



DOI: 10.1515/hssr -2017-0003

On The East-West Trade in Skill Intensive Tasks: Theory vs. Evidence

Sorin Burnete*

The Lucian Blaga University of Sibiu, Romania

Abstract

In keeping with an already entrenched paradigm, international trade in tasks exerts upward pressure upon skilled workers' wages in both home and host countries. Yet certain empirical evidence from intra-European trade shows that sometimes things occur in reverse, that is high skilled workers' wages in home countries may decline as a result of offshoring, an outcome that looks like an inverse "maquiladora effect". I try to show that such deviations do not fly in the face of mainstream theory but rather, they reflect the different conditions under which offshoring is performed today as compared to the ones prevailing two decades ago.

Keywords

Trade in Tasks, Wage Inequality, Skill Intensity, Demand for Labor, Technological Progress

JEL Codes: F16, F21, F29

I. The recent upsurge in eastward shift of skill intensive tasks

The opening of Central and East European economies (hereafter CEEs) to international trade and investment in the early 1990s prompted western multinationals to relocate chunks of manufacturing sectors to countries in the region, most often in the form of foreign direct

* Department of Management, Marketing and Business Administration, The Lucian Blaga University of Sibiu, 10, Victoriei Bvd., 550024, Sibiu, Romania ; sorin.burnete@gmail.com

investment (FDI). Before long, scores of both newly established firms and revamped ex-socialist enterprises became foreign- or domestic-owned “maquiladoras” (Aguilar, 1995) endowed with cutting-edge technology and decidedly plugged into international markets. Concomitantly, business ties between western and eastern firms gradually shifted from the subcontracting of cheap marginal tasks such as final assembly to the offshoring of products and intermediate inputs. Doubtless then, CEEs’ chance to make further headway resides in the trade and investment relations with western partners insofar as said relations involve the offshoring of tasks and/or allow for knowledge spillover.

Unquestionably both the transfer of tasks and knowledge spillover usually occur more smoothly when the subcontractor is a foreign subsidiary of the hiring firm, a formula referred to as captive offshoring (Sass and Fifekova, 2011), as compared to the case in which the parties are engaged in arm’s length trade, aka offshore outsourcing. Yet from the strict perspective of this paper, namely the impact of offshoring upon earnings, asset ownership matters less. As Grossman and Rossi-Hansberg (2006) noted, “tasks can be offshored within or outside the boundaries of the firm”... and... “in either case, the effects on production, wages and prices will be roughly the same”.

International trade in tasks aka offshoring has raised yet another thorny problem beside technological upgrading and knowledge spillover. Specifically, this kind of trade has driven a wedge between the skilled and unskilled categories of workers by invariably raising the former’s relative wages, a phenomenon frequently termed “maquiladora effect”. Yet recent empirical evidence from intra-European trade in tasks shows that things sometimes run counter to this entrenched paradigm, namely skilled workers’ wages in donor countries may actually decline as a result of offshoring. Using data from a number of industrial sectors during a specified period, a study performed by Lorentowicz et al. (2008) found that the shifting by Austrian firms of high skilled activities to lower income Poland had diminished Austrian workers’ skill premium, while increasing the relative wage of skilled workers in Poland. This outcome obviously points to an “inverse maquiladora effect”. One might infer that offshoring seems to be prompting technologically advanced donor

countries to specialize in relatively low skilled stages of production, whereas less advanced receiving countries are being driven toward the higher skilled ones. I try to show that paradoxes of the kind are not to be understood as refutations of mainstream theory but rather they highlight the complex effects of skill biased technological change on labor markets and implicitly on offshoring. Hence, under certain conditions, eventual effects on employment and wages may be counterintuitive.

The remainder of the paper is organized as follows: section II contains an outline of the theory on trade in tasks and wage inequality; section III includes a brief description of Lorentowicz et al.'s methodology and findings; in section IV, I develop a constricted variant of Feenstra and Hanson's well-known model; my intention is to show that conventional theory is encompassing enough, namely the effects of offshoring upon the price of labor are similar regardless of the nature of the offshored activities (physical inputs or intangible tasks) and skill intensiveness, in spite of possible deviations which, might likely be due to different causes; section V is devoted to conclusions.

