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## Property debt overhang: the case of Irish SMEs

Fergal McCann &  
Tara McIndoe-Calder

*Balance Sheet Recovery  
of Households and Firms*

30th Jan 2015



# Disclaimer

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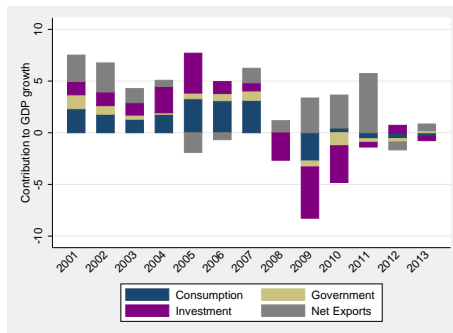


## Motivation

- ▶ SME loan performance is important for employment.
- ▶ Performance of SME loans has a material impact on loan losses.
- ▶ Property debt overhang on Irish SMEs represents a significant risk to Irish economy.
- ▶ Debate around SME property exposure has been characterised (to date) by a lack of reliable, statistical information.



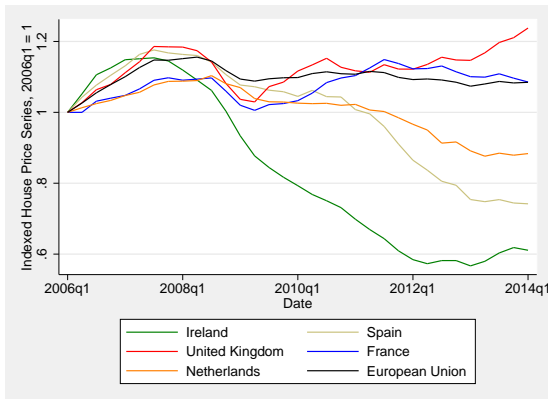
# Components of GDP growth, 2001 to 2013



*Source:* Central Statistics Office “Expenditure on GNP at Current Market Prices (Seasonally Adjusted) (Euro Million) by Expenditure Item and Quarter”.



# House prices in selected countries, 2006 to 2014



Source: Eurostat house price series.



# Overview

- ▶ Survey and (Central Bank of Ireland) loan-level data used here to quantify some of these risks:
  - ▶ Size of SME property-related debt exposure?
  - ▶ Performance of these property loans?
  - ▶ Performance of non-property-related SME loans?
  - ▶ Credit risk and intensity of property debt?
- ▶ Towards causation:
  - ▶ SME default model with property debt measures.
  - ▶ Propensity score matching (in absence of alternate identification channels).

Figure: Outstanding Balance, December 2013 (Total €67.6bn)

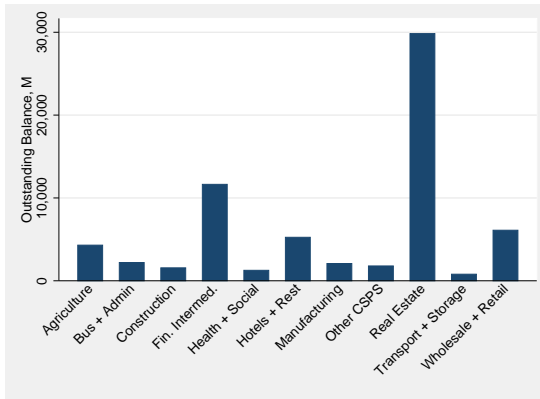
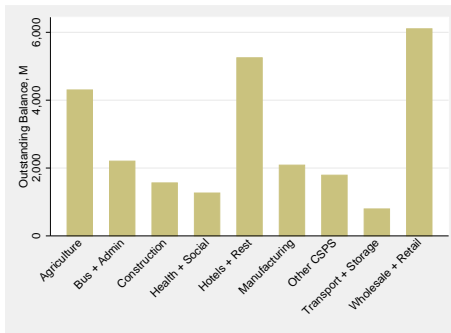


Figure: Excl. Real Estate and Financial (Total €26.1bn)



- ▶ What share of the €26.1bn of outstanding bank debt of non-financial, non-real-estate SMEs, is related to property investment?





