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Cleansing in severe recessions

What can be learned from the 2008–2013 Portuguese crisis?

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Motivation

- A large percentage of industry productivity growth can be credited to firm-level reallocation.
- The Schumpeterian literature suggests that cleansing effect is countercyclical.
- It is however still not clear how the cleansing mechanism really works in “severe” recessions simply because they are a rare event.
- The 2008-2013 Portuguese financial crisis, for its intensity, seems to offer a quite natural experiment .

Main Purpose

- The main objective of this paper is to provide new evidence on how the market selection mechanism works in severe recessions.

- Our central hypothesis is that during financial crisis credit market distortions reduce the efficiency of resource reallocation through reduced bank lending to profitable projects.
- Banks may also forbear bad debtors, delaying the process of firm death, in an effort to protect their own balance sheets, thereby hindering one of the key mechanisms through which productivity growth arises.

Overview

After this introduction, the remainder of presentation is organised as follows:

- Section 2 presents the background: (i) related literature; and (ii) the Portuguese crisis.
- Section 3 presents the model.
- Section 4 describes the dataset.
- Section 5 presents the main empirical results.
  Our main finding is that evidence does not unequivocally support the cleansing hypothesis.
- Section 6 concludes.

Related literature

- Firm mobility impacts on aggregate productivity growth, with changes in industry-level productivity arising either from within-firm productivity growth (e.g. innovation) or resource reallocation (firm growth, exit, and entry).
  - Baily et al. (1992), Foster et al. (2001), Disney et al. (2003), Baldwin and Gu (2006), Cantner and Krüger (2008), Carreira and Teixeira (2008).

Related literature

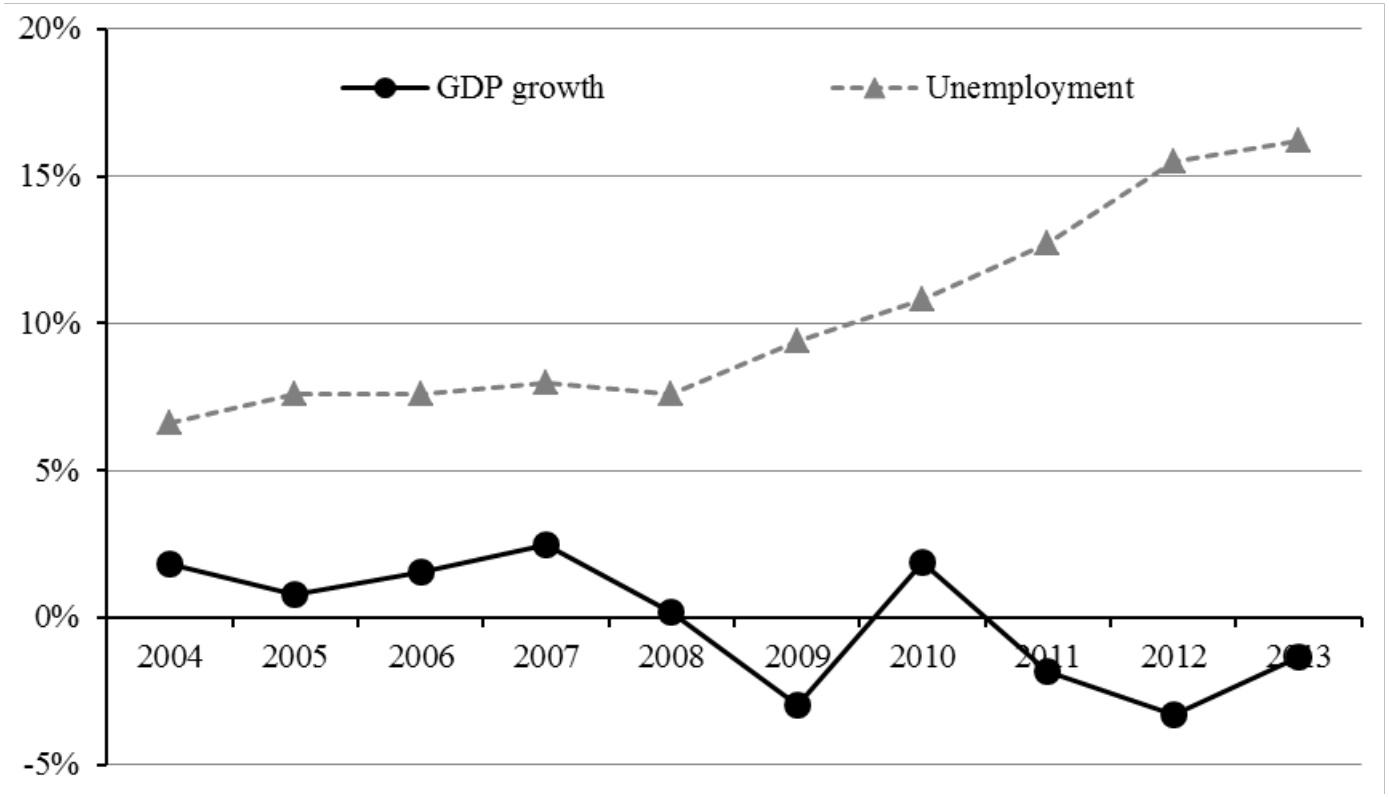
- An ongoing debate is whether in recessions the productivity-enhancing reallocation is accelerated (the “cleansing” effect).
  - Recessions intensify resource reallocation:
    (i) theoretical models – Caballero and Hammour (1994, 1996) and Mortensen and Pissarides (1994);
    (ii) empirical evidence – Davis and Haltiwanger (1992), Davis et al. (1996), Foster et al. (2001) and Carreira and Teixeira (2008).
  - Cleansing effect may be reversed:
    theoretical models – Barlevy (2002; 2003) and Caballero and Hammour (2005).

