Sudden Stops, Productivity, and the Exchange Rate

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Motivation

Productivity in a sudden stop

Sudden stop: An abrupt, unexpected fall in net capital inflows.

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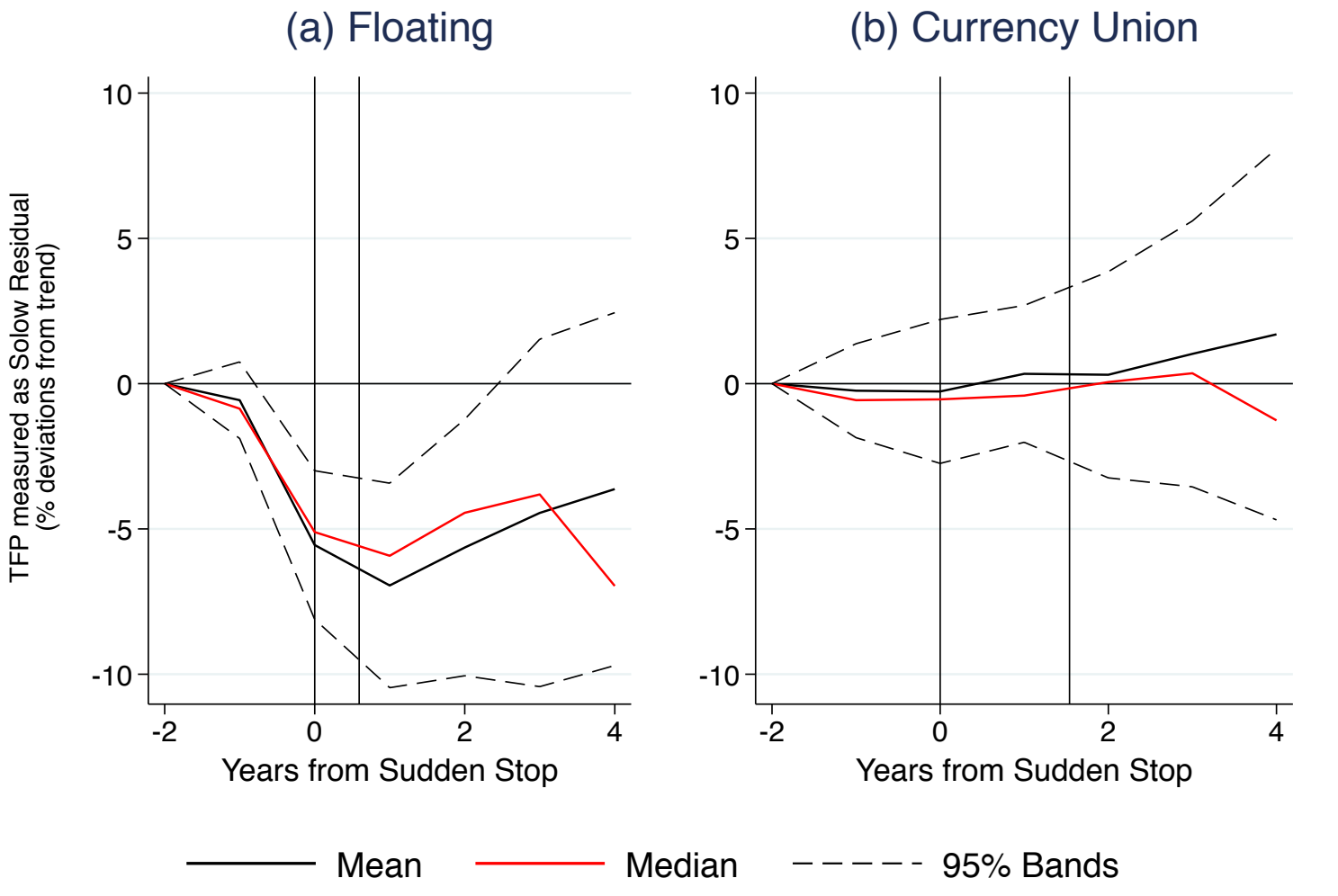

This paper

1. Firm-level data from two sudden stops in Spain.
   - The focus is on firm entry & exit patterns.
   - In the recent crisis, massive exit of unproductive firms and (partial) reallocation of resources $\rightarrow$ **cleansing.**
2. SOE model with firm dynamics and nominal rigidities.
   - With fixed exchange rates, wage adjustment is larger. Demand and firm profitability take a larger hit.
3. Aggregate predictions hold for a wider set of economies.
   - Event study by exchange rate regime. Details
   - Decline in productivity is increasing in flexibility. Hard vs. soft pegs Robustness

Literature Review

Firm-level Evidence

Data and Method

- A tale of two sudden stops: 1992-93 Exchange Rate Mechanism Crisis & 2010-13 European Sovereign Debt Crisis.
- Firm-level data from Survey on Business Strategies (ESEE).
  - Over 1,800 firms in the Spanish manufacturing sector for the period 1990-2014.
  - Reports causes of firm inactivity $\rightarrow$ firm exit.
  - Other advantages: export data, sample length, minimal cleaning required.
- Estimate revenue production function at two digit industry level to measure firm-level TFP.

