IMMIGRATION, LABOR MARKET AND WAGE INEQUALITY

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1. **Introduction**.

The extensive literature on immigration is the result of a growing concern about the effects of massive immigration on the host economies. The analysis of the effects of immigration takes two avenues: the costs from immigration translated mainly in terms of fiscal costs for the host state; the benefits from immigration understood mainly as a surplus either directly from the production process through a decrease in costs, due to lower wages, or through accumulation of capital, mainly knowledge, to the existing stock of capital. A second domain of the analysis of immigration phenomenon and which makes up the purpose of this paper concerns a more delicate subject which has implications not only for the economic process but also for the social process within the host nation, namely a change in relative wages of skilled and unskilled workers. Thus, we survey in this paper the literature, both empirical and theoretical, on the effects of immigration on skill-based wage differentials. Our intention is to look mainly at the wage inequality between groups with different skills and less at the inequality within the groups of similar skills.

This paper is comprised of two main parts. The first part covers the theoretical framework behind the analysis of immigration. The second is presenting the empirical results of several projects on the issue of immigration together with possible implications the East enlargement project might have upon European Union countries.

2. Survey of the theoretical literature

The literature on immigration and its impact on skill-based wage differentials is divided between contradicting opinions. There are those who claim and prove empirically that an increase in the labour supply due to immigration process leads to a widening gap in wage differentials between skilled and non-skilled natives while others claim that immigration does not have any effect upon the wage inequality for the natives. As Borjas et al.(1996) show in their paper "Searching for the effect of immigration on the labour market" any empirically inquiry on the issue might yield different results due to the "empirical experiment used". We learn from their essay that an approach based on *area analyses* , which "contrasts the level or change in immigration by area with the level or change of outcomes of non-immigrant workers" shows that a higher supply of labour due to immigration might have a negative impact upon the natives' level of income when we control for "regional conditions". This approach takes into account an element which although not visible at the first sight may negatively alter our results. That is the migration of the natives from one region to the other and which if taken into account might explain why much of the literature does not find a significant correlation between immigration and wage differentials.

The *factor proportions analysis* on the other hand conducts a holistic approach by " treating immigrants as a source of *national* supply of workers of the relevant skills, and treating trade as a source of changes in the supply of skills"(Borjas, Freeman and Katz, 1996). The rationale behind it is that because of elasticity of substitution between labour of same schooling level, an increase in the supply of same type of labour might lead to a change in relative wage of different groups of workers. However, previous projects based

on factor proportions analysis were not able to show a significant correlation between immigration of low skilled labour and wage differentials.(Borjas et al. 1992, Heckman et al. 1998).

We can see that the method we use to determine the effects of immigration on wage differentials is based not only on empirical observations but also on different theoretical grounds. If for example one takes the general equilibrium as its base of analysis and assumes labour homogeneity then important aspects of the labor market such as complementaries between capital and skilled labour are lost from the analysis and the model gives erroneous outcomes. In what will follow we present few characteristics of the labour market and their importance for the analysis of the immigration on the labour market. The theoretical grounds are the same as the one which research the effects of changes in relative labor supply on relative wages. Afterwards, we apply the theoretical discussion to be developed subsequently to the specific case of a change in relative labor supply due to an inflow of immigrants.

For the beginning we place the analysis in a classical demand-supply framework and we search for the effects of a change in relative supply on the relative wages. The analysis evolves from a simple model of demand and supply to a more complex one by including skills differentials, complementaries between capital and different groups of labour and the elasticity of substitution between types of labor. The final model is based on the model of wage inequality in the context of technical change as developed by Daron Acemoglu, 2001.The survey of the theoretical aspects of immigration is followed by a review of the main empirical findings.

2.1   Endogenously versus exogenously determined demand.

The analysis of labor market and wage differentials is divided between two theoretical approaches. One which comes from the theory of labor market, and which considers changes in the demand for labor as being exogenously determined (Katz and Murphy (1992), Freeman and Needels (1993), Autor, Katz and Krueger (1997), Kruger (1998)), and one which is based on endogenous growth theory where shifts in the relative demand for labor are endogenously caused (Murphy, Riddell and Romer (1999), Acemoglu (1998), Aghion et al. (2000)).

The main argument in the literature on the relative labor demand shifts is constructed on the idea that there is a skill-biased technological change which was mainly observed during the last six decades (Acemoglu 2001) and which is the main cause of an increase in wage inequality between skilled and unskilled labor.

