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RESOURCE MISALLOCATION IN PORTUGAL:

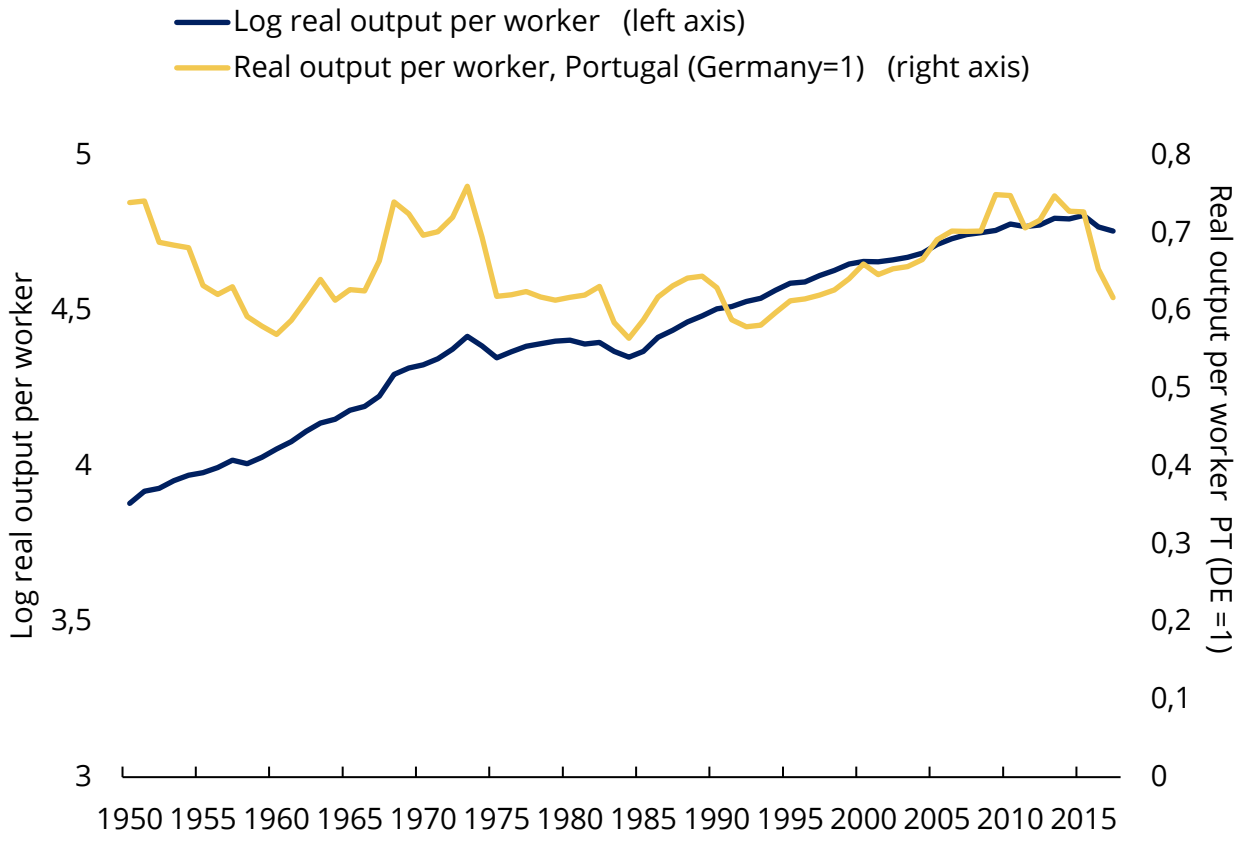
BETWEEN SECTOR MISALLOCATION AND INTERSECTORAL LINKAGES

MADALENA GASPAR

MOTIVATION

- Why are some countries richer than others?
- The misallocation literature explores the extent to which distortions, by conditioning the resource split, and therefore aggregate output, can partly explain cross-country income differences.
- This work looks at the impact of between-sector primary input distortions.