Details Ackerberg, Caves and Frazer (2015)

The role of the extensive margin

TFP growth decomposition Details

	Episode	
	1992-1993	2010-2013
Productivity Growth (%)	-10.87	10.02

Robustness: Value-added TFPR ORBIS

Other results: Distribution Nature of exit Cleansing Markups Alternative explanations

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Productivity Growth (%)	-10.87	10.02
Contribution to Productivity Growth		
Net Entry Contribution	**0.33**	**6.96**
Incumbents' Contributions	**-11.20**	**3.05**

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Productivity Growth (%)	-10.87	10.02
Contribution to Productivity Growth		
Net Entry Contribution	**0.33**	**6.96**
Entrants' Contribution	-0.77	-0.72
Exiters' Contribution	1.10	7.68
Incumbents' Contributions	**-11.20**	**3.05**

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Entrants' Contribution	-0.77	-0.72
Exiters' Contribution	1.10	7.68
Incumbents' Contributions	**-11.20**	**3.05**
Within-firm Contribution	-9.69	-2.41
Between-firm Contribution	0.47	3.75
Cross-term Contribution	-1.98	1.71

Robustness: Value-added TFPR ORBIS

Other results: Distribution Nature of exit Cleansing Markups Alternative explanations

The representative household

- Melitz and Ottaviano (2008) preferences:

$$U\left(c_t\left(\omega\right), L_t^i\right) = \alpha \int^{N_t} c_t(\omega) d\omega - \frac{\gamma}{2} \int^{N_t} c_t(\omega)^2 d\omega - \frac{\eta}{2} \left(\int^{N_t} c_t(\omega) d\omega \right)^2 - \int_0^1 L_t^i \, di \, .$$

- HH budget constraint:

$$\int^{N_t} p_t(\omega) c_t(\omega) d\omega + \epsilon_t B_t = \int_0^1 W_t^i L_t^i \, di + \Pi_t + \epsilon_t R_{t-1} B_{t-1} \, .$$

- Debt elastic rate of return:

$$R_t = R^* + \phi(e^{\bar{B} - B_t} - 1) + (e^{\psi_t - 1} - 1) \, .$$

Nominal rigidities

- HH is the monopolistic supplier of **ALL** types of differentiated labor input. It chooses W_t^i subject to:

$$L_t^i = \left(\frac{W_t^i}{W_t}\right)^{-\theta} L_t \,.$$

- A random share μ of labor types can update their wage each period.
- The labor type that adjusted s periods ago would have chosen:

$$log(X_{t-s}) = (1-\beta(1-\mu)) \sum_{j=0}^{\infty} (\beta(1-\mu))_{t-s}^{j} \left(log(W_{t+j-s}^{flex})\right) \,.$$

- The aggregate wage is given by:

$$log(W_t) = \mu \sum_{j=0}^{\infty} (1-\mu)^j \, log(X_{t-s-j}) \,.$$

Firms

- One factor of production: labor.
- Unit production cost $c_t = \frac{W_t^\sigma}{Z_t z}$.
- Firms differ in productivity level z which is drawn from a Pareto distribution $1 - G(z) = z^{-k}$.
- Constant number of existing firms. Short run analysis.
- There is a per-unit trading cost $\tau > 1$.
- Foreign demand for a domestic variety is $q_t^{F*} = A - Bp_t^{F*}$ where A and B are exogenous.

Exchange rate policy

The nominal exchange rate, ϵ_t, is the only monetary policy tool.

$$(\Pi_t^w)^{\phi_W} (\epsilon_t)^{1-\phi_W} = 1$$

.

Consider two policy regimes:

- **Currency Union ($\phi_W = 0$)**

  A perfectly credible peg: $\epsilon_t = 1$, $\forall t > 0$.

- **Floating arrangement ($\phi_W = 1$)**

  Zero wage inflation target. Ensure $W_t = W_{t-1}$, $\forall t > 0$.

Definition of equilibrium

A **rational expectations equilibrium** is the set of stochastic processes $\{z_t^H, z_t^F, z_t^{*F}, L_t, N_t, B_t, R_t, P_t, \lambda_t, W_t\}_{t=0}^{\infty}$ that satisfies:

(i) household's optimization conditions,

(ii) firm's optimization conditions,

(iii) aggregation,

(iv) labor and goods market clearing conditions,

given the risk premium shock $\{\psi_t\}_{t=0}^{\infty}$, the productivity common shifter $\{Z_t\}_{t=0}^{\infty}$ and the central bank's exchange rate policy $\{\epsilon_t\}_{t=0}^{\infty}$.

Sudden stops and productivity

Analytical model: $\frac{\epsilon_t}{W_t} \uparrow$ & $Z_t = 1$

Lemma

Domestic productivity is determined by $\hat{z}_t^H$.

Proposition

In equilibrium: $$\hat{z}_t^H = \underbrace{\Phi \hat{N}_t}_{\text{Pro-competitive}} + \underbrace{\Theta \hat{W}_t}_{\text{Cost}} - \underbrace{g(\hat{W}_t)}_{\text{Demand}},$$

where Φ *and* Θ *are functions of model parameters,* N_t *is the number of varieties consumed domestically and* $g'(\hat{W}_t) > 0$.

Proposition

Given a real exchange rate depreciation,

1. ***Floating***: $\hat{N}_t < 0,\ \hat{W}_t = 0$ *and* $-g(\hat{W}_t) = 0 \rightarrow \hat{z}_t^H < 0$.
2. ***Currency union***: $\hat{N}_t < 0,\ \hat{W}_t < 0$ *and* $-g(\hat{W}_t) > 0 \rightarrow \hat{z}_t^H \gtrless 0$.

Sudden stops and productivity

Results

	Data (Normalized)		Analytical Model	
	1992-1993	2010-2013	Floating	CU
Productivity Growth	-1.12	4.16	$-$	$+$
Contribution				
Net Entry	**0.03**	**2.89**	$-$	$+$
Entrants	-0.08	-0.30	$-$	n.a.
Exiters	0.11	3.19	n.a.	$+$
Incumbents	**-1.16**	**1.27**	$-$	$+$
Within	-1.00	-1.00	n.a.	n.a.
Between	0.05	1.56	$-$	$+$
Cross-term	-0.20	0.71	n.a.	n.a.

