On the Cleansing Effect of Recessions and Government Policy: Evidence from Covid-19[1]

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[1] Disclaimer: The views are our own and not those of the Bank of Portugal or the Eurosystem.

Introduction

Questions

- Cleansing effect: do recessions reallocate resources to more productive firms?
- Does government support to firms offset this?

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- Model to guide interpretation of empirical results

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- Does government support to firms offset this?

Methods

- Empirical analysis using data on Covid-19 recession in Portugal
- Model to guide interpretation of empirical results

Results

- Labor did reallocate to more productive firms
- Lower-productivity firms were more likely to use government support
- Exit did not increase and was less selective

Data

Dataset 1: Covid-19 firm survey

- Panel survey of $\sim 7,000$ firms for April–July 2020
- Measures impact of recession on sales and employment
- Also information on eligibility and use of government support

Dataset 2: Administrative balance sheet data

- Used to measure pre-recession firm characteristics
- Productivity measurement: for firm i in sector s,

$$\ln TFP_{is} = \ln Y_{is} - \alpha_K^s K_{is} - \alpha_L^s L_{is} - \alpha_M^s M_{is}$$

- Standardize productivity across sectors

$$\widehat{TFP}_i = \frac{1}{\sigma^s}\left(TFP_i - \frac{1}{N_s}\sum_{j \in \mathcal{S}} TFP_j\right)$$

Dataset 3: Administrative data on firm creation and closure

Empirical specification

Objective: assess relationship between productivity, and sales and employment outcomes during the recession

Regression

$$y_i = \beta_0 + \beta_1' \widehat{TFP}_i + \beta_2' \widehat{Markup}_i + \boldsymbol{\beta}_3' \mathbf{Sector}_i + \boldsymbol{\beta}_4' \mathbf{X}_i + \varepsilon_i,$$

- y_i: sales or employment outcomes
- $\widehat{TFP}_i$: standardized productivity
- $\widehat{Markup}_i$: standardized markup
- $\mathbf{Sector}_i$: sector fixed effects (2-digit)
- $\mathbf{X}_i$: controls—age, size, leverage, in Lisbon or not

Employment effects

	Employment contracted $> 10\%$			Employment contracted $> 50\%$		
	(1)	(2)	(3)	(4)	(5)	(6)
$\widehat{TFP}_i$	-0.019^{***}		-0.023^{***}	-0.017^{***}		-0.011^{*}
	(0.006)		(0.007)	(0.006)		(0.007)
TFP Q2		0.017			-0.001	
		(0.017)			(0.016)	
TFP Q3		0.023			-0.008	
		(0.017)			(0.016)	
TFP Q4		-0.056^{***}			-0.046^{***}	
		(0.017)			(0.016)	
$\widehat{Markup}_i$			0.006			-0.010
			(0.007)			(0.007)
Obs.	6499	6499	6486	6499	6499	6486
R^2	0.053	0.055	0.053	0.076	0.077	0.076

- Higher productivity firms less likely to have employment contractions
- Robust to controlling for government employment support

Sales effects

	Sales contracted $> 10\%$			Sales contracted $> 50\%$		
	(1)	(2)	(3)	(4)	(5)	(6)
$\widehat{TFP}_i$	0.006		0.013^{**}	-0.016^{***}		-0.001
	(0.005)		(0.006)	(0.006)		(0.007)
TFP Q2		0.016			-0.002	
		(0.014)			(0.017)	
TFP Q3		0.027^{**}			-0.009	
		(0.014)			(0.017)	
TFP Q4		0.022			-0.027	
		(0.014)			(0.017)	
$\widehat{Markup}_i$			-0.015^{**}			-0.031^{***}
			(0.006)			(0.007)
Obs.	6378	6378	6366	6378	6378	6366
R^2	0.028	0.029	0.029	0.064	0.064	0.067

- Small differences in sales across the productivity distribution
- Markups more relevant for sales than employment

Takeup of government support

Specification

$$y_i = \beta_0 + \beta_1' \widehat{TFP}_i + \beta_2' \widehat{Markup}_i + \boldsymbol{\beta}_3' \mathbf{Sector}_i + \boldsymbol{\beta}_4' \%\boldsymbol{\Delta}\mathbf{Sales}_i + \boldsymbol{\beta}_5' \mathbf{X}_i + \varepsilon_i,$$