II. Trade in tasks and wage inequality: a few theory landmarks

It happens that international trade does not fit conventional theory framework smoothly. A thorny issue for example, is the relation between offshoring and the skill-biased wage gap: reportedly, low skilled workers' relative wages have fallen not only in (mostly developed) home countries but also in (mostly developing) host countries. In other words, offshoring seems to have made the unskilled invariably worse off, while providing the skilled with a "premium" (Irwin et al., 2008). This outcome obviously "overturns the Stolper-Samuelson theorem" (Zhu and Trefler, 2005) according to which, in (host) developing countries low skilled workers' wages are supposed to rise as a result of offshoring. Scholars e.g. Acemoglu (2003), Goldberg and Pavcnik (2007) and others ascribed this result to developing countries' outward-oriented policies in terms of trade reforms and friendly FDI regimes, which paved the way for "skill-biased technological changes". The so induced "complementarity of capital with skilled labor" increased the demand for skilled workers, pushing the latter's relative wage upward. An alternative explanation is to be found in Feenstra and Hanson (1996)'s most influential paper that

deals with the shift of intermediate inputs by US-based multinationals to Mexican maquiladoras. The authors provide a sound argumentation as to why skilled workers in both the home and the host country win from offshoring.

The growing tradability of knowledge intensive tasks on a global scale, not only of routine jobs but also of those that require high skills and knowledge, has been raising further questions related to the trade in tasks' macroeconomic implications and even shaking some of the well-entrenched beliefs deriving from the earlier cited Feenstra and Hanson's paradigm. Opinions, for instance, diverge as to whether offshoring rendered low skilled workers worse off in real or just relative terms. Geishecker and Görg (2008), as an example, found that international outsourcing had reduced the real wage for workers in the lowest skill categories, whereas according to Grossman and Rossi-Hansberg (2006), "low-skill wages have not fallen as much as one should have expected given the combined forces of terms-of-trade movement and TFP (total factor productivity) improvement". No less puzzling is the question how deep the wage inequality between the two skill brackets is made by offshoring. As Irwin et al. (2008)'s unorthodox statement suggests, whereas trade in intermediate inputs and final goods "tends to increase wage inequality", trade in services "tends to decrease it".

Unquestionably, whatever the cause – whether it is about the expansion of vertical specialization within industries, which has changed the pattern of international trade and implicitly income distribution within industries (Krugman, 2008), or other trends e.g. the increasing "offshorability" of jobs resulting from routineness (Ebenstein et al., 2009), the effects of search frictions and unemployment on labor markets (Harrison et al., 2010), the real and relative earnings of superstars (Haskel et al., 2012) etc. – the new developments in the relation between trade in tasks and skill-biased wage gaps are visibly challenging the explanatory power of mainstream theory.

III. Recent evidence: in disagreement with established beliefs

The so-called maquiladora effect is commonly related to the offshoring of intermediate inputs by US-based multinationals to Mexican manufacturing firms. As a rule, tasks are shifted in the ascending order

of their skill intensiveness. The rationale of this procedure is straightforward: since the receiving country workers' professional skills and knowledge improve, they can handle ever more exacting tasks. In this manner, an entire manufacturing process can be moved all the way offshore provided each input (task) exceeds the prior ones in skill intensiveness, until the fragmentation of production reaches cost-minimizing equilibrium. Any increase in the relative capital stock of the receiving country (whether in the form of FDI inflow or endogenously induced) will trigger the offshoring of extra tasks, thereby raising the relative wage of skilled workers in both countries. Concomitantly, the ratio of skilled/unskilled labor used in total production in each country increases. In this manner, an entire manufacturing process can be moved all the way offshore provided each task be more skill intensive than the one previously moved. By comparison, the inverse maquiladora effect suggests that offshoring may inflict an adverse result upon the donor country skilled workers, while benefiting those in the receiving country. In the particular Austrian-Polish case, the shifting of high skilled activities by Austrian to Polish firms reportedly diminished Austrian workers' skill premium, while Polish workers' wages increased.

