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# SME Recovery Following a Financial Crisis: Does Debt Overhang Matter?

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## Introduction

- Large build-up in debt during boom across all sectors of economy
  - Evidence that debt stocks can impact growth at economy level
    - Elmeskov and Sutherland, 2012, Brown and Lane, 2011
  - And reduce consumption at household level
    - McCarthy and McQuinn, 2014, Gerlach 2013
  - Do outstanding debts have negative effects on firm performance?
    - Evidence relatively limited
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## Existing Evidence

- Focus mainly on access to new credit
    - Negative effects of credit constraints on new investment (Gerlach, O’Connell & O’Toole, 2015)
  - Some evidence on negative effects of debt overhang on firm investment
    - Coulibaly and Millar, 2008, 2011, Hennessy, 2004
  - Debt also positively related to firm productivity and innovation
    - up to a certain point
      - Coricelli, Driffield, Pal and Roland, (2010, 2012), Costanzo, Silipo and Succurro (2013)
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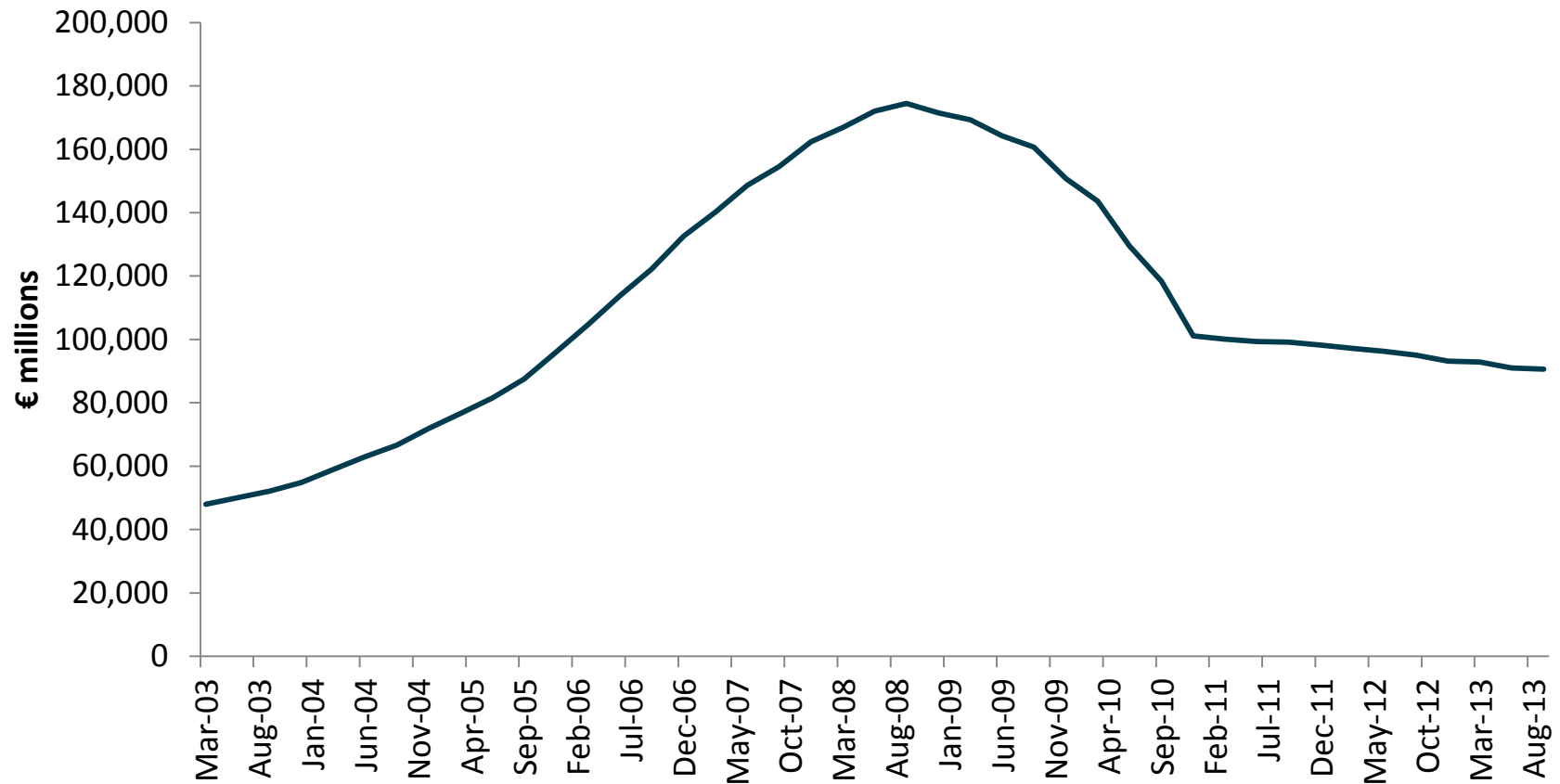
## Research Questions