## Why is debt overhang bad?

- ▶ Research on US HHs has shown:
  - ▶ Housing wealth shocks & HH over leverage have had -ve effects on C and E growth (Mian et al., 2013; Dynan et al., 2012).
- ▶ High firm leverage may -vely affect firm performance & I:
  - ▶ Non-financial corporates re impacts on I: Aivazian et al., 2005; Cai and Zhang, 2011; Coricelli et al., 2012.
  - ▶ Debt overhang can explain weak post-crisis (Asia) I growth (Coulibaly and Millar, 2011)



# Real economy effects of Irish financial crisis

- ▶ Progress made on understanding effects of crisis on loan arrears, C, I
  - ▶ Arrears and C: McCarthy & McQuinn (2014) & Lydon (2013).
  - ▶ Ability of SMEs to repay debt during crisis: McIndoe-Calder (n.p).
  - ▶ Impact of SME indebtedness on economic activity: Lawless et al. (2014).
- ▶ Here: effect of investment during the property boom on ability to repay 'core' business debt.



## Red C survey data

- ▶ Red C *SME Credit Demand Survey* 2012 dealt with property exposure question.
  - ▶ Large employment-weighted sample of Irish SMEs.
- ▶ Measure of property exposure: all companies responding 'yes' to either of:
  - ▶ Has your company purchased property which is financed by bank debt since 2005?
  - ▶ Have any of your directors purchased property financed by bank debt since 2005, which the business acts as security for?
- ▶ 19.88% of the sample report being exposed to property debt by this measure.
- ▶ This figure is a lower bound due to the following omissions:
  - ▶ Mortgage debt of SME owners;
  - ▶ Properties purchased with non-Bank debt;
  - ▶ No pre-2005 property purchases;
  - ▶ Issue of cross-guarantees not fully captured.

**Table:** Did the SME, or its director, invest in property since 2005?

	No	Yes	Total firms
All firms	80.12	19.88	1,504
<b>Broken down by employment size</b>			
Self Employed	93.22	6.78	59
1 to 10	82.82	17.18	524
10 to 20	81.35	18.65	327
20 to 50	81.67	18.33	251
50+	74.89	25.11	223
<b>Broken down by export status</b>			
Non Exporter	80.05	19.95	1,108
Exporter	80.3	19.70	396
<b>Broken down by age of SME</b>			
Under 20 years	81.11	18.89	868
Over 20 years	78.77	21.23	636
<b>Broken down by Activity</b>			
Agri	71.43	28.57	28
Construction	76.87	23.13	134
Financial / Real Estate	78.67	21.33	75
Hotels / Restaurants	76.69	23.31	163
Manufacturing	84.44	15.56	180
Services	81.04	18.96	443
Wholesale / Retail	80.46	19.54	481



## Description of loan-level data

**Table:** Central Bank SME loan data description, December 2013

Total Balance (€M)	21,041
Average Balance (€)	71,101
Median Balance	9,954
Average Interest Rate	6.41%
Default Rate (Count)	26.05%
Default Rate (Balance)	41.38%

- ▶ SME categorised in these data as any enterprise not managed in the Corporate Banking divisions of the subject banks.
- ▶ This definition will not precisely match the Eurostat definition used in aggregate lending statistics.