Lorentowicz et al. (2008) try to ascertain whether it is indeed offshoring that generated this unexpected result. The variable cost of production is assumed to be a function of five independent variables, that is: factor prices (the price of capital, skilled and unskilled labor respectively), offshoring and technical change. Methodologically, the analysis implies the use of a trans-log cost function to determine various factors' share in total cost and implicitly, the demand for them. Subsequently, a regression equation is built, whereby the effects of certain variables on the respective factors' cost are estimated. Basically, the estimations indicate that offshoring has a negative effect on the demand for high-skilled labor and implicitly on the non-production workers' share of the wage bill at every step, no matter how many independent variables are used. Instead, the effects of both technical change and technology policy are always positive and significant. The conclusion of the study is that it was the shifting by Austrian firms of high skilled activities to lower income Poland that had pulled Austrian skilled workers' relative wages down. Thus Lorentowicz et al. (2008)'s

findings (hereafter the Lorentowicz case) are in seeming disagreement with mainstream theory. The question is: is disagreement significant enough so as to conclude that it refutes Feenstra and Hanson's conventional model? To show that this is not the case, I briefly elaborate on the latter in the following section.

IV. The conventional model: still all-encompassing

A large technologically advanced western economy (hereafter *West*) has the choice either to perform N productive tasks I_k ($k = 1, 2, \dots, N$) within its boundaries or contract them out (partly or entirely) to a small emerging economy (hereafter *East*), which is an offshore location with lower wages. The offshoring is focused on skill intensive tasks that is, those components of the value chain (e.g. technological operations, product-related services etc.) whose performance relies mostly on knowledge, special skills, high expertise etc. and less on physical capital. There are no FDI flows from *West* to *East*. The rest of the conventional model's assumptions (high skilled labor is relatively abundant in *West*, implying its relative price is lower than in *East*; international trade does not equalize factor prices across countries; constant returns to scale and identical tastes prevail etc.) still hold.

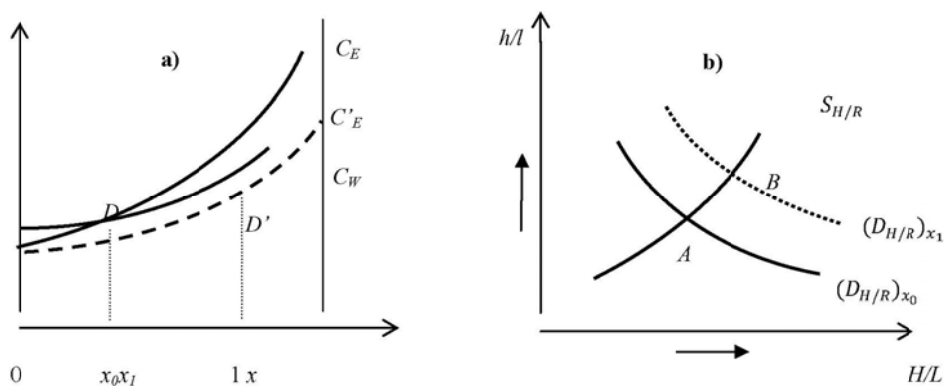


Figure 1

If the set of N tasks is viewed as a continuum, each individual task can be attached a value x , from the $(0, 1)$ interval. A continuous

function, denoted by $\Omega(x)$ can then be derived by imposing two restrictions to the Cobb-Douglas-type production function: a) physical capital is abstracted from; b) the labor inputs (low skilled respectively high skilled labor) are not substitutable i.e. they are used in fixed proportions. The N activities can then be ordered so that the proportion of high skilled labor increases as x travels from 0 to 1. Let $\Theta(x)$ denote the production function for a single activity, which can be expressed, according to Leontief's formula, as follows:

$$\Theta(x) = \text{Min} [q_l(x); q_h(x)] \quad (1)$$

where $q_l(x), q_h(x)$ = amounts of low skilled, respectively high skilled labor employed in activity x (technological parameters are ignored for the sake of simplicity). Each individual activity x has its own share within the whole set of tasks so that the sum of shares equals unity. If $m(x)$ denotes the share of operation x , the $\Omega(x)$ function can then be written as follows:

$$\Omega(x) = \theta_1(x)^{m_1(x)} \theta_2(x)^{m_2(x)} \quad (2)$$

By taking logarithms, (2) can be expressed in linear form, as follows:

$$\ln \Omega(x) = m_1(x) \ln \theta_1(x) + m_2(x) \ln \theta_2(x) + \dots$$

equivalent to:

$$\ln \Omega = \int_0^1 m(x) \ln \Theta(x) dx \quad (3)$$

The cost of performing operation x in the two countries will then be:

$$C_E(x) = l_E q_l(x) + h_E q_h(x) \text{ respectively } C_W(x) = l_W q_l(x) + h_W q_h(x) \quad (4)$$

where l_E, h_E = wage rate for low skilled respectively high skilled labor in *East*; l_W, h_W = wage rate for low skilled respectively high skilled labor in *West*.