- Do *levels* of outstanding debt affect firm performance:
    - Debt positive if being used for productive investment?
    - Negative effect if overhang from credit boom?
  - How does its *debt burden* affect a firm?
    - Debt burden = Outstanding debt stock/turnover
    - No data on assets so leverage ratio not available
    - Distribution discussed by McCann (2014)
    - Analogous to income ratio in mortgage literature
  - Do these effects differ across firms types?
  - Link debt to investment, employment and financial distress
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# Irish Resident Firm Credit

**Total Credit to Non-Financial Corporations in Ireland, 2003- 2013**





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## Data

- RedC survey of Irish SMEs
  - Carried out at 6-month intervals since 2010
  - Approx 1500 firms per wave
  - Cross-sectional data, no panel element
  - Initial waves lacked information on debt stocks
    - Added in 2 most recent waves (2013-2014)
    - Debt level refers to start of period
  - Range of firm controls available
    - Size, age, export status, innovation activity, broad sector
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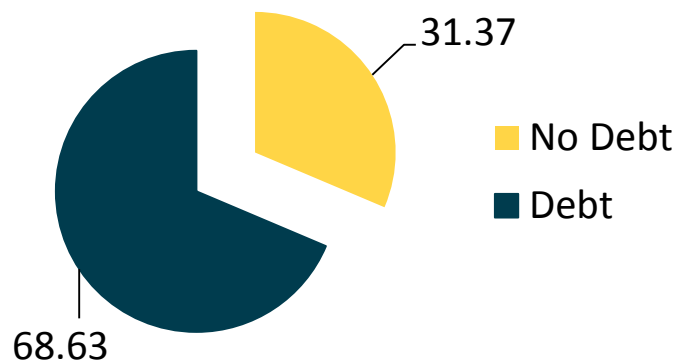
## Firm Performance Indicators

- Employment
    - Indicator of employment change: increase, unchanged, decrease
  - Investment
    - Dummy variable for if firm undertakes new fixed investment expenditure
    - Volume of investment
  - Financial distress
    - Missed loan repayment, cash flow problem (increase in days to pay suppliers or receive payments), credit constraint, made losses or had an adjustment on loans
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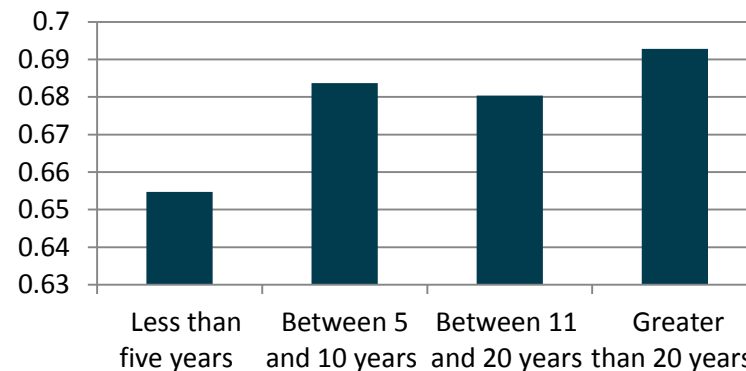
# Who has debt?



