On Firm Exit During the Double Dip Recession: A Tale of Two Crises?

T. Ferraresi   M. Mariani

Irpet

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Background *stories*

Italy and the Great Recession → the double dip recession

Two dips and a high degree of heterogeneity between the two (e.g., Locatelli et al., 2016) → a tale of two crisis?

Firm selection over the downturn → cleansing or not? selection on profitability? different selection mechanisms in different phases? what about the role of exports and credit?

We look at (manufacturing) firm exit in a regional economy during the Great Recession and investigate the relevant selection mechanisms at work, though a duration model that allows for (time) non proportionality of risk (i.e., departing from *PH*).

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The double dip recession in Italy
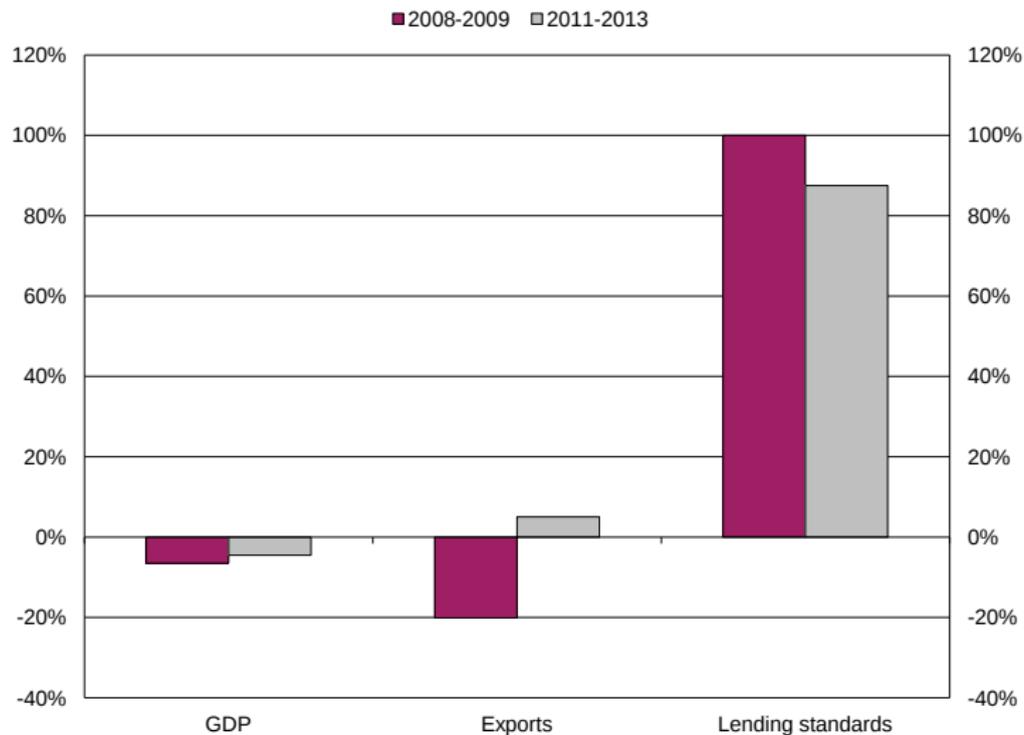
Heterogeneity and selection mechanisms

a. Heterogeneity in productivity as:

- a key driver of firm dynamics in competing school of thoughts (e.g., Jovanovic, 1982 vs. Nelson & Winter, 1982), which should lead to the survival and the growth of the fitter (cleansing effect)
- a persistent feature of all industries and economies, due at least in part to the weakness of selection mechanisms (e.g., Syverson, 2004; Dosi et al., 2015, 2017; Bottazzi and Secchi, 2012) and the impact of alternative selection mechanisms (sullying effect)

b. The role of (global) economic (and financial) crises: whereas in principle productivity differential could become more important (Caballero & Hammour, 1994) the collapse of international trade coupled with credit crunch may severely hit the most efficient firms (e.g., Foster et al., 2016; Girourd & Mueller, 2016, Landini, 2016)

Our work

i. Inspired by the international literature on firm dynamics during recessions → **We look at the selection dynamics of complex firm profiles** (combinations of firm characteristics in terms of productivity, pricing power, openness to international trade and leverage)

ii. Accounting for the message coming from empirical literature on the crisis years in Italy/S. Europe → **We investigate to what extent risk of exit varies for such firm profiles in the different stages of the recession**