Figure: SME default rates, by region, December 2013

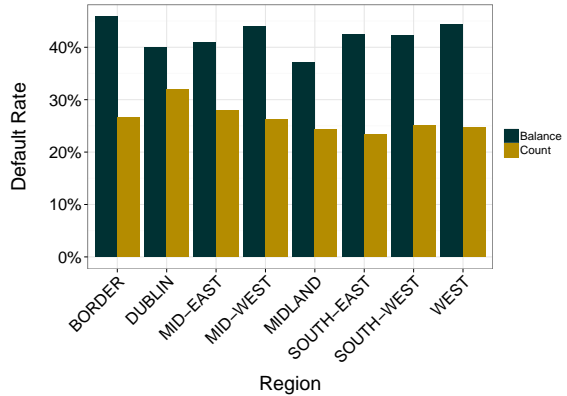
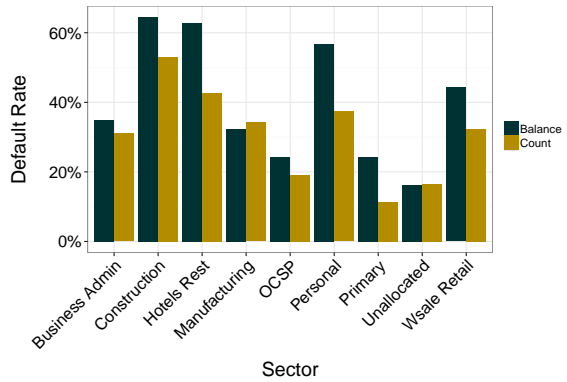




Figure: SME default rates, by sector, December 2013





## Identifying property debts in the LLD

- ▶ Three ways in which SME-property links can be identified in our loan-level data:
  1. Mortgages of an SME owner can be located in the mortgage book of the bank with which the SME has its business loans.
  2. Property-related loans of an SME owner can be categorised in the SME loan books.
  3. Firms can be identified in both the SME and Commercial Real Estate (CRE) loan datasets.
- ▶ (2) and (3) identifiable in full sample;
- ▶ (1), (2) & (3) identifiable in sub-sample;
- ▶ All channels identifiable *within* bank only.
- ▶ Focus here on full sample.





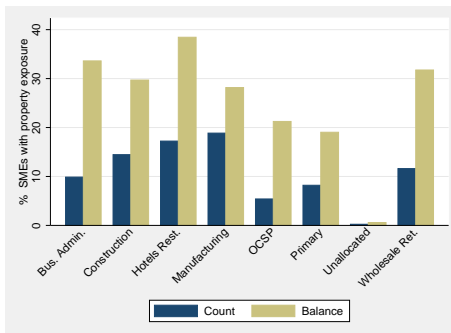
**Table:** Firms identified as having property exposure

Measure	Sample	Property Exposure
Number of firms	$N = 184,758$	4.45%
Number of loans	$N = 299,445$	10.75%
Share of balance	$N = €20.55bn$	32.36%

- Larger SMEs have additional property debts.



Figure: Percentage of SME loans with property exposures by sector



- ▶ Larger SMEs have additional property debts.
- ▶ Sectors particularly affected: Hotels & Restaurants; Wholesale & Retail; Construction.



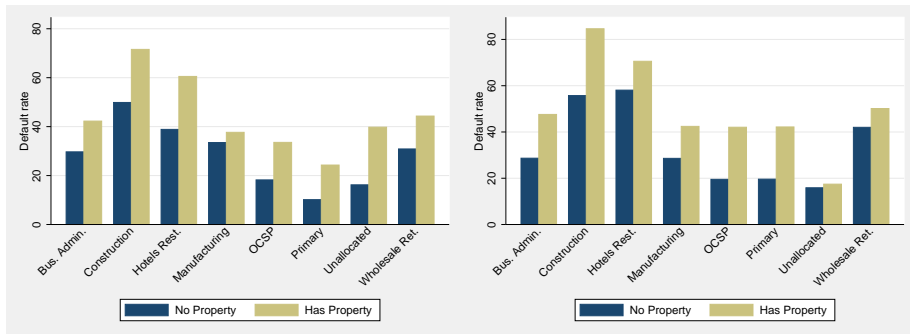
**Table:** SME default rates for firms with and without property exposures, percentage of loans and balance: December 2013

Property ?	Default Rate	
	Count	Balance
No	23.4	33.6
Yes	43.0	54.5

- ▶ Property debt correlated with riskier SME debt.



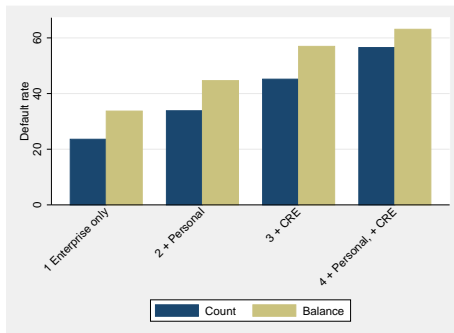
**Figure:** Default rates for firms with & without property exposure



- ▶ LHS: count; RHS: balance-weighted
- ▶ Property debt correlated with riskier SME debt across all sectors.



