
CHAPTER 3

CAPITAL INFLOWS AND THEIR (MIS)ALLOCATION

A Model of Misallocation

The Seeds of the Euro Crisis: Portugal's Slump

Chile's 1970s Liberalization and 1982 Crash

**a crash course
on crises:**

macroeconomic

concepts for

run-ups,

collapses, and

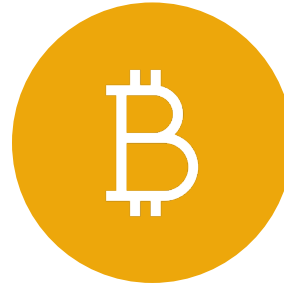
recoveries

**markus k. brunnermeier
and ricardo reis**

THE SURGE OF CAPITAL FLOWS: BENEVOLENT VIEW



Before a crash, there is generally a prolonged investment boom. Optimistic expectations lead to cheap credit and financial markets grow.



Large capital flows from savers to borrowers, from developed to developing regions. Housing is at the centre of these flows.



The housing market booms causing an increase in demand for construction and real estate sectors.



These large capital flows make financial markets integrate, economies boom and incomes converge.

A MODERN VIEW OF CAPITAL FLOWS

The focus is on how capital is allocated across sectors and firms

- Productivity can fall when capital flows to poorer countries because:
 - They are worse at allocating capital
 - They lack depth in financial markets
 - Banks and financial markets are unsophisticated in evaluating projects and have governance problems.
 - There is political interference through taxes, regulation, and corruption
 - Capital inflows intensify misallocation as abundant resources make bank managers more lax at screening projects and politicians less eager to implement reforms
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A MODEL OF MISALLOCATION

Illustrate how investment booms lead to acute misallocation of capital

Simplifications:

- The economy has two sectors which each contains several firms
 - We focus on two types of misallocation: between and within sectors
 - The economy has to allocate its scarce capital between the two sectors
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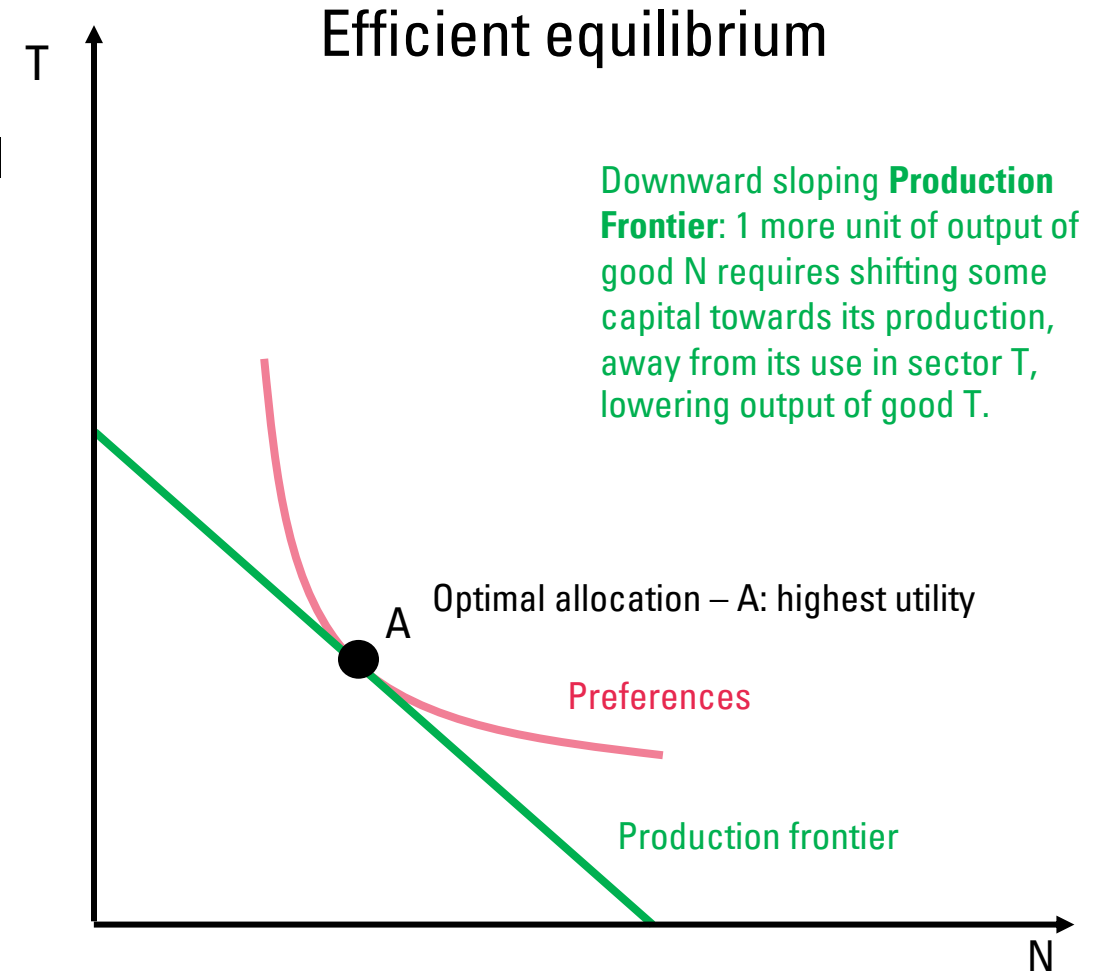
SETTING UP THE MODEL

Sector T

- Produces goods that are traded in international markets, subject to fierce competition
- E.g. manufacturing

Sector N

- Produces goods for the domestic market, protected from foreign competition by natural and political barriers
- E.g. construction and real estate



SETTING UP THE MODEL

Politics

- Sector N protected by local politicians, as politicians are sensitive to: the number of voters that construction employs, the visibility of public work, electoral impact
- No competition, can form local cartels
- Coordinate political contributions

Finance

- Sector N favoured by local bankers
- In construction, collateral is available and is easy to price
- Large construction companies often have important shareholder stakes in local banks

Rents

- Favoring sector N creates rents.
 - Effort and resources are diverted to capture these rents.
 - Wasteful activities do not create any new output, directly lowers the economy's resources.
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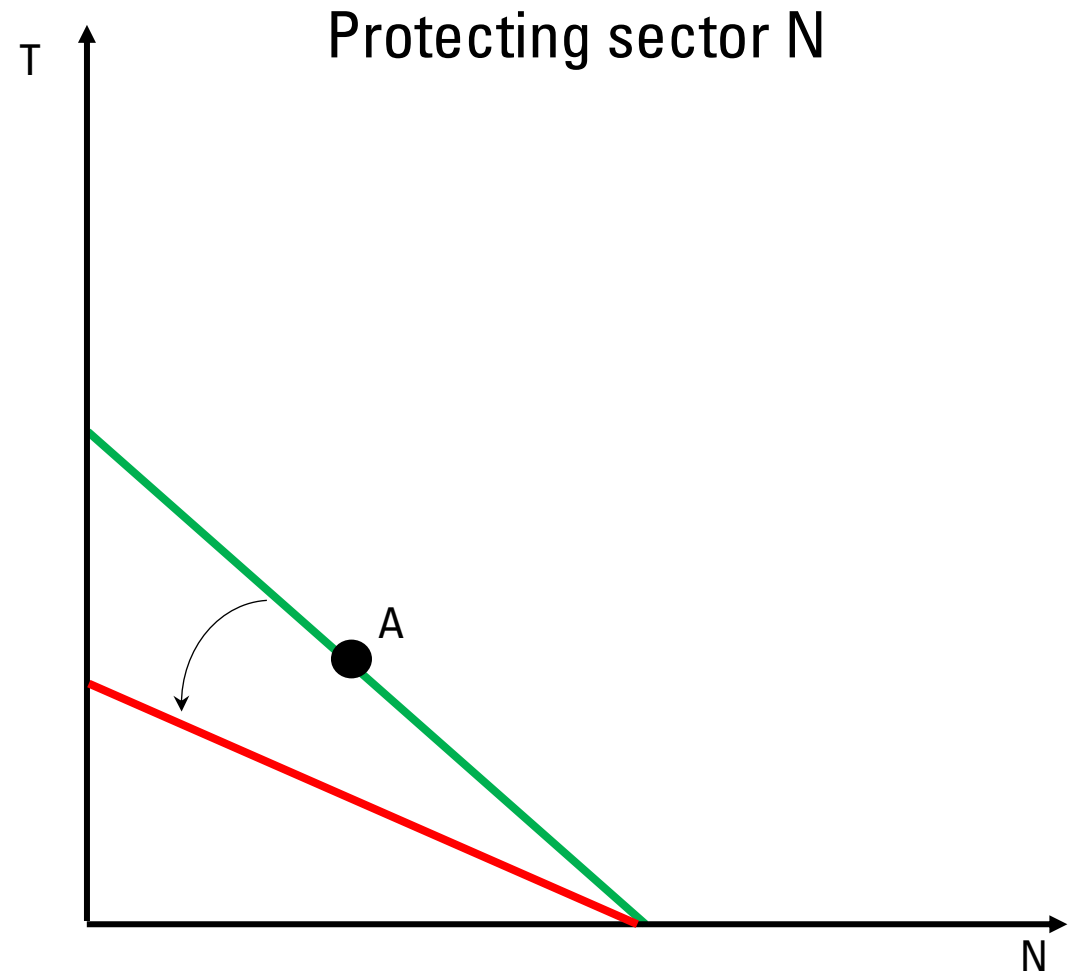
BACK TO MODEL

Favouring N

- Illustrated as a **tax** on sector T over their output leading to a lower marginal product of capital
- The production frontier is now **flatter** since diverting one unit of capital from N to T gives a lower return

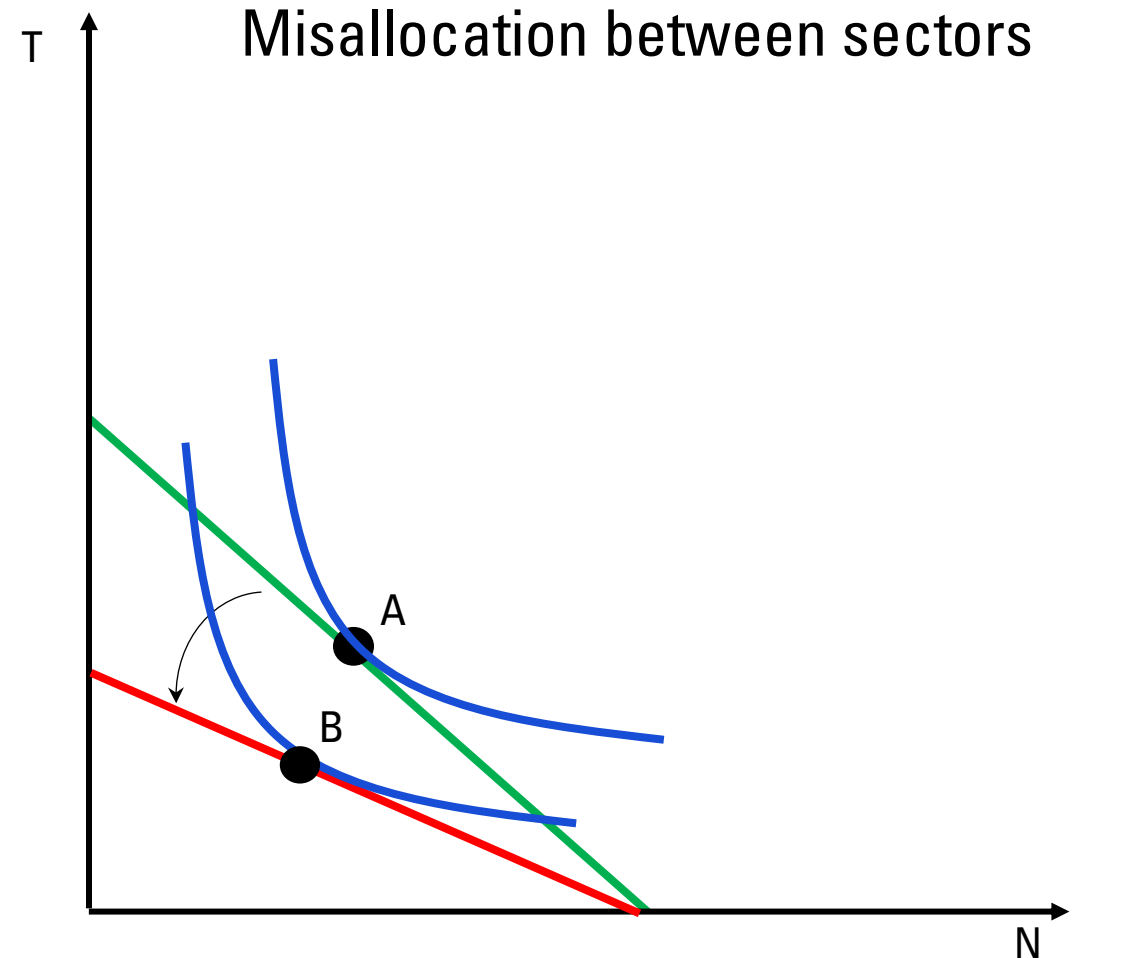
Rent

- Production function **shifts in**
- For simplicity, assume all of the taxes on T are lost this way



EFFECTS OF MISALLOCATION

- Equilibrium moves from A to B
- Ratio of output in T to output in N falls
- Economy **worse off**



MISALLOCATION WITHIN SECTORS – FAVOURING THE SMALL

Politics

- Without foreign competition, firms can more easily lobby for local regulations
 - to erect barriers to entry
 - to put constraints on firms growing
- Politicians are receptive to small firms as
 - entrepreneurship - income mobility
 - small firms employ many people

Finance

- Banks in underdeveloped financial markets lack managerial talent and tools to diversify their credit portfolio
- They are wary of giving large loans to a few firms.
- Prefer to spread credit among many small firms.