The Tuscan economy
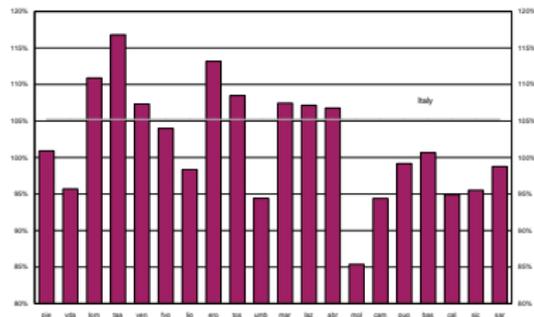
i. A (relatively) growing economy (Panel A)
ii. A (relatively) manufacturing economy (Panel B)
iii. A (relatively) open economy (Panel C)
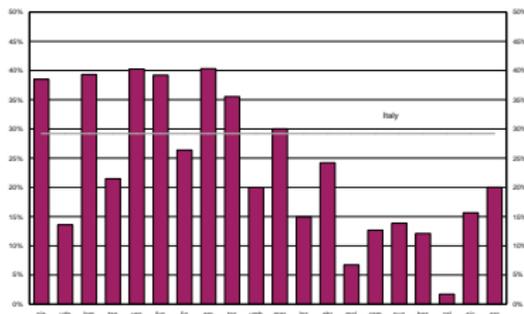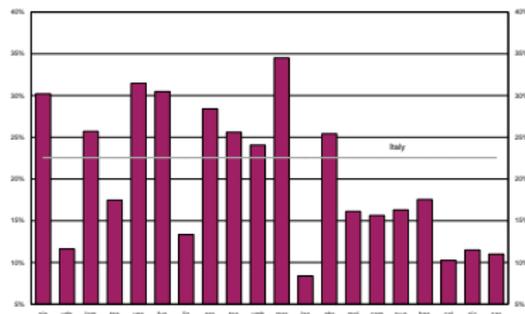
Definitions

Let *T* denote the random variable for the firms' residual life duration during the crisis.

- The hazard of exit at time *t* is defined as

$$h_t = \lim_{dt \to 0} \frac{Pr(t) \leq T < t + dt}{dt}$$

- In a discrete-time setting, $h_t = Pr(t \leq T < t + 1)$

We are interested in the differences between the hazard levels associated with different (combinations of) firm characteristics (e.g., productivity#pricing power#export propensity#leverage)

$$\Delta h(t, X) = h(t, X = x) - h(t, X \neq x)$$

Methodology

To estimate h_t we need a **duration model**, as firms' life duration may be (right-) censored at the end of observation period.

Our model

- should produce hazards on a yearly basis (more fine-grained estimates are unnecessary)
- should be flexible enough to deal with possible non proportional hazards between the levels of X

We specify a discrete-time duration model, where t corresponds to calendar years (2008,..., 2013), that enables the estimation of $h(t, X)$ through GL models for the probability of a binary event $\rightarrow$ we choose a **complementary log-log model**

Data

The period under investigation is 2008-2013, data are collected from different sources:

- Tuscan manufacturing public companies and their balance sheets from AIDA (Bureau van Djik)
- Exit dates (if any) from Business Register. Exits due to transfers or M&A are not regarded as exits
- NACE sectors, foundation dates and number of employees from the Statistical Archive of Active Firms – ASIA (Istat)
- Value of exports from COEWEB (Istat) microdata

The explanatory variables behind our story...

i. *Time*: non proportional relative risk; year dummies

ii. *Productivity*: selection on productivity; value added over employment; two classes (above/below the sectoral median)

iii. *Markup power*: selection on profitability; sales minus operating costs over sales; two classes (above/below the sectoral median)

iv. *International trade openness*: domestic vs. foreign demand reliance; exports to sales ratio; three classes (0%, 0-20%, 20+%)

v. *Leverage*: financial imbalances and credit supply shocks; total assets over own capital; two classes (0-2, 2+)

vi. We also control for sector (2 digit NACE), age (start up, less than 6, older than 6) and employment size (micro, small, medium and large)

Specification

1. We start from the more saturated model, as to variables of primary interest and time, conditional on not losing observations.

2. We use the model to obtain (average adjusted) predictions of hazards of exit.

3. For sensitivity purposes, we look at further interactions involving secondary variables under the constraint of not losing observations and compare predicted hazards to those of the model in 1.