Calibration IRFs

Sudden stops and productivity

Results

	Data (Normalized)		Analytical Model		Numerical Model	
	1992-1993	2010-2013	Floating	CU	Floating	CU
Productivity Growth	-1.12	4.16	–	+	-0.53	3.5
Contribution						
Net Entry	**0.03**	**2.89**	**–**	**+**	**0.01**	**0.51**
Entrants	-0.08	-0.30	–	n.a.	n.a.	n.a.
Exiters	0.11	3.19	n.a.	+	0.01	0.51
Incumbents	**-1.16**	**1.27**	**–**	**+**	**-0.53**	**3.00**
Within	-1.00	-1.00	n.a.	n.a.	-1.00	-1.00
Between	0.05	1.56	–	+	0.47	4.04
Cross-term	-0.20	0.71	n.a.	n.a.	-0.00	-0.04

Calibration IRFs

Conclusion

- How does exchange rate policy affect macroeconomic performance after a shock?
- This is a new attempt at an old question emphasizing the role of firm dynamics.
- Documents divergence in aggregate TFP patterns and relates them to observed differences in firm exit at the micro level.
- A SOE model featuring firm dynamics and nominal rigidities formalizes the mechanism.

Thank You!

Relation to the literature

Back

Capital flow movements and the macroeconomy

Calvo et al. (2004), Guidotti et al. (2004), Calvo and Talvi (2005), Kehoe and Ruhl (2009).
Christiano et al. (2004), Neumeyer and Perri (2005), Meza and Quintin (2007), Mendoza (2010).

Optimal exchange rate policy

Friedman (1953), Cúrdia (2007), Braggion et al. (2009), Farhi et al. (2013), Schmitt-Grohé and Uribe (2016), Galí and Monacelli (2016).

Heterogeneous firm selecting into trade

Melitz (2003), Melitz and Ghironi (2005), Melitz and Ottaviano (2008), Demidova and Rodriguez-Clare (2009).

Firm dynamics, reallocation and productivity growth

Baily et al. (1992), Caballero et al (1994), Foster et al. (2001), Hsieh and Klenow (2009, 2017).

Reis (2013), Benigno and Fornaro (2014), Gopinath et al (2017), Ates and Saffie (2020), Monacelli et al (2020).

Estimating firm-level TFP

Step I. Estimate two-digit industry output elasticities for capital and labor:

$$y_{ist} = \alpha + \beta_s^k k_{ist} + \beta_s^l l_{ist} + \omega_{ist} + \epsilon_{ist} \,,$$

where y_{ist} is value added, k_{ist} is capital and l_{ist} is labor input. All deflated using industry indices. ω_{ist} is unobserved firm-level TFP.

(i) Simultaneity bias $\rightarrow$ proxy variable approach.

- Allow for labor dynamics: Ackerberg et al (2015). Algorithm

(ii) Selection bias $\rightarrow$ control for attrition.

Step II. Firm-level TFP is calculated as the Solow residual.

Back

Estimating firm-level TFP

Ackerberg et al (2015)

Suppose there exists a proxy variable: $m_{ist} = f_t(k_{ist}, l_{ist}, \omega_{ist})$.
If f_t is strictly monotonic, substitute:

$$y_{ist} = \alpha + \beta_s^k k_{ist} + \beta_s^l l_{ist} + f_t^{-1}(k_{ist}, l_{ist}, \omega_{ist}) + \epsilon_{ist} .$$

Use a two-stage procedure:

1. Identify the composite term: $\hat{\Phi}_{ist} = \alpha + \widehat{\beta_s^k k_{ist} + \beta_s^l l_{ist}} + \omega_{ist}$
2. Exploit moment conditions

$$\frac{1}{N}\frac{1}{T}\sum_i \sum_t \begin{pmatrix} \hat{\xi}_{ist}\left(\beta_s^k \beta_S^l\right) k_{ist} \\ \hat{\xi}_{ist}\left(\beta_s^k \beta_s^l\right) l_{ist-1} \end{pmatrix} = 0 ,$$

where $\hat{\xi}_{ist}$ is the residual of regressing $\hat{\omega}_{ist} = \hat{\Phi}_{ist} - \beta_s^k k_{ist}$ on $\hat{\omega}_{ist-1}$

Back

Firm-level data evidence

Decomposing TFP growth

Back

Melitz and Polanec (2015) to decompose the change in productivity, ΔZ_t, into contributions of entrants, N, exiters, X, and incumbents, C:

$$\Delta Z_t = \underbrace{Z_t^C - Z_{t-1}^C}_{incumbents} + \underbrace{s_t^N \left(Z_t^N - Z_t^C\right)}_{entrants} + \underbrace{s_{t-1}^X \left(Z_{t-1}^C - Z_{t-1}^X\right)}_{exiters},$$

where Z_t^j and s_t^j are average TFP and labor share of firms in group $j = \{N, X, C\}$.

