Wages and Employment by skill level in Europe: the reaction to the crisis

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Outline

- Introduction;

- Simple theoretical set-up;

- Results from previous research;

- Preliminary results;

- possibile relazione con consumo (se faccio in tempo);

- Comments and options for future research;

Introduction

We investigate the impact of the financial crisis and the Great Recession on wages and employment in European economies, with the aim of understanding what has been the reaction to the recession.

By relying on the Eu-Silc database, we measure wage dispersion in manufacturing and services, by decomposing the labour force by skill level according to mansions and, and considering the wage premium and the high-skill / low-skill ratio.

We analyse which strategy to recover competitiveness has been followed in different sectors

We "find" that the reaction to the crisis across Europe has been very heterogeneous, ranging from the search for a lower real unit labour costs, to capital deepening, and technical progress.

Simple theoretical set-up

We define the CES function as follows:

$$Y(t) = \left[\gamma_L (A_L(t)L(t))^{\frac{\sigma-1}{\sigma}} + \gamma_H (A_H(t)H(t))^{\frac{\sigma}{\sigma-1}} \right]^{\frac{\sigma-1}{\sigma}}$$

- where $A_L(t)$ and $A_H(t)$ are two separate technology terms;
- γ_i determine the importance of the two factors L (low-skill workers) and H (high-skill workers), with $\gamma_L + \gamma_H = 1$;
- $\sigma \in (0, \infty)$ is the elasticity of substitution between the two factors;

Simple theoretical set-up

Capital is often viewed as complementary to skilled labour but substitutable to unskilled labor (Griliches 1969, Krusell et al. 2000).

Clearly, $A_H(t)$ is H-augmenting, implying that capital and high-skill workers are complements, while $A_L(t)$ is L-augmenting, implying that capital and low-skill workers are complements.

Whether technological change is L-augmenting (H-augmenting) that is L-biased (H-biased) depends on σ.

With $\sigma > 1$, an increase in $A_H(t)$ relative to $A_L(t)$ augments the marginal product of high-skill workers.
With $\sigma < 1$, an increase in $A_H(t)$ relative to $A_L(t)$ reduces the marginal product of high-skill workers.

Simple theoretical set-up

We now focus attention on the relationship between the high-skill/low-skill workers ratio (HR) and the wage distribution across skill levels, that is the skill premium (SP).

$$HR = \frac{skilled}{medium + unskilled}$$

$$SP = \frac{W_{skilled}}{W_{medium/unskilled}}$$

Provided that labour productivity is strongly correlated with education and skill, the labour share can be associated to a wide range of wage distances across groups of workers aligned by skill level, depending on the relative supply of the educated labour force and the mansions for each skill level.

Simple theoretical set-up

SBTC view: whenever more skilled workers are substituted to less skilled workers, the wage distribution is affected both through the variation in the wage premium and the changing proportions of workers across skills (Acemoglu, 2002):
- under $\sigma > 1$ (substitutes), the SP rises less than the HR;
- under $\sigma < 1$ (complements), the SP rises more than the HR

Assuming that K and HS are complements and K and LS are substitutes, SBTC implies that, with elasticity of substitution between HS and LS v>1, due to a higher Ah/Al, Wh/Wl rises.

We define four patterns of technological choices, depending on a varying combination of technological choices and institutions:

1. SBTC: in case regulation does not constrain the substitution of capital and high-skill workers to low-skill workers, firms may find profitable to introduce labour-saving techniques. The presence of SBTC manifests in an increase of both SP and HR;

2. Complementary Technology: in case of regulation constrains, firms realize complementary technologies, by investing on low-skill workers when EPL inhibits their dismissal due to high firing costs and their productivity has to be raised to the level of the minimum wage (legally imposed). The choice of a "complementary technology" entails a decrease both in the SP and in the HR, through the reduction of minimum wage and/or the relaxation of EPL enlarging the relative number of intermediate and low-skill workers.

3. Restructuring: whereby the retrenchment of the low-skill traditional productions under the competitiveness pressure of developing economies causes the loss (or the out-sourcing) of low-pay jobs, so that in spite of deregulation wage compression remains (or SP even falls) and the high-skill to low-skill workers ratio (HR) increases

4. Downsizing: whereby labour market deregulation prompts the structural change towards small-size firms, with a higher percentage of low-skill workers in presence of lowering wage rates, so causing an increase in SP and a fall in HR.