Related literature

- The scope of present study (i.e. the pattern of productivity dynamics in severe recessions) was rarely examined.
  - Griffin and Odaki (2009)—1990s Japanese stagnation: they found that the weak productivity growth was due to a significant reduction in the within-firm effect rather than to an absence of cleansing.
  - Hallward-Driemeier and Rijkers (2013)—1997 Indonesian crisis: despite a spike in firm exit and an increased employment reallocation rate, they did not find evidence supporting the cleansing effect. Productivity was less critical for firm survival during the crisis, while the risk of exit increased for those firms financially constrained.
  - Foster et al. (2014)—2007–2009 Great Recession: they found that the Great Recession has been less productivity enhancing in comparison with previous recessions, in particular, the cleansing effect was less pronounced than it was expected.

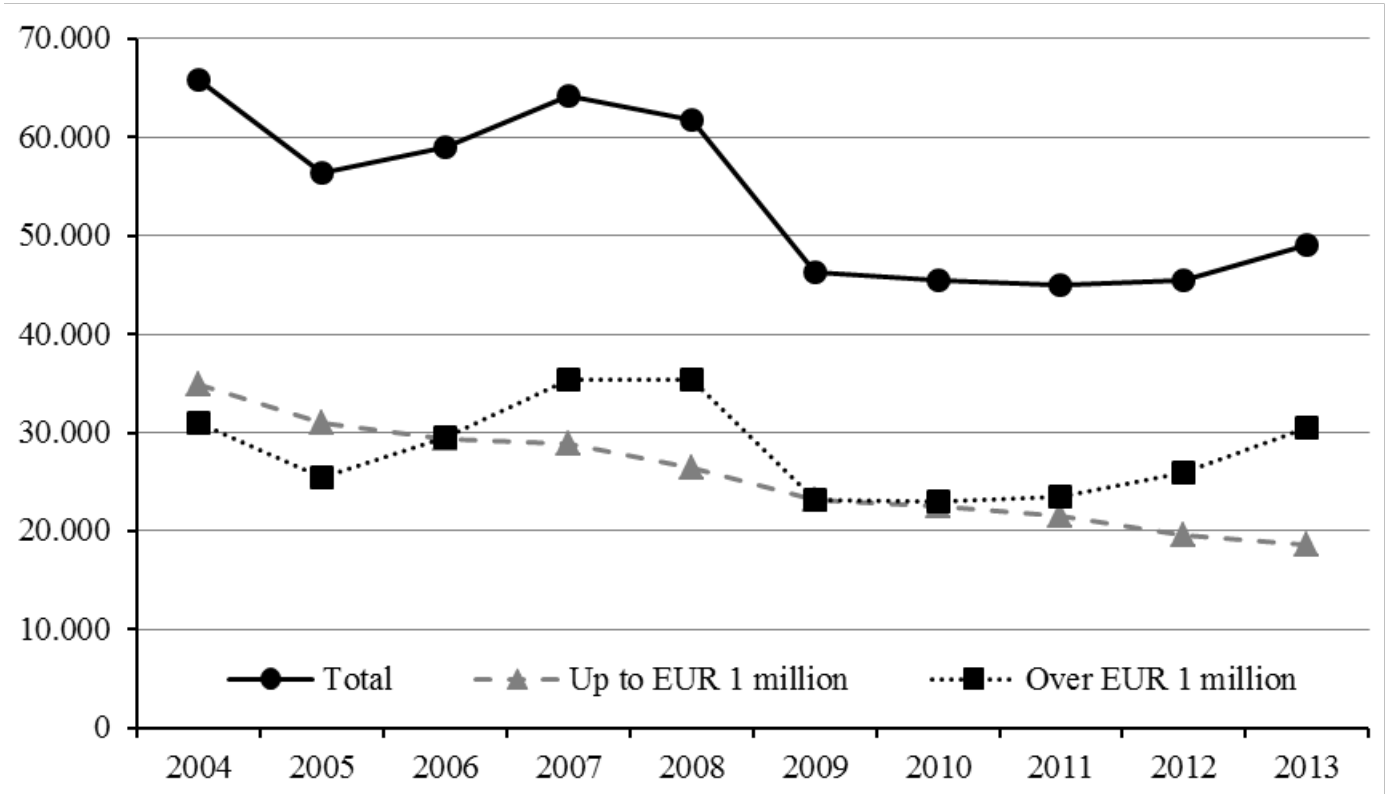
The Portuguese crisis

- Real GDP growth and the rate of unemployment



The Portuguese crisis

- Loans to non-financial firms



The model

- The model is similar to Cooper and Haltiwanger (2006), but it differs in that, as in Barlevy (2003), a firm can invest in different projects.