Consequence

- Distribution of firm size becomes left-skewed, biased towards the smaller firms
 - Within-sector misallocation

MISALLOCATION WITHIN SECTORS – FAVOURING LARGE FIRMS

Politics

- Larger firms have more political clout
 - Employ many voters
 - Large contracts to provide government services that encourage corruption

Finance

- Owners of large firms may be the major shareholders and directors of the banks
- Favouring their non-financial businesses when it comes to allocating credit

Consequence

- Often happens more in emerging economies
 - More likely that large firms receive special treatment
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FUNDAMENTAL VALUE AND MARKET PRICES

An example of within-sector misallocation

- Consider a limit on firm size of 1 unit of output
 - There are many potential firms to produce good N
 - Demand for good N is 3 units in an efficient economy
 - The most productive firm can produce all 3 units using 3 units of capital – thus its productivity is 1
 - Yet, facing an upper bound, it can only produce 1 unit
 - The next best firm needs 3 units of capital to produce 1 unit
 - The third firm needs 5 units of capital to produce 1 unit
 - Hence, $1+3+5=9$ units of capital is required to produce 3 units of good N – productivity is $3/9 = 1/3$ which is lower than the productivity of $3/3 = 1$ without barriers to firm size
 - *A sign of misallocation: increase in the dispersion of productivity across firms in operation, as the market no longer drives the less productive firms out of business*
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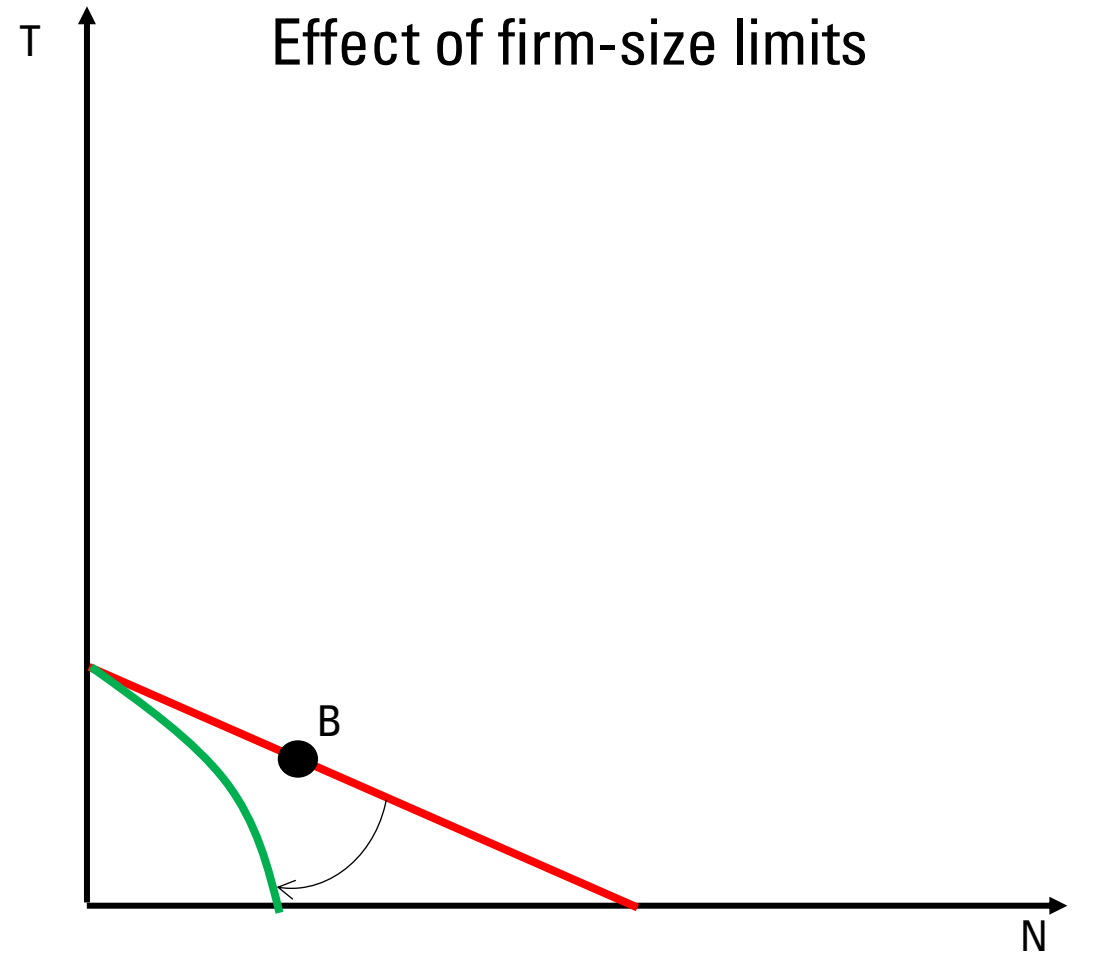
BACK TO MODEL

Implication

- Every extra unit produced in sector N takes more capital
- Less T output is sacrificed for an extra unit of N
- And increasingly so, as N production expands

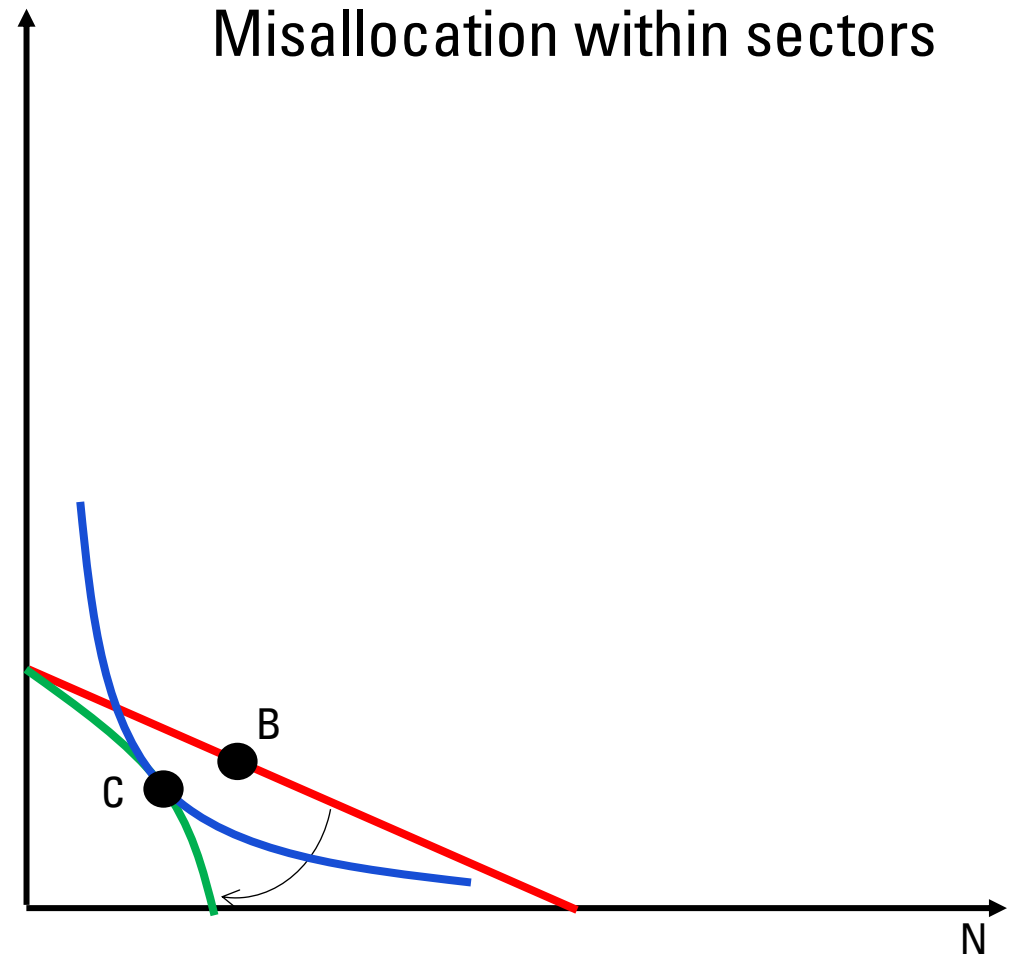
Production frontier

- Becomes concave
- Start at same vertical intercept, as this is an issue within the N sector



EFFECTS OF MISALLOCATION

- The distribution of firm size is therefore skewed τ to **smaller** firms
- Moving the equilibrium from B to C (lower welfare)
- Economy worse off