The survey of the literature in this part of the paper is based on work conducted mostly on the case of U.S. labor market. The question posed in the literature deals with the trends in the wage inequality by taking into consideration two empirical observations: an increase in the supply of skilled workers and an augmentation of the skill-biased technological change. However, in the context of the American labor market reality the argument that the presence of skill-biased technological change leads to an increase in the wage inequality has to be reshaped if one considers that the data show an increase in the wage inequality only beginning with 1970s.

Several authors (among them Katz and Murphy (1992)) try to explain first that this trend in wage inequality is due to changes in relative supply of skills, assuming that demand for skilled labor grows at a constant pace (steady-demand hypothesis). In order to

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test for this hypothesis, the model presented by Katz and Murphy assumes first a stable factor demand and tests for changes in relative wages due to changes in skills supply. Using this technique one can investigate if the shift in the supply curve alone explains for the differences in the wage inequality. The results show that only until 1970s supply shifts alone could explain the increase in wage inequality. In other words, because the supply of skilled workers increases faster than the demand, the wage differentials narrows. However, after 1970s when although the supply of skilled workers increased substantially, the wage inequality followed itself the same trend. Katz and Murphy extend the model by including a shifting demand for different types of labor. Although there is an expansion in the supply of educated workers the return to skills increases as well because the employment of educated workers follows the same upward trend. In this approach we can see that the demand is exogenously determined by some elements which remain unexplained but which determine shifts in the employment rate. A straightforward conceptualization of this model can be offered by the equation of wage differentials in a demand-supply framework as presented by Kruger et al. (1998).

$$\frac{\omega_H}{\omega_L} = \frac{1}{\sigma}(D_{\frac{H}{L}} - S_{\frac{H}{L}}) \qquad (1)$$

In this model the analysis concerns the differences between the rates of increase in the supply and demand. Applied to the topic of this paper, we are able to see how changes in the wage differentials evolve when there is a change in the supply of labor because of an inflow of immigrants. If there are sectors of the host economy where there is a demand for the type of immigrant labor, there might not be any change in the wage inequality. If however, the demand for labor is already satisfied, an inflow of immigrants will cause

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movements in the wage differentials depending on the type of labor that entered the market. Although the analysis is similar when the change in the supply of labor is caused by immigration or by a simple domestic increase in the supply of labor, one has to take into account that the immigration phenomenon has certain characteristics. First, the skills might not be entirely transferable in the host environment. Secondly, depending on the immigration policies, the magnitude of the immigration might be far superior than a simple and somehow forecastable increase in the domestic labor supply.

The approach described above is to a certain extent useful in understanding the basics of wage differentials dynamics. Still, there is more to be analyzed than simple shifts in demand and supply of labor. We have to ask ourselves what determines an increase in the demand for skilled labor. The most plausible answer would be the technology which during the 20th century seems to favor skilled labor. In this respect, the literature presents the acceleration hypothesis which claims that in the last three decades we can observe an increase in skill bias technology which consequently generated a higher demand for skilled workers (Acemoglu 2001). This approach is divided between two subsequent theories.

The first is similar in assumptions with Katz and Murphy's, maintains that the technological advances are viewed as exogenously determined by some "nonprofit motives" as Acemoglu puts it. Krueger in his 1993 article on the role of computers upon wage structure, explains extensively how the introduction of computerized work has increased wage inequality between the workers who are computer literate and those who are not. This approach however assumes that demand is itself determined exogenously and therefore it does not explain why the demand for skilled labor (the acceleration in skill bias technology) follows the same trend as the increase in the supply of labor.

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The endogenous approach comes in here and shows that the demand for skilled labor and technological changes are endogenously determined by the response of firms to profit motives. Because of higher supply of skilled labor, the firms have incentives to create a technology which is suitable for a growing supply of skilled labor. The technology itself is determined by profit motives which arise as a result of a demand that is present on the market. Firms invest in technological developments not just for the sake of holding a patent or an invention, but with the purpose of using the new technology in producing a commodity which is necessitated on the market. And since there is a large number of skilled workers on the market that wait to be employed, the firms find it worthy to create tools i.e. technology ready to be used by the skilled workers. As a consequence the technological development tends to be skill bias. An interesting example which is related to our topic is given by the case of Israeli's labor market in the beginnings of 1990s which was confronted with an inflow of educated immigrants from former Soviet Union that increased the total population by 12 percent (Rachel Friedberg 1997, Acemoglu 2001). The classical demand-supply framework or the exogenous approach would have predicted a decrease in wage premium for skilled labor. However, it did not happen because the employment of skilled workers increased as well during 1990s. This response of the market is explained in the literature by employing an endogenously caused shift in the relative demand for labor. Firms respond to a higher supply of skilled labor with a change in the methods of production which allow for a greater use of skills, and hence the demand will shift to the right preventing a decrease in the wage of skilled labor. The behavior of the firm to a great extent is in accordance with our expectations. We know that the prices for goods produced with a higher technology and employing a scarce factor will yield