- We consider a monopolistically competitive firm with *N* different types of projects, where projects that require more investment are more productive and yields more profits.

- Entrepreneur must decide whether or not to invest in a project and how much to invest, solving the following Bellman equation:

$$V(z,K_t)=\max_{I_{nt}} \sum_{n=1}^{N}\left[\Pi(z_n,K_{nt})-I_{nt}\right]-C(z,I_t,K_t)+\beta E\left[V\left(z,K_{(t+1)}\right)\middle|\Phi_t\right]$$

The model

- We assume that, in each period, only one type of project can be carried out.

- The adjustment costs of investment are given by the function:

$$C(z,K_t)=\left[\eta\left(\frac{B_t}{K_t}\right)^2+f\right]K_t$$

where $B_t=\sum_{i=1}^{N} I_{nt}-\Pi_t$ represents the amount of external financing needed, $K_t=\sum_{i=1}^{N} K_t$ and $K_{n(t+1)}=(1-\delta)K_{nt}+I_{nt}$, and $\Pi_t=\sum_{i=1}^{N}\Pi_{nt}$.

The model

- While the intuition that only the most efficient projects survive seems almost tautological, it may be not true once there is limited enforceability of loan contracts.

- Since the risk to default on loans rise with the amount of firm's borrows, it will be the projects that require less borrowing that will get financed, regardless of the surplus they offer.