The cost functions are plotted in figure 1, a. Since the N operations are assumed to be increasing in their ratio of high skilled-low skilled labor and high skilled labor is assumed to be the more expensive factor relative to low skilled labor in both countries, the $C_E(x)$ and $C_W(x)$ curves are increasing and convex, as illustrated in figure 1,a, which means that: a) when x is close to zero, the cost is higher in *West* than in *East*; b) the two curves intersect somewhere between zero and one (point D in figure

1,a) so that, as x approaches one, the unskilled labor content falls until it becomes negligible. Since wages are lower in *East* than in *West* for either category of workers, in the neighborhood of one the cost is higher in *East* than in *West*.

Costs are equalized in point D , corresponding to value x_0 on the horizontal axis. The vertical borderline drawn through x_0 divides production into two parts: the segment to the left of point D ($0 < x < x_0$) measures the subset of activities that will be performed by *East*, while the one to the right of point D ($x_0 < x < 1$) shows the remainder of tasks, which will be performed by *West*. For the production-sharing arrangement to be optimal, it must equally be cost-efficient and secure full employment. I will consider the two conditions one at a time: (1) cost-efficiency is fulfilled due to the distribution of activities being in compliance with factor endowment: those with highest content of low skilled labor are performed in *East*, where this factor is relatively cheaper, while the ones that make intensive use of high skilled labor continue to be performed in *West*, where this last factor is relatively abundant and therefore relatively cheaper.

(2) Full employment requires that factor demand equals factor supply in either country. The demand for low skilled labor in the two countries equals the marginal product of this factor, which can be determined by differentiating the two respective equations of (4) with respect to the price of low skilled labor (l_E respectively l_W). The demand for high skilled labor will be determined analogously. The aggregate demand for low skilled respectively high skilled labor in *East* can then be determined by integrating the marginal product function of the two respective factors on the interval $(0, x_0)$. Thus letting L_E, H_E denote the amount of low skilled respectively high skilled labor available in *East*, the full employment condition for this country can be expressed as follows:

$$L_E \left(\frac{q_h}{q_l} \right) = \int_0^{x_0} q_l(x) \theta_E(x) dx$$

respectively

$$H_E \left(\frac{q_h}{q_l} \right) = \int_0^{x_0} q_h(x) \theta_E(x) dx \quad (5)$$

West's conditions can be determined analogously for the interval $(x_0, 1)$, L_W and H_W denoting the amount of low skilled respectively high skilled labor available in *West*. The overall equilibrium condition can then be expressed in matrix form as follows:

$$\left\| \begin{array}{cc} \int_0^{x_0} q_l(x)\theta_E(x)dx & \int_0^{x_0} q_h(x)\theta_E(x)dx \\ \int_{x_0}^1 q_l(x)\theta_W(x)dx & \int_{x_0}^1 q_h(x)\theta_W(x)dx \end{array} \right\| = \left\| \begin{array}{cc} L_E\left(\frac{q_h}{q_l}\right) & H_E\left(\frac{q_h}{q_l}\right) \\ L_W\left(\frac{q_h}{q_l}\right) & H_W\left(\frac{q_h}{q_l}\right) \end{array} \right\| \quad (6)$$

The position of the borderline (the vertical dashed line drawn through x_0) shows that the factor market is in quantitative equilibrium that is factor demand equals factor supply (full employment) in either country. Now suppose *East* manages to enhance its stock of human capital, say through self-induced technological progress and learning, which means its workers are able to perform tasks with increasingly high skill content. In figure 1,a, this change is illustrated by a flattening of the C_E curve. (Since *West* is by assumption a large economy, the effects of this change are barely perceptible so that the C_W curve virtually does not shift.) The new curve, C_E' crosses the C_W curve in point D' , located to the right of D . Concomitantly suppose competition on the goods market intensifies, compelling firms to cut back on costs. In order to stay competitive *West* increases the amount of activities outsourced to *East*, so as to benefit by the latter's lower wage rates, thereby altering the distribution of activities between the two countries: *East's* share rises, *West's* share decreases. Correspondingly, the production borderline shifts rightward (from x_0 to x_1 in figure 1,a), illustrating the fact that either country undergoes an increase in the intensiveness of high skilled labor in production: activities inside the interval (x_0, x_1) have a higher ratio of high skilled to low skilled labor as compared to those in the interval $(0, x_0)$ but a lower ratio than those in the interval $(x_1, 1)$.

