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Comments on Eicher and Fuchs

Outsourcing and Productivity Growth,  
Sectoral Evidence from Germany

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# Purpose of the paper

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- To contrast  $TFP_y$  and  $TFP_{ya}$
- Highlight the effect of outsourcing on German productivity growth

But the paper also

- Describes and presents a very high value dataset

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- The paper succeeds in the first purpose

It explains very clearly the differences between TFP<sub>y</sub> and TFP<sub>va</sub> and the advantages and disadvantages of each of them

## Comments on the second purpose: use of the $TFP_{va}/TFP_y$ as an indicator of outsourcing intensity

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- Taking into account that

$$tfp_{va} = (1 + M/VA) tfp_y$$

- Then, the paper claims that an observed increase in the ratio  $tfp_{va}/tfp_y$  implies an increase in outsourcing.
- In the paper both  $tfp$  are measured by the corresponding Solow residual

## $tfp_{va}/tfp_y$ as an indicator of outsourcing (cont)

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- But Solow  $res_y = tfp_y$  if
  - Inputs are measured properly (labour quality, capital services, etc.)
  - Constant returns to scale and null pure profits
  - Constant input utilization and no adjustment costs
- Failure of these assumptions make  
 **$Solow\ res_y ?\ tfp_y$**

## $\text{tfp}_{va}/\text{tfp}_y$ as an indicator of outsourcing (cont)

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**Problem here :**

$$\text{Solowres}_{va} = (Y/VA) \text{Solowres}_y = (1+M/VA) \text{Solowres}_y$$

**only if there are constant returns to scale**

- The failure of this assumption breaks up this relationship.
- Failure of this assumption may be the reason behind  $\text{TFP}_{va}/\text{TFP}_y$  (measured by Solow res) being negative for 8 industries and below 1 for other 4 industries this.

# Proof

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- Consider a homogenous production function with returns to scales ? for sector  $i$
- Taking into account the relationship between returns to scale and mark up:

$$g = m(1 - p)$$

- Then sectoral output growth can be written as

$$dy = m dx + m s_m dm + tfp_y$$

where

$$dx = [s_k dk + s_l dl]$$

$s_k$ ,  $s_l$  and  $s_m$  are income shares

# Solow residual (output)

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Then:

$$\text{Solow res}_y = dy - dx = (\mathbf{m} - 1)[dx + s_m dm] + tfp_y$$

Solow residual (output) = TFP + scale factor

# Solow residual (value added)

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- Substituting  $dy$  in the following equation

$$dva = \frac{dy - s_m dm}{1 - s_m} = dy - \frac{s_m}{1 - s_m} (dy - dm)$$

- We get

$$dva = \frac{m(1 - s_m)}{1 - ms_m} dx_{va} - \frac{(m-1)}{1 - ms_m} \frac{s_m}{1 - s_m} (dy - dm) + \frac{1}{1 - ms_m} tfp_y$$

## Solow residual (VA terms) (cont)

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- Since

$$\text{Solow res}_{va} = dva - dx_{va}$$

$$\text{Solow res}_{va} = \frac{(m-1)}{1 - ms_m} dx_{va} - \frac{(m-1)}{1 - ms_m} \frac{s_m}{1 - s_m} (dy - dm) + \frac{1}{1 - ms_m} tfp_y$$

# Solowres<sub>va</sub>/Solowres<sub>y</sub>

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$$\text{Solowres}_{va} = \frac{\text{Solowres}_y}{1 - ms_m} - \frac{(m-1)s_m}{1 - ms_m} \frac{1}{1 - s_m} dy$$

- Therefore, **If  $\mu=1$**

$$\text{Solowres}_{va} = \frac{1}{1 - s_m} \text{Solowres}_y = \frac{Y}{VA} \text{Solowres}_y$$

- **But if  $\mu \neq 1$**

$$\text{Solowres}_{va} \neq \frac{Y}{VA} \text{Solowres}_y$$

Note that if  $\mu \neq 1$ , you can have  $\text{solowres}_{va} < 0$  &  $\text{solowres}_y > 0$

