



Cost of Labor Translation in Healthcare Sector between Poland and the UK the Evidence from Obstetrics and Gynecology Department

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Authors' contributions

This work was carried out in collaboration between both authors. Author MJ designed the study, wrote the protocol, and wrote the first draft of the manuscript. Author MJ managed the literature searches, analyses of the study performed and author AJ has gathered the data to the case study. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Wages translation, understood as a process of restating the remuneration of selected employee from a particular currency to another currency, is based on the market exchange rate. In the recent studies there are some statistically proven evidences that this procedures are inapplicable. Recently the theory of translation based on productivity differences, firstly introduced by Balassa and Samuelson, has been enriched by more precise determination of productivity: a labor productivity Q defined as quotient of real GDP to cost of labor W . The main aim of the paper is to present the equalizing mechanism, which is hereby proposed as the quotient of productivity factors in compared countries. The case study involves labor costs represented by wages of doctors from obstetrics and gynecology departments in Poland and the UK.

Keywords: Labor cost; healthcare; exchange rate; labor productivity; translation.

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1. INTRODUCTION SALARIES TRANSLATION PRACTICE

The role of exchange rate is divided into two parts: first, more theoretical, as the equilibrium point on the foreign trade market between supply and demand for a particular currency and second, more practical as the relationship between two different money units. In everyday life one can go to the exchange and buy one US dollar for 3 Polish zlotys. In the analysis of the exchange rate behavior, scientists rarely explain the nature of the monetary unit, whose value mainly determines the rate of exchange between currencies. This relationship, however, is used to translate wages, salaries etc. The dilemma we face is whether it is possible to use the relationship between two monetary units to the conversion of wages and if the value received in this process can be treated as objective and fair.

There are also some symptoms of misunderstanding the role and nature of the exchange rate. In the news we sometimes hear that the inhabitants of named poor countries must live on one dollar a day. Not so long ago (in 1980's) people in Poland earned 25 US dollars per month and they did not face any hunger or poverty. After 30 years of transformation in Poland the average pay is more than 1300 US dollars. Are contemporary Poles really fabulously rich after 30 years? For reasonable economists, comparing remunerations with the direct use of the exchange rate does not produce any useful information. However, most people still use the exchange rate for this purpose, and what is worse, they formulate their wage expectations by multiplying the wages from abroad by the current market exchange rate.

The direct use of the exchange rate can easily be refuted through simple examples concerning two countries with similar and different labor productivity [1]. Let us consider two countries and two wages of the workers doing the same job with similar amount of responsibility. In this case the direct use of the current exchange rate should satisfy the equation:

$$W_P = W_{UK} \cdot ER$$

Where: W_P is wage in Poland, W_{UK} is wage in UK and ER is average market exchange rate for the period.

In practice wages of particular country depend mainly of the wage productivity of the economic system, that is why it is almost impossible to compare wages with the direct use of the exchange rate. Let us consider previous study on the exchange rate estimation based on average pays made in several countries. The results of this study has been presented in Table 1.

The general outcome from the Table 1 is that exchange rate is well estimated only in case of the countries with similar level of economic development, which is deeply connected with wage productivity observed in particular economic systems. For instance, since USA, UK, Japan, Switzerland and Sweden have almost the same productivity, the exchange rate based on average pays is almost equal to observed market exchange rate in the same period. But in case of Poland the situation is slightly different. Since Polish productivity is lower than in the US, the exchange rate estimation based on compensations is wrong (see productivity calculations in [2]). If so, in case of countries with different wage productivity the direct use of exchange rate in the translation process leads to wrong results. Is it worth to introduce a formal procedure, that will justify the labor costs comparison in case of countries with different productivity factor Q .

2. WAGE PRODUCTIVITY THEORY IN TRANSLATION OF ECONOMIC VALUES

In recent studies M. Dobija [3] has enriched the Balassa-Samuelson research and stated that this represents not just productivity, but also labor productivity differences [4,5].