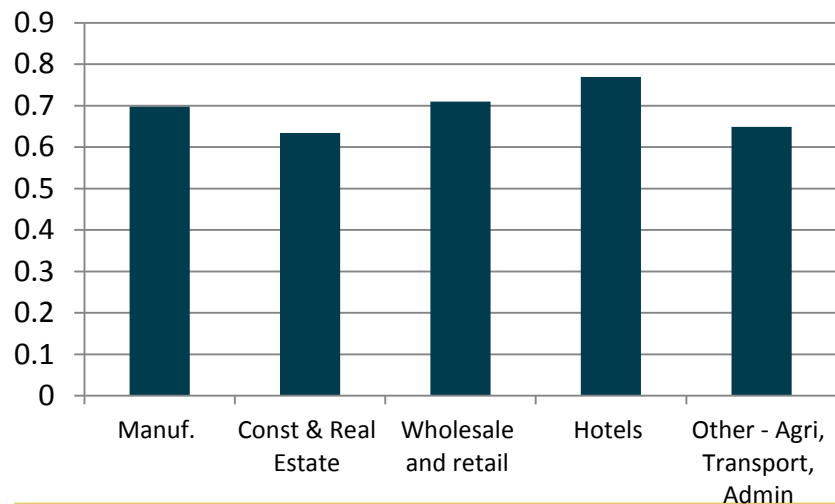
## Percentage of SMEs With Outstanding Debt Liabilities, by age, size and sector