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higher prices and therefore higher profits for the producer. Firms choose to have some reallocation costs and costs with developing new technology, but all these in the expectations of higher profits.

At this point we see that the supply of skilled labor is the cause of a change in technological development and further of the demand for labor. The supply of labor itself is determined as well in the system by the expectations individuals have in respect to the return to skills. If there is a growing return to skills, we expect that an increasing number of individuals choose to educate themselves in return for higher returns. This development, on the other hand, determines an endogenous increase in the skill bias technology and an outward shift in the relative demand for labor, which causes higher wage for skilled labor and further a higher supply of skilled labor.

In the next section of this paper we discuss several cases of the determination of skill-based wage differentials which diverge from each other because of the differences in the initial assumptions. In the end we present a particular model of skill-based wage differentials, model which employs an endogenous approach to the issue.

2.2 Preliminary insights on skill based wage differentials mechanism and immigration.

The assumption often made in the literature and which to a great extent complies with the reality is that the labor supply is inelastic. When labour supply is completely inelastic we assume that at initial stage t_0 the economy is at full employment and therefore there is no labour reserve which might alter the equilibrium wage on the labour market. Thus, according to the diagram below the economy is at employment level E_0 which corresponds to a wage level of w_0.

Figure 2.1
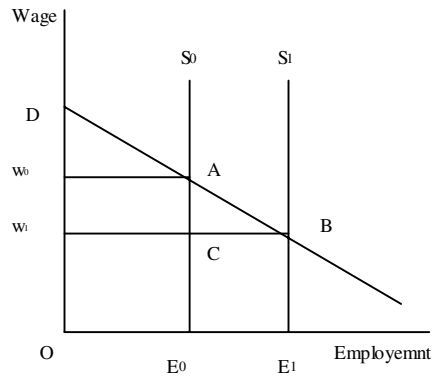
If there is an exogenous increase in the supply of labour i.e. immigrants inflow, the supply curve shifts to the right and accordingly the wage decreases from w_0 to w_1 while employment moves to E_1. If we take the analysis further, according to Borjas, the host economy as a whole gains (we make in this case the assumption of constant return to scale) by increasing production and gaining the area of ABC, however this being the gain of the owner of the capital. We also face a redistribution of income from native labour to the owner of capital which is due to a decrease in the level of wage (area w_0ACw_1). At the macro level the host economy benefits although the native labour loses part of their income for the benefit of capital owners. It is important to point out that the labor is considered here to be homogenous.

Next we survey the case, closer to reality, that is the labour is heterogenous. At this point we introduce other concepts which allow us to analyze in a much more complex manner the effects of immigration. We deal further with several features of the labour market, namely the elasticity of substitution among factors and the factor price elasticity.

A first point that we want to make is that skilled labour and capital are

complementaries and not substitutes as has happened in the industrial revolution in England when the purpose of better technology was to substitute for labour (Acemoglu 2001). The technological development therefore did not lead for the last three decades to a decrease in the demand for skilled labour but actually to an increase in the demand for skilled labour which offsets the initial effect of higher supply of skilled labour.

One explanation that the literature offers is that the technology is skill bias and therefore even if on the market there is a higher number of skilled labour they find jobs at the same level of wage or higher. An immigration inflow according to this logic contributes to an increase in wage inequality between skilled and unskilled labour. The result depends on several aspects which need to be considered. According to Acemoglu (1998) there is first a substitution effect between different types of labor which if high it should lead to a decrease in the wage differentials when the supply of high skilled labor shifts to the right. Second, there is a countereffect of the technology variable which shifts the demand for skilled labor to the right and causes an increase in the wage of high skilled labor (assuming that the technology is skilled biased.) The magnitude of the impact of immigration on the wage premium is subject to these two opposite forces. The model fits the theoretical framework used in the analysis of technological effect on the wage premium by Murphy, Riddle and Romer (1998) who found that both in Canada and US the increase in wage inequality is explained by an increase in the demand for skilled labor due to a technological change. Further the demand for skilled labor is inversely related to the price of labor i.e. wages, however the changes in the supply of different types of labor affect the wages of different type of labor in the opposite way the demand does. The final results show that Canada did not experience an increase in wage differentials as US