Hazards per year
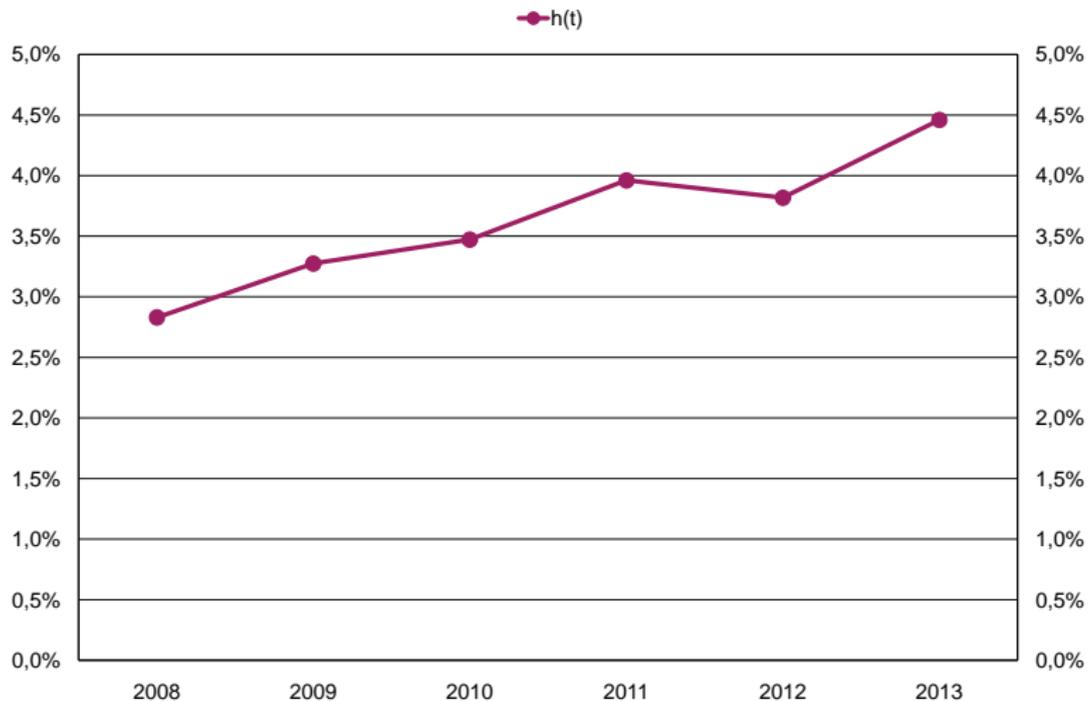
Selection mechanisms at work
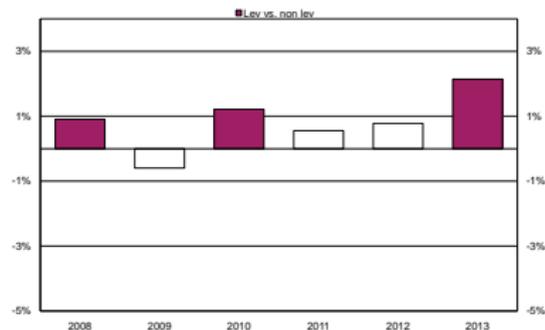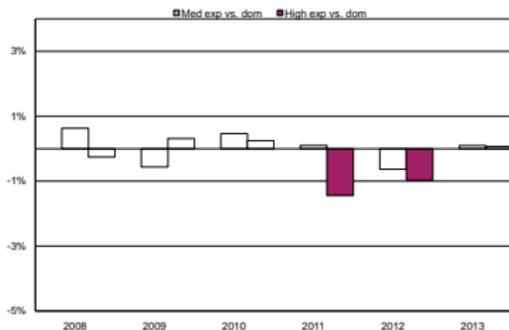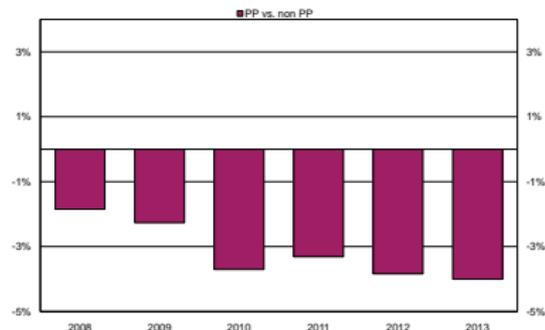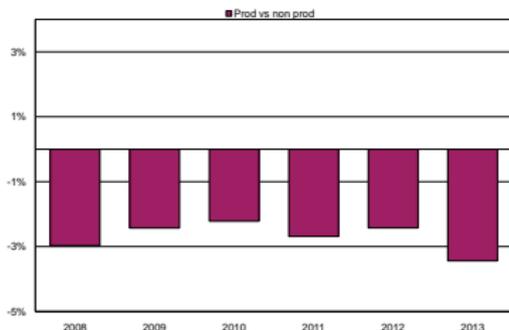
Does markup alleviate efficiency problems?
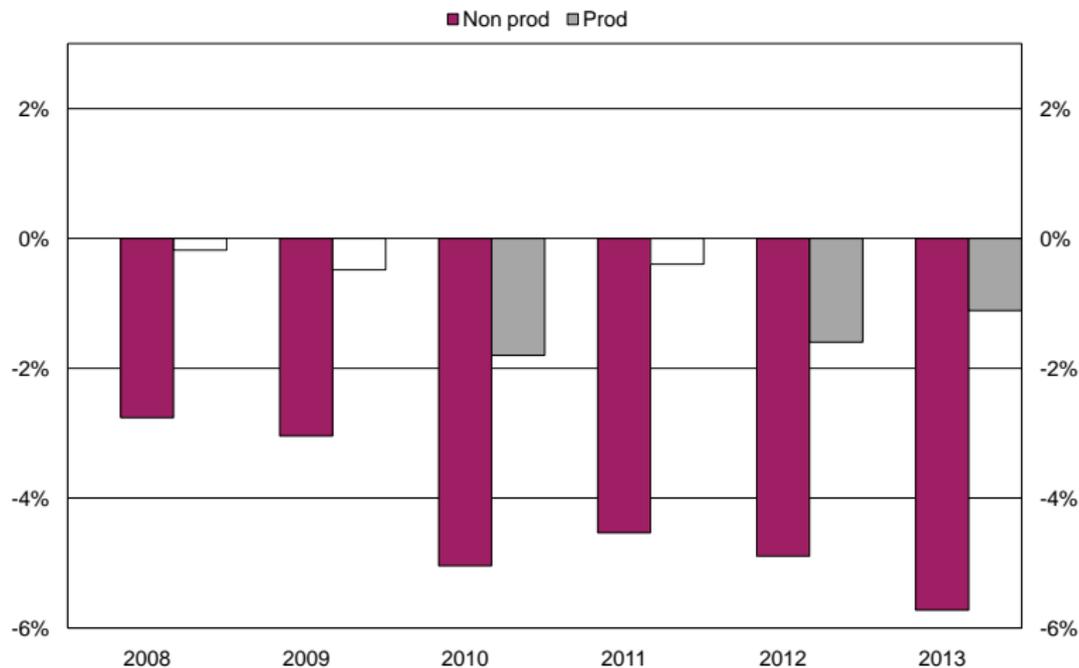
Productivity, profitability and exports