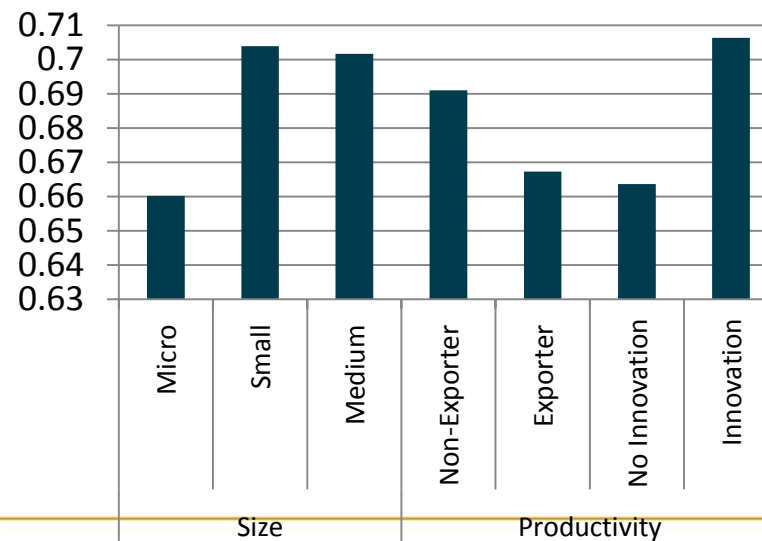
Debt Share by Age



Debt Share by Sector



Debt Share by Size, Exporter and Innovation



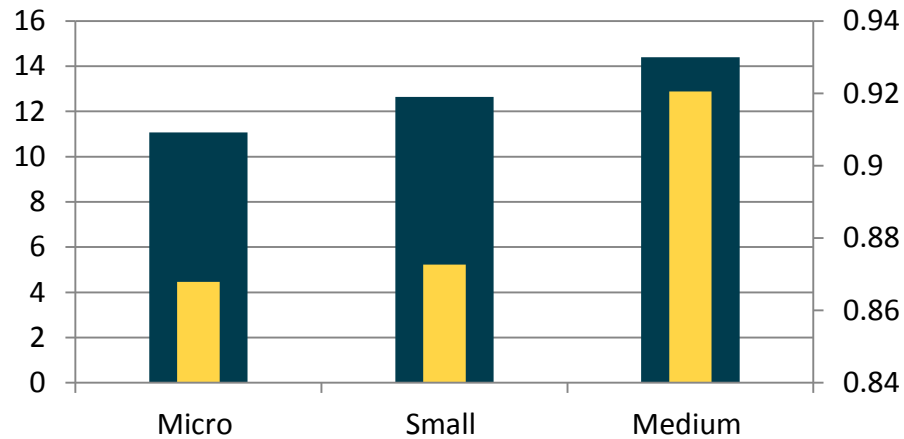


# Debt burden and volumes by firm groups

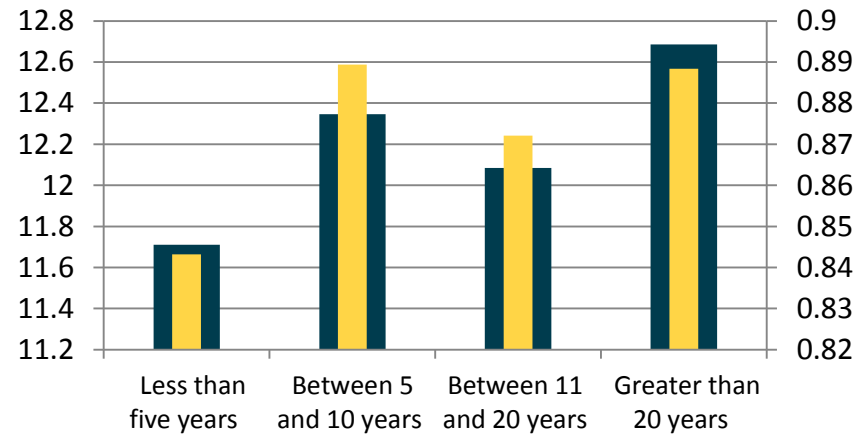