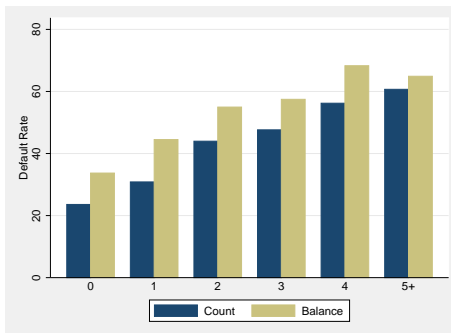
Figure: SME default rates by property exposure type: December 2013



- Intensity of property debt appears to be correlated with credit risk too.



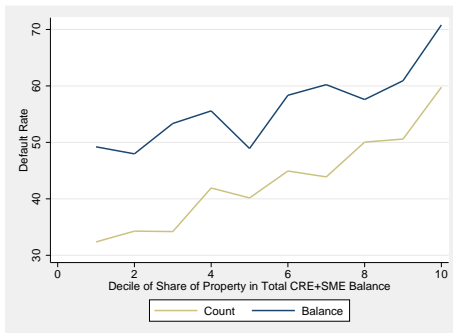
Figure: Firm default rates by property intensity



- ▶ Property debt intensity correlated with SME credit risk, by count.



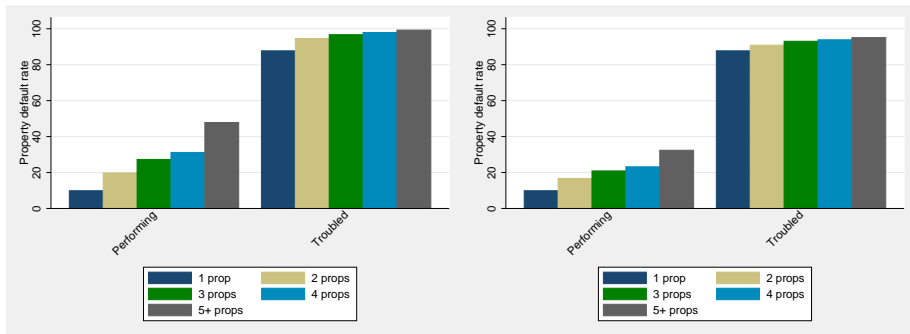
Figure: SME default rate by decile of *OBPS*



- ▶ Property debt intensity correlated with SME credit risk, and by balance-share.



Figure: Coincident firm and property credit risk



- ▶ LHS: count; RHS: balance-weighted
- ▶ Correlation between credit risk of SME and property debt.





**Table:** Covariates included in logit default model

Covariate	Notes
Outstanding balance	A flexible function form is allowed.
Undrawn facility dummy	A dummy that takes a one when a loan has a positive undrawn balance.
Loan Age	Loan age, in months, and its squared term enter the regression.
Sector dummy	Nine sectors as given in the data.
Amortising dummy	Two categories: Amortising and Non-Amortising loans.
NUTS 3 regional dummy	BORDER, DUBLIN, MID-EAST, MID-WEST, MIDLAND, SOUTH-EAST, SOUTH-WEST, WEST.
Bank dummy	Three banks in the data set.



**Table:** Property exposure covariates included in logit default model

Covariate	Notes
<i>Property</i>	A dummy variable indicating the existence of a property exposure.
<i>NP</i>	A count of the number of property loans per SME.
Dummies <i>NP</i>	5 dummy variables, 0 properties is the reference category for all dummies.
<i>OBPS</i>	The share of property loans in the firm's total outstanding balance.
<i>SPD</i>	The share of the firm's property-related debt that is in default.

- Existence, intensity and performance of SME property debt captured.