FIGURA 1.: REAL OUTPUT PER WORKER, PORTUGAL (1950-2017)



SOURCE: PWT 9.1.. AUTHOR'S OWN CALCULATIONS

RESEARCH QUESTIONS

- What was the extent and evolution of the misallocation loss in Portugal (2000-2017) resulting from between-sectors primary input misallocation?

  How did Portugal's performance fair against Germany?

  What was the contribution of the misallocation of capital and labor to overall evolution of misallocation?

  What was the contribution of the various sectors?

- What is the relevance of the input-output network for the analysis?

DATA

- ***World Input-Output Database*** (WIOD) (2000-2017)

National input-output Tables (NIOT).

- **EU-KLEMS** (1995-2017)

Capital stock, employment, capital and labor compensations, and value-added.

THE MODEL

Fundamentals

The stock of primary inputs, labor (L) and capital (K), is exogenously determined.

The final good (F) is produced according to the following technology: $F = \left(\prod_{i=1}^{N} f_i^{\beta_i}\right)$

Gross-output of sector i (y_i) is produced according to the following technology:

$$y_i = A_i\left[(k_i)^{\alpha_i}(l_i)^{(1-\alpha_i)}\right]^{1-\sigma_i-\gamma_i}\left(\prod_{i=1}^{N} x_{ij}{}^{\sigma_{ij}}\right)m_i^{\gamma_i}$$

The sector-input-specific taxes imposed by the government (t_{li} and t_{ki}) are exogenously determined ($1 + t_{li} = \tau_{li}$ and $1 + t_{ki} = \tau_{ki}$). They are rebated lump-sum to the representative household.

The price of imported intermediate goods (p_i^m) is also exogenous.

The agents are a representative household, the final good producer, the N sector producers and the government. They all behave competitively.

THE MODEL

In equilibrium:

$$\frac{l_i}{L} = \frac{\frac{(1-\alpha_i)(1-\sigma_i-\gamma_i)v_i}{\tau_{li}}}{\sum_{j=1}^{N}\frac{(1-\alpha_j)(1-\sigma_j-\gamma_j)v_j}{\tau_{lj}}} = \theta_{li}$$

$$\frac{k_i}{K} = \frac{\frac{(\alpha_i)(1-\sigma_i-\gamma_i)v_i}{\tau_{ki}}}{\sum_{j=1}^{N}\frac{(\alpha_j)(1-\sigma_j-\gamma_j)v_j}{\tau_{kj}}} = \theta_{ki}$$

$$\log \boldsymbol{y}_{\mathbf{N\,x\,1}} = [\boldsymbol{I} - \boldsymbol{\gamma\beta'} - \boldsymbol{\sigma}]_{\mathbf{N\,x\,N}}^{-1}[\log \boldsymbol{A}_{\mathbf{N\,x1}} + \log \boldsymbol{VA}_{\mathbf{N\,x\,1}} + \boldsymbol{\zeta}_{\mathbf{N\,x\,1}}]$$

$$\log \boldsymbol{F}_{\mathbf{1\,x\,1}} = \boldsymbol{\beta}'_{\mathbf{1\,x\,N}}[\log\left(\frac{\boldsymbol{\beta}}{\boldsymbol{v}}\right)_{\mathbf{N\,x\,1}} + \log \boldsymbol{y}_{\mathbf{N\,x\,1}}]$$