because of the government policies to increase the level of education of the population. Although in both countries the demand for skilled labor has increased during 1980s and 1990s, in Canada the change in the supply of skilled labor was greater which caused a lower increase in the wage inequality. When the supply-demand model is applied to the case of immigration effect on the wage inequality we have to take into consideration that the changes in the supply of labor are likely to be larger and more sudden and therefore labor demand does not respond immediately, causing a new equilibrium but at larger variations of the level of relative wage. If we consider statistics on immigration to US or European Union countries we may find out that the rate of the population increase due to inflow of immigrants is much higher than the rate of population increase when we take the difference between birth rates and rate of death. In this respect we intuitively assume that the response in demand for labor is somehow delayed unless there is already an excess labour demand. Still we can adopt the model and see how an inflow of skilled or unskilled labour will affect the wage inequality.

2.2 A model of skill-based wage differentials

To put it in a mathematical form, the equation for relative wage based on supply-demand model is, according to Acemoglu 2001, derived in the following way.

We assume a production function with constant elasticity of substitution:

$$Y(t) = [(A_l(t)L(t))^\rho + (A_h(t)H(t))^\rho]^{\frac{1}{\rho}} \quad (2)$$

where: A_h, A_l = factor-augmenting technology terms

$L(t),\ H(t)$ = unskilled, skilled labour supply

$\rho \leqslant 1$

The elasticity of substitution between skilled and unskilled labour is $\sigma = \frac{1}{1-\rho}$. If $\sigma < 1$

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then the skilled and unskilled workers are considered to be complements and in this case we expect that an increase in supply of labour to have a direct effect upon wage differentials, given the demand stays the same. If $\sigma > 1$, the skilled and unskilled labour are substitutes and therefore the wage differentials experience a different trend then in the first case.

The wage premium is derived from the production function by taking the ratio of the skilled labour wage to unskilled wage, which is obtained by taking the derivative of the total product in respect to the supply of skilled and unskilled labour.

$$\omega_L = \frac{\partial Y}{\partial L} = A_l^\rho [A_l^\rho + A_h^\rho (H/L)^\rho]^{(1-\rho)/\rho} \qquad (3)$$

$$\omega_H = \frac{\partial Y}{\partial H} = A_h^\rho [A_h^\rho + A_l^\rho (H/L)^{-\rho}]^{(1-\rho)/\rho} \qquad (4)$$

$$\omega = \frac{\omega_H}{\omega_L} = \left(\frac{A_h}{A_l}\right)^{(\sigma-1)/\sigma} \left(\frac{H}{L}\right)^{-1/\sigma} \qquad (5)$$

The equation (4) becomes the following when we take the logs:

$$\ln w = \frac{\sigma-1}{\sigma} \ln \frac{A_h}{A_l} - \frac{1}{\sigma} \ln \frac{H}{L} \qquad (6)$$

In this case if there is a high substitution between skilled and non-skilled workers, $\sigma > 1$, the increase in the supply of skilled workers will lead to a decrease in wage premium:

$$\frac{\delta \ln w}{\delta \ln \frac{H}{L}} = -\frac{1}{\sigma} \qquad (7)$$

In terms of our analysis of immigration effects this implies that if the supply of skilled labour increases the wage inequality should decrease since there will be a substitution between skilled and non-skilled workers. The skilled workers are forced to work for a level of wages that before the immigrants came in belonged to unskilled workers.

However the elasticity of substitution affects the technological side of equation (2) and implicitly the technology will affect the wage differential.

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$$\frac{\delta \ln w}{\delta \ln \frac{A_h}{A_l}} = \frac{\sigma - 1}{\sigma} \qquad (8)$$

Thus for $\sigma > 1$ wage differential will increase and probably offset the initial decrease due to a change in labour supply. Hence, skilled labour wage might not decrease although the supply of skilled labour has increased. We may have several cases depending on three possibilities: the majority of the immigrants are either skilled or unskilled; the elasticity of substitution is either > 1 or < 1; the effect of a change in relative supply is larger or smaller than the effect of technological change.