Foster et al (2001) to decompose further the contribution of incumbents:

$$Z_t^C - Z_{t-1}^C = \underbrace{\sum_{i \in C} s_{i,t-1} \Delta Z_{i,t}}_{within} + \underbrace{\sum_{i \in C} Z_{i,t-1} \Delta s_{i,t}}_{between} + \underbrace{\sum_{i \in C} \Delta s_{i,t} \Delta Z_{i,t}}_{cross-term}.$$

Decomposing TFP growth

Robustness: using value-added weights

Back

	Episode	
	1992-1993	2010-2013
Productivity growth (%)	-10.13	10.91
Contribution to productivity growth		
Incumbent firms' contribution	**-9.69**	**6.59**
Within firm contribution	-18.75	-12.021
Between firm contribution	-10.48	-6.98
Cross-term contribution	19.54	25.6
Net entry contribution	**-0.44**	**4.31**
Entrants' contribution	-1.35	-1.35
Exiters' contribution	0.91	5.17

Decomposing TFP growth

Robustness: TFPR

Back

	Episode	
	1992-1993	2010-2013
Productivity growth (%)	-10.73	5.98
Contribution to productivity growth		
Incumbent firms' contribution	**-10.59**	**1.79**
Within firm contribution	-11.19	-0.88
Between firm contribution	1.71	-6.98
Cross-term contribution	-1.11	2.62
Net entry contribution	**-0.14**	**4.19**
Entrants' contribution	0.56	0.56
Exiters' contribution	-0.7	3.49

Decomposing TFP growth

Robustness: using ORBIS

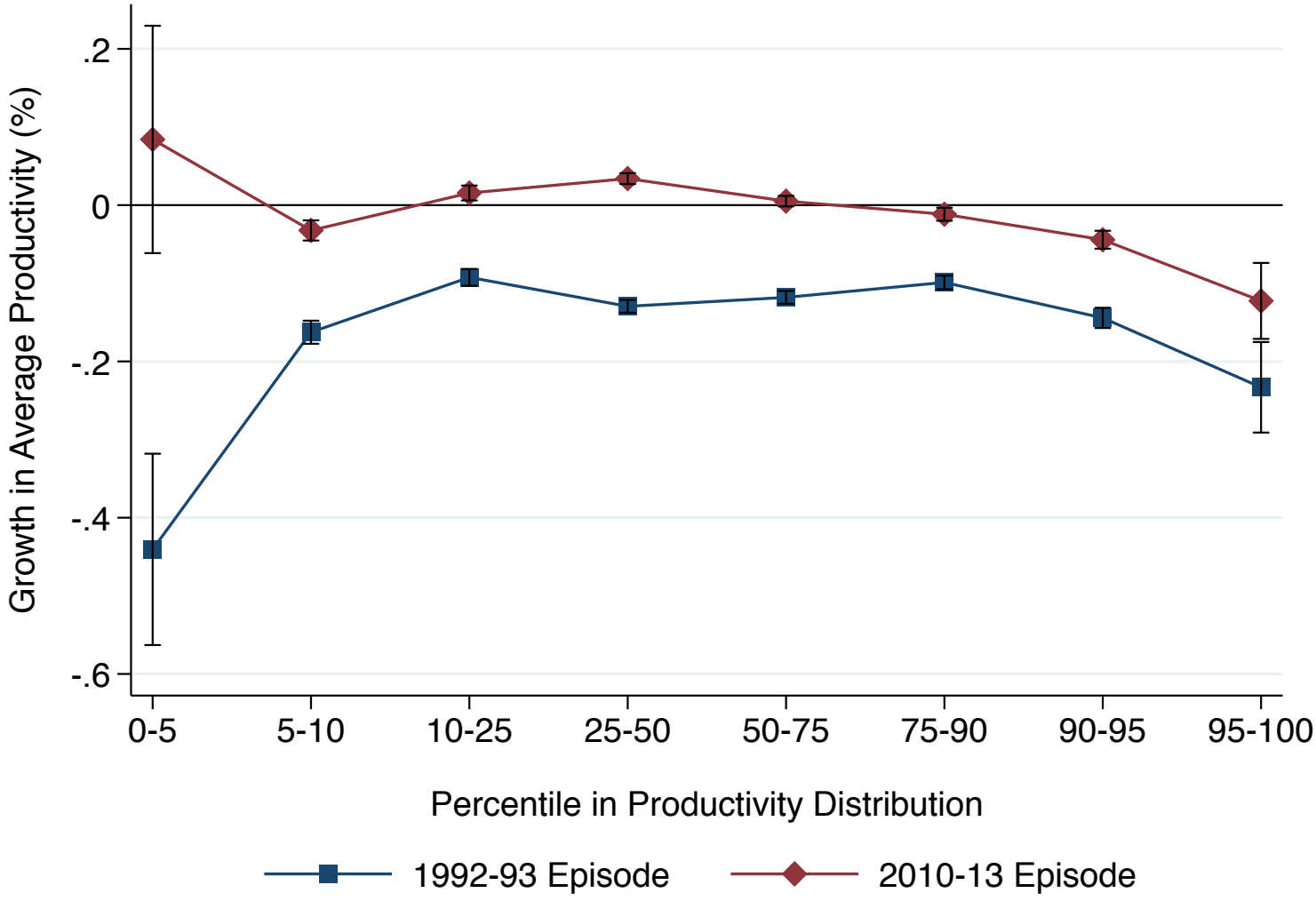
Back

	Sudden stop 2010-2013
Productivity growth (%)	8.83
Contribution to productivity growth	
Incumbent firms' contribution	**2.20**
Within firm contribution	-1.28
Between firm contribution	1.89
Cross-term contribution	1.59
Net entry contribution	**6.63**
Entrants' contribution	-0.19
Exiters' contribution	6.82

Firm-level evidence

The action is on the lower tail

Back



Firm-level evidence

Volume and nature of exit

Back

	full sample	1992-1993	2010-2013
Exit rate	7.71%	4.47%	9.19%
Market weight	6.43%	2.78%	7.01%
TFP relative to incumbents	-14.09%	-9.17%	-27.16%

*In 2010-13 there is **more** exit and exiters are **bigger** and **more unproductive**.*

Firm-level evidence

The cleansing hypothesis Back

$$y_{it} = \lambda + \beta\, tfp_{it} + \delta\, ss_t^1 + \gamma\, ss_t^1 * tfp_{it} + \mu\, ss_t^2 + \theta\, ss_t^2 * tfp_{it} + \epsilon_{it}\ ,$$