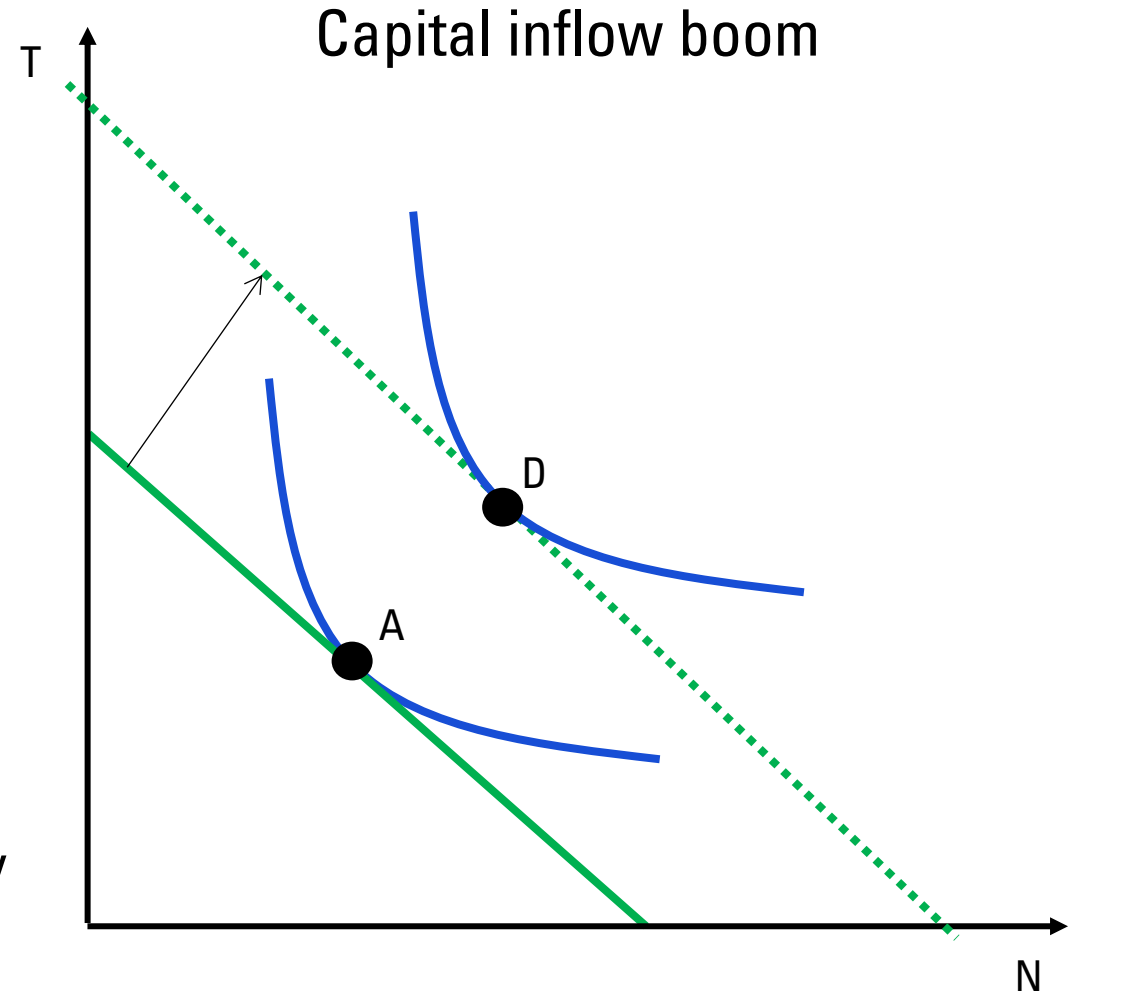
A CAPITAL INFLOW COMES

Possible causes

- Financial liberalization
- Capital market union

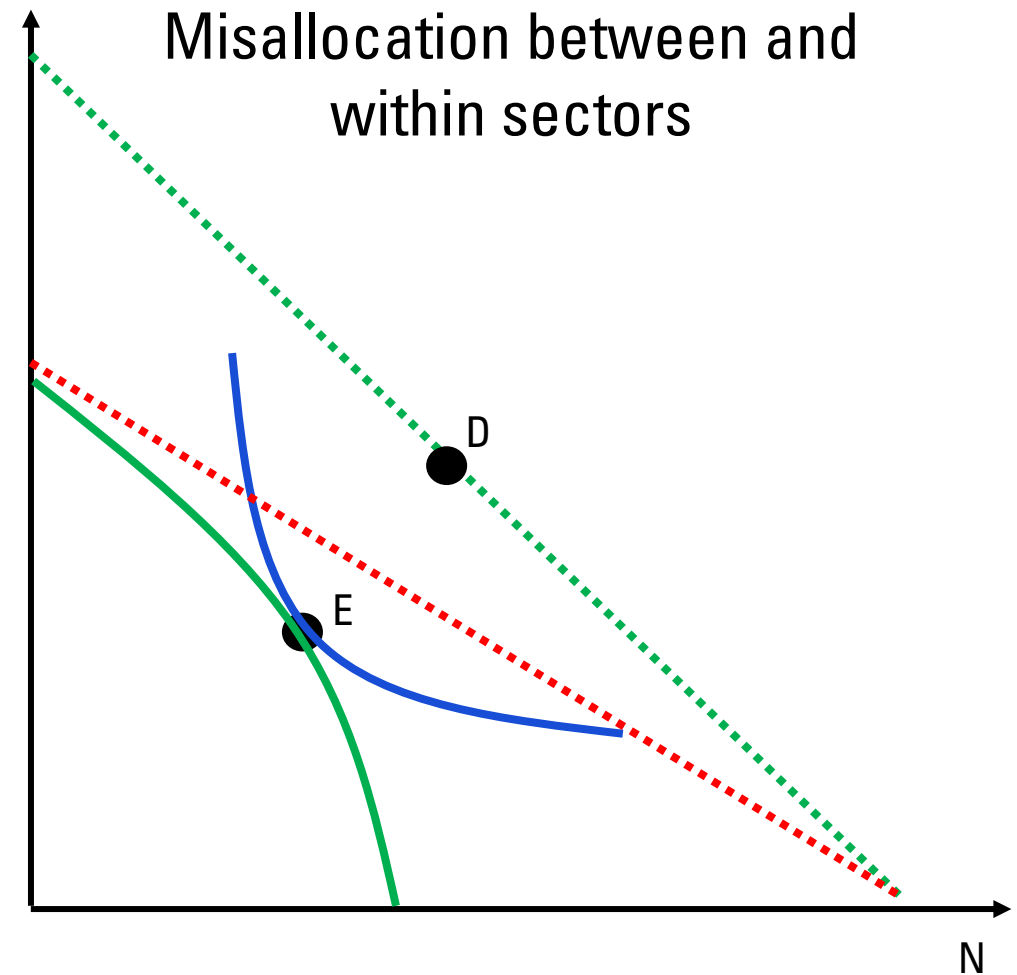
Effects

- More capital available for production
- Production function **shifts out**
- Close-to-efficient economy at start (for simplicity): point A
- If efficient economy, benevolent view: economy moves to D



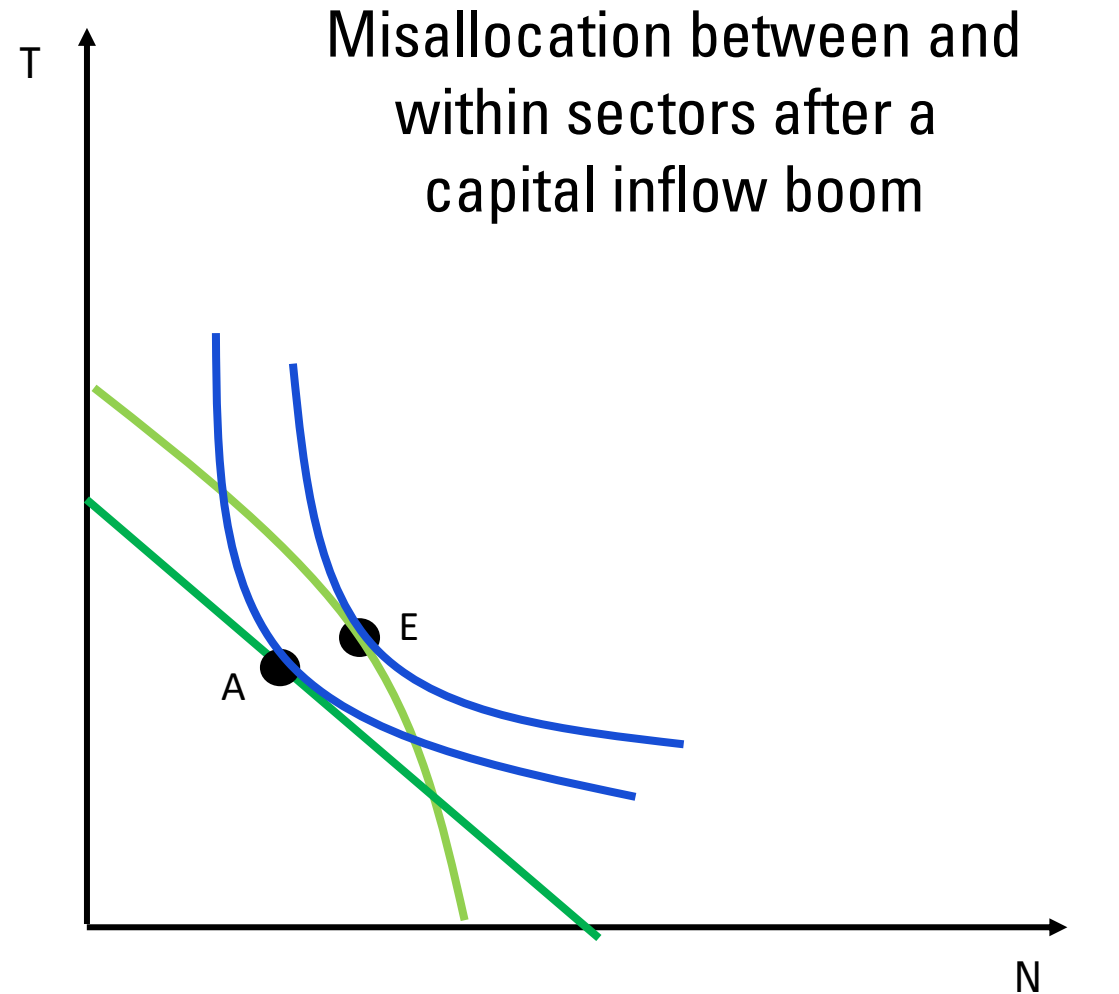
BUT WITH MISALLOCATION

- Political sector: Pressure on politicians to make τ structural reforms is relaxed
- Financial sector: Abundant credit makes it harder to spot productive projects
- Some of the funds get diverted to assets with low supply elasticities.
 - This pushes up asset prices, which can generate capital gains and trigger extrapolative expectations, leading to asset price bubbles.
 - Bubbles relax collateral & financing constraints. This spurs further credit to particular sectors (e.g., construction, may not be efficient).



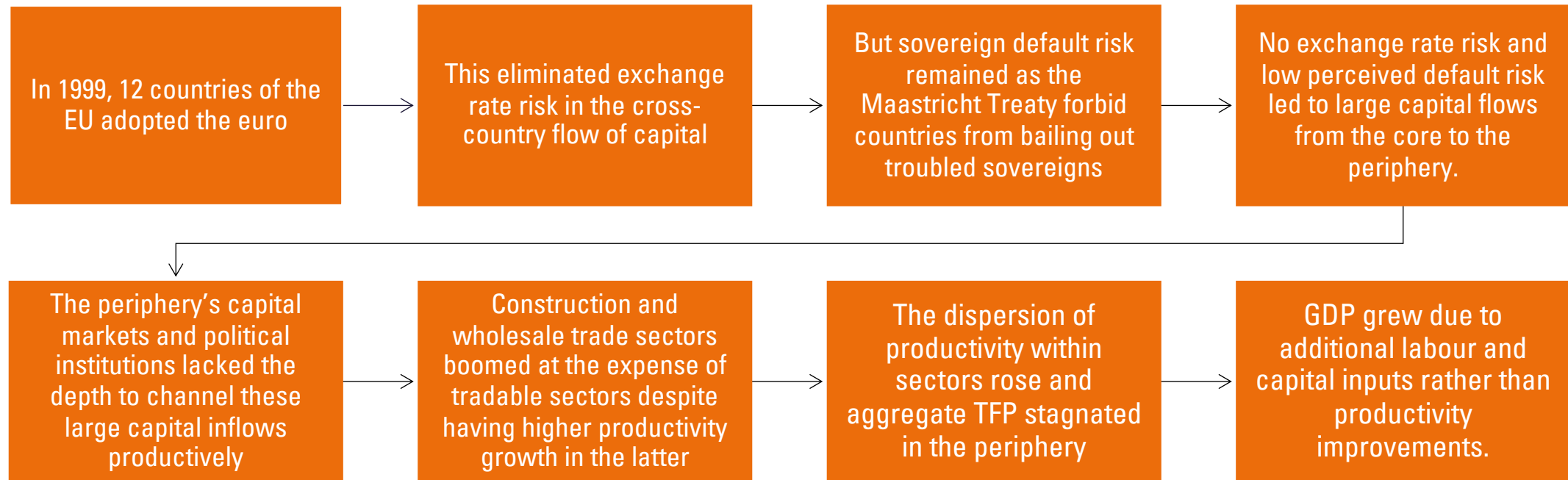
END RESULT

- Economy moves instead to E
- Non-tradable sector booms at expense of tradable sector, the booms are moderate and may barely even happen (E not far from A)
- TFP falls on aggregate
- **Dispersion of TFP** across firms rises: new capital is misallocated to more politically connected & less productive firms
- And run-up of foreign funding (debt) that funded capital flow must eventually be repaid.



