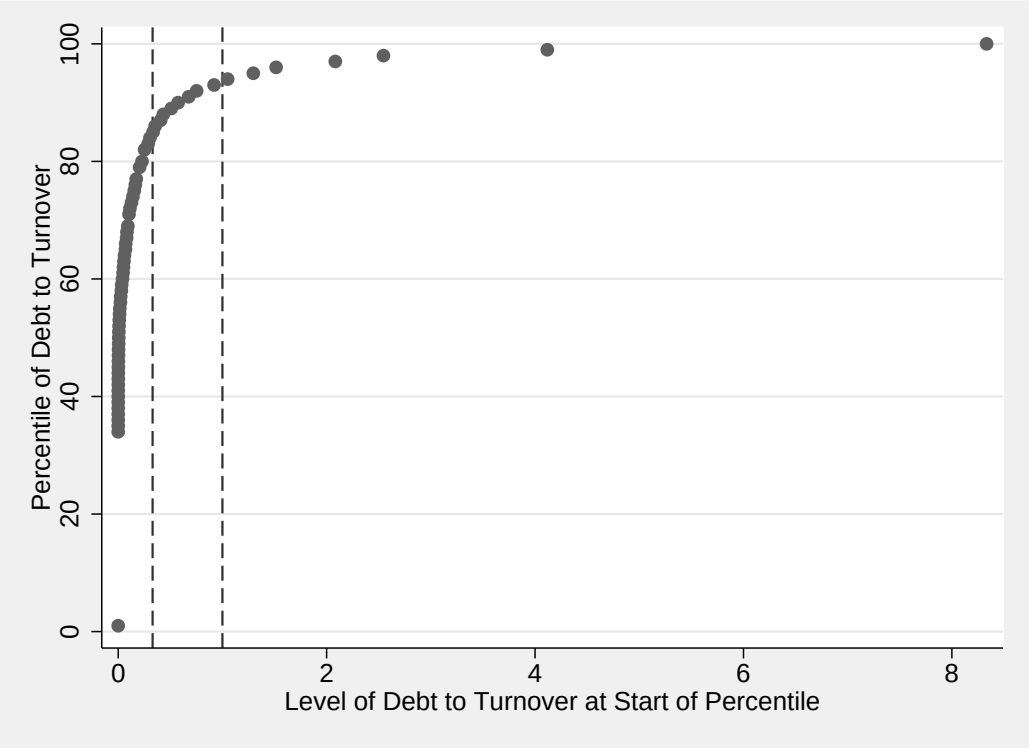
Rows sum to 100

Table 2: Debt to Turnover ratio by Sector

Sector	Zero Debt	0 to 1/3	1/3 to 1	≥ 1
Agri/Industry	32.2	52.6	8.9	6.3
Construction	37.7	48.3	9.3	4.7
Financial and Real Estate	45.4	37.7	8.5	8.5
Hotels and Restaurants	24.5	46.1	11.5	17.8
Services	37.3	46.6	8.7	7.4
Wholesale and Retail	31.5	55.4	9.4	3.7
Total	33.8	49.9	9.3	7

Rows sum to 100

Figure 1: Debt to Income Distribution for Irish SMEs[a] [b]

