



Рис. 5. Оценка действительной эффективности подразделений  
 Накопленный потенциал определяется следующим образом:

$$X(p, t) = \int_{\tau=0}^{\infty} x(t - \tau) \psi^*(\tau, p) d\tau \quad (1)$$

Здесь,  $X(p, t)$  – это поток платежей  $x(\xi), \xi \in (-\infty, \infty)$ , ассоциированный с активом. Экономическая интерпретация потенциала заключается в текущей оценке рыночной стоимости прошлых платежей.

## CHANGES IN THE SKILL PREMIUM IN POLAND

Piotrowska Maria, Professor

Wroclaw University of Economics

The question how labour market is changing at the globalization time is still open. Theory offers well specified conceptual frameworks which lead to apparently unambiguous predictions. The available empirical literature does not help choose alternatives.

The primary purpose of this paper is to present the results of an empirical investigation of changes in wage inequality in Poland in a short run between 2002 and 2006. The analysis is based on the skill premium, as a measure of wage inequality. Empirical investigation uses the Eurostat data.

The paper begins in Section 1 with a presentation of the empirical literature on the impact of globalization on inequality. Section 2 describes the methodology. Empirical findings are presented in Sections 3. Finally, the last section concludes.

### 1. The Impact of Globalization on Inequality - Review of the Empirical Literature

There is a common opinion that the widening wage between skilled and unskilled workers (or so-called skill premium) is resulted from an increase in the

demand for skilled workers. The empirical studies reveal that wages and employment in various skill categories have moved in the same direction suggesting that labor demand shifts are a dominant factor (Robbins, 1996; Sanchez-Paramo and Schady, 2003).

The link between trade openness and changes in the skill premium may be explained by :1) the Stolper-Samuelson effects; 2) an increase in capital flows; 3) the skill-biased technological change<sup>1</sup>.

The Stolper-Samuelson Theorem links changes in product prices to changes in factor returns, if trade liberalization increases prices of the skilled-labor intensive products, the skill premium will rise in developed countries. If open trade induces developing countries to extend output of unskilled-intensive goods and to exchange them in the world market, prices of these goods will relatively increase resulting in higher wages of unskilled workers. The Stolper-Samuelson Theorem predicts that trade liberalization will decline the skill premium in developing countries.

A world-wide skill bias in the new technologies is reflected in an increase in both the share of skilled workers and their relative wage within industry categories in both developed and developing countries. Leamer (1998) suggests that if skilled-biased technological change is concentrated in unskilled-intensive sectors, it will benefit unskilled workers and decrease the skill premium in the general equilibrium, while skilled-bias technological change concentrated in skill-intensive industries benefits skilled workers and generates the increased wage inequality.

## **2. Methodology**

The primary purpose of this paper is to present the results of an empirical investigation of changes in wage inequality in Poland in a short run between 2002 and 2006. This period was very special for the Polish economy. Poland experienced tariff cuts after the EU accession, so that it became more exposed to trade liberalization and capital flow. In 2002 the economy suffered from the bottom of recession and in 2006 the society enjoyed the pick of prosperity. Most of structural reforms has been carried out in the 1990s and at the beginning of the 2000s to meet the accession requirements, therefore it can be assumed that globalization, defined as trade openness and capital flow, was one of main forces driving growth in the years of 2002-2006. If there is the rationale to accept such an assumption, it is worthy to investigate some issues referring to wage inequality.

It seems to be interesting to look for answers to the following questions:

- How did skill premium change between 2002 and 2006, including different level of education and different sectors?
- Which of the theoretical alternatives could be accurate to explain changes in wage inequality in Poland?

Wage inequality is measured by the skill premium, by sector, or the intra-sector wage gap, is calculated as a ratio between mean monthly earnings of skilled-workers with tertiary education and mean monthly earnings of unskilled workers with primary education.

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<sup>1</sup> More factors explaining the link between trade openness and changes in the skill premium, see Leamer (1995)

The employment gap, by sector is a ratio between employment of skilled-workers with tertiary education and employment of unskilled workers with primary education.

Trade openness is measured by the volumes of exports and imports, as a percentage of GDP. There are used several measures for technological change: high-tech exports and imports; employment in technology and knowledge-intensive sectors.

Wage inequality and employment are investigated across: 1) three levels of education: primary, secondary and tertiary; 2) twelve sectors including industry and services

Eurostat is a source of the data for the mean monthly earnings, employment, exports and imports and all measurement of technological change.

### **3. Changes in the skill premium and the employment gap in Poland**

In 2002 the highest skill premium appeared in the sector of hotels and restaurant, where mean monthly earnings of tertiary-educated workers were 3,5 times higher than mean monthly earnings of primary-educated workers. In 2006 the skill premium in the sector of real estate, renting and business activities was on the first position, and it amounted to 2,92. In both years the lowest skill premium appeared in the sector of mining and quarrying, less than 1,5.

In general, the skill premium declined in almost all sectors (in 9 of 12) in 2006 comparing to 2002. The highest decrease took place in the sector of hotels and restaurant (40%), the declines in the sector of construction and the sector of wholesale and retail trade were on the second position (around 9,5%).