At unchanged wages, the moving of additional activities to *East* will increase the relative demand for high skilled workers in both countries. To understand why, suffice is to consider the relative demand for high skilled labor as a function of x_0 ($0 < x_0 < 1$) and show that it is increasing all the way from 0 to 1. Let $L_E(x_0)$, $H_E(x_0)$ denote the amount of low

skilled respectively high skilled labor required if activity x_0 is performed only in *East*, and $L_W(x_0)$, $H_W(x_0)$ the amount of low skilled respectively high skilled labor required if activity x_0 is performed only in *West*. By making use of (5), we can apply the definite integral formula to (6), which allows us to calculate the amount of high skilled respectively low skilled labor required to perform activity x_0 by each country. For example, the amount of low skilled labor ($L_E(x_0)$) respectively high skilled labor ($H_E(x_0)$) required to perform activity x_0 by *East* is equal to $m(x_0)q_l(x_0)/C_E(x_0)$ respectively $m(x_0)q_h(x_0)/C_E(x_0)$. By the same token, the corresponding values for *West* will be $m(x_0)q_l(x_0)/C_W(x_0)$ respectively $m(x_0)q_h(x_0)/C_W(x_0)$. The following identity then becomes evident:

$$\frac{H_E(x_0)}{L_E(x_0)} = \frac{H_W(x_0)}{L_W(x_0)} = \frac{q_h(x_0)}{q_l(x_0)} \quad (7)$$

Admitting the relative demand for high skilled labor (H_E/L_E) is an increasing function of x_0 ($0 < x_0 < 1$), its logarithm must also be increasing, which means the derivative of the logarithm must be positive.

Observing that $\frac{\partial H_E}{\partial x_0} = H_E(x_0)$ respectively $\frac{\partial L_E}{\partial x_0} = L_E(x_0)$, the logarithm of the H_E/L_E function can be determined as follows:

$$\frac{\partial \ln H_E/L_E}{\partial x_0} = \frac{L_E}{H_E} \frac{H_E(x_0)L_E - H_E L_E(x_0)}{(L_E)^2} = \frac{H_E(x_0)}{H_E} - \frac{L_E(x_0)}{L_E} = \frac{L_E(x_0)}{H_E} \left[\frac{H_E(x_0)}{L_E(x_0)} - \frac{H_E}{L_E} \right] \quad (8)$$

Taking account of (7), in (8) one can replace the $\frac{H_E(x_0)}{L_E(x_0)}$ ratio with the $\frac{q_h(x_0)}{q_l(x_0)}$ ratio. At the same time, since the ratio of high skilled to low skilled labor in x_0 is greater than the average for *East* but inferior to the average of *West*, the following double inequality must also hold:

$$\frac{H_E}{L_E} < \frac{q_h(x_0)}{q_l(x_0)} < \frac{H_W}{L_W} \quad (9)$$

It then becomes evident that:

$$\frac{L_E(x_0)}{H_E} \left[\frac{q_h(x_0)}{q_l(x_0)} - \frac{H_E}{L_E} \right] > 0 \quad (10)$$

respectively

$$\frac{L_W(x_0)}{H_W} \left[\frac{H_W}{L_W} - \frac{q_h(x_0)}{q_l(x_0)} \right] > 0 \quad (11)$$

In sum, as x rises, thereby pushing the borderline x_0 rightward, the ratio high skilled/low skilled labor used in production also rises and consequently, the relative demand for high skilled labor, as a function of x_0 , slopes upward in both countries. But concomitantly, just like any other demand function, the relative demand for high skilled labor is inversely related to the price (in this case, the relative price of factors h_E/l_E , respectively h_W/l_W). Figure 1,b illustrates the upward shift of the relative demand curve (following the increase in x), which makes the equilibrium move from point A to point B thus reaching an even higher level of the relative price. Yet the shift is subject to the relative supply's ability to adjust to the increase in the relative price, and this in turn depends on the degree to which the supply of high skilled respectively low skilled labor responds to variances in price. The adjustment occurs differently on the two markets due to the difference in factor endowment: *West's* adjustment will be smooth due to its relative abundance in high skilled labor; instead *East's* adjustment will be slightly fuzzier. However, since I assumed *East* underwent an enhancement of its human capital, one can reasonably admit point B stands for the new market equilibrium in both countries.