## Debt Size (Log) and Debt to Turnover Indicators by Age, Size, Sector, and Trading Status

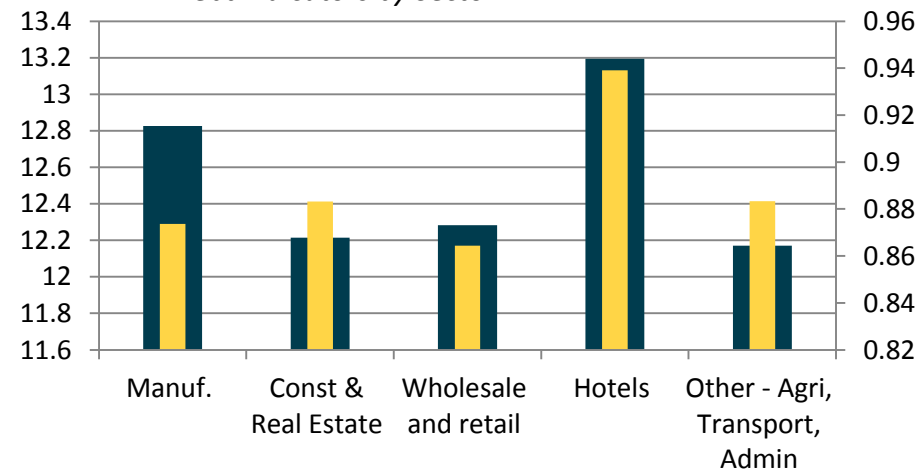
Debt Indicators by Size



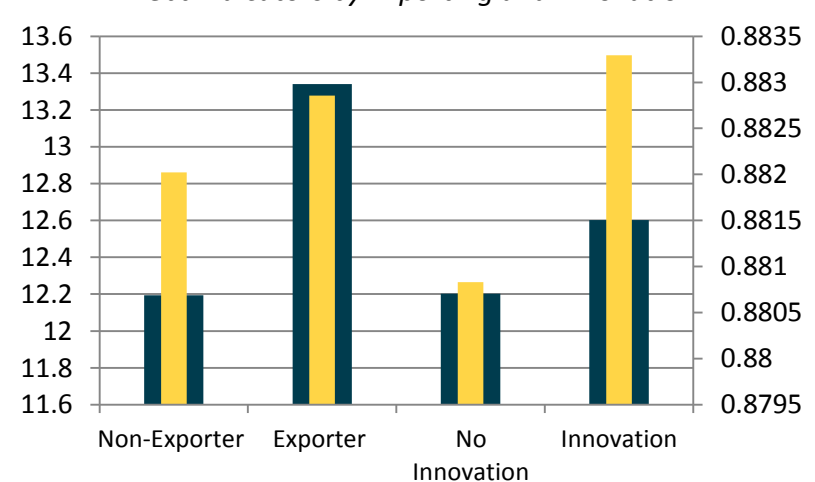
Debt Indicators by Age



Debt Indicators by Sector



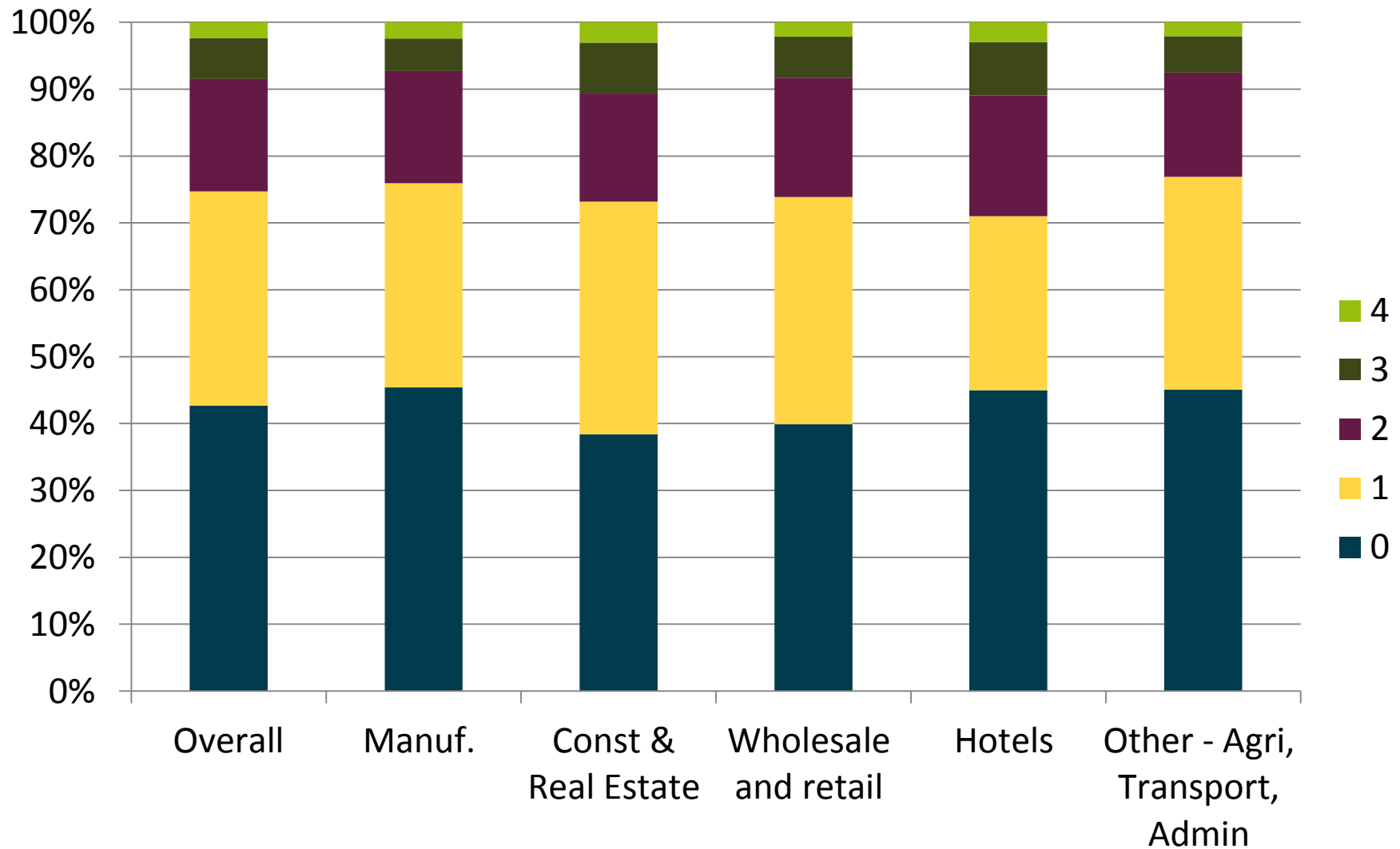
Debt Indicators by Exporting and Innovation