Simple theoretical set-up, Earnings Dispersion Index (EDI)

The four patterns of technological choices are reflected by the measure of earnings dispersion. The figure shows the construction of the Earnings Dispersion Index (EDI) where workers are ranked on the basis of their average wages (and corresponding skill level):
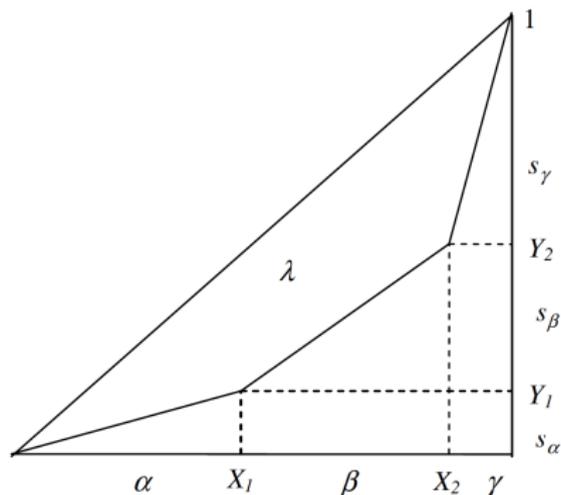
The EDI are calculated as the ratio between the area (λ) limited by the diagonal and the Lorenz curve, and the whole triangle area.

Results from previous research

Croci Angelini and Farina (2008) performed the analysis over the period 1994-2001, including seven countries (Belgium, Denmark, France, Italy, Germany, the Netherlands, the United Kingdom).

They consider six sectors:

	A: ICT producers	B: ICT intensive users	C: ICT less intensive users
1: manufacture	A1	B1	C1
2: services	A2	B2	C2

With the following results (-/+ indicate EDI changes):

	SBTC (SP+, HR+)	Complementary Technology (SP-, HR-)	Restructuring (SP-, HR+)	Downsizing (SP+, HR-)	Countries (unclassified)
A1	FR+, NL+, UK-	DE-	DK-, IT-	BE+	7
A2	BE+, NL+	-	UK-	DE-, FR-, IT+	6(DK)
B1	UK-	FR-, IT-	DE-, DK-, NL-	BE+	7
B2	UK=	BE-	DE-, FR+, NL-		5(DK,IT)
C1	UK+	IT-, NL-	DE-, DK+	BE+	6(FR)

Preliminary Results

Dataset: Eu-Silc; only employees; personal cross-sectional weight.

Income definition: employee cash or near cash income + employer's social insurance contribution; gross values.

Skills defintion: we refer to the ISCO classification (mansions):
   - Skilled: Managers, Professionals, Technicians and associate professionals.

Data cleaning:
   - we removed the cases with negative incomes;
   - for each country and each year we cut off the first and last percentile of the income distributions;
   - we keep only the cases with valide responses about income, skill/mansions, sector of activity;.

		Before-crisis (2005-2007)					During-crisis (2007-2012)				
		Weight 2005 → 2007	Strategy	EDI	Skill Premium (% var)	High Skilled Ratio (% var)	Weight 2007 → 2012	Strategy	EDI	Skill Premium (% var)	High Skilled Ratio (% var)
	Total economy		DOWNsize	up	+5%	-29%		SBTC	up	+1%	+6%
	Manufacturing	21% → 22%	CT	down	-5%	-16%	22% → 26%	DOWNsize	up	+14%	-19%
GERMANY	Trade,transp.,hotel,ict	19% → 24%	DOWNsize	down	+4%	-23%	24% → 22%	DOWNsize	down	+21%	-2%
	Finance	6% → 5%	RESTR	up	-0%	+41%	5% → 4%	SBTC	up	+10%	+4%
	Real estate, profess.	6% → 8%	CT	up	-0%	-29%	8% → 7%	CT	down	-9%	-16%
	PA	35% → 28%	DOWNsize	down	+6%	-35%	28% → 29%	RESTR	down	-2%	+65%
	Total economy		RESTR	down	-3%	+3%		RESTR	down	-1%	+34%
	Manufacturing	19% → 17%	SBTC	up	+4%	+8%	17% → 17%	SBTC	up	+3%	+56%
FRANCE	Trade,transp.,hotel,ict	22% → 22%	CT	down	-4%	-1%	22% → 23%	SBTC	up	+2%	+45%
	Finance	4% → 4%	SBTC	up	+8%	+3%	4% → 3%	RESTR	down	-10%	-31%
	Real estate, profess.	6% → 7%	RESTR	down	-5%	+28%	7% → 10%	CT	up	-14%	-31%
	PA	30% → 31%	CT	down	-2%	-4%	31% → 31%	SBTC	up	+7%	+11%
	Total economy		SBTC	up	+5%	+7%		SBTC	up	+2%	+33%
	Manufacturing	15% → 14%	SBTC	up	+5%	+23%	14% → 14%	SBTC	up	+3%	+7%
UK	Trade,transp.,hotel,ict	26% → 26%	DOWNsize	up	+5%	-1%	26% → 27%	SBTC	up	+6%	+76%
	Finance	5% → 5%	SBTC	up	+7%	+11%	5% → 4%	SBTC	down	+9%	+39%
	Real estate, profess.	11% → 11%	SBTC	up	+17%	+10%	11% → 12%	CT	down	-15%	-7%
	PA	31% → 32%	RESTR	down	-1%	+2%	32% → 33%	SBTC	up	+3%	+38%
	Total economy		RESTR	down	-2%	+7%		SBTC	up	+5%	+15%
	Manufacturing	18% → 17%	DOWNsize	down	+4%	-7%	17% → 13%	RESTR	down	-8%	+56%
DENMARK	Trade,transp.,hotel,ict	21% → 23%	RESTR	down	-9%	+25%	23% → 23%	SBTC	up	+3%	+28%
	Finance	3% → 4%	RESTR	down	-12%	+61%	4% → 4%	SBTC	up	+5%	+150%
	Real estate, profess.	10% → 11%	SBTC	down	+1%	+36%	11% → 11%	CT	up	-7%	-38%
	PA	35% → 33%	RESTR	down	-3%	-3%	33% → 38%	DOWNsize	down	+2%	-4%