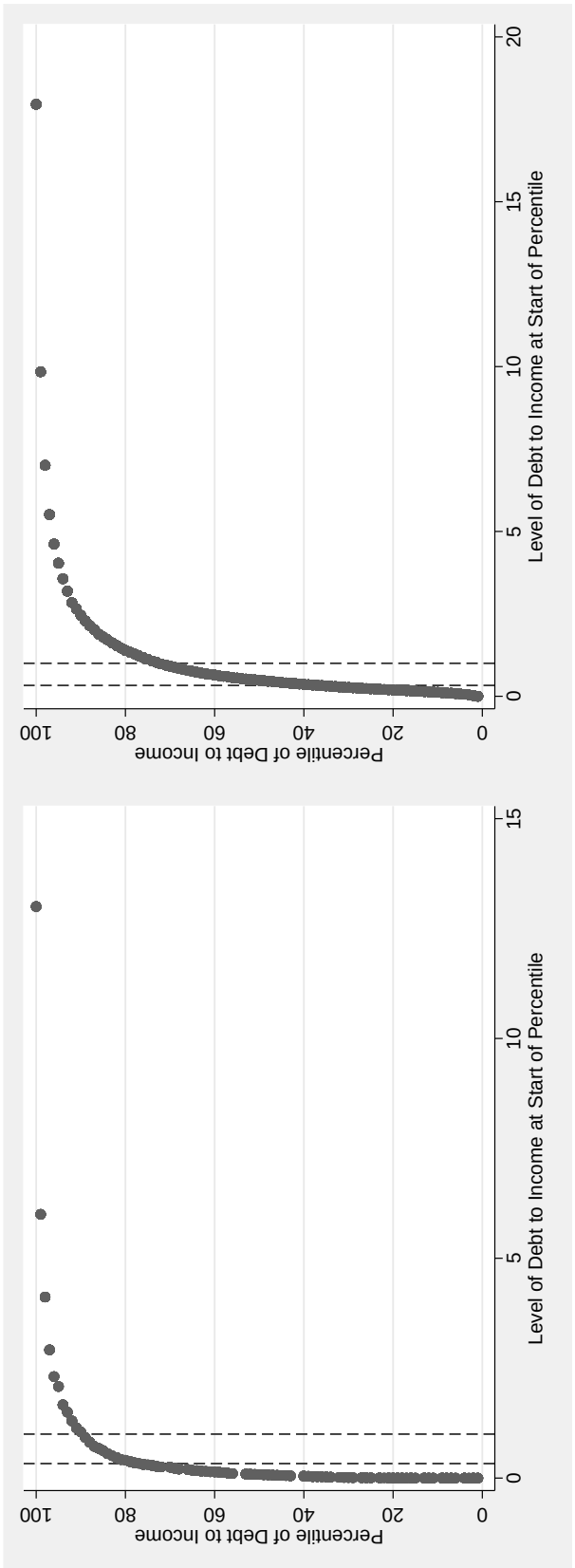


[a]Source: Red C SME Credit Demand Survey, 2011-2013.
[b]Dotted lines at DT=1/3 and DT=1

Table 3: Regressions of solvency and default on within and across-quartile DT

	OLS		Logit	
	Coeff.	S.E.	Coeff.	S.E.
Cross-quartile effects				
DT Quartile 2	-13.9***	1.854	0.201**	0.086
DT Quartile 3	-26.2***	1.382	0.177***	0.073
DT Quartile 4	-52.9***	1.136	0.310***	0.069
Within-quartile effects				
DT^*Q1	-108.1***	11.675	0.455**	0.197
DT^*Q2	-31.0***	4.402	0.040	0.095
DT^*Q3	-3.6***	0.336	0.067***	0.034
DT^*Q4	0.00003	0.000	0.000	0.000
Constant	56.8	0.993		
Sample	11,448		6429	

OLS model using $FAME$ data; logit model using Loan Level Data.
Marginal effects at the mean reported in logit model.
***,** ,* indicates significance at 1, 5 and 10 per cent, respectively.