In equilibrium without distortions:

$$\frac{l_i^*}{L} = \frac{(1-\alpha_i)(1-\sigma_i-\gamma_i)v_i}{\sum_{j=1}^{N}(1-\alpha_j)(1-\sigma_j-\gamma_j)v_j} = \theta_{li}^*$$

$$\frac{k_i^*}{K} = \frac{(\alpha_i)(1-\sigma_i-\gamma_i)v_i}{\sum_{j=1}^{N}(\alpha_j)(1-\sigma_j-\gamma_j)v_j} = \theta_{ki}^*$$

$$\log \boldsymbol{y}^*_{\mathbf{N\,x\,1}} = [\boldsymbol{I} - \boldsymbol{\gamma\beta'} - \boldsymbol{\sigma}]_{\mathbf{N\,x\,N}}^{-1}[\log \boldsymbol{A}_{\mathbf{N\,x1}} + \log \boldsymbol{VA}^*_{\mathbf{N\,x\,1}} + \boldsymbol{\zeta}_{\mathbf{N\,x\,1}}]$$

$$\log \boldsymbol{F}^*_{\mathbf{1\,x\,1}} = \boldsymbol{\beta}'_{\mathbf{1\,x\,N}}[\log\left(\frac{\boldsymbol{\beta}}{\boldsymbol{v}}\right)_{\mathbf{N\,x\,1}} + \log \boldsymbol{y}^*_{\mathbf{N\,x\,1}}]$$

THE MODEL

Allocative efficiency (E): ratio between consumption (C) and consumption in the undistorted equilibrium (C^*).

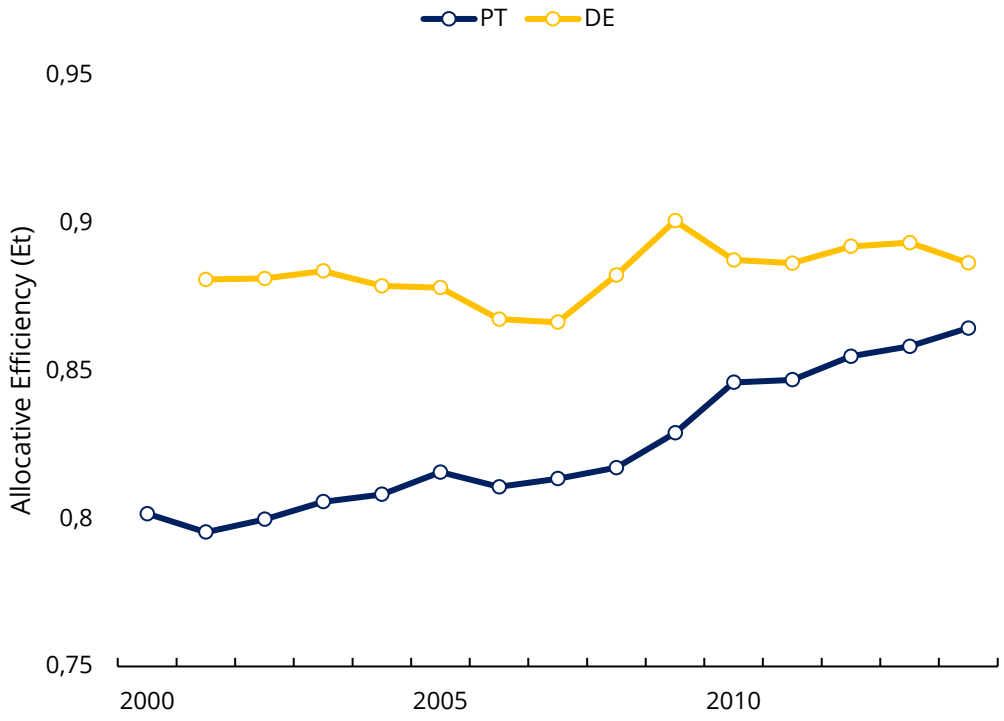
The misallocation loss is given by $\left(\frac{1}{E} - 1\right)$ and is the increase in aggregate consumption were all distortions eliminated.

$$\log E = \underbrace{\boldsymbol{\beta}'_{1\,\mathrm{x}\,\mathrm{N}}[\boldsymbol{I} - \boldsymbol{\gamma}'\boldsymbol{\beta} - \boldsymbol{\sigma}]_{\mathrm{N}\,\mathrm{x}\,\mathrm{N}}^{-1}}_{\boldsymbol{\varphi}_{1\,\mathrm{x}\,\mathrm{N}}} \log \left[\frac{\boldsymbol{VA}}{\boldsymbol{VA}^*}\right]_{\mathrm{N}\,\mathrm{x}\,1}$$

The allocative efficiency measure can be decomposed in the allocative efficiency of capital and labor and in the contribution of the various sectors.