**Table:** Logit default model with indicators of property incidence and intensity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Property</i>	0.0527*** (6.05)	0.0351*** (3.37)		0.00297 (0.27)	-0.000750 (-0.07)		-0.176*** (-36.40)
<i>NP</i>		0.00731* (1.73)			0.00362 (0.86)		
1 property			0.0212** (2.44)			-0.00747 (-0.70)	
2 properties			0.0821*** (5.50)			0.0352** (2.03)	
3 properties			0.0730*** (2.85)			0.0232 (0.85)	
4 properties			0.152*** (4.23)			0.0876** (2.40)	
5+ properties			0.142*** (4.11)			0.0654* (1.91)	
<i>OBPS</i>				0.103*** (7.06)	0.0939*** (6.23)	0.0784*** (4.90)	
<i>SPD</i>							0.622*** (33.22)
Pseudo $R^2$	0.281	0.282	0.282	0.282	0.282	0.283	0.330
N	254,467	254,467	254,467	254,467	254,467	254,467	254,467



## PD estimation result conclusions

- ▶ *Existence* of property debt predicts SME default - with statistical and economic significance (PD  $\uparrow$  by 5.27 per cent).
  - ▶ Ave SME default rate is 26.05,  $\uparrow$  of 5.27 per cent  $\rightarrow$  27.4 per cent PD.
- ▶ Likewise for *intensity*:
  - ▶ Especially as the number of property debts increases (4 and 5+ properties increases PD by 15.1 and 14.2 per cent, respectively).
  - ▶ 1 per cent  $\uparrow$  in OBPS  $\uparrow$  PD by 0.7-0.1 per cent (depending on how number of properties is controlled for).
- ▶ *Performance* of property debt matters too: there is default correlation between SME and property debt held by the same firm.
  - ▶ 1 percentage point  $\uparrow$  in share of property debt in default increases SME PD by .6 per cent.



## Correlation vs. causation

- ▶ Nothing presented so far suggests that property investment *causes* more default.
- ▶ Property exposure and default may simply both be more likely to arise at the same firms due to:
  - ▶ Origination period credit standards: riskier firms more likely to invest in property and to have been offered a loan.
  - ▶ Productivity: less productive firms more likely to mask weaker productivity with property investments during upturn?
  - ▶ Innate risk-taking characteristic of the borrower.
- ▶ We would like to know whether property investment has caused more defaults, controlling for these issues of selection.
- ▶ Difficult in non-experimental setting due to importance of selection bias to this issue.
- ▶ Propensity Score Matching (PSM) methods allow an estimate of the causal effect of property on default.



## Idea behind PSM

- ▶ We match firms with and without property with similar observed (loan, SME) characteristics.
- ▶ We observe whether there is a difference in the SME default rate between matched firms where the only (observed) difference between them is the existence of property debt.


**Table:** Propensity Score Matching results

Specification	$N$	Difference- in-Means pre-matching	$ATT$ post- matching
Full sample	248,058	.1918 (.0030)	.1079 (.0051)

- ▶ In the full sample:
  - ▶ Of the 19 per cent difference in default rates between propertied and non-propertied firms,
  - ▶ 11 per cent cannot be explained by a model of firms' selection into property investment.



## Discussion - scale of exposure

- ▶ Survey data suggest a **minimum** of 20 per cent of Irish SMEs have an exposure to property.
- ▶ Loan-level data show that 10 per cent of SME loans (or 32 per cent of outstanding balance) have exposure to property investment at the same bank.
  - ▶ This figure rises to 24 per cent (43 by balance) when including the mortgage book of one bank.





## Discussion - impact on loan performance

- ▶ Personal SME sector and CRE exposure are associated with increased default (balance-weighted):
  - ▶ 34 per cent for firms with no property links
  - ▶ 45 per cent with personal SME mortgages
  - ▶ 57 per cent with CRE exposure
  - ▶ 63 per cent with CRE **and** personal SME mortgage.
- ▶ *Selection and causation*: Empirical work (PS matching) suggests that, of the 19 per cent differential in default rates between SMEs with and without property exposure, 11 per cent remains after controlling for the characteristics of propertied firms.



Thank-you.