		During-crisis (2007-2012)				
		Weight 2007 → 2012	Strategy	EDI	Skill Premium (% var)	High Skilled Ratio (% var)
	Total economy		DOWNsize	up	+8%	-11%
	Manufacturing	27% → 24%	SBTC	up	+1%	+13%
ITALY	Trade,transp.,hotel,ict	20% → 25%	SBTC	up	+26%	+1%
	Finance	3% → 4%	SBTC	up	+15%	+1%
	Real estate, professionals	6% → 8%	DOWNsize	up	+10%	-50%
	PA	26% → 25%	CT	up	-0%	-25%
	Total economy		SBTC	up	+2%	+28%
	Manufacturing	19% → 17%	SBTC	up	+1%	+22%
SPAIN	Trade,transp.,hotel,ict	24% → 28%	RESTR	up	-2%	+57%
	Finance	3% → 3%	RESTR	down	-6%	+39%
	Real estate, professionals	8% → 8%	DOWNsize	up	+13%	-37%
	PA	23% → 27%	RESTR	down	-8%	+29%
	Total economy		RESTR	down	-8%	+6%
	Manufacturing	15% → 14%	CT	down	-1%	-9%
GREECE	Trade,transp.,hotel,ict	31% → 32%	CT	up	-7%	-9%
	Finance	3% → 5%	DOWNsize	up	+4%	-23%
	Real estate, professionals	6% → 6%	DOWNsize	down	+3%	-13%
	PA	27% → 32%	RESTR	down	-5%	+6%
	Total economy		RESTR	down	-15%	+55%
	Manufacturing	25% → 22%	RESTR	up	-23%	+49%
PORTUGAL	Trade,transp.,hotel,ict	24% → 27%	SBTC	up	+13%	+75%
	Finance	2% → 2%	RESTR	down	-18%	+86%
	Real estate, professionals	5% → 7%	RESTR	down	-14%	+3%
	PA	24% → 27%	RESTR	down	-14%	+27%

Comments

- A general analysis over the total economy is useless, while a sectorial one is needed;

- Only two countries seem to have an almost homogenous behavior across various sectors: UK (SBTC, before and during the crisis), Portugal (RESTR);

- The crisis has radically changed the behavior of economies and sectors. In general, it seems to amplify the role of SBTC;

- During the crisis, only Germany exhibits an increasing role(weight) of the manufacturing sector, with a "DOWNsize" behavior;

- During the crisis, only Italy shows a negative dynamic of HR in the Public Administration sector (mainly health and education), while the other countries (governments...) are "restructuring" the public sectors;

-In Italy, Portugal and Spain the weight of the sector "Trade, transport, hotels, ict" significantly increases during the crisis. But while the Iberian countries exhibit a large increase of HR in this area, in Italy the HR of these industries remains substantially stable, while SP considerably increases.

Future improvements: alternative skill definition, merging ISCO and education levels;