The new approach to the production function, which is not econometric, but natural, explains the determinants of wage productivity Q [6]:

$$Q = \exp[AF/H] = \exp[AFp/L] = \exp[TF],$$

Where A = end-of-period value of assets, H = human capital, L = constant basic pay ($L = p \times H$), p = the constant of potential growth (0.08), T = technical equipment of work, and F = level of management. The relationship comes from the transformation of production function P , since Q is a quotient of production P and cost of labor W [7]:

Table 1. Exchange rate estimation on the basis of labor costs In comparison with average exchange rate for the period in year 2005

	USA(\$)	UK (£)	Switzerland (CHF)	Japan (¥)	Sweden (SEK)	Poland (zł)
Average hourly pay	16,5	9,51	29,15	1792	109,3	19,5
Labor cost estimated exchange rate	1	0,576	1,767	108,606	6,624	1,182
Average observed exchange rate for the period (Middle)	1	0,549	1,246	110,100	7,471	3,236

Source: Own estimation on the base of data of U.S. Department of Labour, Bureau of Labor Statistics, November 2006, International Average Salary Income Database

$$P = W \times e^{\frac{Amp}{L}}$$

Where W = cost of labor, A = assets, L = remuneration level, and p = economic constant of the potential growth.

In terms of a macroeconomic approach, labor productivity signed by coefficient Q means the quotient of GDP, which represents the outcome of global production and costs of labor (W). The simplest formula for labor productivity has been provided below:

$$Q = \frac{GDP}{W}$$

Where Q = labor productivity and W = cost of labor.

However before presenting the formal method of international comparisons with the use of wage productivity coefficient it is crucial to explain the role of inflation in the context of the case study. In the proposal of using wage productivity in international comparisons we have to consider the difference between real and nominal wage productivity. The relation can be presented by the formula in which Q means real wage productivity, and Q_n stands for nominal wage productivity. Coefficient i is the current inflation rate in the economic system:

$$Q = \frac{Q_n}{(1+i)}$$

In all formulas the real wage productivity (Q) has been used. It is clear that higher inflation rate means lower real wage productivity. That is why using real wage productivity in the forthcoming formulas we already include the inflation

differences between particular economic systems.

In order to formally present the method of estimating labor productivity ratio Q using observed values of the market exchange rate and to present relationships between coefficients, we take the real GDP, which represents the nominal GDP expressed in the last years' prices for a chosen country and the USA. We consider the GDP to be a product of wage (cost of labor) W and real productivity coefficient (Q). The subscript P denotes Polish, and subscript UK is the United Kingdom wage and real productivity. Thus the equations can be written as follows [8]:

$$GDP_P = W_P \cdot Q_P$$

$$GDP_{UK} = W_{UK} \cdot Q_{UK}$$

After dividing the above equations:

$$\frac{GDP_P}{GDP_{UK}} = \frac{W_P}{W_{UK}} \cdot \frac{Q_P}{Q_{UK}}$$

Then reformulating following formula can be obtained:

$$GDP_P[zł] = \frac{W_P}{W_{UK}} \cdot \frac{Q_P}{Q_{UK}} \cdot GDP_{UK}[UK \text{ pound}]$$

The above formula shows some applications of the exchange rate. Therefore, we write a subsequent formula, where f(ER) denotes some function of the exchange rate. £

$$GDP_P[zł] = f(ER) \cdot GDP_{UK}[UK \text{ pound}]$$

Dividing labor cost W by number of employees, we obtain a formula in which (AP) represents average pay and E is the number of employees of the given countries:

$$GDP_p[zl] = \frac{AP_p}{AP_{UK}} \cdot \frac{E_p}{E_{UK}} \cdot \frac{Q_p}{Q_{UK}} \cdot GDP_{UK}[UK \text{ pound}]$$

Dividing GDP by number of employees E , we get the equation:

$$GDPE_p[zl] = \frac{AP_p}{AP_{UK}} \cdot \frac{Q_p}{Q_{UK}} \cdot GDPE_{UK}[UK \text{ pound}]$$

Where $GDPE$ = GDP per one employee. So the fundamental relationship is:

$$\frac{W_p}{W_{UK}} \cdot \frac{Q_{UK}}{Q_p}$$

And it can be treated as an equalizing mechanism for countries with different productivity. This equation has been statistically tested by M. Jędrzejczyk [9] in the article about trend of exchange rate and wage productivity. Table 2 shows the rates of the Q factor for several countries, starting from the year 2006 and ending in 2011. Since the data concerning cost of labor in the whole economic system is quite hard to acquire, the newest data comes from the year 2011.