	Exit	Labor growth (continuers & exiters)	Labor growth (continuers only)
	(1)	(2)	(3)
tfp_{it}	-0.041***	0.980*	1.060**
	(0.005)	(0.488)	(0.498)
ss_t^1	0.005	-0.582	-0.842
	(0.005)	(0.886)	(0.883)
$ss_t^1 * tfp_{it}$	-0.005	0.146	0.087
	(0.010)	(1.095)	(1.203)
ss_t^2	0.023***	-7.115***	-6.811***
	(0.005)	(0.813)	(0.800)
$ss_t^2 * tfp_{it}$	-0.031***	1.637**	1.804**
	(0.008)	(0.737)	(0.815)
Observations	34,854	30,861	28,275
Industry FE	Yes	Yes	Yes

Firm-level evidence

Markups and productivity

Back

	(1)	(2)	(3)	(4)
Firm-level TFP	0.994***	0.992***	0.964***	0.960***
	(0.003)	(0.003)	(0.008)	(0.008)
Aggregate TFP	0.022	-0.000		
	(0.020)	(0.016)		
Industry TFP			-0.882***	-0.879***
			(0.048)	(0.049)
Observations	36,261	36,261	36,261	36,261
R-squared	0.933	0.937	0.856	0.859
Industry FE	Yes	Yes	No	No
Export status	No	Yes	No	Yes

Firm-level evidence

Alternative explanations Back

- Coincidence of a **banking crisis** in 10-13.

  No significant difference in leverage between incumbents and exiters. Differences

- Additional effects of a nominal depreciation on firm profitability:
  - **expenditure switching** on imported intermediate inputs,
  - **balance sheet effects** of foreign debt.

  Exit is more prevalent in the later sudden stop. Moreover, incumbents are more likely to import than exiters.

- The undoing of the 2000s increasing **capital misallocation** trend.

  The standard deviations of MRPK and MRPL co-move during both crises.

- Other concerns: crisis duration and the role of construction.

Characteristics of exiters

Back

	1991-1993			2010-2013		
	μ_C	μ_X	p-value	μ_C	μ_X	p-value
productivity	0.30	0.16	0.02	0.19	-0.05	0.00
age	24.36	18.53	0.01	31.51	29.82	0.12
construction	0.20	0.20	0.89	0.23	0.30	0.00
employees	232.52	138.76	0.08	220.34	150.11	0.04
part-time share	0.02	0.02	0.88	0.03	0.04	0.86
fixed-term share	0.24	0.29	0.07	0.10	0.07	0.00
exports	0.50	0.45	0.26	0.70	0.56	0.00
imports	0.52	0.42	0.05	0.67	0.56	0.00
imp. intermediates	-	-	-	0.49	0.40	0.00
debt	13.82	13.43	0.15	13.74	13.67	0.58

Definition of equilibrium

Equilibrium conditions

Back

Debt elastic interest rate	$R_t = R_t^* + \phi(e^{\bar{B}-B_t} - 1)$	(1)
Euler condition	$1 = \beta R_t E_t[\frac{\epsilon_{t+1}}{\epsilon_t}\frac{\lambda_{t+1}}{\lambda_t}]$	(2)
Productivity cutoffs	$z_t^H = \frac{\gamma+\eta N_t}{\alpha\gamma\frac{1}{\lambda_t}+\eta P_t} W_t^\sigma$	(3)
	$z_t^F = \frac{\gamma+\eta N_t}{\alpha\gamma\frac{1}{\lambda_t}+\eta P_t}\tau\epsilon_t$	(4)
	$z_t^{*F} = \frac{B}{A}\frac{\tau W_t^\sigma}{\epsilon_t}$	(5)
Number of firms	$N_t = M(z_t^H)^{-k} + M^*(z_t^F)^{-k}$	(6)
Labor market clearing	$L_t = \frac{k}{(k+1)(k+2)}\frac{\sigma}{W_t} M[\frac{\lambda_t}{\gamma}(z_t^H)^{-(k+2)} + B\frac{\tau^2}{\epsilon_t}(z_t^{*F})^{-(k+2)}]$	(7)
Aggregate wage	$W_t = \prod_{s=0}^{\infty}(\frac{\theta}{1-\theta}\mathbb{E}_{t-s}(\frac{1}{\lambda_t}))^{\omega(1-\omega)^s}$	(8)
Aggregate price	$P_t = \frac{2k+1}{2k+2}\frac{W_t^\sigma N_t}{z_t^H}$	(9)
Balance of payments	$MB(\frac{\tau W_t^\sigma}{\epsilon_t})^2(z_t^{*F})^{-(k+2)} - M^*\frac{\lambda_t}{\gamma}\epsilon_t\tau^2(z_t^F)^{-(k+2)} = 2(k+2)(B_t - R_t B_{t-1})$	(10)

Calibration

Back

	Parameter	Value	Calibration target/source
β	Discount factor	0.99	Annual real return on bonds is 4%
ω	Index of wage rigidity	0.2	Gali and Monacelli (2016)
θ	Elasticity of substitution (labor)	4.3	Gali and Monacelli (2016)
τ	Iceberg trade cost	1.3	Ghironi and Melitz (2005)
γ	Preference parameter	10	Ottaviano (2012)
α	Preference parameter	10	Ottaviano (2012)
η	Preference parameter	10	Ottaviano (2012)
$\bar{B}$	Steady state level of debt	0	Steady state trade balance
σ	Labor share	0.64	National Accounts Spain
n	Relative size of SOE	0.12	Business Demographic Statistics
k	Shape productivity parameter	1.9	Estimated from ESEE data Estimation
A	Foreign demand parameter	0.01	Domestic productivity cutoff (1.55)
B	Foreign demand parameter	0.33	Share of exporting firms (63.6%)
$\bar{M}$	Number of total firms	173	Active domestic firms (75.86)
ϕ	Risk premium parameter	8	Output volatility (3%)