CASE 1

In the first case we assume that there is an inflow of high skilled immigrants. According to the diagram when the relative supply of labor changes from S_0 to S_1 and since the demand for labor is downward sloping, the relative wage is depressed from its initial value ω to ω', and therefore the wage inequality is lower. The elasticity of substitution is assumed to be higher than 1 ($\sigma > 1$). The dynamics between supply and demand for labor is presented in the diagram below.

Figure 2.2

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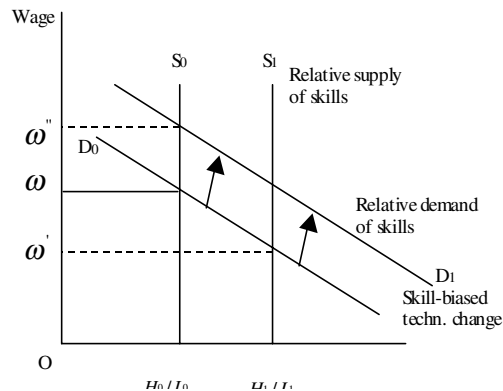
What is the mechanism behind this? First of all, since there is a substitution between skilled and unskilled workers, the excess supply of skilled worker will substitute for the unskilled but in the same time their wage will be lower than the usual wage of skilled labor. Thus, an inflow of skilled immigrants expands the supply of skilled workers and implicitly causes a decrease in the wage differentials. However, we have to take into account how technological change affects the wage premium when there is a change in the relative supply. If we consider equation 6 we see that if the elasticity of substitution is greater than one, there is an increase in the wage premium as $\ln \frac{A_h}{A_l}$ increases when there is an improvement in the technology which is skilled complementary. The endogenous approach concludes here that a higher supply of skilled labor leads to an augmentation of skill bias technology in the long run which shifts the demand curve to the right and therefore impedes the return to skills from falling. In terms of the diagram this implies a shift in the demand curve from D_0 to D_1. As a consequence the relative wage is stopped from falling to $\omega^{'}$ when the effect of technology is superior to the increase in the relative supply of labor. However, if the effect of an increase in the relative supply of labor exceeds the effect of technological augmentation factor, the return to skills will be depressed while the wage inequality narrows.

CASE 2

For the same situation when $\sigma > 1$, assume that there is an inflow of unskilled immigrants. This implies that the relative supply of labor is lower and therefore the supply curve shifts to the left.

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Figure 2.3
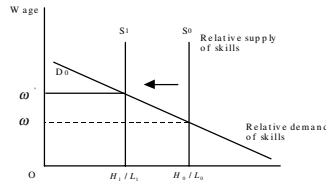
As the relative supply of labour decreases, the wage premium increases from ω to ω',
as we reach point *A*. The elasticity of substitution is however higher than one, and one
would expect that there is a substitution of skilled labor by unskilled labor. This will not
happen since the unskilled labor could replace the skilled labor only after they acquire the
skills and thus become skilled workers. Acemoglu points out an important dynamics that
takes place at this moment in a similar situation created by an inflow of low-skilled labor
intensive goods. Since the skilled intensive goods become more expensive, the investment
is directed towards technology that is skill-biased. Thus according to the diagram below
the relative demand curve shifts to the right and causes an even higher increase in wage
differentials at point *B* where the wage premium is ω''.

Figure 2.4
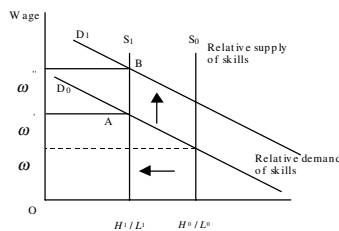
The conclusions of the above analysis is constructed of course on theoretical basis, while the reality might give us different results especially when we consider an change in the relative supply of labor due to immigration. The next step in our inquiry is to survey several empirical studies of immigration effects on the wage differentials in the host economy.

3. **Survey of the empirical literature on immigration and its effects on the wage inequality**

In this section of the paper we survey the empirical findings across the literature on immigration and its effects on the wage differentials in the host economies. As we have explained at the beginning, the results are to a great extent determined by the "empirical experiment" employed in the assessment of the immigration phenomenon. However, we have to say from the beginning that most of the empirical findings show that immigration does not have a decisive effect upon the wage inequality.