In all sectors there was the increase in the employment gap. It means the increases in the ratios between employment of high-skill workers and employment of low-skill workers appeared in all 12 sectors. The highest increase in the employment gap took place in the sector of health (78%) and in the sector of electricity, gas and water supply (75%), while the lowest rise appeared in education.

Further analysis of the changes in wages and employment across sectors can suggest some explanation for the impact of the labor demand on the skill premium. Comparing 2006 to 2002, employment of primary- and secondary educated workers declined in majority of sectors, while employment of tertiary educated workers increased in all sectors. Wages of primary- and secondary educated workers increased in majority sectors. It is difficult to evaluate the relationship between changes in employment and wages because of a small sample (only 12 observations), however, the values of correlation coefficients can throw some light. They amount - 0,16; -0,46 and -0,70 respectively for workers with primary, secondary and tertiary education<sup>2</sup>. The high value of correlation for the tertiary-educated workers (-0,70) suggests that a Rybczynski effect might not work in the Polish economy over the year 2002-2006.

The Rybczynski effect predicts that, if there is an increase in skilled-labor supply, the economy does not respond by lowering wages of skilled workers but by a change in sectoral output. A combination of higher output in the skill-intensive sector

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<sup>2</sup> Author's calculation

and lower output in the unskilled-intensive sector can potentially absorb the rise in skilled supply. The Rybczynski effect does not work, if the change in sectoral output is not large enough to absorb the extended skilled supply and the economy can absorb the extra skilled labor only through relative wage changes.

High-tech sectors absorbed only small fractions of workers with tertiary- and secondary education, respectively around 5% and 2,5% of total employment. The similar situation took place in knowledge-intensive high-technology services. The relatively large fraction of tertiary-educated workers was employed in other knowledge-intensive services (excluding market, financial intermediation and high-tech services), but this fraction was declining during the years 2002-2006. Moreover, wages in such services (health, education, public administration) do not depend on market forces.

Seven percentage of high-educated people were employed in low and medium low technology manufacturing sector and almost 30% in less-knowledge-intensive services. Comparing 2006 an 2002, there was an increase in a number of family heads with tertiary- and secondary education who were employed as manual workers.

If skill-intensive sectors were not developing intensively what it was signaled by very low high-tech exports and they were not absorbing skilled-labor supply, the skill premium could not increase.

Summarizing, for the period of 2002-2206 when Poland experienced larger trade openness after the EU accession, the analysis of the skill premium by sector and by occupation suggests the following factors responsible for the decline in the skill premium:

- the increased employment of the skilled labor on the one hand
- but on the other one, small technical change that could not induce high-tech sectors to develop visibly.

As a consequence, the high-skilled workers have been employed in medium and low-tech sectors where the skill premium, by definition, cannot be very high.

- changes in the low-skilled labor market

The EU accession has opened labor market for Polish workers and stimulated migration, referring considerably to unskilled labor. The Polish economy, dynamically growing over the 2002-2006, has responded by the increase in low-skilled wages. These aspects of integration together with less skill-intensive trade of Polish goods and services and low-developed high-tech sectors could be identified as important factors responsible for the decline in the skill premium.

### **Conclusions**

The findings reveal that Poland is still a labor-intensive country rather than capital-intensive one. Dynamic growth and greater trade openness over the years 2002-2006 have not be able to stimulated large technical change that could guarantee a shift of skilled labor to high-tech sectors. Majority of tertiary-educated workers have been employed in lower technological sectors. Comparing 2006 and 2002 the skill premium declined in many sectors and in many occupations. The increase in low-skilled wages and the decline in the skill premium occurred to be consistent with the Stolper-Samuleson prediction.

## References

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## МОДЕЛІ БІЗНЕС-ПРОЦЕСІВ ВИРОБНИЧО-ЗБУТОВОЇ СФЕРИ ПІДПРИЄМСТВА

Соколовська З. М., д.е.н., професор

Одеський національний університет ім. І.І. Мечникова

Підвищення ефективності управління виробничо-збутовою діяльністю промислових підприємств є фундаментом формування їх конкурентоспроможності. Сучасна парадигма управління вимагає перегляд концептуальних основ вітчизняного менеджменту, спрямування його на бізнес-процеси та використання превентивних методів. Процесна структура підприємства (за якою ієрархія функціональних підрозділів замінюється або доповнюється ієрархією міжфункціональних бізнес-процесів, що виконуються процесними командами під керівництвом власників, координаторів процесів) найбільше відповідає сучасним вимогам оперативного реагування на швидкі зміни у внутрішньому та зовнішньому середовищі. Реалізація бізнес-процесного підходу передбачає відокремлення та вивчення основних бізнес-процесів з метою оцінки їх відповідності стратегічним цілям підприємства, визначення їх ефективності та оптимальності, а також можливостей удосконалення або реінжинірингу. Аналіз комплексу бізнес-процесів, їх взаємозв'язків та ресурсного оточення реалізується за допомогою моделювання, для чого існують стандартизовані, апробовані в часі методології та інструментальні засоби. Не зважаючи на це, вибір платформи моделювання та розробка ефективних технологій її використання й досі є достатньо актуальною та дискусійною проблемою. Одним із сучасних напрямків її розв'язання є залучення багатофункціональних графічних середовищ імітаційного моделювання -- таких, як Idecide, ReThink, Ithink, Powersim, AnyLogik.