For instance, the value of coefficient Q for Poland in 2011 accounted for 1,93 and for the UK 3,216. This means that, in Poland, 1 zloty of labor cost generated 1,93 GDP, and in the UK, 1 UK pound generated 3,22 pounds of GDP. This shows a noticeable difference in productivity between the two countries. That is why, by comparing minimum wages in Poland (10 zlotys per hour) and in the UK (£6,31 per hour), it is impossible to estimate the real exchange rate, which was in 2013 about 4,94 zlotys per one pound. On the other hand, direct use of the exchange rate for translating English minimum wage to Polish zloty will bring more than 30 zlotys per hour, which is highly improbable in Poland. This happens because the direct use of the exchange rate is inapplicable to the conversion of wages because of the previously mentioned differences in wage productivity. More about inadequate usage of the market exchange

rate has been described and tested in M. Jędrzejczyk recent book [10].

3. THE RELATION BETWEEN LABOR COSTS AND COSTS OF LIVING – THE HEALTHCARE CASE

The above motions are confirmed by the study based estimated wages of doctors in Poland and the UK. To maintain the adequacy of data with Q factor from Table 2, the research has been based on the year 2011 and the year of study has been intentionally chosen. Doctors' wages has been divided between several separate groups. The first group are wages of young doctors just after studies. Three next rows of the Table 3 present wages during doctors' training. The last group contains specialists just after degree exam. It is clearly visible that average salaries of doctors are quite similar. Of course depending on the professional profile wages can vary from 3500 to 8800 zł. In the UK average monthly pay after degree exam is equal to £ 7000.

It is clear that the direct application of the exchange rate to convert value of English doctor will not estimate monthly wage of Polish doctor. From this point of view exchange rate is not applicable to convert wages between Poland and the UK. But this motion is commonly known in healthcare sector, where UK remunerations multiplied by the current exchange rate constitutes pay demands of Polish specialists.

Therefore the second step of planned survey is necessary in the meaning of purchasing power of Polish Zloty and UK Pound. In the Table 4 different prices of products in Poland and the UK has been gathered. Prices of identical or very similar goods has been used to estimate the exchange rate on line-by-line basis. The results has been presented in the last column. The aim of the study is to compare Polish and English purchasing power of one currency unit, which can be a measure of real wage adequacy. This problem has been also enlightened in the article about so called Bigmac currencies [11].

The last row of the Table 4 reveals, that exchange rate estimated on the basis of randomly chosen basket of goods is equal to 3,90 zł/£. The average exchange rate at that day on the monetary market was 4,5471 zł/£. It is worth stressing that in case of Poland and United

Kingdom exchange rate cannot be used directly to convert prices and wages, what is the general motion from Tables 3 and 4. It confirms the thesis, that in case of countries with different wage productivity exchange rate cannot be used directly to convert prices of goods, assets, GNP or wages.

The relation between wages in above study is close to 1 zł/£ whereas the average relation between products' prices is 3,90 zł/£. Unfortunately relation between prices of goods is also distorted by the speculative pricing, in which manufacturers calculate the price on the different markets using exchange rate, which is obviously wrong. The study published in 2009 basing on the data from 2007 revealed the same relation equal to 3,35 zł/£. After 4 years it is noticeable

that average price level in Poland has raised especially due to rising transport costs.

The study however shows that generally doctors in Poland earn less than their UK counterparts, but the difference is not that radical as pay demands based on direct exchange rate application to remunerations of English doctors. Apart from that is it worth mentioning, that not every source of income of Polish doctors is formally revealed. The data in the study shows wages including night work, whereas English does not. What is more in Poland doctors can work in couple of hospitals or consulting rooms (especially after degree exam), whereas in the UK it is not that common.

Table 2. Value of Q factor for chosen countries in years 2006-2011

	2006	2007	2008	2009	2010	2011
Poland	1,881	1,992	1,854	1,869	1,903	1,935
Switzerland	3,534	3,645	3,748	3,65	3,509	3,498
UK	3,204	3,517	3,444	3,082	3,095	3,216
USA	3,458	3,47	3,56	3,5	3,452	3,648
Japan	3,069	3,093	3,186	3,433	3,279	3,448
Germany	3,305	3,38	3,389	3,276	3,169	3,158

Table 3. Monthly wages estimation of doctors. Data from the year 2010

	Poland (in zł)		United Kingdom (in £)	
Jobs				
Young doctor just after studies	2000	3200	2000	2400
Doctor 2 years after studies	2440	4500	2200	2500
Doctor 4 years after studies	2920	5000	3500	4000
Doctor 6 years after studies	3000	5800	5500	6000
Specialist	3500	8800	7 000	

Source: Polish data comes from <http://gazetapraca.pl> and has been confirmed by Krakow doctors. UK data has been acquired by Anna Jędrzejczyk M.D.