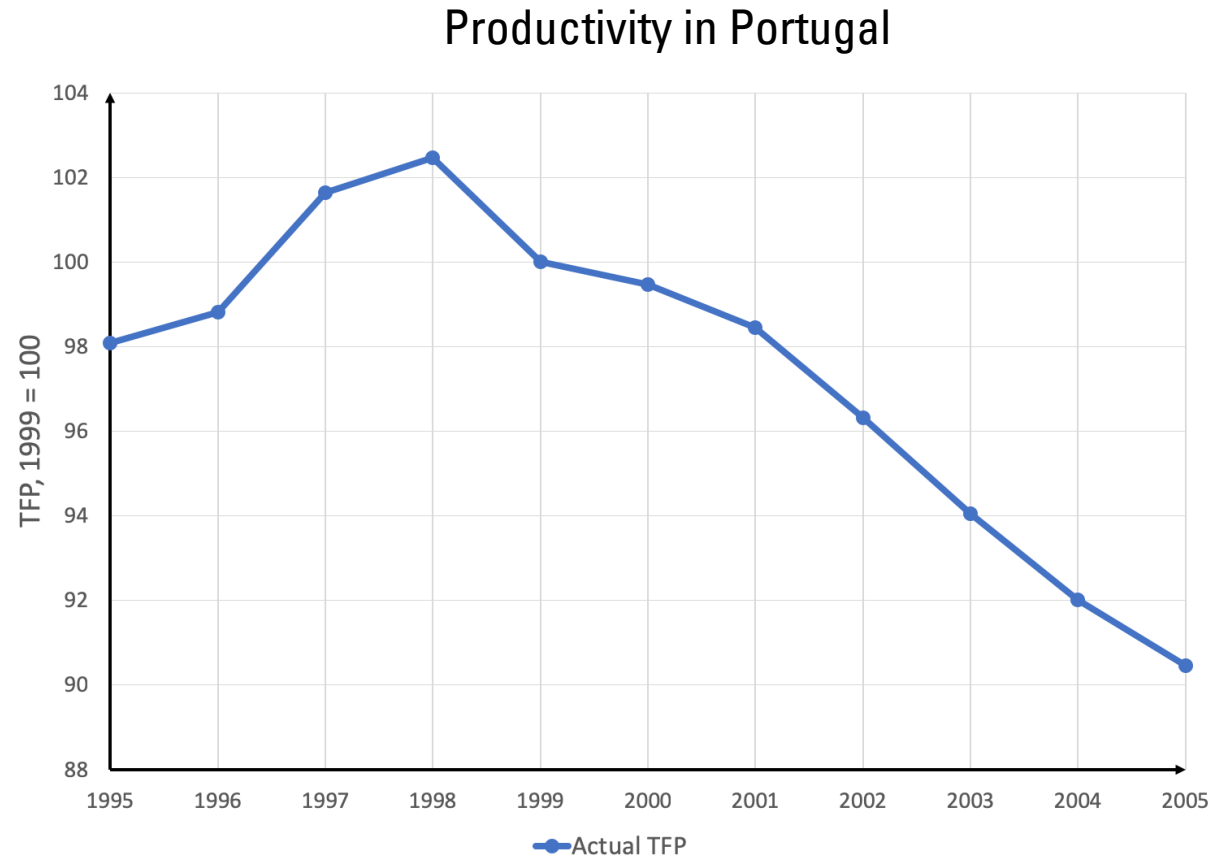
THE SEEDS OF THE EURO CRISIS: THE INVESTMENT BOOM IN PORTUGAL

THE SEQUENCE OF EVENTS



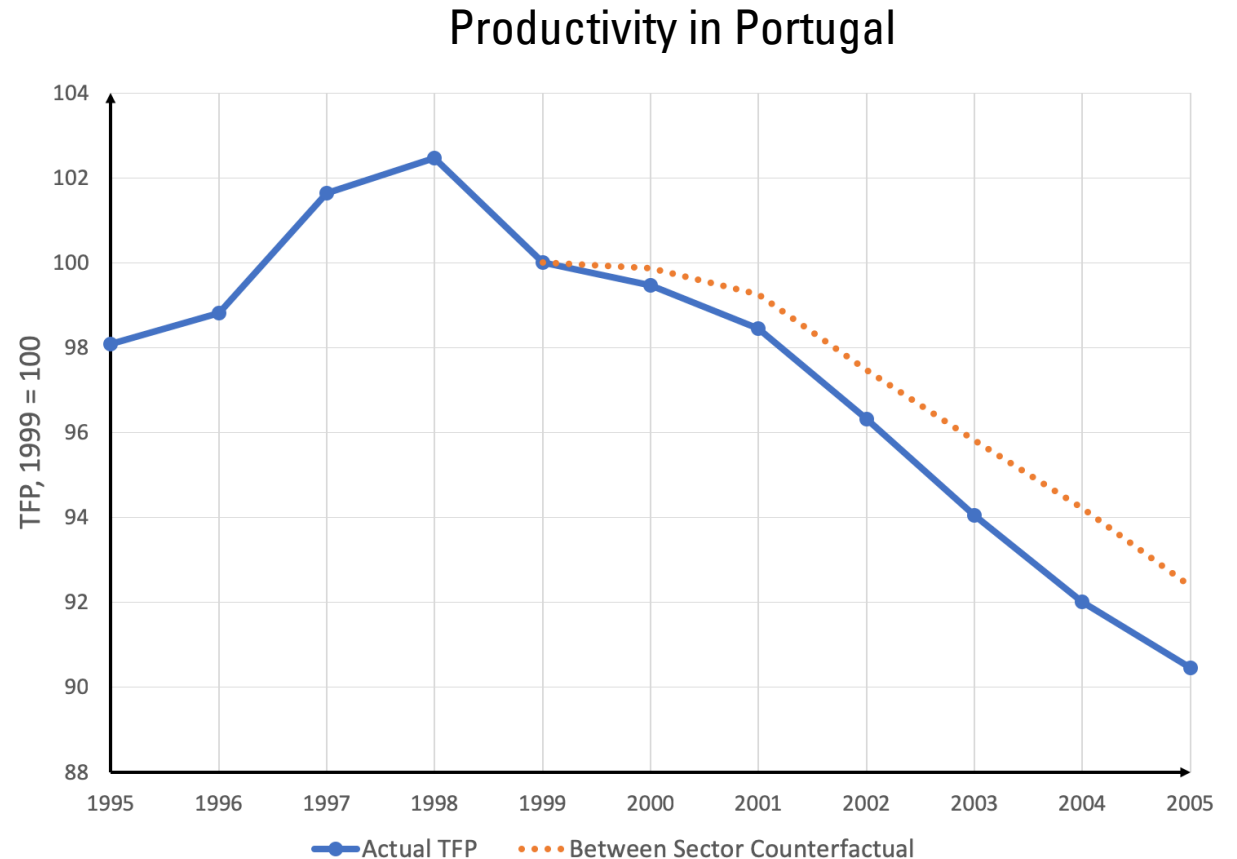
ACTUAL TFP IN PORTUGAL

- The blue line is actual TFP
- After 1999, it falls
- Seemed puzzling: local firms now had capital from abroad to expand, conquer new markets
- Same happened in Ireland, Spain, Italy.
- Construction and real estate sectors boomed, wages rose.
- But productivity fell.



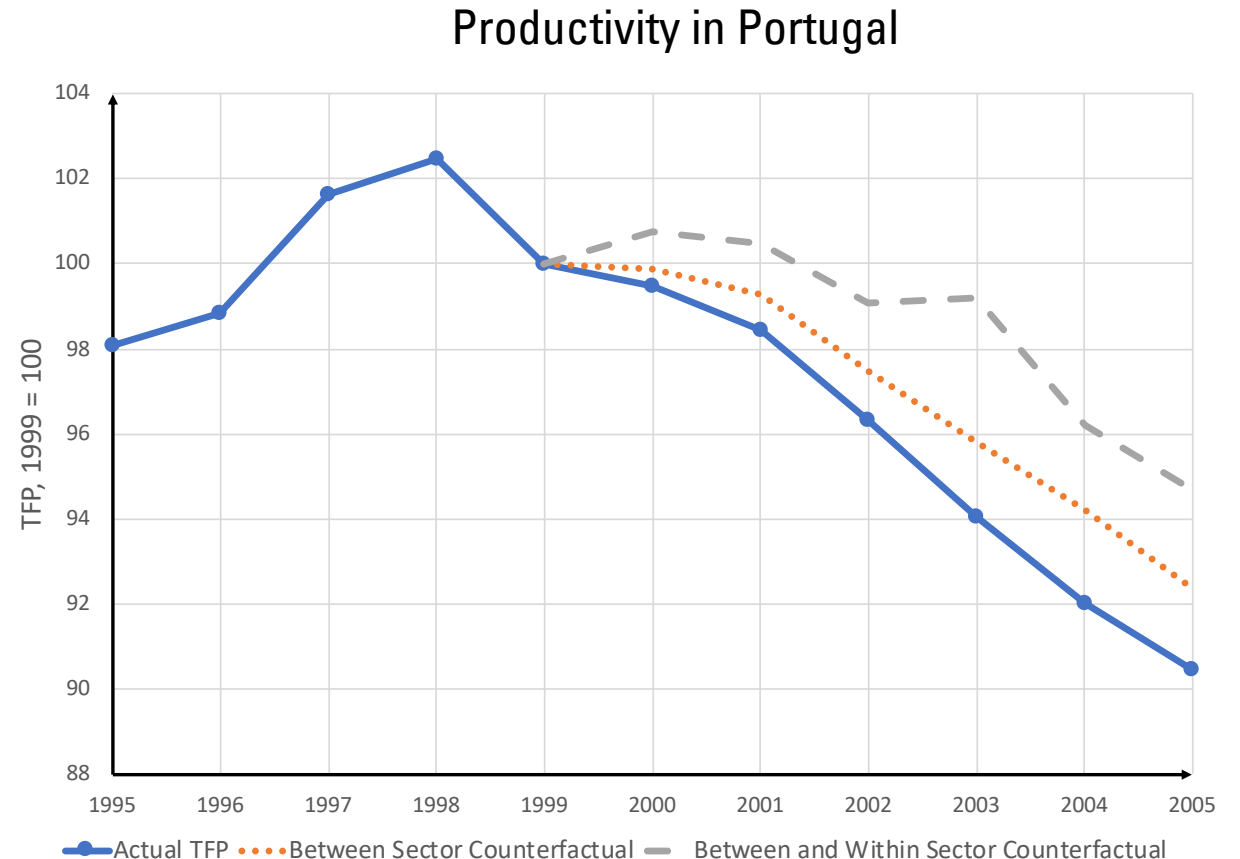
ACTUAL AND COUNTERFACTUAL TFP IN PORTUGAL

- Orange line fixes the relative size of each economic sector at its 1999 level to build a **counterfactual TFP**.
- Eliminate possible **between-sector** misallocation.
- The sectors that expanded were those that were relatively less productive.
- Explains some of the decline.



ACTUAL AND COUNTERFACTUAL TFP IN PORTUGAL

- As well as fixing the relative size, the grey line shows the TFP counterfactual if misallocation **within sectors** also remained at their 1999 levels
- Eliminate possible between and within-sector misallocation.
- Explains about half the decline
- Portugal's slump in productivity can be partly explained by capital misallocation after the euro in 1999

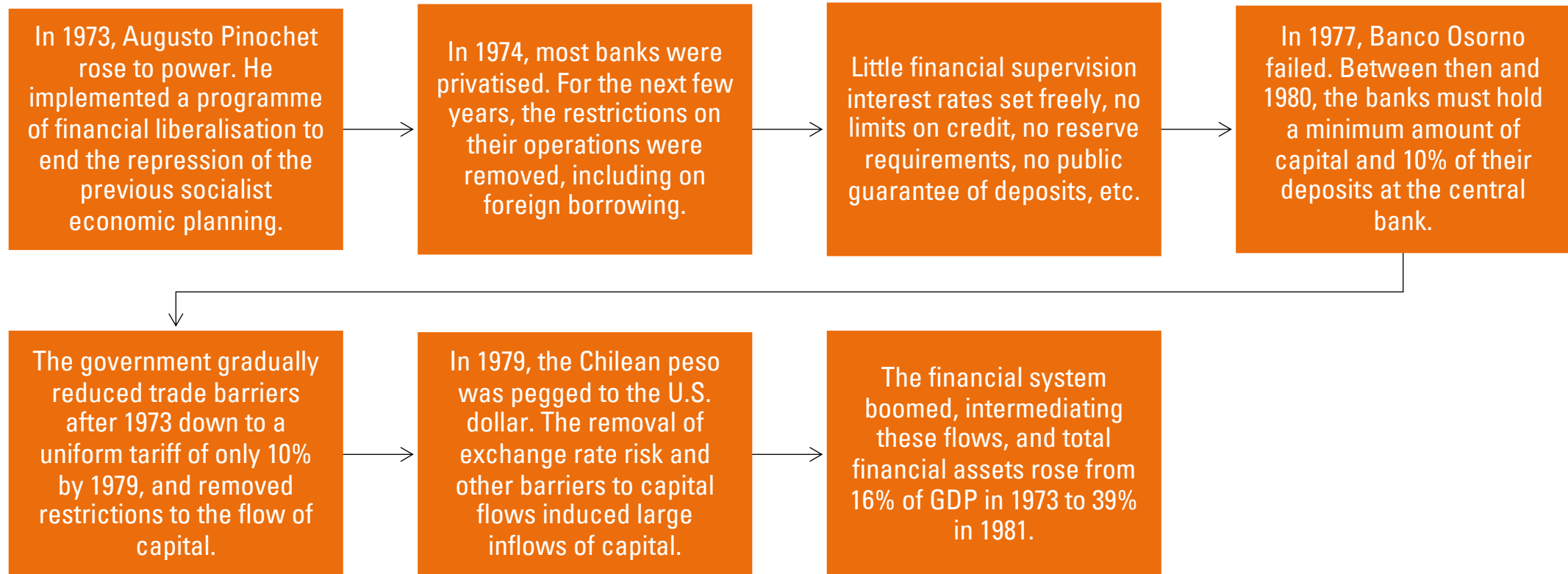


IMPLICATIONS FOR INTERNATIONAL COMPETITIVENESS

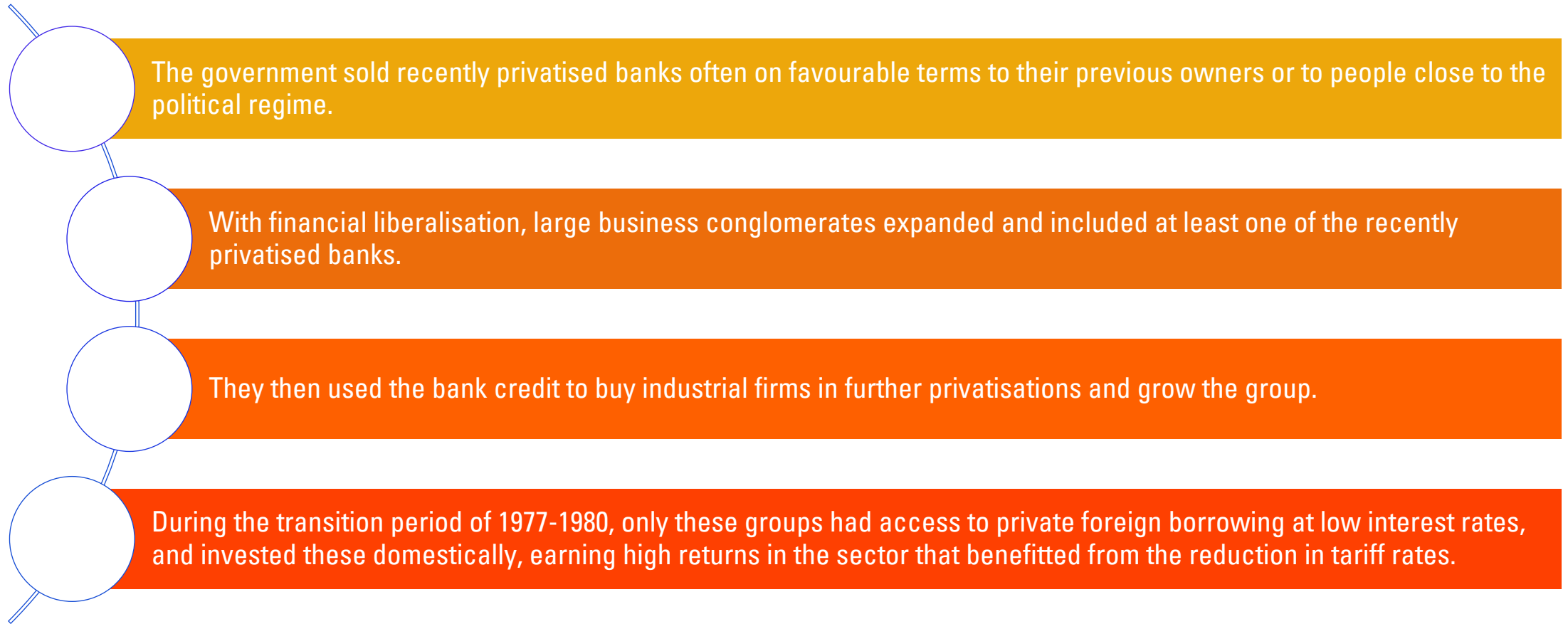
- Misallocation of capital affects labor by raising the wages of workers in the construction and public-service sectors.
 - With abundant capital, non-tradable sectors pay higher wages and attract more workers.
 - In Portugal, the average earnings of construction and public-sector workers relative to manufacturing workers increased significantly.
 - Higher costs of firms in the tradable sector.
 - The competitiveness of Portuguese firms fell, more trade deficits.
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CHILE'S 1970S LIBERALIZATION