- Restrict sample to eligible firms
- Control for change in sales

Takeup of government support

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- Restrict sample to eligible firms
- Control for change in sales

Results

	Debt Moratorium	Credit Lines	Tax Deferral	Paid Furlough
$\widehat{TFP}_i$	-0.066^{***}	-0.022^{***}	-0.031^{***}	-0.043^{***}
	(0.006)	(0.005)	(0.007)	(0.013)
$\widehat{Markup}_i$	0.002	-0.007	-0.003	-0.003
	(0.005)	(0.005)	(0.007)	(0.013)
$\%\Delta$ Sales FE	Yes	Yes	Yes	Yes
Obs.	5242	5213	5418	1865
R^2	0.074	0.042	0.073	0.101

- Higher-productivity firms less likely to use all policies

Firm exit

Specification

$$exit_{i,t} = \beta_0 + \beta_1 \widehat{TFP}_{i,t-2} + \beta_2 \widehat{Markup}_{i,t-2} + \mathbb{1}_{t=2020}(\beta_3 \widehat{TFP}_{i,t-2} + \beta_4 \widehat{Markup}_{i,t-2}) + \boldsymbol{\beta}_5' \textbf{Sector-year}_{i,t-2} + \boldsymbol{\beta}_6' \mathbf{X}_{i,t-2} + \varepsilon_{i,t}$$

- Exit data for 2016–2020

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- Exit data for 2016–2020

Results

	Exit
$\widehat{TFP}_i$	-0.0073^{***}
	(0.0002)
$\mathbb{1}_{t=2020} \times \widehat{TFP}_i$	0.0030^{***}
	(0.0004)
$\widehat{Markup}_i$	0.0020^{***}
	(0.0002)
$\mathbb{1}_{t=2020} \times \widehat{Markup}_i$	0.0000
	(0.0005)
Obs.	1,106,574
R^2	0.007

- Selection through exit weakened in recession

Model

Firm production problem

$$\pi_i = \max_{n_i} \left\{ paz_i n_i^{\alpha} - wn_i - \left(\lambda + \frac{\tau n_i}{2} \right) wn_i - \gamma \right\}, \quad \lambda \in \mathbb{R}, \tau > 0$$

Model

Firm production problem

$$\max_{n_i} \left\{ \tilde{p} z_i n_i^{\alpha} - \left(1 + \lambda + \frac{\tau n_i}{2}\right) n_i - \gamma \right\} \quad \lambda \in \mathbb{R}, \tau > 0$$

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Result 1: Employment decreases less at higher productivity firms

$$\frac{\partial \left(\frac{\partial n_i / \partial \tilde{p}}{n_i} \right)}{\partial z_i} < 0.$$

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$$\frac{\partial \left(\frac{\partial n_i / \partial \tilde{p}}{n_i} \right)}{\partial z_i} < 0.$$

Result 2: Sales changes vary less than employment changes across firm

$$\left| \frac{\partial \left(\frac{\partial s_i / \partial \tilde{p}}{s_i} \right)}{\partial z_i} \right| < \left| \frac{\partial \left(\frac{\partial n_i / \partial \tilde{p}}{n_i} \right)}{\partial z_i} \right|.$$

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Result 3: Aggregate productivity increases for $\Delta \tilde{p} < 0$

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Firm production problem

$$\max_{n_i} \left\{ \tilde{p} z_i n_i^{\alpha} - \left(1 + \lambda + \frac{\tau n_i}{2}\right) n_i - \gamma \right\} \quad \lambda \in \mathbb{R}, \tau > 0$$

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Remark: For $\Delta \tilde{p} < 0$, support necessary to avoid low-productivity exits

Conclusion

Questions

- Do recessions reallocate resources to more productive firms?
- Is government support for firms likely to offset this?

Insights

- Covid-19 recession did reallocate labor to more productive firms
- Lower-productivity firms were more likely to use government support
- Selection of lower-productivity firms into exit weakened