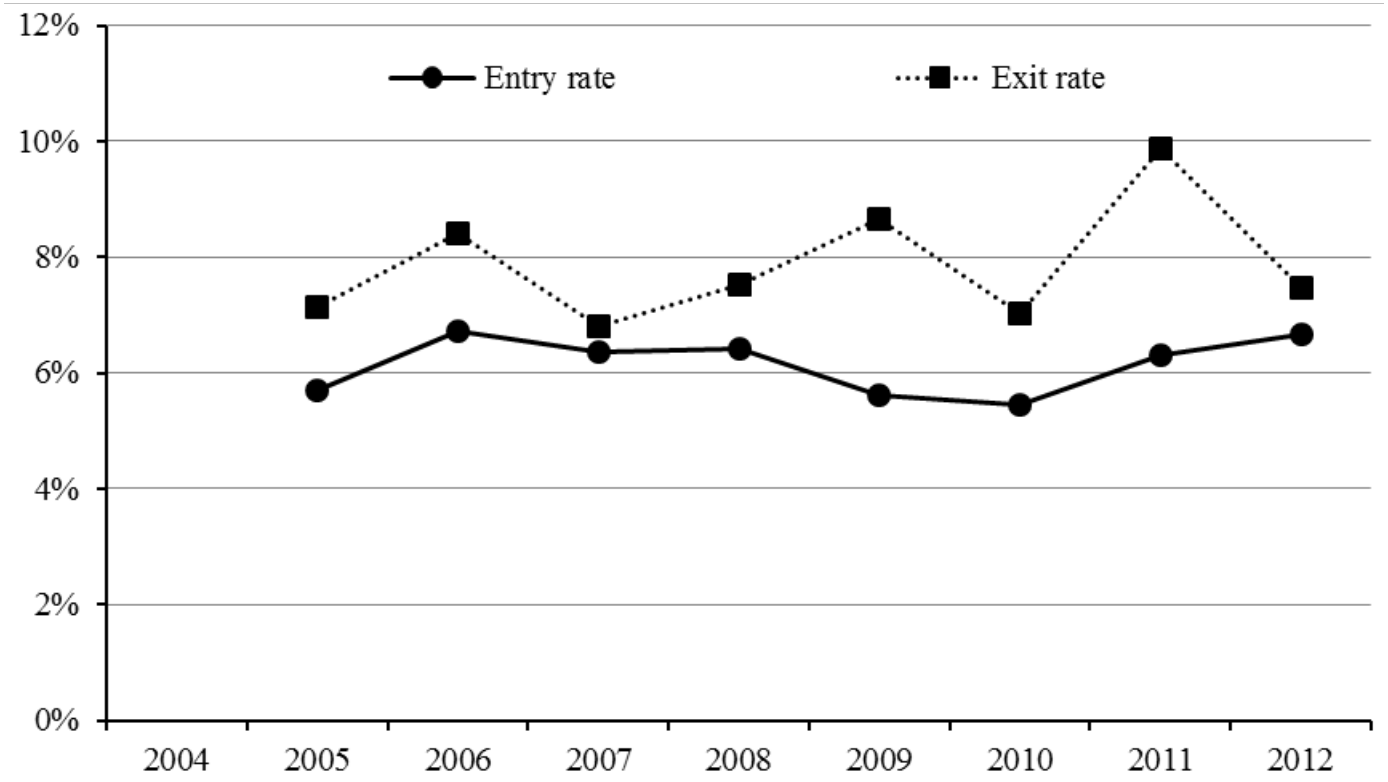
Data Source

- The data is based on a dataset extracted from *Sistema de Contas Integradas das Empresas* (SCIE), an annual business survey administrated by the Portuguese Statistical Office (INE).

- The SCIE comprises the 2004-2012 interval and includes all registered enterprises (thus, of all sizes) in Portugal.

- It contains detailed input and output information required for the computation of firm-level productivity (i.e. total factor productivity, TFP).