THE SEQUENCE OF EVENTS



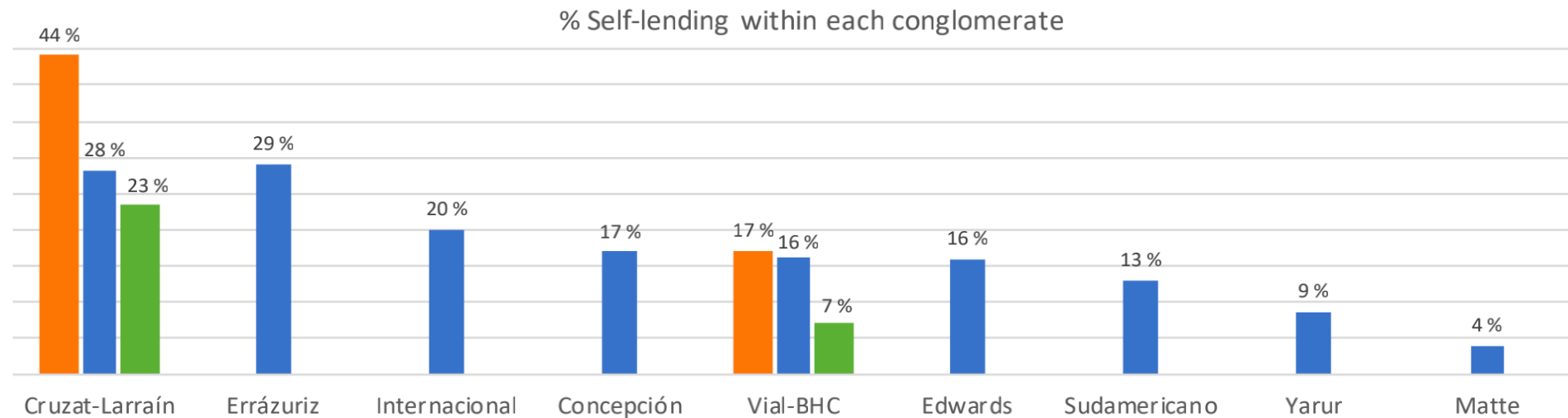
CHILEAN BUSINESS SECTOR



MISALLOCATION - CONGLOMERATES

% Self-lending within each conglomerate:

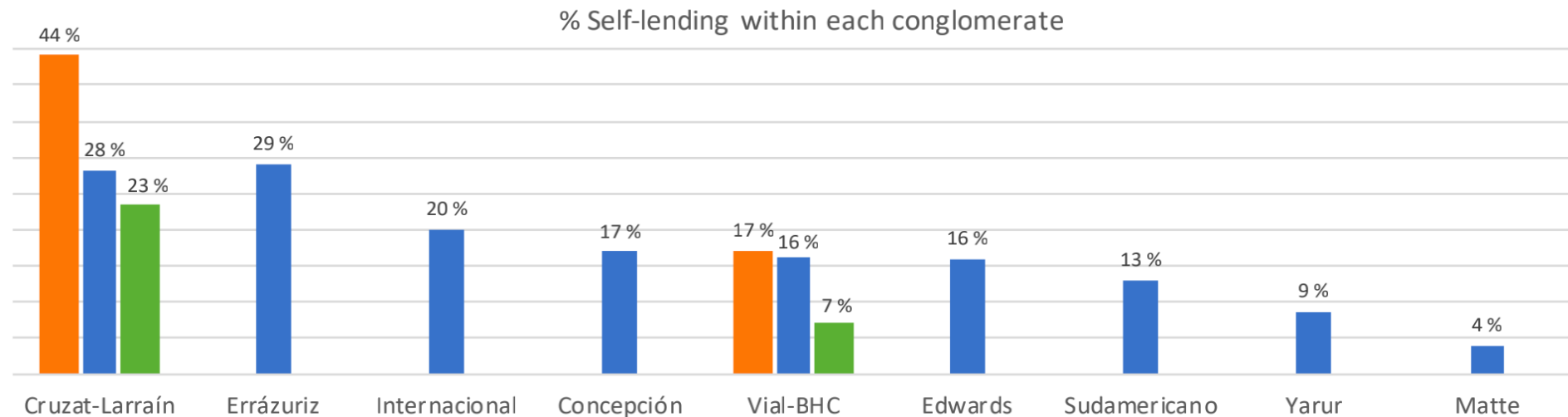
- Y-axis: % of total credit given by a bank in the group (there can be as many as 3) that is given to companies within the conglomerate
- X-axis: Name of conglomerate. Each bar within a conglomerate is for a bank within it.



MISALLOCATION - CONGLOMERATES

Those companies borrowed heavily:

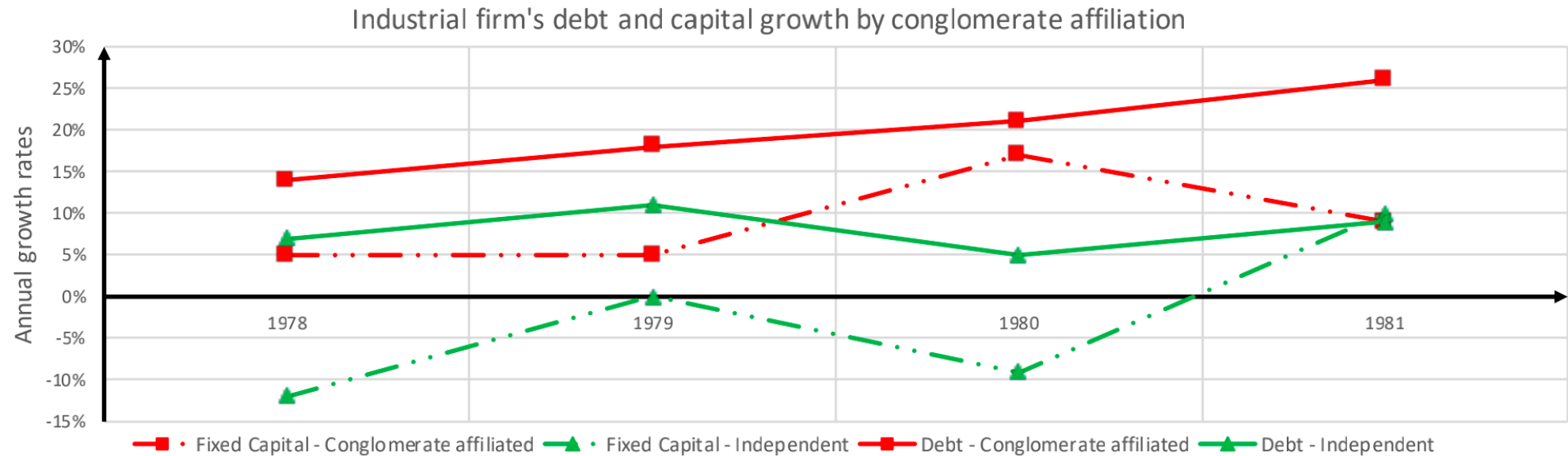
- The banks allocated credit preferentially to the businesses within the conglomerate, independent of their productivity
- Capital was misallocated within industries, towards firms that belonged to the group



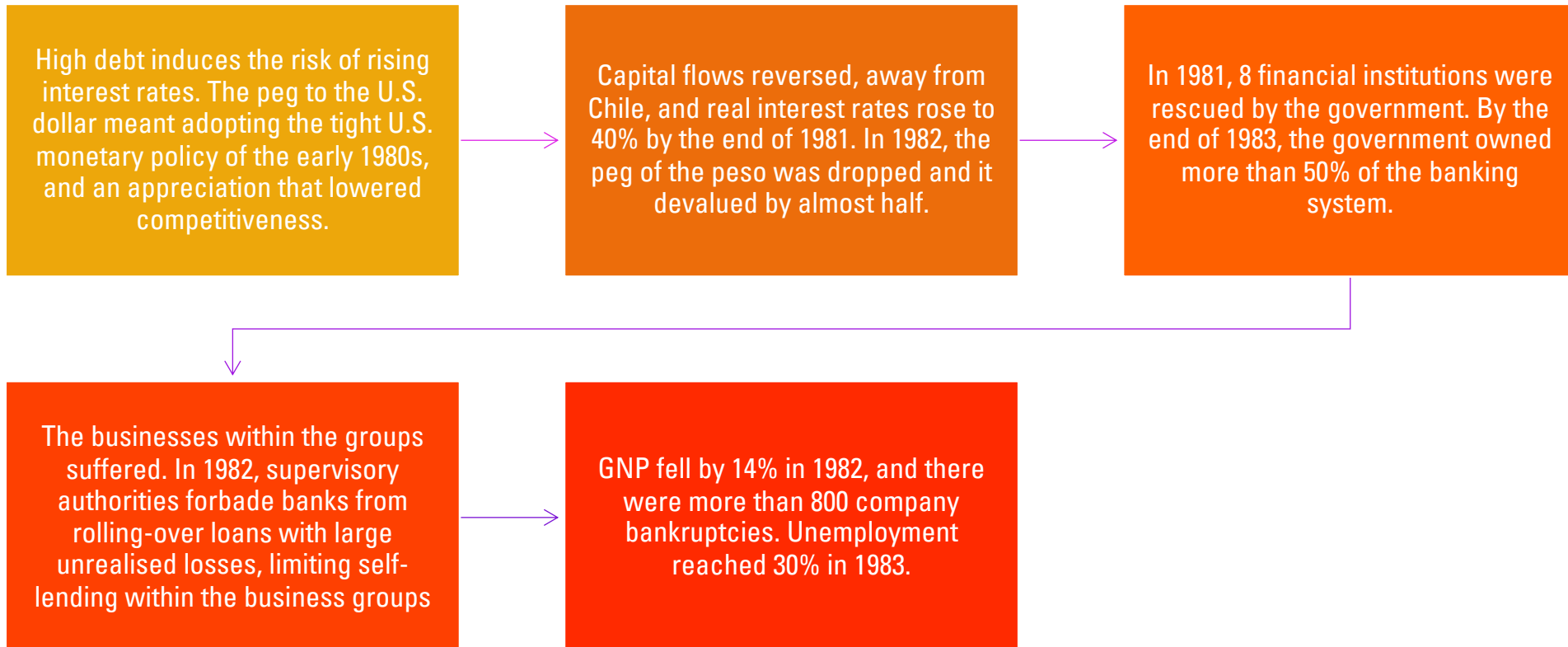
MISALLOCATION - CONGLOMERATES

Industrial firm's debt and capital growth by conglomerate affiliation:

- Y-axis: Annual growth rates
- Shows how during this period, bank credit and capital accumulation were much higher for companies within a group.