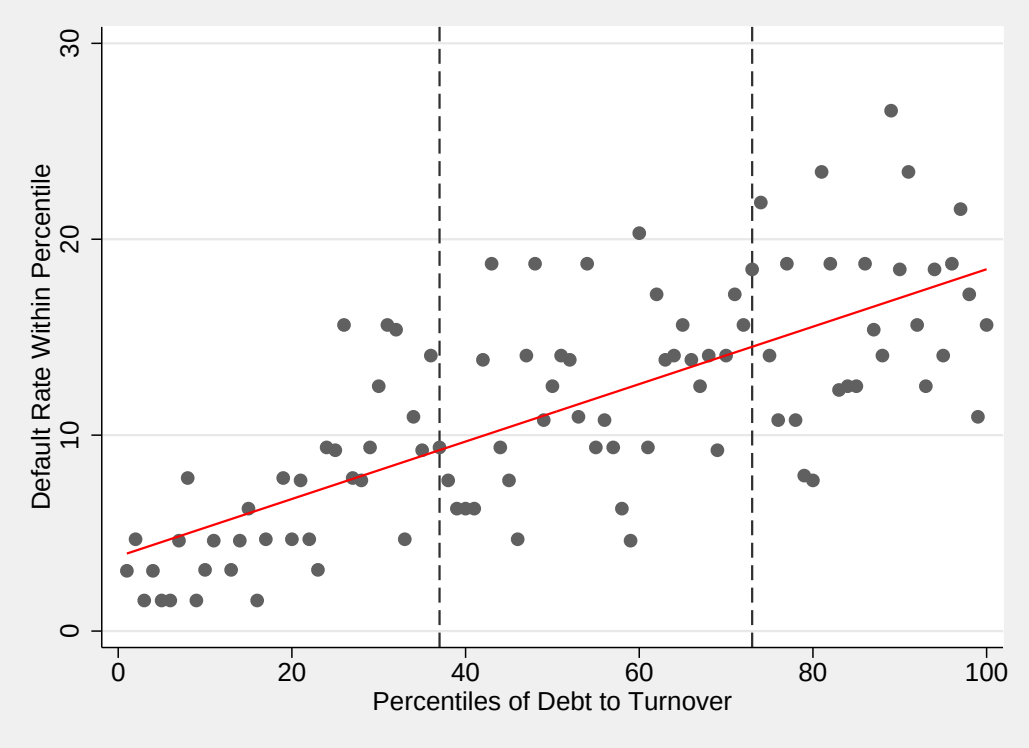


(a) Red C Survey, with zero debt firms removed

(b) 2010 Loan Level Data sample

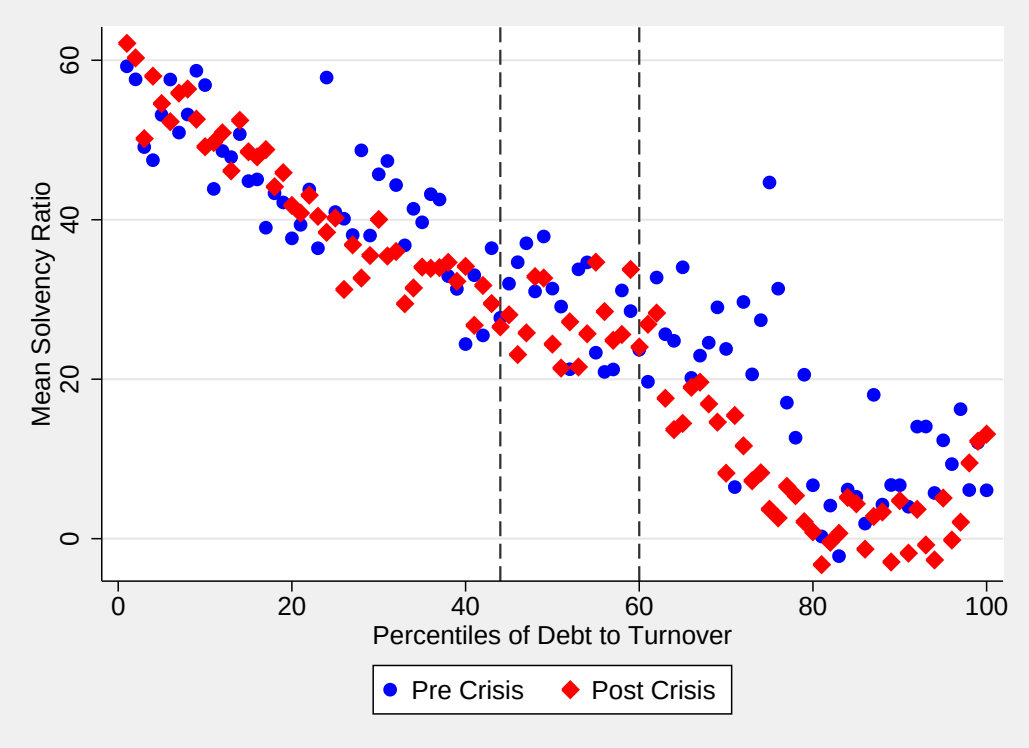
Figure 2: Comparing the DT distribution between survey and loan-level data

Figure 3: Default rate within percentiles of DT distribution[a] [b]



[a]Source: 2010 Central Bank of Ireland loan level data; sample of 7,000 large SMEs.
[b]Dotted lines at DT=1/3 and DT=1

Figure 4: Solvency Ratio across the distribution of DT[a] [b]



[a]Source: Author's calculations, $FAME$ data base 2006-2012.
[b]Dotted lines at DT=1/3 and DT=1. Pre-crisis defined as 2006 and 2007; Post crisis defined as 2008-2012.