As a preliminary conclusion, the shifting by *West* of additional skilled labor intensive activities to *East* triggers an increase in the relative demand for as well as in the relative price of high skilled labor in both countries. An equally important implication of this development is that it changes the distribution of income between the two countries: *West's* share decreases whereas *East's* increases. The final step is to establish which labor category, in either of the two countries, benefits most from the increase in outsourcing and which one gains least, or loses (should it be the case). The two countries' respective shares in total factor income results from (3) and (4):

$$L_E l_E + H_E h_E = \int_0^{x_0} m(x) dx \text{ respectively } L_W l_W + H_W h_W = \int_{x_0}^1 m(x) dx \quad (12)$$

The variation in factor incomes following the transfer of additional high skilled labor-intensive activities from *West* to *East* can be emphasized through their respective logarithmic change. Thus as x travels along the (x_0, x_1) interval, the share of *East* in total labor income gradually rises, which means its logarithmic increase is positive, that is:

$$\frac{d(L_E l_E + H_E h_E)}{L_E l_E + H_E h_E} > 0, \text{ equivalent to } \frac{L_E d(l_E)}{L_E l_E + H_E h_E} + \frac{H_E d(h_E)}{L_E l_E + H_E h_E} > 0 \quad (13)$$

The variation in the price of a factor can also be expressed by differentiating its logarithm. For example, a small change in the price of low skilled labor is: $d \ln l_E = \frac{dl_E}{l_E}$, equivalent to $dl_E = l_E d \ln l_E$. By replacing dl_E and dh_E with the corresponding algebraic expressions ($l_E d \ln l_E$) respectively ($h_E d \ln h_E$), (13) can be rewritten as follows:

$$d \ln l_E \frac{L_E l_E}{L_E l_E + H_E h_E} + d \ln h_E \frac{H_E h_E}{L_E l_E + H_E h_E} > 0 \quad (14)$$

The first term of the addition on the left side of (14) is the product of two factors: the increase in the price of low skilled labor ($d \ln l_E$) respectively the share of low skilled labor in the total wage payments of *East*. By the same token, the increase in the price of high skilled labor ($d \ln h_E$) is multiplied by the share of high skilled labor in *East's* total wage payments. Since the two respective shares sum up to unity, inequality (14) can be rewritten as follows:

$$d \ln h_E > \frac{L_E l_E}{L_E l_E + H_E h_E} (d \ln h_E - d \ln l_E) \quad (15)$$

Since the difference $(d \ln h_E - d \ln l_E)$ is positive due to the increase in the relative price of high skilled labor (which was demonstrated earlier), inequality (15) states that the price of high skilled labor in *East* rises in absolute terms, whereas the variation in the price of low skilled labor (also in absolute terms) is indefinite. Concomitantly, given that *West's* share of total factor income decreases, the following inequalities must hold:

$$d \ln l_W < \frac{H_W h_W}{L_W l_W + H_W h_W} (d \ln l_W - d \ln b_W) \quad (16)$$

respectively

$$d \ln b_W < \frac{L_W l_W}{l_W L_W + h_W H_W} (d \ln b_W - d \ln l_W) \quad (17)$$

Since the difference $(d \ln l_W - d \ln b_W)$ is negative due to the increase in the relative price of high skilled labor, (16) states that the price of low skilled labor in *West* definitely declines in absolute terms, while (17) emphasizes a state of uncertainty vis-à-vis the price of high skilled labor. To summarize, the pair of inequalities (15) and (16) shows that the increase in offshoring (marked by the rightward shift of the x_0 borderline) works in favor of *East's* workers, who reap a larger share of the overall income relative to *West's*. As for the distribution of benefits across skill categories, the increase in the price of high skilled labor in *East* is unequivocally positive, whereas the earnings of the same category in *West* do rise but to a lesser degree relative to *East*. Concomitantly, the low skilled workers in *West* lose from the increase in outsourcing (the increase in their wages is unequivocally negative), whereas the variation in the earnings of the same category in *East* is indefinite.