CHILE'S 1982 CRASH

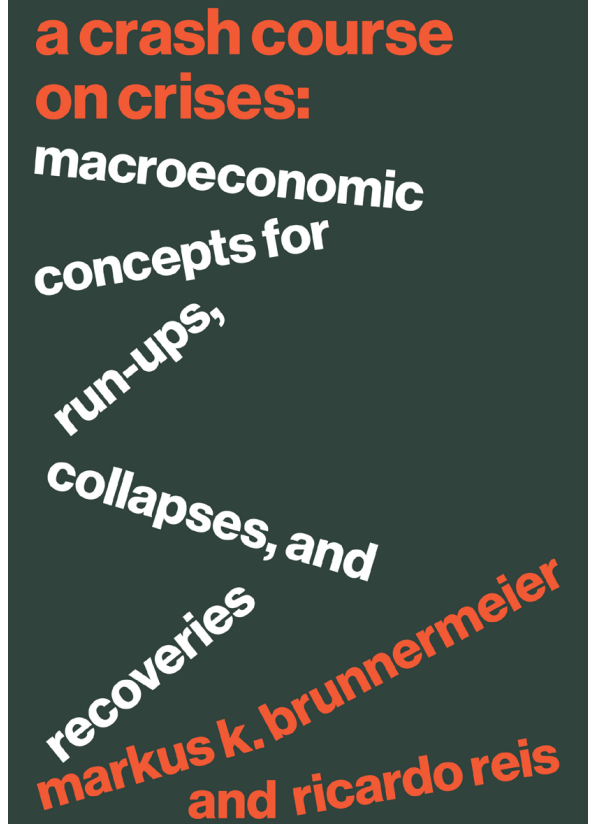


CHILE'S MACRO-FINANCIAL CRASH

- Mainly caused by misallocation of resources within the economy
 - Productivity fell further
 - In spite of the 10% decline in TFP in the manufacturing sector, within-industry allocative efficiency barely improved
 - Removing the preferential treatment of the inefficient firms affiliated with the groups, partially offset the disruption brought by the deep crisis
 - Argentina and Uruguay went through similar crises at the time
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SUMMARY

- A modern view of capital flows shows how investment booms can actually lower productivity
- Because they come with capital misallocation in poorer countries as their financial markets lack financial depth
- We looked at two types of misallocation: **between** and **within** sectors
- This raised the costs of firms in tradable sectors, reducing their international competitiveness and leading to trade deficits
- In the Euro-area's first decade, integration of European capital markets came with falls in productivity in periphery countries
- In Chile's 1970 liberalization, capital flows came with preferential treatment of firms within groups



**a crash course
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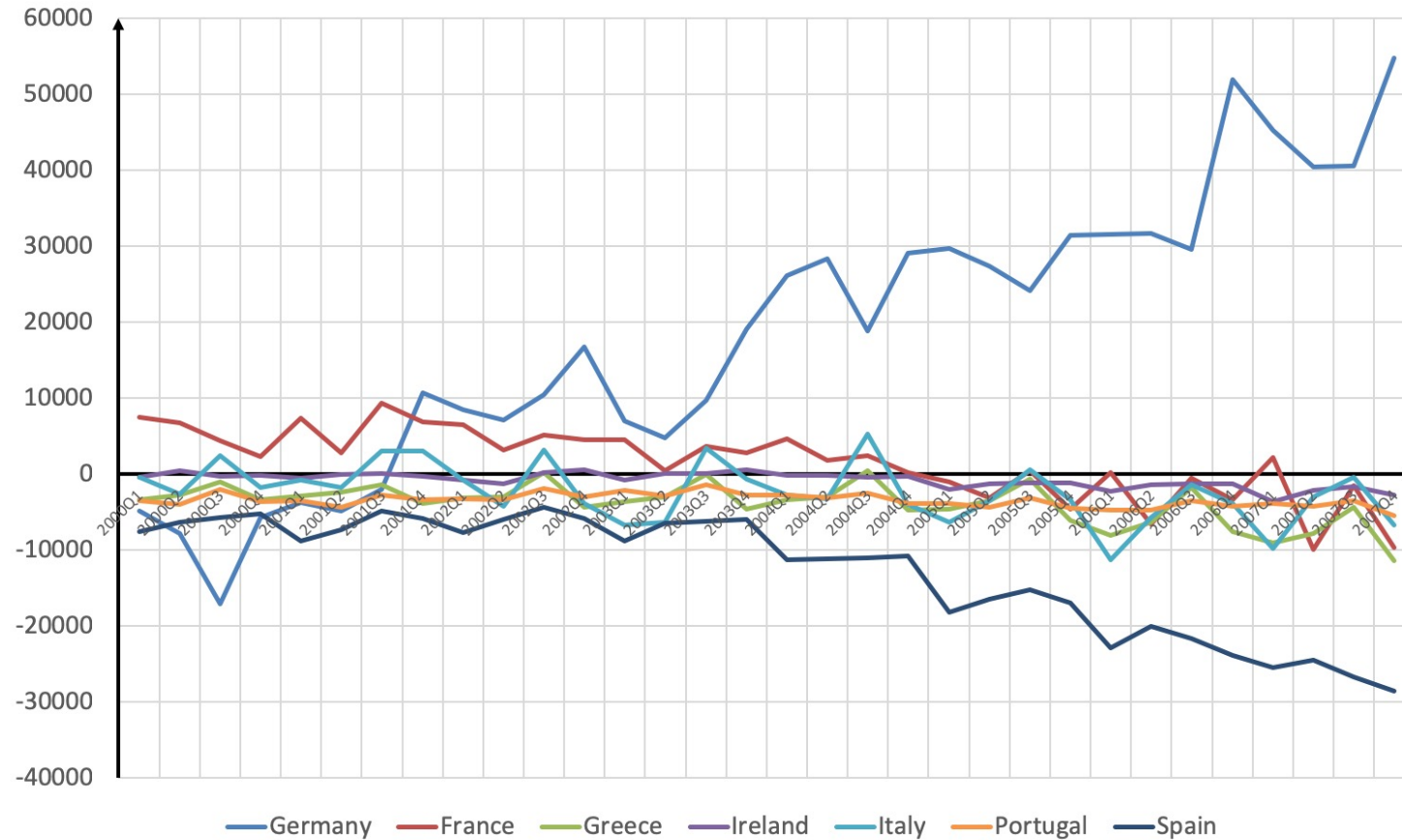
MORE EURO-AREA DATA

Further illustration of this at work in the euro-area 2000-07:

- Capital inflows from core to periphery
 - Cross-sector changes in Portugal and others
 - Dispersion of manufacturing productivity in Spain
 - The rise in productivity in Spain during the crisis
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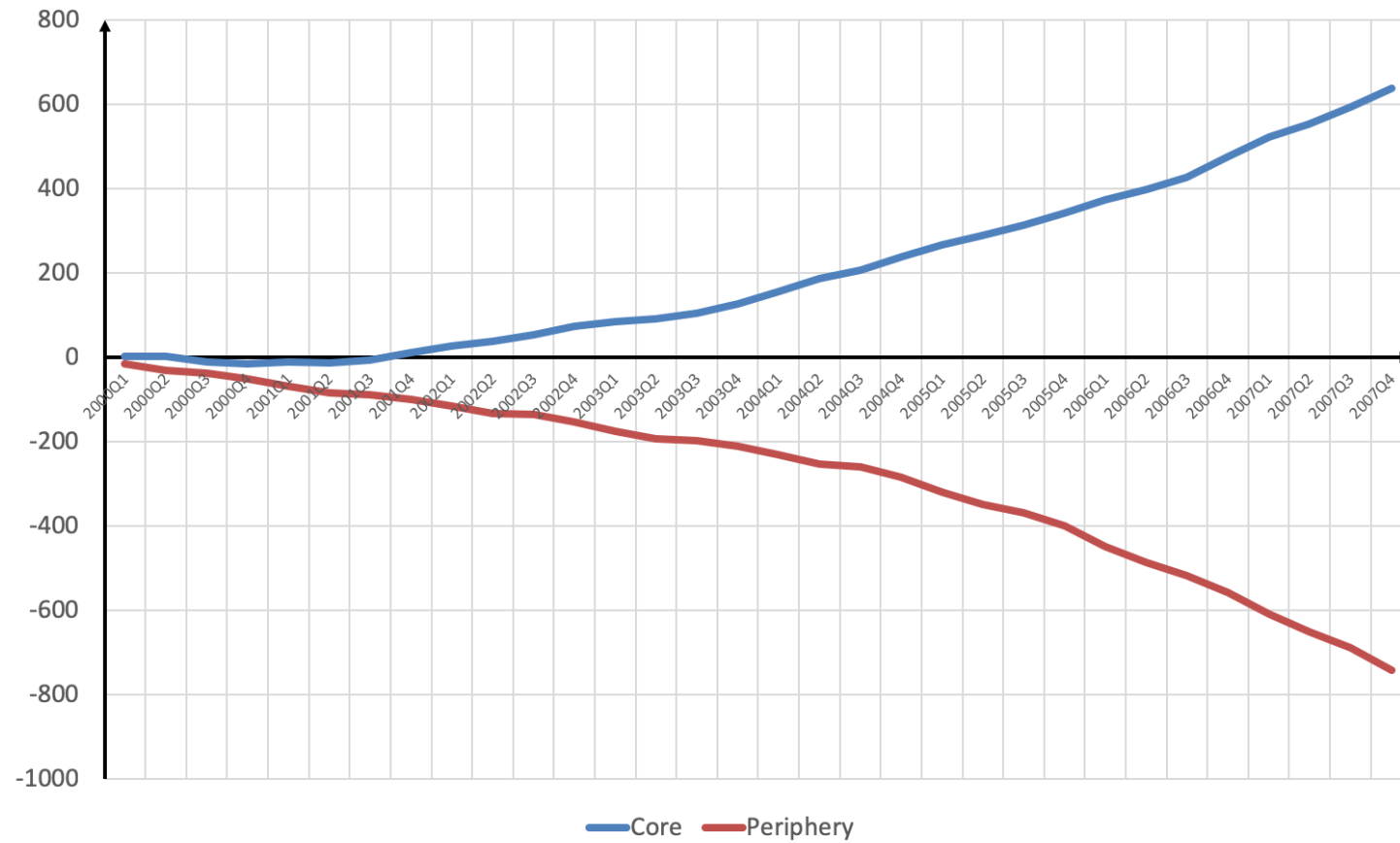
CAPITAL FLOWING FROM CORE TO PERIPHERY