Table 4. Exchange rate estimation between Poland and the UK with basic consumer products

Item	Polish price	UK price	Estimated exchange rate
Dove soap 100g	2,99 zł	£0,54	5,54
Heinz ketchup 570g	5,19 zł	£1,47	3,53
Lettuce	2,99 zł	£1,00	2,99
Tomatoes 1kg	3,99 zł	£1,58	2,53
Nescafe gold 200g	26,99 zł	£5,89	4,58
Rice 1kg	4,49 zł	£1,20	3,74
White bread 800g	4,99 zł	£1,00	4,99
Butter 250 G	2,85 zł	£0,58	4,91
Head & shoulders 500ml	16,99 zł	£3,00	5,66
Aquafresh mint 100ml	7,99 zł	£2,00	4,00
Pepsi 2l	4,89 zł	£1,36	3,60
Mineral water 6x1,5l	10,14 zł	£3,00	3,38
Carlsberg 1l	6,50 zł	£3,04	2,14
Tesco orange juice1L	2,59 zł	£0,90	2,88
Total	103,58 zł	£26,56	3,90

Source: Own estimation. London prices from 30.03.2011, Tesco. Krakow prices: Tesco from 30.03.2011

This circumstances of course should not be taken into regard in case of wages comparisons especially in case of purchasing power of earned money by particular employee. Considering the specificity of Polish healthcare the general motion that Polish doctors' purchasing power of monthly income is much worse in comparison to doctors in the UK can be formulated.

4. SUMMARY AND CONCLUDING REMARKS

Converting the value of goods' prices, wages and GDP is still unclear in economic practice. As proposed in the paper, direct use of exchange rate to international comparisons is only possible and reasonable in case of countries with identical or similar wage productivity. There is no doubt that this wage productivity parity does not hold between Poland and the UK. The healthcare case, in spite of many underlying systemic differences, also confirms the general thesis. Translation of wages especially in the context of pay demands on Polish healthcare work market is highly inappropriate. This is also visible in comparison to exchange rate estimation between zloty and pound based on the basket of randomly chosen goods on Polish and English market.

The research also confirms Balassa-Samuelson research in a way, because the value of labor productivity indicator (Q) is higher for rich countries and lower for developing countries. However, even more important is that this procedure will enable one to conduct truthful and fair translation processes in case of labor costs represented by wages. So far, GDP or GDP per Capita has been used to measure economic development and the welfare of societies, and surely it can be replaced by productivity coefficient Q. What is more, Q is unrated value and is very easy to interpret.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Jędrzejczyk M. Towards the best procedure of translation. in I. Górowski, General Accounting Theory, Evolution and Design for Efficiency, Wydawnictwa Akademickie i Profesjonalne, Warsaw; 2008.
2. Dobija M. The theoretical basis of an integrating currency area. The Dilemmas of Polish Accession to the Eurozone. Management and Business Administration. Central Europe. 2013;21(4):123.
3. Dobija M. Labor productivity vs. minimum wage level. Modern Economy. 2011;2(5):780-787. DOI: 10.4236/me.2011.25086.
4. Balassa B. The purchasing power parity doctrine: A reappraisal. Journal of Political Economy. 1964;72.
5. Samuelson P. Theoretical notes on trade problems. Review of Economics and Statistics. 1964;46.
6. Dobija M, Jędrzejczyk M. Production function in accounting approach and managerial applications. Zeszyty Teoretyczne Rachunkowości. New Trends in Management Accounting Concepts and Practice. 2013;72(128).
7. Dobija M. Abstract nature of money and the modern equation of exchange. Modern Economy. 2011;2(2):142-152. DOI: 10.4236/me.2011.22019.
8. Dobija M, Jędrzejczyk M. Conversion of values to one money unit in consolidation process. Emergo - Journal of Transforming Economies and Societies. 2004;11(4).
9. Jędrzejczyk M. Labor productivity parity vs trend of exchange rate. Modern Economy. 2012;3(6):780-785. DOI: [10.4236/me.2012.36099](https://doi.org/10.4236/me.2012.36099).
10. Jędrzejczyk M. The exchange rate and the equivalent translation of economic value in the economy. DIFIN, Warsaw; 2013.
11. Pakko M, Pollard P. For here or to go? Purchasing power parity and the Big Mac. Review (Federal Reserve Bank of Saint Louis). 1996;78.

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