V. Conclusions

Despite its unusual outcome, the particular case under consideration does not seem to essentially deviate from the usual maquiladora phenomenon. Apparently, the Austrian firms did not run counter-mainstream: they shifted tasks to lower income Poland in order to simultaneously capitalize on the latter's attractive combination of high qualified human capital and lower wages.

The point I attempted to make in the previous section is that conventional theory is sufficiently broad in scope to accommodate such deviations. In constricted form, the model considers a technologically advanced western economy that has the choice either to perform a set of productive tasks within its boundaries or contract them out (partly or entirely) to a small eastern economy, which is an offshore location with

lower wages. The offshoring is focused on skill intensive tasks that is, those components of the value chain (technological operations, product-related services etc.) whose performance relies mostly on knowledge, special skills, high expertise etc. and less on physical capital. High skilled labor is assumed to be relatively abundant and implicitly cheaper in the donor country relative to the receiving country. Since tasks are shifted abroad in the ascending order of their skill intensiveness, at unchanged wages, the relative demand for high skilled workers in both countries is an increasing function of the production sharing ratio (number of tasks performed in the receiving country/number of tasks performed in the donor country).

Offshoring continues until the full employment condition is met. The cost-efficiency condition is also met because production is split in compliance with factor endowment: tasks with highest content of low skilled labor are performed in the receiving country, where this factor is relatively cheaper, whereas the ones that make intensive use of high skilled labor continue to be performed in the donor country, where this last factor is relatively abundant and therefore relatively cheaper.

The arrangement set in the previous section is not immutable but subject to change. As the receiving country manages to enhance its stock of human capital, say through self-induced technological progress and learning, its workers are able to perform tasks with increasingly high skill content. Consequently, the donor country will be willing to shift additional tasks to the receiving country, where wages are lower. Concomitantly, since the relative demand for high skilled labor is inversely related to the relative price, it will also shift upwards as a response to the increase in offshoring. In the new equilibrium state, the relative price of labor is higher in both countries.

An important implication of this development is that it changes the distribution of income between the two countries: the donor country's share decreases whereas the receiving country's share increases. Yet the distribution of benefits across skill categories is unequivocally in favor of skilled workers: the latter's wages rise in both relative and absolute terms. In conclusion, the increase in offshoring makes skilled workers in both countries better off.

The Austrian-Polish case seemingly does not substantiate the above conclusion. Still, this is not a ground for theory refutation: it rather underscores the complexity of the offshoring business. In my view, theory and evidence can be reconciled by slightly relaxing the underlying assumption of the conventional model. Two ensuing scenarios might then be considered: suppose, first, that tasks are shifted by Austrian firms to Poland, not in ascending but in random order of their skill intensiveness.

The rationale of this alternative procedure is straight forward: the receiving country workers' professional skills and knowledge may be sufficiently high so that they can handle even the most sophisticated tasks. The corollary, from the conventional model's perspective, is that the relative demand for high skilled labor is no longer an increasing function of production sharing ratio. Under such circumstances, the model's underlying causation relationship between the increase in offshoring and the increase in the relative price of skilled labor can no longer be sustained.

Second, one can admit that changes in relative wages likely reflect either changes in technology or changes in the relative supply of high skilled labor. Although changes in technology in western countries have been generally skill biased and therefore largely in favor of skilled labor, the phenomenon is rather J-curved: because technology adjusts sluggishly, the rapid increase in the supply of skills following a surge in schooling, initially produces the opposite effect that is a fall in the cost of skilled labor.

This will continue until technology has changed enough to offset the direct effect of the higher supply of skill. In the particular Austrian-Polish case, the likely upward shift in the relative supply of skilled labor may have been, arguably, not triggered by offshoring but most likely, by a complex of factors, skill biased technological change being the mainstay. More specifically, the developments in the case under consideration rather indicate a reverse causation relationship, which has been duly emphasized by scholars: rather than technology inducing shifts in the relative demand for high skilled labor, it is employers' strategies that trigger technological changes. Accordingly, the upward trend in the relative supply of skilled labor in Austria during the analyzed period was

possibly rooted in past R&D accumulations by Austrian industries. Additional technological factors such as the increasing proportion of personnel employed in research and development, government's policy in support of R&D as well as other variables considered by the researchers, may have furthered the trend.