Current account balance (mn euros), 2000-07

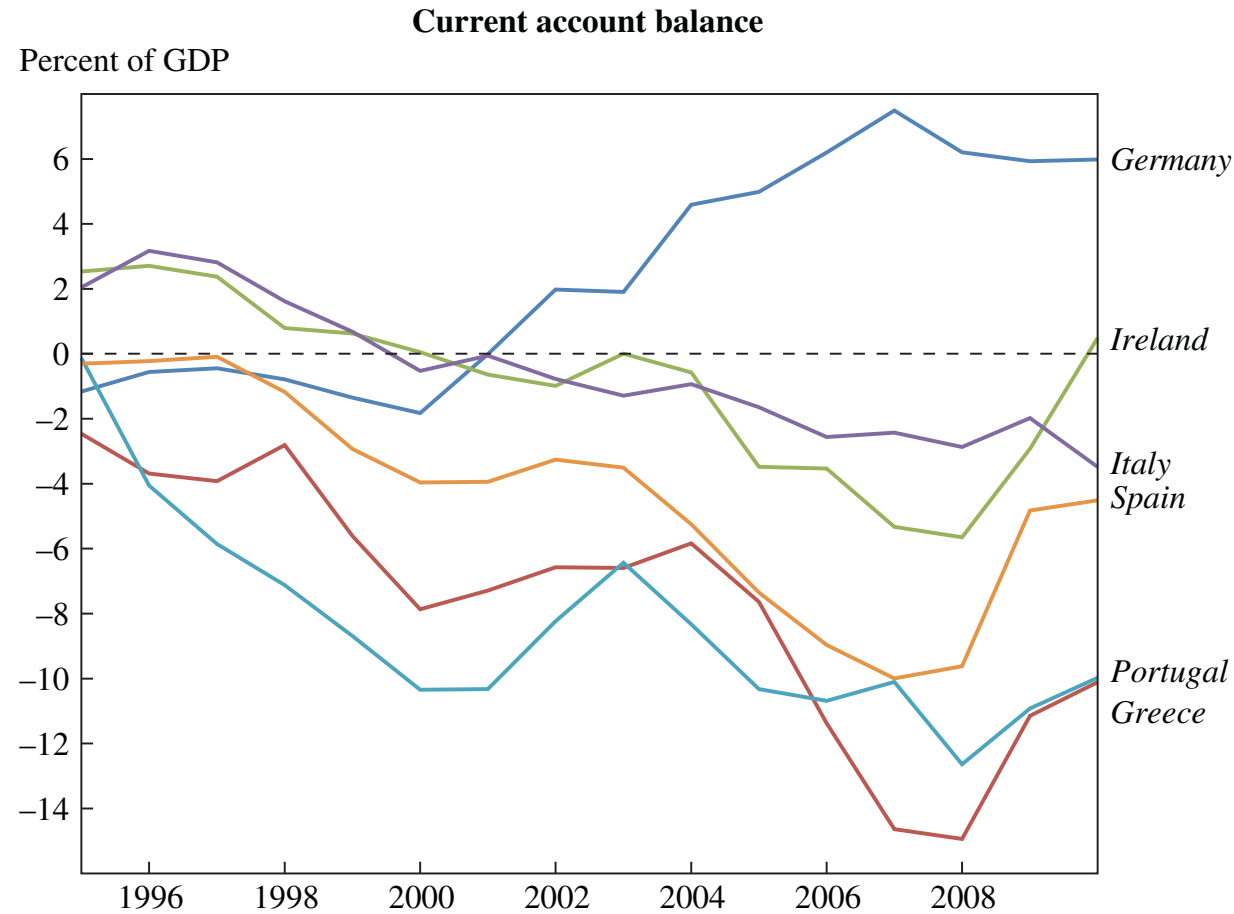


CAPITAL FLOWING FROM CORE TO PERIPHERY

Cumulative current account balance (bn euros), 2000-07



CURRENT ACCOUNT BALANCE AS A RATIO OF GDP

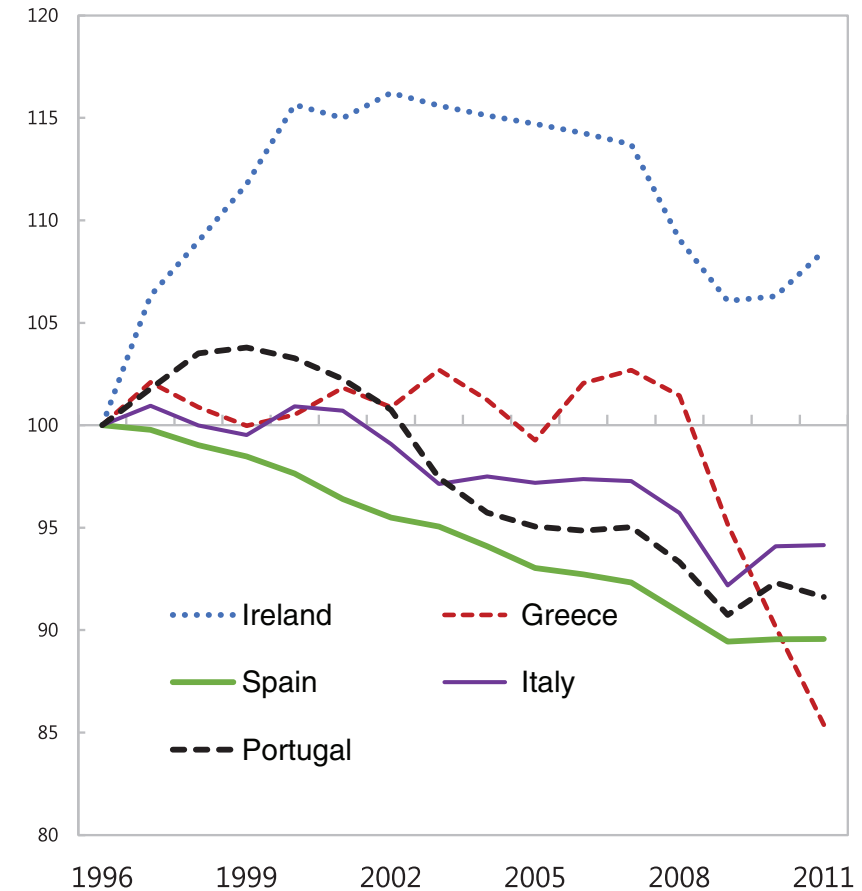


Sources: European Central Bank and Organisation for Economic Co-operation and Development.

Source: Reis, R. (2012) "Comment" *Brookings Papers on Economic Activity*

TOTAL FACTOR PRODUCTIVITY AFTER CAPITAL INFLOWS

Total Factor Productivity
(1996=100)



Source: Conference Board Total Economy Database

Source: Dias, C, Marque, C. and Richmond, C. (2016) "Misallocation and productivity in the lead up to the Eurozone crisis", *Journal of Macroeconomics*

ACROSS-SECTOR REALLOCATION IN PORTUGAL

Table 4. Changes in Sector Composition in Portugal and Its Trading Partners, 2000–06

<i>Indicator and sector</i>	<i>Portugal, 2006</i>	<i>Change, 2000–06 (percentage points)</i>		
		<i>Portugal</i>	<i>Euro area^a</i>	<i>Main trading partners^a</i>
Share in employment				
Manufacturing	17.74	–2.72	–1.94	–2.14
Construction	10.22	–1.33	0.16	0.53
Real estate	6.38	0.96	1.40	1.39
Community and other services	24.06	1.12	1.07	0.94
Wholesale and retail trade	17.42	1.95	–0.14	–0.28
Share in value added				
Manufacturing	14.43	–2.66	–1.34	–2.23
Construction	6.61	–1.00	0.37	1.74
Real estate	14.59	0.14	0.75	1.91
Community and other services	26.51	2.53	0.11	0.06
Wholesale and retail trade	12.85	–0.52	–0.72	–0.63

Source: Reis, R (2013) "The Portuguese Slump and Crash and the Euro Crisis", Brookings Papers on Economic Activity.

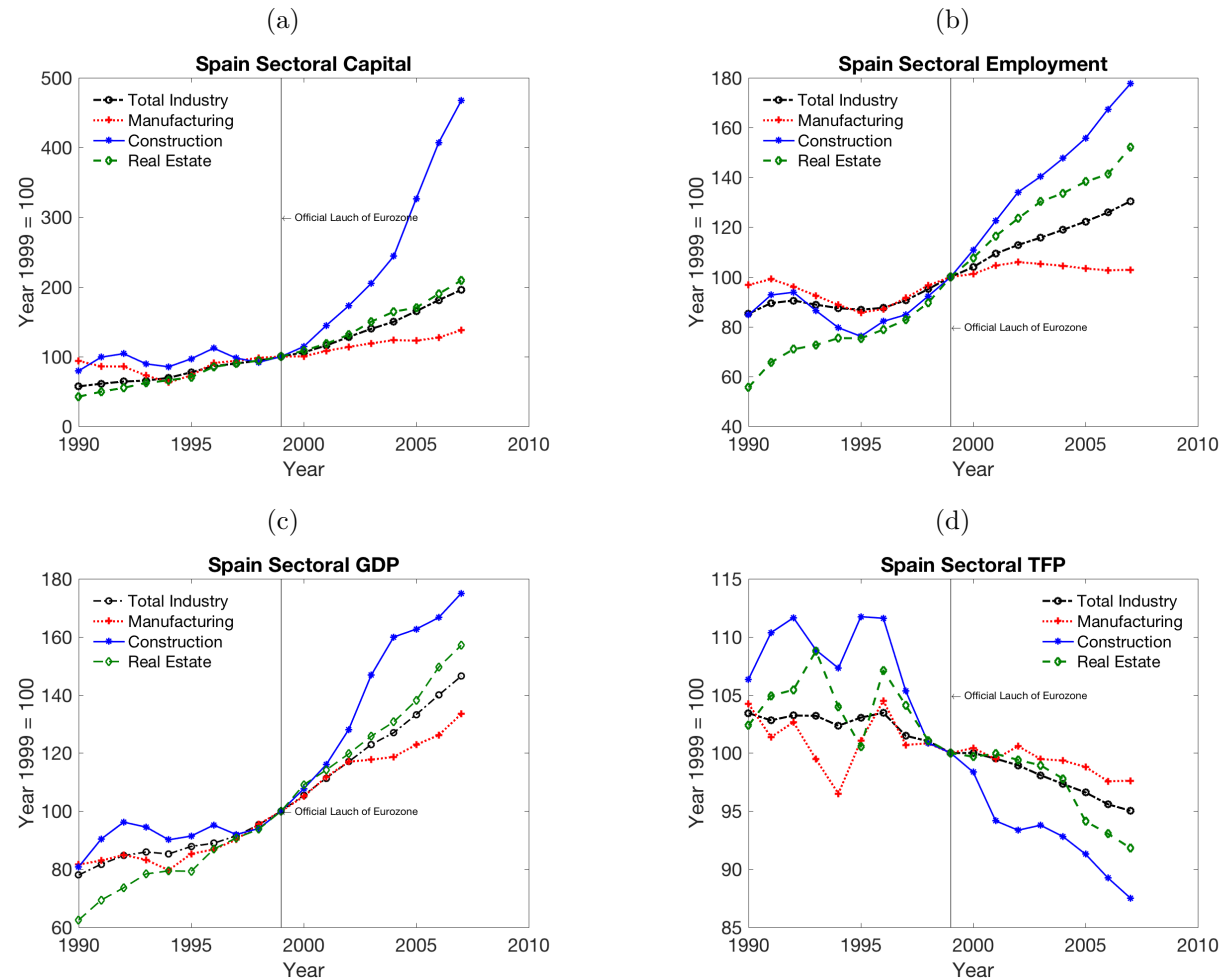
ACROSS-SECTOR PRODUCTIVITY AND MARKUPS

Table 5. Changes in Productivity and in Markups in Portugal and Its Trading Partners, by Sector

<i>Indicator and sector</i>	<i>Portugal</i>	<i>Euro area^a</i>	<i>Main trading partners^a</i>
Total factor productivity	<i>Annualized growth rate, 2000–05 (percent)</i>		
All industries	–1.85	0.07	–0.21
Manufacturing	–0.81	0.92	0.63
Construction	–2.46	–0.60	–0.74
Real estate	–4.44	–0.76	–0.92
Community and other services	–1.77	–0.19	–0.48
Wholesale and retail trade	–2.96	0.34	–0.16
Markups ^b	<i>Average annual change, 2000–06 (percentage points)</i>		
All industries	0.00	0.39	0.84
Manufacturing	–0.58	0.31	0.35
Construction	–0.93	1.16	1.42
Real estate	–0.49	–1.02	0.10
Community and other services	0.58	0.11	0.29
Wholesale and retail trade	–1.42	0.01	0.13

Source: Reis, R. (2013) "The Portuguese Slump and Crash and the Euro Crisis", Brookings Papers on Economic Activity

ACROSS-SECTOR REALLOCATION IN SPAIN



Source: Chen, T. (2018) "TFP declines: misallocation or mismeasurement" Columbia University manuscript.

ACROSS-SECTOR REALLOCATION IN PERIPHERY COUNTRIES

Table 1: Expansion and TFP Growth (1999 - 2007 Annualized)

Countries	Sectors	Most expanding		Sectors	Least expanding	
		$\Delta \ln \frac{L_{st}}{L_t}$ (%)	$\Delta \ln TFP_{st}$ (%)		$\Delta \ln \frac{L_{st}}{L_t}$ (%)	$\Delta \ln TFP_{st}$ (%)
Portugal	Real estate	2.57	-4.81	Utility	-5.51	-0.29
	Hotels & Restaurants	1.66	-2.43	Finance	-3.12	4.32
	Wholesale & Retail	1.39	-2.38	Manufacturing	-2.59	-0.72
Spain	Construction	3.36	-1.7	Mining & Quarrying	-4.29	0.52
	Real estate	2.18	-1.22	Manufacturing	-2.98	-0.14
	Hotels & Restaurant	1.94	-2.63	Utility	-2.21	0.19
Ireland	Construction	4.82	-2.74	Agriculture	-7.76	2.25
	Community service	1.45	-1.84	Utility	-4.41	-0.42
	Mining & Quarrying*	0.93	-0.87	Manufacturing	1.31	4.93
Italy	Real estate	3.35	-0.71	Utility	-2.59	-0.13
	Construction	2.67	-1.21	Agriculture	-1.55	-0.55
	Hotels & Restaurant	2.56	-2.27	Manufacturing*	-1.48	-0.13

Raw data: KLEMS

All the numbers are in percentages. The growth rate of Portugal is calculated between 1999 and 2005, others 1999 - 2007

* For Ireland, Mining & Quarrying is the fourth most expanded sector. For Italy, Manufacturing is the fifth least expanded sector.