3.1 Methodological Aspects

Let us start by pointing out few methodological aspects of the surveyed literature as well as to the impediments one might encounter in terms of the data analysis. First of all, most of the empirical literature investigates the case of immigration to the US due to the presence of an important inflow of immigrants throughout the history and therefore to the availability of data. Second, the studies divide themselves between those which make use of cross-sectional data and those which look at time-series data. Third, the empirical experiments are confronted with what is called a "composition problem" which is caused by the aggregation of wages of immigrants and natives.

For the beginning we examine how the use of different types of data affect the results.

An important aspect of this difference is linked to the theoretical approach that the experiment is based on. The studies which use cross-sectional data compare regions or cities across a nation at one point in time by taking into account "immigrant density to identify the effect of immigrants on the outcome of interest"(Friedberg and Hunt, 1995). For our topic this approach would compare the immigrant density and the level of wages across cities or regions . If we consider that the rate of growth of native population is the same regardless of the city or region we conclude that a change in the level of wages is caused by a change in the supply of labor. We involve here the assumptions established by labor market theory as presented by Katz and Murphy (1992), Freeman and Needels (1993), Autor, Katz and Krueger (1997), Kruger (1998), where the movements in relative wages are explained by the shifts in the relative supply of labor. However, the effects of immigration may not be observed if the factor price equalization theorem holds. "Even if immigrants affect native wages at the national level, an uneven distribution of immigrants may not result in cross-section wage differences, as wages may be equalized by flows in goods and services (Friedberg and Hunt, 1995)."

The same authors tell us that since the shifts in the supply curve are considered in this case to be exogenously determined we may be lead to believe that the level of immigrant density determines the level of wages when in reality the causation might be exactly the opposite one. For instance if we agree that the immigrants choose the city where to settle based on the level of wage sin the city, and therefore we endogeneized the shifts in the labor supply, we observe that the higher the immigrant density the higher the wage. Friedberg and Hunt found that the correlation coefficient between the immigrant density and the mean 1990 wage and salary income across 30 Largest Metropolitan Statistical

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Areas is 0.37.

If we employ here an analysis of the changes over time that occur in the immigration density and the level of wages we may observe that the causality is not one way, from level of wages to immigrants inflow. Instead, the results might show that a shift in the supply of labor due to immigration determines a shift in the demand for labor which in return will determine future shifts in the same direction of the labor supply. In other words we take up here the endogenous approach described above, where the demand for labor is endogenously determined and it is responding positively to a higher supply of labor. Of course, our previous analysis is directed at explaining an endogenous change in the level of demand for skilled labor due to an augmentation of skill-biased technology. However, if entrepreneurs respond to profit incentives by producing goods that use intensively the factor of production that is abundant we may theoretically conclude that a positive correlation between immigration density and the level of wages may occur even if the immigrants are low skilled. This last conclusion is certainly a theoretical derivation because in the reality this result is not likely to take place if we consider that the entrepreneurs produce those goods for which prices are higher, and those goods are likely to be skilled-labor intensive goods. Friedberg and Hunt, 1995, consider this issue as a major shortfall of the data because it distorts the results by reducing the average income of a region as a consequence of a lower level of wages earned by immigrants even if the natives wage is not affected. In other words we may infer that there is a bias against the immigrants workers even if they have the same level of education as the natives. This could be caused by what is called the transferability of skills and which plays an important role in determining the level of wage of the immigrant labor.

The bias in the data produced by the movements of immigrants to high income locations can be reduced by the use of instrumental variable techniques as it is proposed by Altonji and Card (1991). Their proposed variable is the stock of immigrants in a base year when analyzing the change in the density of foreign-born individuals throughout a given period. The results showed that immigration in US between 1970-1980 had no effect on the level of unemployment, and it actually contributed to a decrease in the level of unemployment while the level of wages of unskilled labor was reduced by 1.2 percent when there is an increase of 1 percentage point in the share of foreign-born in the total population.

3.2 Immigration vs Wage Inequality

In this section we discuss the results of several empirical projects conducted on the case of the US, in the context of the theoretical frameworks discussed above. As mentioned already, in most of the cases there are no major movements in the level of relative wage due to immigration. First, in the case of immigration to the US, there is observed a change in the quality of the immigrants in the sense that throughout the time the share of unskilled-immigrants has significantly increased. This trend allows us to verify the hypothesis that an increase in the relative supply of unskilled workers as a result of immigration leads to an increase in wage inequality. The US case is interesting for a second reason. Since 1970s there has been an important increase in the number of native college graduates and therefore one would expect wage inequality to narrow. The reality, however does not meet these expectations. Hence the question is: had the unskilled immigrants not contribute to a higher supply of unskilled labor in the context of an increasing supply of college graduates, the wage inequality would have narrowed. The

answer is no because the technological improvement has proved to be skill biased and therefore a higher supply of skilled labor was met by a higher demand for skills. Thus, recalling our theoretical presentation, even if the supply of skilled labor in US has increased during 1980s by a higher percentage than the supply of unskilled labor, and therefore the relative supply of workers shifted to the right causing an initial decrease in wage inequality, the demand itself shifts to the right and thus compensate for the change in relative supply of labor and impedes wages of skilled labor from decreasing.