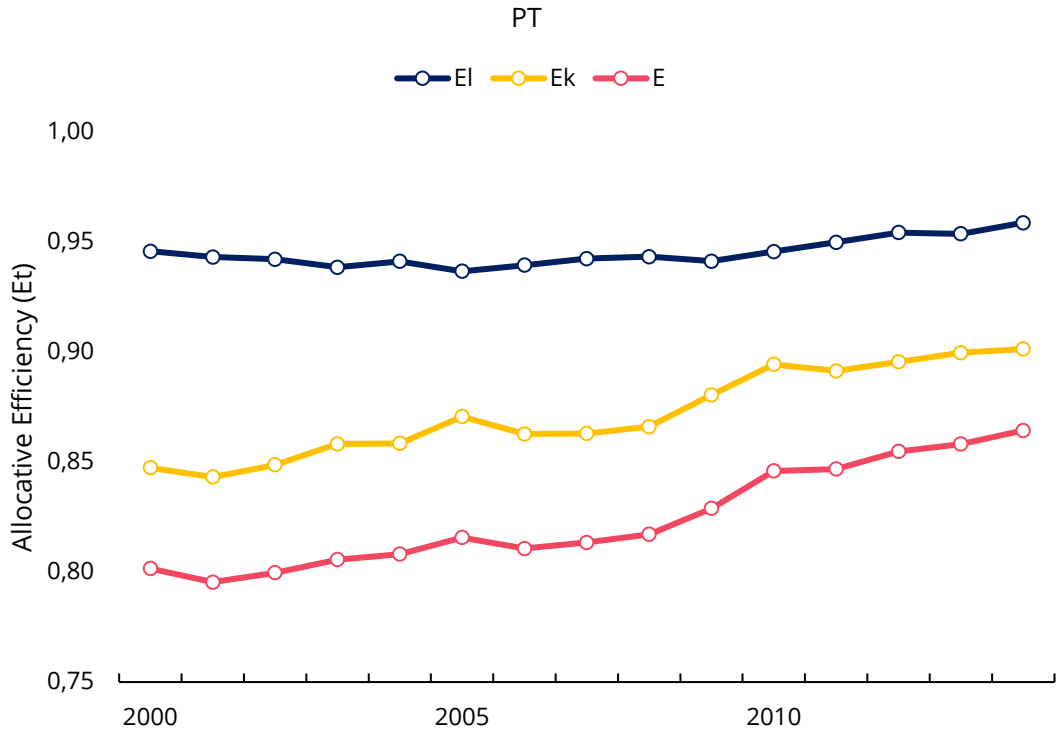
RESULTS

FIGURE 2.: ALLOCATIVE EFFICIENCY IN PORTUGAL (PT) AND GERMANY (DE) (2000-2014)



SOURCE: EU-KLEMS, WIOD E INE.
AUTHOR'S OWN CALCULATION.