# Solowres<sub>va</sub>/Solowres<sub>y</sub> with $\mu = 1$

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$$tfp_{va} = \frac{tfp_y}{1 - ms_m}$$

$$Solowres_{va} = \frac{Solowres_y}{1 - ms_m} - \frac{(m-1) s_m}{1 - ms_m} dy$$

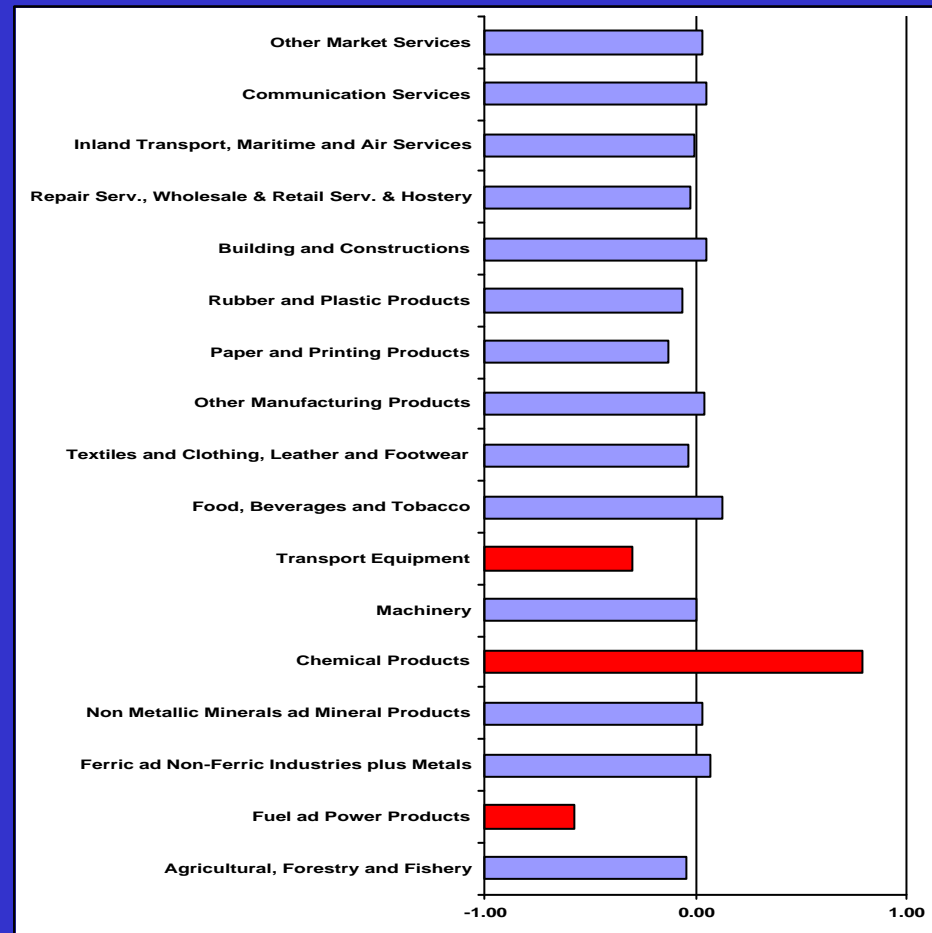
The term

$$\frac{(m-1) s_m}{1 - ms_m} dy$$

*dva* is computed by subtracting from *dy* the *dm* using  $s_m$ . With non-constant returns to scale the productive contribution of these inputs exceeds the  $s_m$ . Thus, there is an additional portion of this contribution that should have been subtracted from gross output growth.

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- In sum,
  - $\text{tfp}_{va}/\text{tfp}_y$  could be a good indicator of outsourcing only if there are constant returns to scale
  - In fact,  $\text{tfp}_{va}/\text{tfp}_y \cdot (1+M/VA)$  could be use as a test of non-constant returns to scale
  - Is that the case in Germany?.
  - I don't know , since the paper reports just averages for but I have some suspects:  $\text{tfpva}/\text{tfpy} < 0$  for 8 sectors –in average- and this ratio is smaller than 1 for other 3 sectors)
  - Let's check Spanish case

# $(\text{Solowres}_{va}/\text{solowres}_y)-Y/VA$ Spain. Average 1993-2001



## Additional comments

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- The analysis of  $\text{tfp}_{va}/\text{tfp}_y$  focuses at the aggregate level and its relationship with aggregate imports growth .
- But at the aggregate level  $\text{tfp}_{va}/\text{tfp}_y = 1 + (M_m/VA)$  where  $M_m$ =intermediates imports.
- $M_m/VA$  may growth just due to shifts in sectoral composition without an increase in outsourcing.