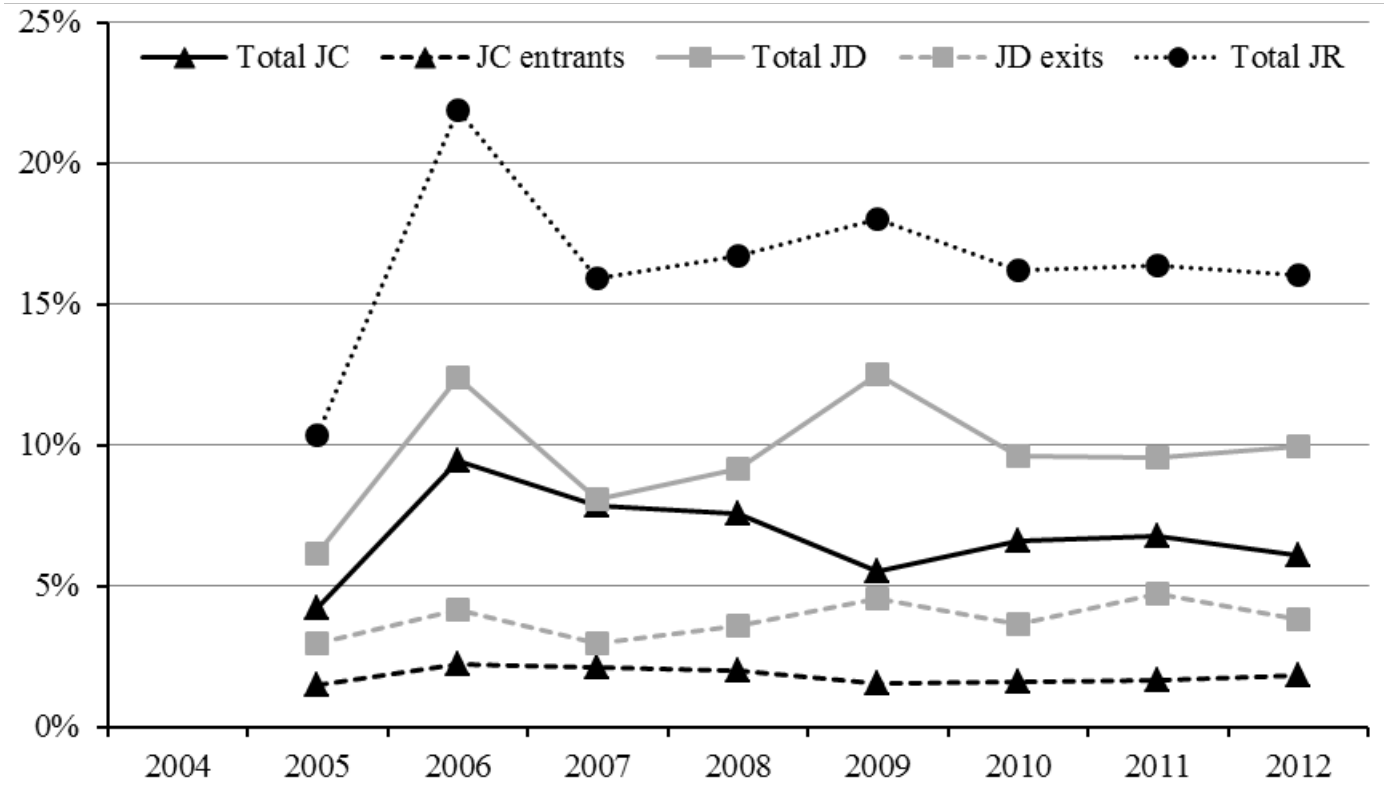
Firm entry and exit



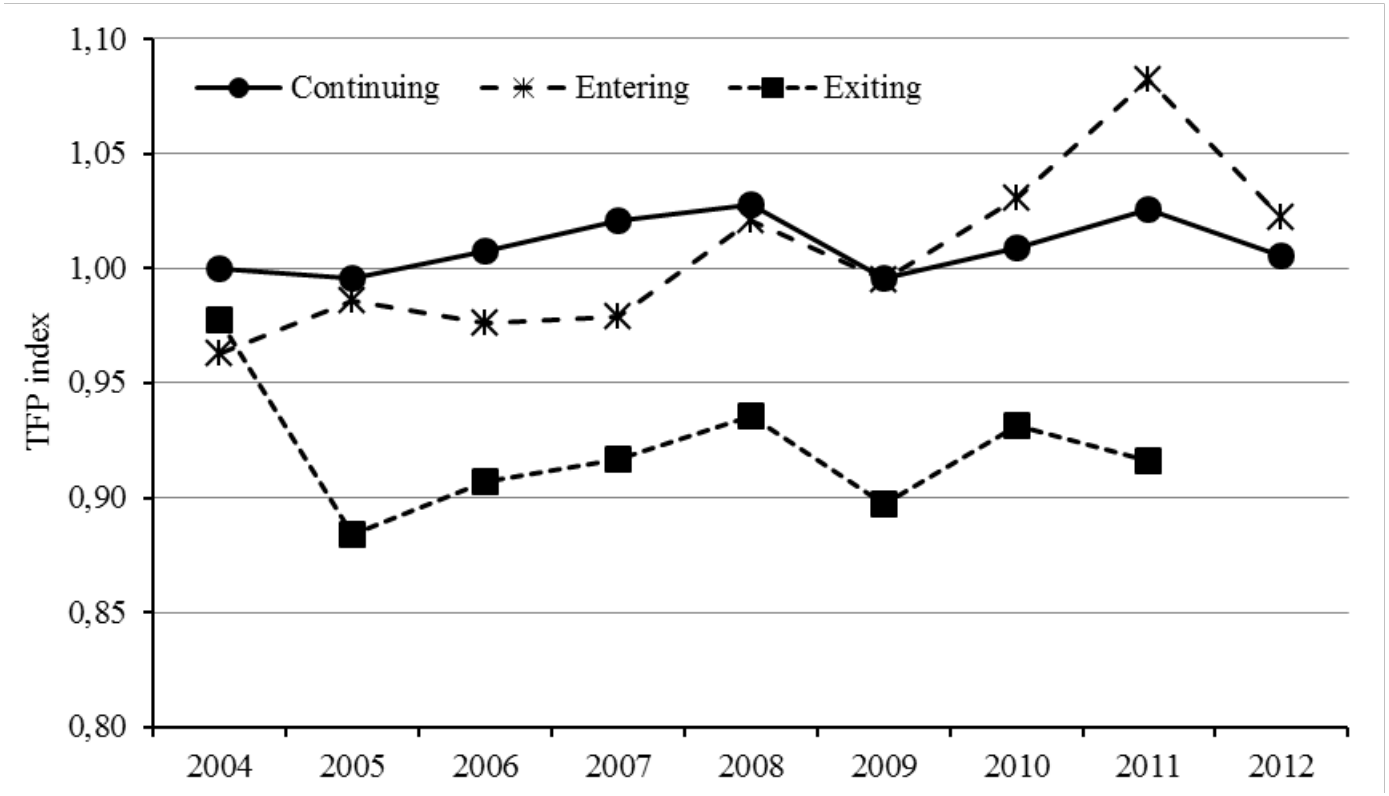
Hazard rates by entry cohort (%)

	2004	2005	2006	2007	2008	2009	2010	2011	2012
2004 Entry Cohort		9.3	12.6	9.9	8.8	10.9	9.5	11.3	7.7
2005 Entry Cohort			14.7	12.1	9.9	12.0	8.7	12.7	8.4
2006 Entry Cohort				12.4	11.5	12.7	10.8	16.5	9.2
2007 Entry Cohort					13.9	15.5	10.0	16.8	11.0
2008 Entry Cohort						14.1	12.0	14.9	10.2
2009 Entry Cohort							9.7	16.2	10.6
2010 Entry Cohort								14.2	9.9
2011 Entry Cohort									11.0