WITHIN-SECTOR REALLOCATION, SPAIN MANUFACTURING

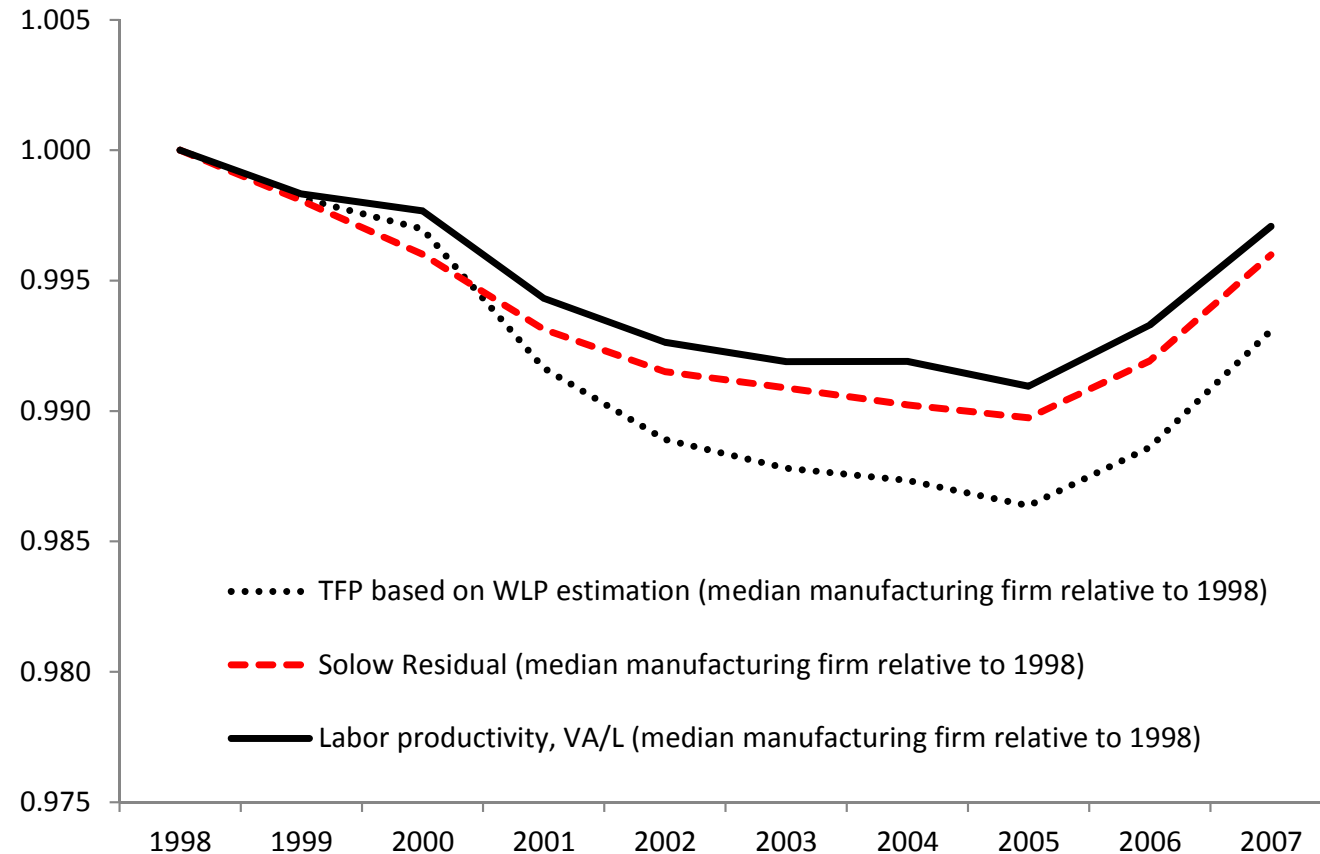
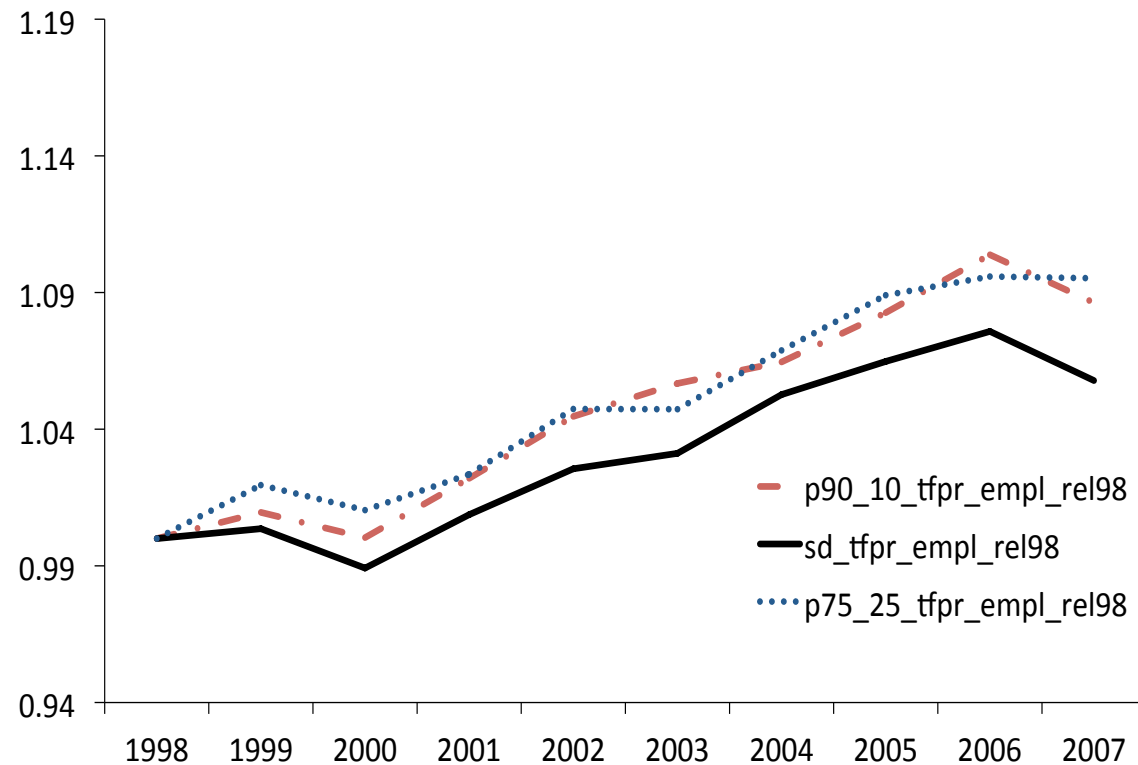


Figure 3: Median Firm Productivity in Spain: 1998-2007

WITHIN-SECTOR REALLOCATION, SPAIN MANUFACTURING

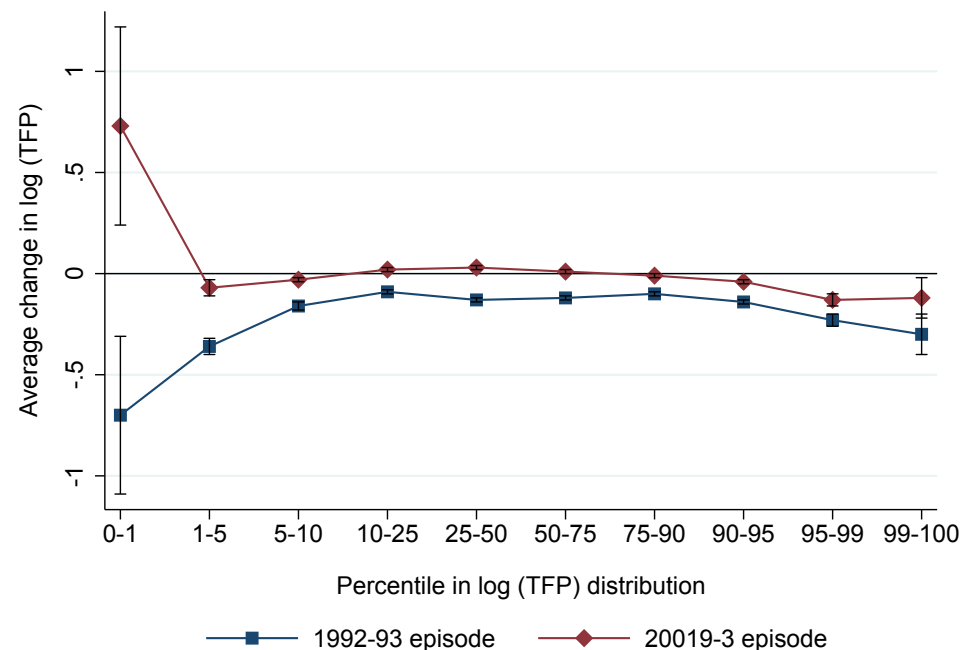
Figure 4: Dispersion of TFPR within four digit NACE for Spain



(a) TFPR (L)

IN CRISIS, TFP ACTUALLY RISES

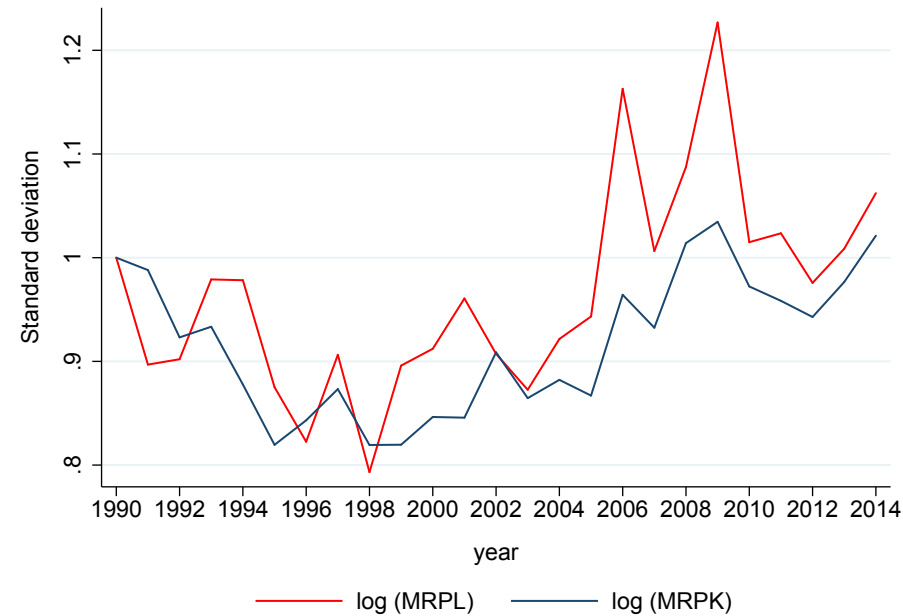
Figure 3: Average change in log (TFP) by percentile



Notes: This graph plots the average change in log (TFP) by percentile of the distribution. It compares the average TFP of firms in a given quantile before and after each of the two sudden stops. As this is an unbalanced panel, firms are allowed to change quantiles and even exit the sample during the transition. The corresponding base and end years are 1991 and 1993 for the first episode; 2009 and 2013 for the second episode. To account for variability, the vertical lines represent error bands.

WITHIN-SECTOR REALLOCATION, SPAIN MANUFACTURING

Figure 5: Evolution of allocative efficiency measures



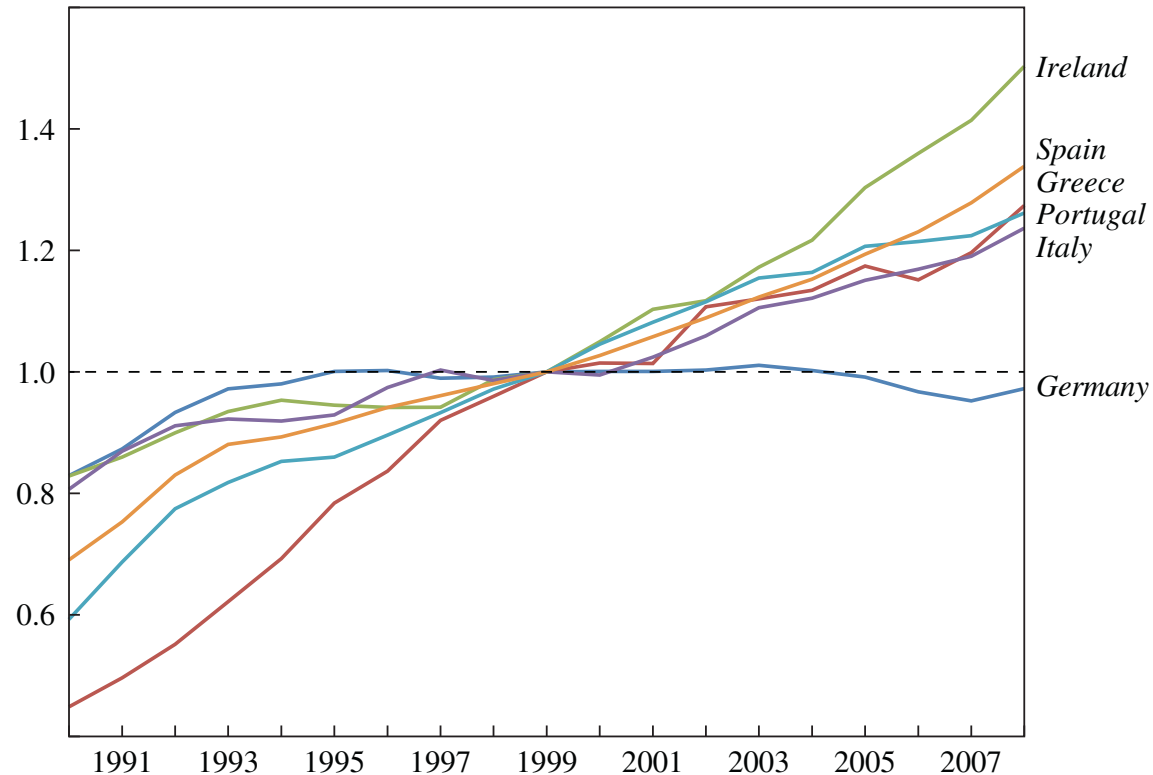
Notes: This figure plots the within-industry dispersion of the marginal revenue products of capital and labor over time. The numbers depicted are relative to 1990, which is normalized to one. Marginal revenue products are measured at the firm-level according to the [Hsieh and Klenow \(2009\)](#) framework. Standard deviations at the sector level are aggregated using time-invariant labor weights.

Source: ESEE data and own calculations.

LOSS OF COMPETITIVENESS OF T SECTOR

Figure 1. Unit Labor Costs in Selected European Countries, 1990–2008

Index, 1999 = 1.0



Source: Organisation for Economic Co-operation and Development.

Source: Reis, R. (2012) "Comment" *Brookings Papers on Economic Activity*

TRADE DEFICITS IN PORTUGAL

Table 3. Changes in Exchange Rates and Relative Prices between Portugal and Its Trading Partners, 2000–07

<i>Indicator</i>	<i>Percent change, 2000–07, relative to</i>		
	<i>All trading partners</i>	<i>Euro area^a</i>	<i>Main trading partners^a</i>
Nominal exchange rate	7.70	0	0
Real exchange rate ^b	11.91	5.98	4.01
Terms of trade	1.33	1.70	–5.74
Relative price of nontradables ^c	10.58	4.28	9.74
Value-added measures of prices ^d			
All industries	8.81 ^e	10.71	–0.77
Manufacturing		2.41	–4.22

Source: Reis, R. (2013) "The Portuguese Slump and Crash and the Euro Crisis", Brookings Papers on Economic Activity.