Estimating shape parameter

Del Gatto et al. 2006

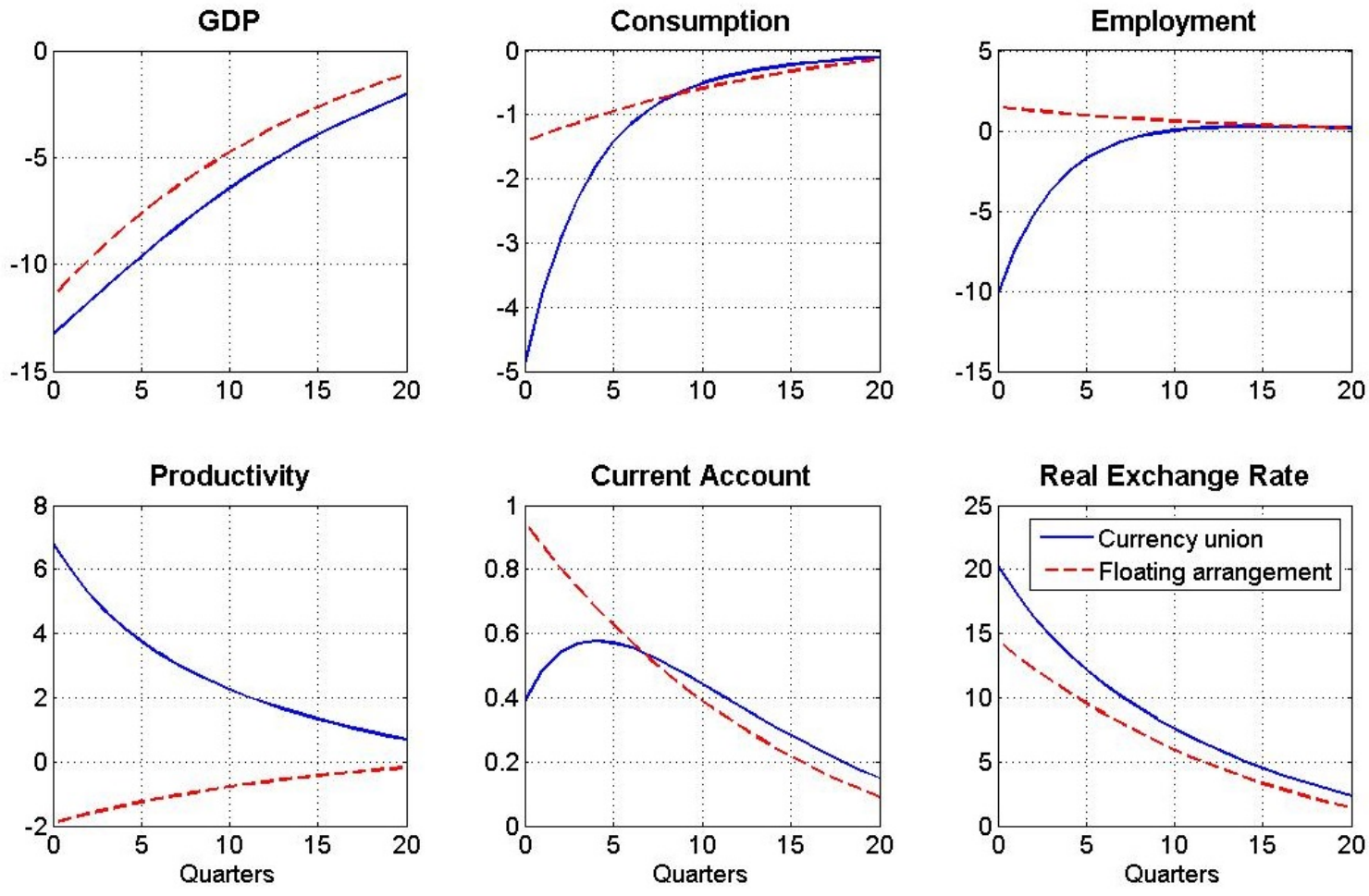
Given the observed cumulative distribution, $G(z)$, I run the following regression for every year and industry

$$ln(1 - G(z)) = \beta_0 + \beta_1 ln(z) + \eta$$

where, assuming a Pareto distribution, the slope coefficient, β_1 provides me with a consistent estimator for k. Back

IRFs to a sudden stop

Back



Aggregate evidence

Back

- How do macro variables behave during a sudden stop?
- Follow the usual steps
  1. Identification of sudden stops. Algorithm List of ss
  2. Conduct an event study.

  NEW Classification by prevalent exchange rate. Ex-rate classification
- On the data
  - 138 countries from 1990-2015. Sample
  - Standard sources: IFS, WDI, Total Economy Database.
  - Annual frequency.

Aggregate data: the TFP fact

Sudden stop algorithm

A sudden stop is an episode with at least one year, t, in which

1. The reduction in the financial account surplus is at least one standard deviation above the rolling average.
2. The current account deficit[1] has fallen by any amount either at t or $t+1$.
3. GDP per capita has fallen by any amount either at t or $t+1$.