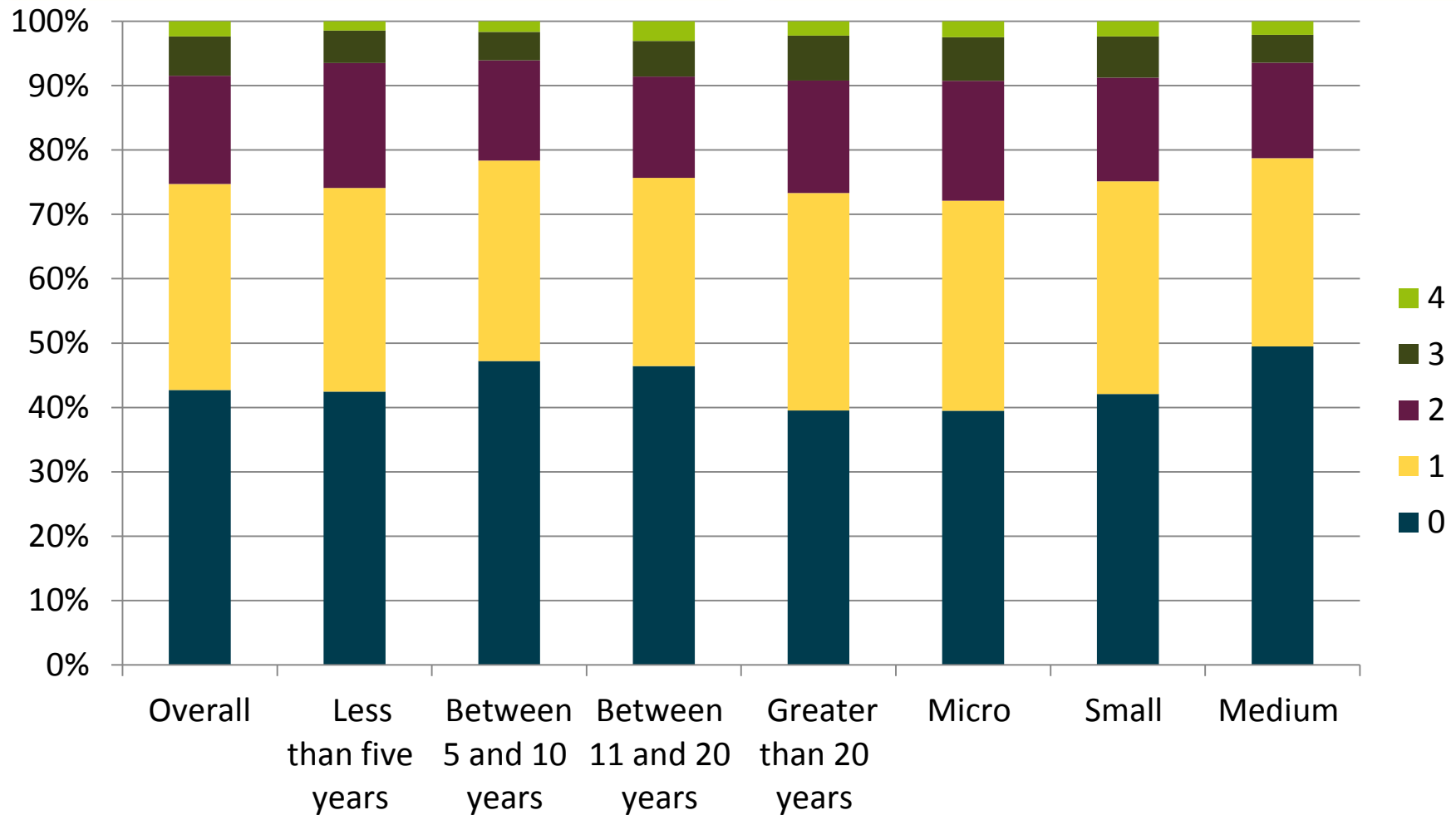
■ Ln Debt t-1 (Left)