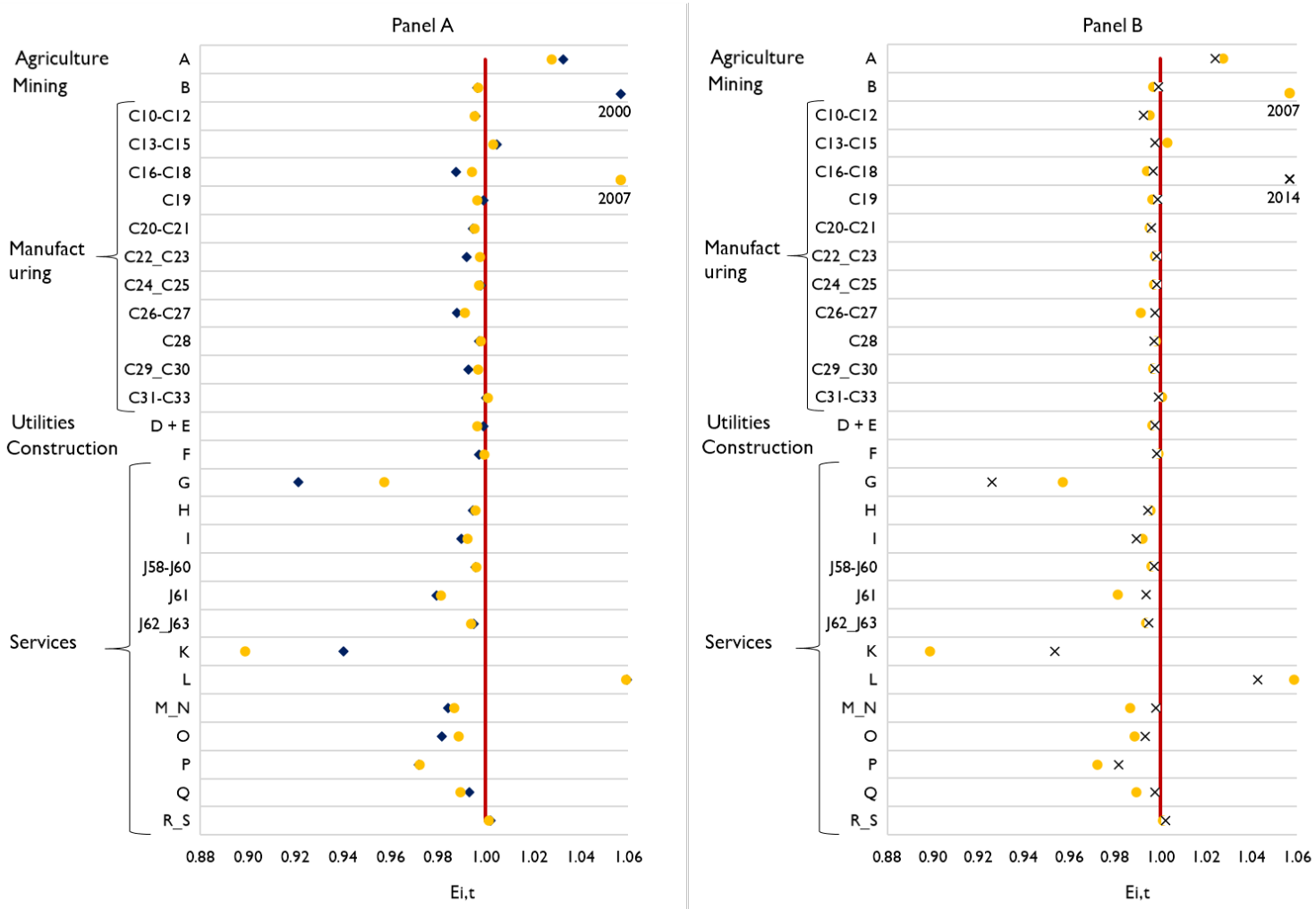
FIGURE 3.: ALLOCATIVE EFFICIENCY IN PORTUGAL (PT) CAPITAL AND LABOR DECOMPOSITION (2000-2014)



SDOURCE: EU-KLEMS, WIOD E INE.
AUTHOR'S OWN CALCULATION.

RESULTS

FIGURE 4.: SECTOR CONTRIBUTION TO ALLOCATIVE EFFICIENCY, PORTUGAL, PANEL A (2000,2007), PANEL B (2007,2014)



SOURCE: EU-KLEMS, WIOD E INE. AUTHOR'S OWN CALCULATION.