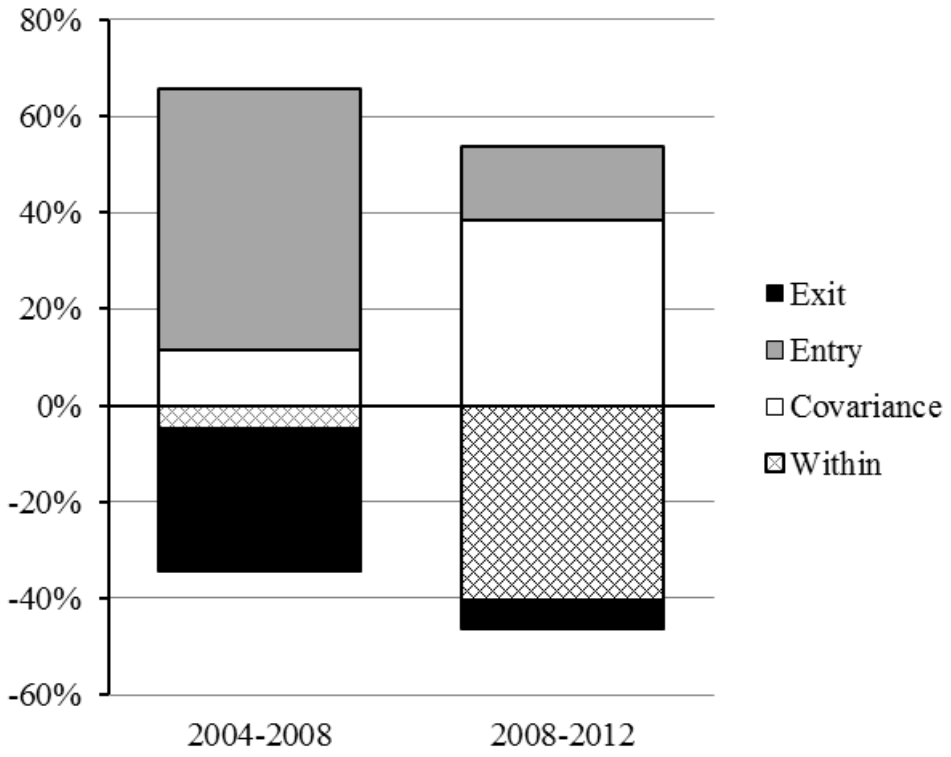
Job creation and job destruction



Productivity of firms by groups



Productivity growth decomposition



Olley-Pakes decomposition method proposed by Melitz and Polanec (2009).

Determinants of firm exit

- Cox proportional hazard (CPH) model regression, with 'ties' handled with the method proposed by Efron (1977).
- All regressions include two-digit industry dummies.
- Firm-cluster robust standard errors are given in parentheses.
- ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Variables	(1)	(2)
Log *TFP*	-0.280*** (0.022)	-0.276*** (0.022)
Crisis × Log *TFP*	0.178*** (0.027)	0.176*** (0.027)
Log *Sales*	-0.354*** (0.011)	-0.353*** (0.011)
Crisis × Log *Sales*	-0.074*** (0.009)	-0.074*** (0.009)
Log *Operating cash-flow*	-0.101*** (0.003)	-0.100*** (0.003)
Crisis × Log *Operating cash-flow*	-0.002 (0.004)	-0.003 (0.004)
Log *Leverage*	0.002*** (0.000)	
Micro × Log *Leverage*		0.002*** (0.000)
Small × Log *Leverage*		0.016*** (0.004)
Medium × Log *Leverage*		0.117*** (0.017)
Large × Log *Leverage*		0.067 (0.111)
Crisis × Log *Leverage*	-0.002*** (0.000)	
Micro × Crisis × Log *Leverage*		-0.002*** (0.000)
Small × Crisis × Log *Leverage*		-0.014*** (0.004)
Medium × Crisis × Log *Leverage*		-0.108*** (0.017)
Large × Crisis × Log *Leverage*		0.589*** (0.117)
Entry rate	0.069 (1.075)	0.151 (1.075)
Log *Employment*	-0.343*** (0.009)	-0.350*** (0.009)
Log likelihood	-179,322.98	-179,276.41
Wald test	15,705.56***	15,956.85***
No. of observations	273,076	273,076

Determinants of employment change

- Fixed-effects regression.
- All regressions include two-digit industry dummies. Firm-cluster robust standard errors are given in parentheses.
- ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Variables	Coefficients
Log *TFP*	-0.975*** (0.159)
Crisis × Log *TFP*	1.367*** (0.212)
Log *Sales*	0.938*** (0.108)
Crisis × Log *Sales*	-0.212** (0.103)
Log *Operating cash-flow*	0.043*** (0.012)
Crisis × Log *Operating cash-flow*	0.021 (0.015)
Leverage	-0.002 (0.004)
Crisis × *Leverage*	-0.015** (0.007)
Entry rate	-4.138 (3.430)
Log *Employment*	-4.329*** (0.142)
No. of observations	274,235
No. of firms	50,604
F statistic	68.14***
R-squared	0.028
Adjuster R-squared	0.028

Conclusion

- Our findings only partially support the cleansing hypothesis. We found an exceptional strong exit flow of firms during the crisis and an increase in the job destruction rate; but job reallocation has not proven to be countercyclical.

- Deep recession seem to be counterproductive, with the possible exit of large/high-productivity firms.

- One plausible explanation for the observed market selection pattern during the Portuguese financial crisis is the presence of credit constraints with the ability to reduce efficiency in resource reallocation and productivity growth.

Conclusion

- Gaining an insight into the mechanisms through which deep recessions impact firm dynamics is important for policy making.
- Countercyclical policies to ensure adequate access to external funding are crucial to ensure the post-crisis economic recovery.
- The next step of our research is to simulate the impact of such policies.

Thanks for the comments

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