The start (end) of the episode is marked by the financial account surplus falling more (less) than half a standard deviation below the rolling average. Back

[1] or, equivalently, foreign reserves

Exchange Rate Arrangement Classification

Based on Ilzetzki, Reinhart & Rogoff (2019)

code	description	IRR fine classification
0	no separate legal tender	1
1	currency union	1
2	hard peg	2-4
3	soft peg	5-11
4	floating arrangement	12-14
5	other	15

Back

Aggregate data: the TFP fact

Sample

Back

Country	Start year	End year	Country	Start year	End year	Country	Start year	End year	Country	Start year	End year
Albania	1990	2015	Dominican Republic	1990	2015	Latvia	1992	2015	Russia	1994	2015
Angola	1990	2015	Ecuador	1990	2015	Lebanon	2002	2015	Rwanda	1990	2015
Argentina	1990	2015	Egypt	1990	2015	Lesotho	1990	2015	Saudi Arabia	1990	2015
Armenia	1993	2015	El Salvador	1990	2015	Libya	1990	2013	Senegal	1990	2014
Australia	1990	2015	Estonia	1992	2015	Lithuania	1993	2015	Sierra Leone	1990	2014
Austria	2005	2015	Ethiopia	1990	2012	Macedonia	1996	2015	Singapore	1990	2015
Azerbaijan	1995	2015	Finland	1990	2015	Madagascar	1990	2013	Slovak Republic	1993	2015
Bahrain	1990	2014	France	1990	2015	Malawi	1990	2015	Slovenia	1992	2015
Bangladesh	1990	2015	Gabon	1990	2005	Malaysia	1990	2015	South Africa	1990	2015
Belarus	1993	2015	Georgia	1997	2015	Mali	1990	2014	Spain	1990	2015
Belgium	2002	2015	Germany	1990	2015	Mauritius	1990	2015	Sri Lanka	1990	2015
Benin	1990	2015	Ghana	1990	2015	Mexico	1990	2015	Sudan	1990	2015
Bolivia	1990	2015	Greece	1990	2015	Moldova	1994	2015	Swaziland	1990	2015
Bosnia and Herzegovina	1998	2015	Guatemala	1990	2015	Mongolia	1990	2015	Sweden	1990	2015
Botswana	1990	2015	Guinea	1990	2015	Morocco	1990	2015	Switzerland	1990	2015
Brazil	1990	2015	Haiti	1990	2015	Myanmar	1990	2015	Syria	1990	2010
Bulgaria	1990	2015	Honduras	1990	2015	Namibia	1990	2015	Tajikistan	2002	2015
Burkina Faso	2005	2014	Hong Kong	1998	2015	Nepal	1990	2015	Tanzania	1990	2015
Burundi	1990	2015	Hungary	1990	2015	Netherlands	1990	2015	Thailand	1990	2015
Cambodia	1992	2014	India	1990	2015	New Zealand	2000	2015	Timor-Leste	2006	2015
Cameroon	1990	2015	Indonesia	1990	2015	Nicaragua	1990	2015	Togo	1990	2015
Canada	1990	2015	Iran	1990	2000	Niger	1990	2015	Trinidad and Tobago	1990	2015
Central African Republic	1990	1994	Iraq	2005	2015	Nigeria	1990	2015	Tunisia	1990	2015
Chad	1990	1994	Ireland	2005	2015	Norway	1990	2015	Turkey	1990	2015
Chile	1990	2015	Israel	1990	2015	Oman	1990	2015	Uganda	1990	2015
China	1990	2015	Italy	1990	2015	Pakistan	1990	2015	Ukraine	1994	2015
Colombia	1990	2015	Jamaica	1990	2015	Panama	1990	2015	United Kingdom	1990	2015
Congo, Democratic Republic of	2005	2015	Japan	1996	2015	Papua New Guinea	1990	2015	United States	1990	2015
Congo, Republic of	1990	2007	Jordan	1990	2015	Paraguay	1990	2015	Uruguay	1990	2015
Costa Rica	1990	2015	Kazakhstan	1995	2015	Peru	1990	2015	Venezuela	1990	2015
Cote d'Ivoire	2005	2013	Kenya	1990	2014	Philippines	1990	2015	Vietnam	1996	2015
Croatia	1993	2015	Korea	1990	2015	Poland	1990	2015	Yemen	2005	2015
Cyprus	1990	2015	Kuwait	1990	2015	Portugal	1990	2015	Zambia	1990	2015
Czech Republic	1993	2015	Kyrgyz	1993	2015	Qatar	2011	2015			
Denmark	1990	2015	Lao	1990	2015	Romania	1990	2015			