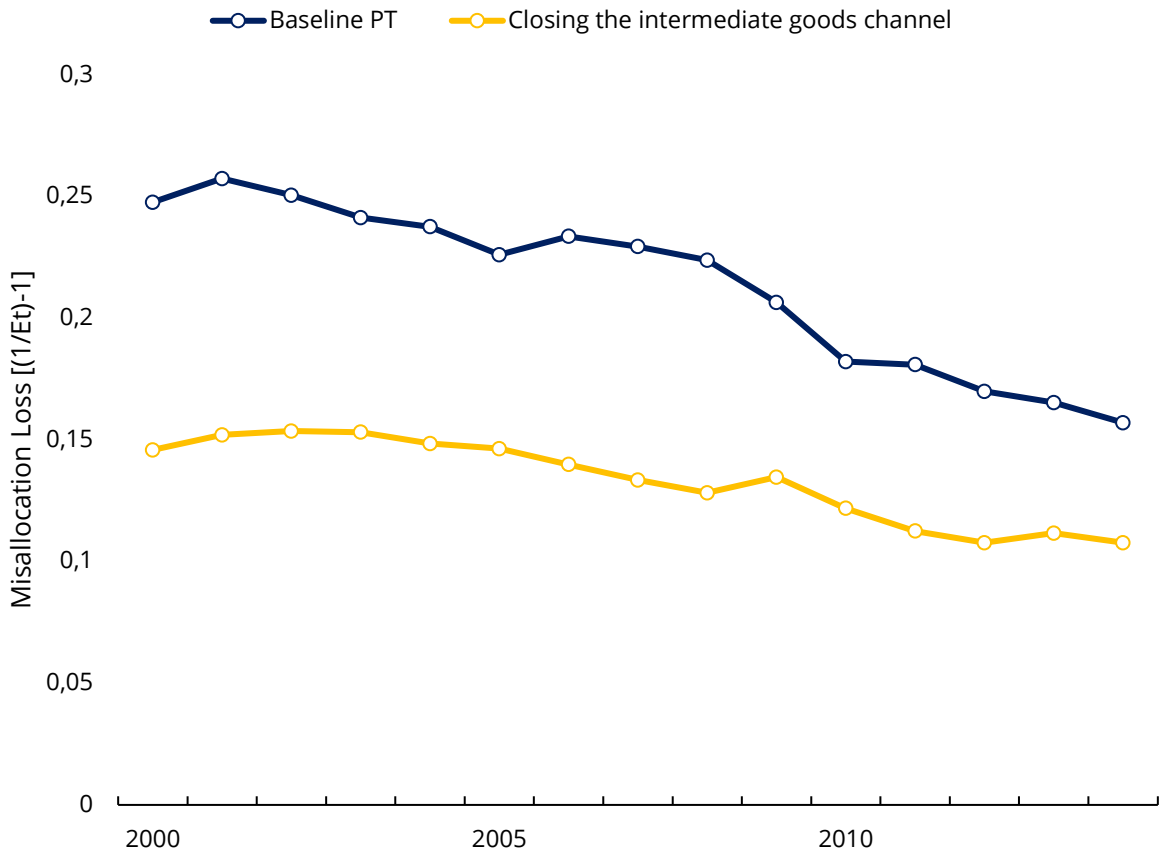
RESULTS

What is the role of the input-output structure on primary input misallocation loss?

1: Keeping all else constant but closing the intermediate goods multipliers

The analysis finds that both in Portugal and in Germany, the intermediate goods channel may have amplified the misallocation loss about 1.5 times.

FIGURA 5.: MISALLOCATION LOSS, BASELINE *VERSUS* CLOSING THE INTERMEDIATE GOOD CHANNEL (2000-2014)



SOURCE: EU-KLEMS, WIOD E INE. AUTHOR'S OWN CALCULATION.