■ D/Y (Right)

# Financial Distress Index



# Financial Distress Index





## Specifications

- Effect on employment changes
  - Ordered probit – three point scale

$$EmpChange_i = \alpha + \phi LnDebt_i^{lag} + \omega Burden_i + \beta X_i + \varepsilon_i$$

- Probability that a firm decides to invest
  - Probit regression
  - Where  $InvestDum_i = 1$  if positive investment volume observed

$$InvestDum_i = \alpha + \phi LnDebt_i^{lag} + \omega Burden_i + \beta X_i + \varepsilon_i$$

- Investment level
  - Tobit regression to control for selection effects

$$LnInvest_i = \alpha + \phi LnDebt_i^{lag} + \omega Burden_i + \beta X_i + \varepsilon_i$$



## Financial Stress

- Range of indicators of financial difficulties

$$Distress_i = \alpha + \phi LnDebt_i^{lag} + \omega Burden_i + \beta X_i + \varepsilon_i$$

- Where *Distress* is proxied by:
  - Missed payment
  - Cash flow difficulty (increase in payment time)
  - Operating losses
  - Credit constrained
  - Loan adjustment
  - Combined index of all of above



## **Modelling the Effect of Debt Sustainability on Employment – Marginal Effects (for Ordered Probit)**

	Employment Change (OP)
	b/se
Age 5- 10	0.005
Age 11-20	0.018
Age 20 +	-0.021
Small	0.002
Medium	0.014
Const and RE	-0.001
Wholesale & Retail	0.017
Hotels	-0.006
Other	0.029
Increase Turnover	0.192***
Exporter	0.021
Innovation	-0.008
Profit Increased	0.111***
Default	-0.041*
Credit Rejected	-0.032
Log Debt t-1	0.014**
<b><i>D/Y</i></b>	<b><i>-0.199**</i></b>
N	2,018



## Modelling the Effect of Debt Sustainability on *Investment* – Marginal Effects

	Extensive Margin (Probit)	Intensive Margin (Tobit)
	b/se	b/se
Age 5- 10	-0.091*	-2.786
Age 11-20	-0.080*	-2.626*
Age 20 +	-0.083*	-2.549
Small	0.120***	5.478***
Medium	0.343***	12.085***
Const and RE	-0.019	-0.465
Wholesale & Retail	-0.045	-1.869*
Hotels	-0.044	-1.597
Other	0.013	0.333
Increase Turnover	0.042**	1.481**
Exporter	0.129***	4.372***
Innovation	0.064***	2.507***
Profit Increased	0.044**	1.853***
Default	-0.057	-2.625
Credit Rejected	-0.058	-2.507
Log Debt t-1	0.025**	1.135***
<b>D/Y</b>	<b>-0.382**</b>	<b>-16.825***</b>
N	2,087	2,073