Aggregate data: the TFP fact

List of sudden stops

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Country	Start year	End year	Regime	Country	Start year	End year	Regime
Albania	1991	1992	4	Macedonia	2009	2010	2
Argentina	1995	1995	2	Malaysia	1998	1998	4
Argentina	1999	2002	4	Mali	1991	1991	1
Argentina	2014	2014	3	Mexico	1995	1995	4
Belarus	2014	2015	3	Moldova	2012	2013	3
Brazil	2015	2015	4	Morocco	1996	1996	3
Bulgaria	1991	1991	4	New Zealand	2004	2010	4
Bulgaria	2009	2010	2	Nicaragua	1991	1991	2
Chile	1999	1999	3	Oman	1999	2000	2
Chile	2009	2010	4	Oman	2010	2010	2
Colombia	1998	1999	3	Philippines	1998	1998	4
Croatia	1997	2002	2	Poland	1990	1990	4
Croatia	2009	2010	2	Portugal	2001	2003	1
Cyprus	2011	2011	1	Portugal	2009	2013	1
Czech Rep.	1997	2002	3	Romania	1999	1999	4
Czech Rep.	2008	2008	3	Russia	1998	2002	3
Czech Rep.	2011	2013	3	Rwanda	1994	1994	4
Ecuador	1999	2000	0	Saudi Arabia	1992	1992	2
Estonia	1996	2001	2	Saudi Arabia	1999	2000	2
Estonia	2008	2009	2	Senegal	1994	1994	1
Ethiopia	1991	1991	3	Sierra Leone	1996	1996	4
Ethiopia	2003	2003	3	Slovak Republic	1997	2002	3
Finland	1991	1993	3	South Africa	2008	2008	4
Finland	2013	2013	1	Spain	1993	1993	3
France	1991	1993	2	Spain	2009	2013	1
Gabon	1999	1999	1	Sri Lanka	2001	2001	3
Greece	1993	1993	2	Sudan	2010	2010	3
Greece	2009	2013	1	Sweden	1991	1991	3
Haiti	2003	2003	4	Thailand	1997	1998	4
Haiti	2009	2010	3	Turkey	1994	1994	4
Indonesia	1998	1998	4	Turkey	2001	2001	4
Iran	1992	1995	4	Ukraine	2014	2015	4
Ireland	2009	2014	1	United Kingdom	1990	1991	3
Israel	2001	2001	3	United States	2007	2007	4
Italy	1993	1994	3	Uruguay	2001	2001	3
Italy	2011	2014	1	Venezuela	1994	1994	4
Kenya	1991	1992	4	Venezuela	1999	2000	3
Korea	1997	1998	4	Yemen	2009	2014	3
Latvia	2008	2009	3				

Hard & Soft pegs

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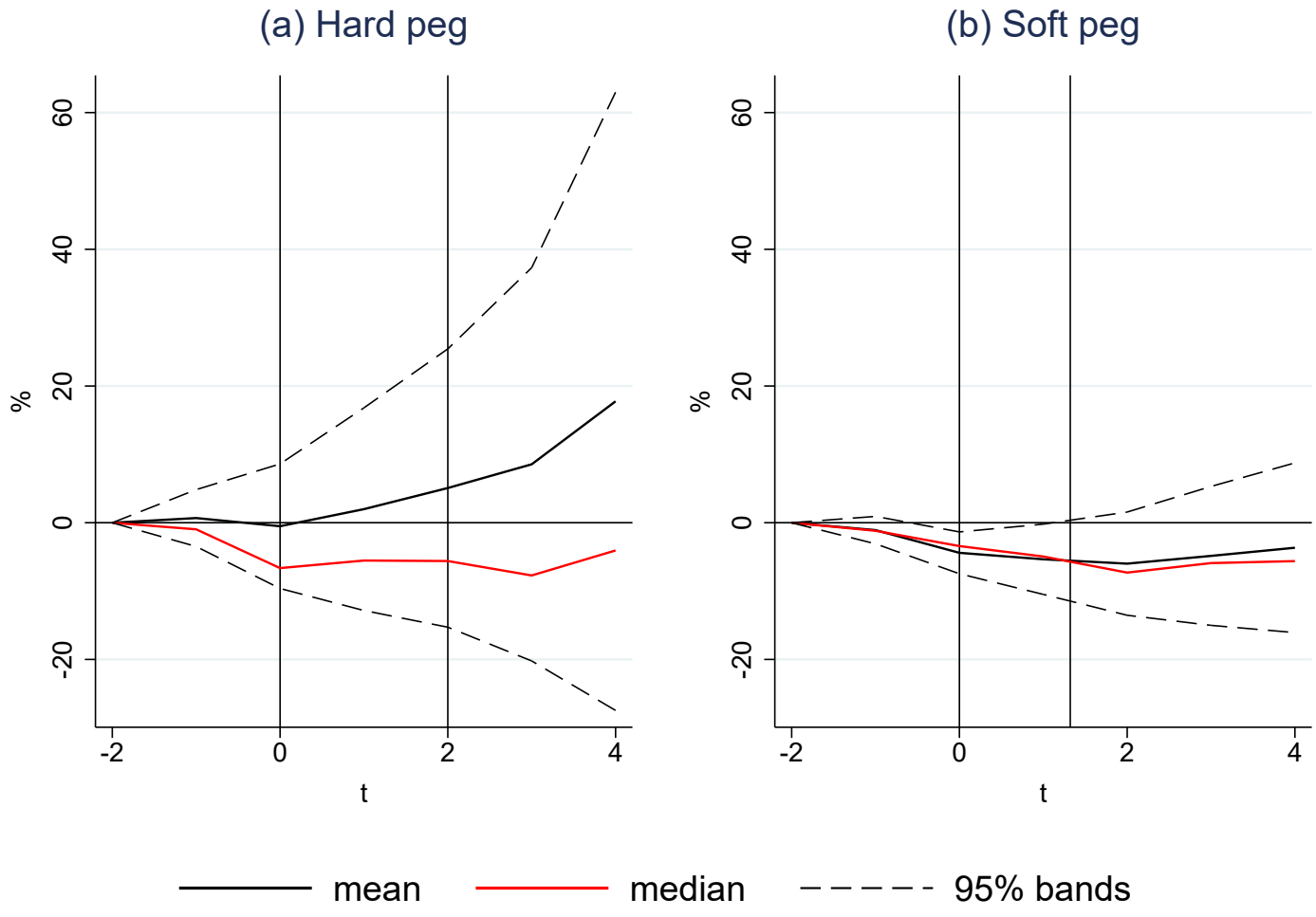

Robustness

Back

- Exchange rate classification:
  - Shambaugh (2004), Klein and Shambaugh (2010).
  - Ex-ante prevalent regime.
- Detrending macroeconomic variable:
  - Backward-looking HP filter.
  - Alternative pre-crisis sample .
- Hours worked vs. number of workers.
- Full window requirement.
- Controlling for the degree of economic development.