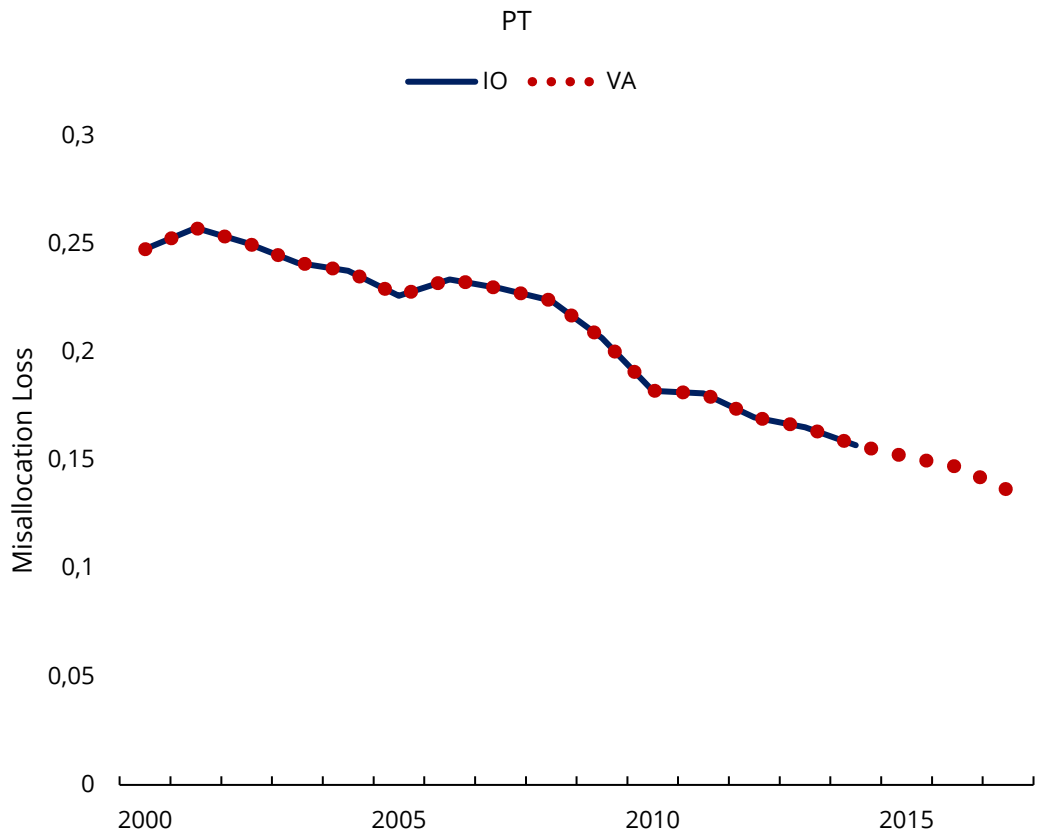
RESULTS

What is the role of the input-output structure on primary input misallocation loss?

2: Considering a value-added economy.

Result: In an economy with Cobb-Douglas production functions where distortions solely affect the allocation of primary inputs, allocative efficiency is the same in the input-output and in the value-added specifications.

FIGURA 6.: MISALLOCATION LOSS, THE VALUE-ADDED ECONOMY (2000-2017)



SOURCE: EU-KLEMS, WIOD E INE. AUTHOR'S OWN CALCULATION.

CONCLUSIONS

- On average (2000-2017), Portugal's misallocation loss was around 20 percent. In Germany, the average loss was around 13 percent.
- The level and improvement of resource allocation in Portugal was mostly driven by improvements in the allocation of capital across sectors.
- Two analysis of the role of input-output structure for these results were carried in this study.
- Resources may be sub-optimally allocated for multiple reasons but ultimately these distortions have a substantial impact on output.

Thank you