Borjas et al. (1992) estimated that immigration and trade had a significant effect on the relative supply of labor during 1980s. According to their findings, the ratios of high school to college graduates was 4.4 percent higher in 1985 as a result of immigration and imports of intensive low skilled labor goods than it would be if no trade or immigration took place. Taken separately, the immigration effect on relative labor supply is not significant when compared with trade impact on the supply of unskilled labor. The same authors found out that trade and immigration have contributed during 1980-1988 to the widening of wage differential by 8 to 15 percent depending on the value of elasticity of substitution we take into account (their estimates of σ are 0.709; 1 and 0.5). They conclude however, that most of the increase in wage inequality could be explained by trade alone. This is because when aggregating labor force into high school graduates and college graduates the effect of the immigration is narrowed since most of the immigrants would fell in the high school dropouts category which in this case is part of high school graduates category.

Next, the paper surveys the situation when the distinction is made between high school dropouts and other workers. The results indicate that trade and immigration have greatly contributed to the increase of the supply of high school dropouts during 1980s (the impact

of trade and immigration increased from 15 percent in 1980 to over 30 percent in 1988).

Consequently, this trend in the relative supply of labor affected the relative earnings, which showed that indeed the wages of natives high school dropouts have suffered from a higher supply of unskilled labor due to immigration and trade. The data show that by taking into account an elasticity of relative wage of dropouts with respect to relative supply of dropouts of .322, "the trade and immigration-induced changes in relative skill endowments can explain over 40 percent of the 9ln point declined in relative earnings of high school dropouts during the 1980s" (Borjas et al., 1992). The authors conclude therefore that both trade and immigration have significantly contributed to the decline in the remuneration of less skilled natives.

An almost similar conclusion is reached by Kristin Butcher and David Card who employ a cross-sectional analysis of immigration impact on wage inequality in 24 major cities from US during the period 1979-1989. The data on density of immigrants in these cities reveal that although immigrants do not make a significant part of the total population, they contribute significantly to the population with less than high school education. Hence, the analysis is focused on the effect of immigrantion upon the low income native population. The authors found out that there is significant variation between cities as well as within cities. Comparing the changes in the 10th percentiles of wages with changes in the 90th percentile during 1979-1988, one finds out that wage rates in the 90th percentile grew much more rapidly than wages of the 10th percentile. Comparing cities, Butcher and Card show that wage inequality increased more in cities with larger immigration inflows, however not through a decrease in wages of less skilled workers, who are usually situated in the 10th percentile of wage distribution, but rather through an

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increase in wages of highly educated workers who are located in the 90th percentile. According to our theoretical analysis this result is expected if we assume that supply of less skilled labor increases and therefore the relative labor supply curve in Figure 2.2 shifts to the left causing an increase in relative wage of skilled labor. If however we take into account the fact that for the same period the supply of skills has increased significantly across US labor market, we would expect that wage inequality to remain the same since an increase in unskilled is compensated by an increase in the supply of skilled workers and therefore relative supply does not change much. Still the data reveal that wage inequality is larger and we hint to an explanation based on the hypothesis of skill biased technological change which determines a shift to the right of the demand curve for skills.

To conclude, although the impact of immigration on wage inequality is not explaining the entire story of the shifts in the relative wage, one can not ignore its presence. Immigration does contribute to a higher supply of a particular type of labor and has a certain effect on the level of wages. The U.S. case shows modest but present changes in the level of relative wage because of higher supply of unskilled immigrant workers during 1980s.