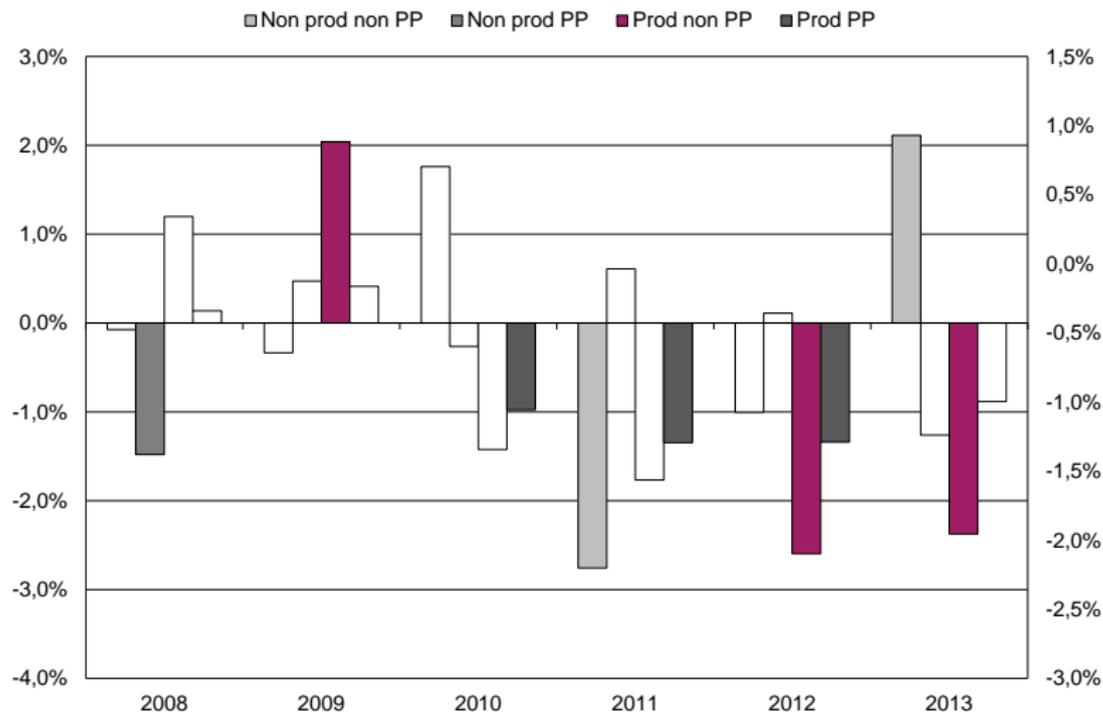
Productivity, profitability and leverage
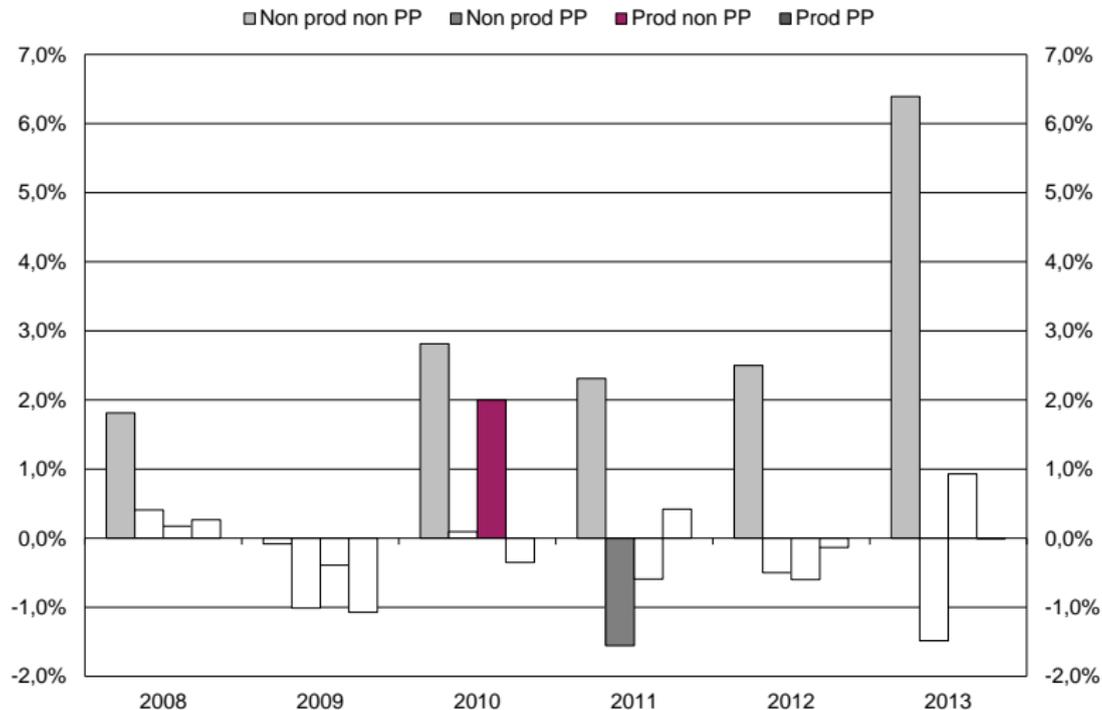
Concluding remarks and current research

a. *Wrapping up*

   i. We estimate a discrete time survival model accounting for non-proportionality of risk

   ii. We show how selection on productivity, selection on profitability, exports premium and financial fragility do display high variability over time

   iii. In particular: efficiency and profitability do appear as the main drivers of selection changes through time

   iv. Exports and leverage, whereas not particularly relevant per se, represent important selection channels when interacted with productivity and profitability

b. *Current research to improve the work...*

   i. Transition among states and survival