## Debt Sustainability and Financial Distress – Multinomial Logit – Relative Risk Ratios

	FD = 1	FD = 2	FD =3	FD = 4
Age 5- 10	-0.284	-0.564	-0.112	13.312***
Age 11-20	-0.193	-0.411	-0.033	13.814***
Age 20 +	0.029	-0.199	0.325	13.717***
Small	0.051	-0.220	0.111	-0.545
Medim	-0.051	-0.276	-0.074	-0.337
Const and RE	0.247	0.391	0.411	0.937
Wholesale & Retail	0.164	0.180	0.134	0.671
Hotels	-0.182	0.482	0.566	0.202
Other	0.103	0.254	0.340	1.098
Increase Turnover	-0.130	-0.394**	-0.351	-1.166**
Exporter	0.122	0.453**	0.219	0.513
Innovation	0.123	0.429***	0.345	1.459***
Profit Increased	-0.677***	-1.474***	-2.520***	-3.289***
Log Debt t-1	-0.139**	-0.125*	-0.160	-0.034
D/Y	2.594***	3.092***	4.094***	4.843***
	2087	2087	2087	2087





## Debt Sustainability and Financial Distress Index – Ordered Probit

Age 5- 10	-0.211
Age 11-20	-0.084
Age 20 +	0.085
Small	-0.079
Medim	-0.128
Const and RE	0.284
Wholesale & Retail	0.147
Hotels	0.279
Other	0.238
Increase Turnover	-0.288***
Exporter	0.248**
Innovation	0.329***
Profit Increased	-1.195***
Log Debt t-1	-0.094
D/Y	2.421***
N	2087



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## Conclusions

- Debt to turnover strong indicator of firm performance
    - And predictor of financial distress
  - Some unexplored aspects due to data limitations
    - When and why initial debt decision taken for example, unobserved endogeneity
  - Policy issues
    - Outstanding credit having lasting effectiveness
    - Dealing with legacy debt issues important for growth
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## Reference

- Lawless, M. O'Connell, B. and O'Toole, C. (2014) "*SME Recovery Following a Financial Crisis: Does Debt Overhang Matter?*", Working Paper WP491, Economic and Social Research Institute.
  - Link: <http://www.esri.ie/UserFiles/publications/WP491.pdf>
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# Annex – Additional Supporting Information



## Financial factors by firm groups

	Overall	Age 0 to 5	Age 6 to 10	Age 11 -20	Age 20 +	Manu	C & RE	W & R	Hotels	Other
<b>Credit rejected</b>	0.08	0.05	0.08	0.09	0.07	0.06	0.08	0.07	0.08	0.09
<b>Default (Missed payment)</b>	0.10	0.08	0.09	0.12	0.10	0.08	0.13	0.09	0.14	0.10
<b>Payable Days Increased</b>	0.20	0.25	0.17	0.23	0.18	0.19	0.19	0.21	0.23	0.18
<b>Receivable Days Increased</b>	0.32	0.23	0.29	0.28	0.35	0.36	0.40	0.33	0.13	0.33
<b>Loan Adjustments</b>	0.15	0.10	0.13	0.13	0.16	0.14	0.15	0.14	0.20	0.14
<b>N</b>	2059	91	294	579	1094	258	208	685	260	648



## Summary Statistics

	Overall	Age 0 to 5	Age 6 to 10	Age 11 - 20	Age 20 +	Manu	C & RE	W & R	Hotels	Other
<b>lnemp</b>	8.75	8.18	8.08	8.31	9.21	11.67	7.26	7.01	12.06	8.81
<b>emp</b>	0.04	0.04	0.08	0.08	0.00	0.05	-0.01	0.02	0.03	0.07
<b>inv</b>	0.29	0.34	0.26	0.28	0.30	0.42	0.23	0.23	0.30	0.31
<b>lninv</b>	3.08	3.41	2.63	2.95	3.25	4.90	2.42	2.42	3.17	3.23
<b>innovate</b>	0.5	0.6	0.6	0.6	0.5	0.6	0.4	0.5	0.5	0.5
<b>export</b>	0.2	0.2	0.1	0.2	0.2	0.6	0.1	0.2	0.0	0.2
<b>profit</b>	0.5	0.4	0.6	0.5	0.4	0.5	0.4	0.4	0.5	0.5
<b>turnover_up</b>	0.3	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.4	0.3
<b>N</b>	2087	96	297	584	1109	269	244	669	212	691