

# Does education raise productivity and wages equally? The moderating role of age and gender.

Based on Kampelmann, Rycx, Saks & Tojerow (2018), *IZA Journal of Labour Economics* 7(1)

## An overview >>

Wage inequalities are argued to be associated with a difference in the education and productivity of workers: workers with a higher education earn higher wages ceteris paribus because they are more productive. However, this explanation has been challenged by empirical and theoretical research on labour markets. Recent literature has found other mechanisms that explain pay inequality such as distinct social processes or firms' strategies to address market distortions. The abundance of theories is, nevertheless, not matched by a corresponding body of empirical literature. This paper seeks to fill the gap by analysing Belgian linked panel data. Findings show that educational level has a higher impact on productivity than on wages. It is especially pronounced in the case of younger and female workers. This empirical paper, thus, finds evidence of the effect of workers' gender and age on the (mis)alignment of wages across educational groups. In addition, the authors argue that female low-income workers are more affected by labour market regulations such as minimum wage requirements or unemployment benefits.

## Key contributions

- In Belgium, **firms' profitability** (i.e. productivity-wage gap) is found to **rise** when **lower educated** workers are **substituted by higher educated** ones.
- The results suggest that **high-educated** (low-educated) workers are **no longer under-paid** (over-paid) **when** they become **older**.
- **Highly educated women are found to be under-paid** relative to their co-workers of the same gender who are less educated.

## Introduction

There exists an abundance of theories on education-driven productivity-wage gaps which is not matched by a corresponding body of empirical literature. Furthermore, there is little evidence on whether education raises productivity and wages equally whilst subject to various possible econometric biases. There also exists a body of literature arguing that labour market regulations, such as minimum wage requirements or unemployment benefits, affect the lower end of the earnings distribution. These regulations are thus likely to lead to a "wage-compression effect" among young workers and low-income workers (Cardoso, 2010). In addition, given that upper management jobs are mainly occupied by men, highly educated men have a greater likelihood to be paid above their marginal productivity. This paper contributes to the existing literature with new empirical evidence on how the education-productivity-wage nexus varies with the composition of the firm's workforce in terms of age and gender.

## Empirical Methodology

The empirical analysis is based on the estimation of a value-added function and a wage cost equation at the firm level. The value-added function yields parameter estimates for the average impact of workers with different educational levels, whilst the wage equation estimates the respective impact of each educational group on the average wage bill paid by the firm. The main independent variables in each equation are the shares of hours worked by each educational group in total hours worked. Employees are consequently classified into three categories: lower secondary education, higher secondary education and tertiary education. A third equation is presented based on the work of Ours and Stoeldraijer (2011) that allows the authors to test directly for statistically significant results.

To control for endogeneity issues, the authors present two approaches. First, they use firms' intermediate inputs to proxy for unobserved productivity shocks. The expectation is that firms respond to these shocks through the adjustment of intermediate inputs. Secondly, the authors use the dynamic system GMM (GMM-SYS). This approach implies that education variables are instrumented by their lagged levels in the differenced equation and by their lagged differences in the level equation. The implicit assumption is that changes in the dependent variables in one period are uncorrelated with lagged levels of the latter. The adoption of a GMM-SYS aims to account for the persistency in firm-level profits, wage costs and productivity. Furthermore, it is likely to improve the identification of the parameters of interest.

## Results

**Table 2** Estimates for the entire sample, three educational categories

	GMM-SYS		
	Value added per hour worked (ln)	Wage cost per hour worked (ln)	Value added-wage cost gap <sup>c</sup>
	(1)	(2)	(3)
Lagged dependent variable (ln)	0.619*** (0.050)	0.447*** (0.135)	0.613*** (0.046)
Shares of worker <sup>a</sup>			
Low-educated (E12)	Reference	Reference	Reference
Middle-educated (E34)	0.106** (0.053)	0.027** (0.013)	0.027 (0.021)
High-educated (E567)	0.258*** (0.092)	0.145*** (0.047)	0.055* (0.031)

Estimates support a “wage-compression effect”:

**Column 1:**

“Increasing the share of high-educated workers by 10pp at the expense of low-educated workers increases firm hourly productivity on average by 2.58%”

**Column 3:**

“Productivity-pay gap rises on average by 0.55% following a 10pp increase in the share of high-educated workers”

Findings show a robust upward-sloping profile between education and wage costs, on the one hand, and education and productivity, on the other. Yet, the size of this effect is found to depend crucially on workers' age and gender. The misalignment between education-driven productivity gains and wage cost differentials appears to be only verified among young workers.

In addition, as shown in Table 4, results vary according to gender. Column 3 shows that firms increase their rents if they substitute low-educated female workers with high-educated ones.

Conversely, in the case of males, education-driven productivity gains do not deviate significantly from wage cost differentials. Hence, highly educated women are found to be under-paid relative to their same-gender co-workers who are less educated. This finding may be explained by the fact that women are over-represented among low-wage earners and thus are more likely to be affected by labour market regulations.

The results concerning high-educated women can be explained by the fact that education raises women's productivity but only weakly raises their wages since a *glass ceiling* is preventing them from reaching top positions. It has also been argued that women are less effective negotiators than men in terms of wage-bargaining (Garnero et al. 2014).

Overall, findings support the literature on social norms and the hysteresis of the wage structure, as well as fairness theories. The findings also strongly support the argument that labour market regulations increase the reservation wage and reduce wage inequalities by pushing earnings of low-wage workers upwards.

**Table 4** Estimates according to workers' gender, three educational categories

	GMM-SYS		
	Value added per hour worked (ln)	Wage cost per hour worked (ln)	Value added-wage cost gap <sup>c</sup>
	(1)	(2)	(3)
Lagged dependent variable (ln)	0.661*** (0.056)	0.453*** (0.135)	0.621*** (0.045)
Shares of workers <sup>a</sup>			
Male low-educated (ME12)	Reference	Reference	Reference
Female low-educated (FE12)	-0.029 (0.060)	-0.060 (0.049)	0.007 (0.046)
Male middle-educated (ME34)	0.058** (0.025)	0.031** (0.016)	0.029 (0.024)
Female middle-educated (FE34)	0.014 (0.060)	-0.035 (0.041)	0.019 (0.043)
Male high-educated (ME567)	0.101* (0.054)	0.150*** (0.050)	0.009 (0.045)
Female high-educated (FE567)	0.151* (0.077)	0.082 (0.069)	0.125** (0.051)

## Policy implications

The results of this empirical paper provide evidence on how labour market regulations affect workers, especially those situated at the lower end of the wage distribution. Market regulations are more likely to compress the wage cost differential between low- and high-educated workers when they are young. In addition, estimates by gender suggest that female workers are more affected by labour market regulations since they are over-represented among low-income workers. Policies aiming to improve labour market prospects of young low-educated workers should try to boost their productivity and/or decrease their wage cost. In Belgium, there are several initiatives in place (i.e. training programs, wage subsidies, reductions of social security contributions) which should be continued and intensified. Furthermore, there should be more policies favouring gender equality in terms of remuneration and career advancement.

## References

Kampelmann, Rycx, Sas & Tojerow (2018) Does education raise productivity and wages equally? The moderating role of age and gender. *IZA Journal of Labour Economics* 7, 1.

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Related Studies:

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