4. Conclusions

The present paper wants to be an introduction to the analysis of immigration and its effect upon the host labor market. We have noticed that common approaches found in the literature on labor market and wage inequality can be applied to the analysis of immigration and its effect on the level of wage of the natives. There are of course certain elements which have to be taken into account in this case, and which might alter the experimental model used. These elements deal mostly with the immigrant's skills

transferability, lower starting wage for the immigrant even if he has similar qualifications as the native, migration of natives in face of immigrants inflows, immigration policies. Moreover, the type of data that one uses can affect the final conclusions of the analysis. Cross-sectional data proved to be less explanatory because of the impossibility to observe changes in the level of wages due to changes in labor supply as a result of immigration. When combined with time-series, the results bear a different conclusion and as we saw in most of the literature the effects of immigration upon wage inequality are not absent.

The present paper wants to be as well a literature survey which can offer ideas for researching potential effects of immigration on European Union's labor market. Countries of EU have been already facing the consequences of Eastern and Southern Europeans and Northern Africans immigrants however now the attention is focused mostly upon the East enlargement project of the EU. Several Central and Eastern European countries are candidates to join the EU, which implies that factors of production, i.e. labor, will freely move across borders ones these countries will be admitted in the EU. This might raise certain worries if one thinks of the differences between level of wage in let's say Hungary and the level of wage in any of the Western European countries. In this respect experiences of economies such as that of US can serve as a reference point in assessing potential effects of Central and Eastern European immigration on the EU labor market.

Bibliography:

Acemoglu Daron, "Technical Change, Inequality and the Labor Market", June 2001.

Borjas, George J. and Ramey A. Valerie, "Time-Series Evidence on the Sources of Trends in Wage Inequality", *The American Economic Review 84* (May, 1994), 10-16.

Borjas, George J., "Assimilation and Changes in Cohort Quality Revisited: What Happened to Immigrant Earnings in the 1980s?", *Journal of Labor Economics* 13 (Apr., 1995), 201-245.

Borjas, George J., "Self-Selection and the Earnings of immigrants: Reply", *The American Economic Review* 80 (Mar., 1990), 305-308.

Borjas, George J., "Immigration and Welfare Magnets", *Working Paper 6813, NBER* (Nov., 1998).

Borjas, George J., Freeman B. Richard, Katz F. Lawrence, "Searching for the Effects of Immigration on the Labor Market", *Working Paper 5454, NBER* (Feb., 1998).

Borjas, George J., Freeman B. Richard, Katz F. Lawrence, "On the Labor Market Effects of Immigration and Trade", in *Immigration and the Work Force,* The university of Chicago Press 1992.

Butcher, Kristin F. and Card David, "Immigration and Wages: Evidence from the 1980s", *The American Economic Review* 81 (May, 1991), 292-296.

Chiswick, Barry R., "Is the New Immigration Less Skilled Than the Old?", *Journal of Labor Economics* 4 (Apr., 1986), 168-192.

Friedberg, Rachel M. and Hunt Jennifer, "The Impact of immigrants on Host Country Wages, Employment and Growth", *The Journal of Economic Perspectives* 9 (Spring 1995), 23-44.

Greenwood, Michael J. and McDowell M. John, "Differential Economic Opportunity, Transferability of Skills, and Immigration to the United States and Canada", *The Review of Economics and Statistics* 72 (Nov. 1991), 612-623.

Greiner, Alfred, Rubart Jens and Semmler Willi, "Economic Growth, Skill-biased Technical Change and Wage Inequality: A Model and Estimations for the U.S. and Europe", September 2001.

Hamermesh, Daniel S., "Labor Demand", *Princeton University Press,* 1993).

Katz, Lawrence F. and Murphy Kevin M. "Changes in Relative Wages, 1963-1987: Supply and Demand Factors", *Quarterly Journal of Economics* 107 (Feb., 1992), 35-78.

Krueger, Alan B., "How Computers Have Changed the Wage Structure: Evidence from Microdata, 1984-1989", *Quarterly Journal of Economics* 108 (Feb., 1993), 33-60.

Krueger, Alan B. and Summer H. Lawrence, "Efficiency Wages and the Inter-Industry Wage Structure", *Econometrica* 56 (Mar., 1988), 259-293.

Murphy, Kevin M., Riddle Craig W. and Romer Paul M., "Wages, Skills, and Technology in the United States and Canada", *Working Paper 6638, NBER* (July 1998).

Topel, Robert H., "Factor Proportions and Relative Wages: the Supply-Side Determinants if Wage Inequality", *The Journal of Economic Perspectives* 11 (Spring 1997), 55-74.

Zimmermann, Klaus F., "Tackling the European Migration Problem", *The Journal of Economic Perspectives* 9 (Spring 1995), 45-62.