In brief, what may look like a clash between theory and evidence is most likely due to a change of setting relative to the conditions that prevailed two decades-plus ago: the "stage" is the same yet the "characters" are somewhat different from what they used to be. Apparently, where as the wage gap between industrialized and emerging economies continues to be considerable, the technological and skill gaps between the respective groups are dwindling. It follows that as firms in emerging economies keep making headway in terms of technological upgrading western firms will be tempted to shift ever more skill intensive tasks offshore. There are no hiatuses in either history or theory: historically, trade in skill intensive tasks was subsequent to trade in capital intensive physical inputs. Accordingly, theory has been following the same sort of continuity: recent models, though not breakthroughs in the conceptual sense are still more insightful as regards causes and implications of trade in skill intensive tasks than prior ones.

References

- Acemoglu, D.(2003). "Patterns of Skill Premia". *The Review of Economic Studies* 70, 199-230.
- Aguilar, L.M.(1995). "NAFTA: A Review of the Issues. Philip King(ed.),*International Economics and International Economic Policy*, McGraw-Hill Inc., 183-90.
- Anràs, P., Helpman, E.(2004). "Global Sourcing". *Journal of Political Economy*.112,552-80
- Anràs, P.(2006). "Offshoring in a Knowledge Economy". *The Quarterly Journal of Economics* 121, 31-77
- Ebenstein, A., Harrison, A., McMillan, M., Phillips, S.(2009). "Estimating the Impact of Trade and Offshoring on American Workers Using the Current Population Surveys". Working Paper 15107, NBER

- Feenstra, R. C., Hanson G. H.(1996). "Foreign Investment, Outsourcing and Relative Wages". In Feenstra R. C., Grossman G. M., Irwin D. A. (Eds.). *The Political Economy of Trade Policy: Papers in Honor of Jagdish Bhagwati*. MIT Press: Cambridge, MA, 89-127.
- Geishecker, I., Görg, H.(2008). "Winners and Losers: A Micro-Level Analysis of International Outsourcing and Wages". *The Canadian Journal of Economics / Revue canadienne d'Economie* 41, 243-270
- Goldberg, P. K., Pavcnik, N.(2007). "Effects of Globalization in Developing Countries". *Journal of Economic Literature* 45, 39-82
- Grossman, G. M., Rossi-Hansberg E.(2006). "The Rise of Offshoring: It's Not Wine for Cloth Anymore". Paper prepared for the symposium sponsored by the Federal Reserve Bank of Kansas City. Jackson Hole, Wyoming, August 24-26, 2006, available at: https://www.princeton.edu/~pcglobal/research/papers/grossman_rise_offshoring_0602.pdf
- Harrison, A., McLaren, J., McMillan, M. S.(2010). "Recent Findings on Trade and Inequality". Working Paper 16425, NBER
- Haskel, J., Lawrence, R. Z., Learner, E. E., Slaughter, M. J.(2012). "Globalization and U.S. Wages: Modifying Classic Theory to Explain Recent Facts". *The Journal of Economic Perspectives* 26, 119-13
- Irwin, D. A., Katz L. F., Lawrence, Robert, Z.(2008). "Trade and Wages, Reconsidered. Comments and Discussion". *Brookings Papers on Economic Activity*,138-54
- Krugman, P. R. (2008). *Trade and Wages, Reconsidered*. *Brookings Papers on Economic Activity*, 103-37
- Lorentowicz, A., Marin, D., Raubold, Alexander, (2008). "Is Human Capital Losing from Outsourcing? Evidence for Austria and Poland". Brakman, S., Garrestsen H. (Eds.). *Foreign Direct Investment and the Multinational Enterprise*. The MIT Press, 225-89
- Sass, M., Fifekova, M.(2011). "Offshoring and Outsourcing Business Services to Central and Eastern Europe: some Empirical and Conceptual Considerations". *European Planning Studies* 19, 1593-1609
- Zhu, S.C., Trefler, D.(2005). "Trade and inequality in developing countries: a general equilibrium analysis". *Journal of International Economics* 65, 21-48

Biographical note

Sorin Burnete, Ph.D., is Professor of at the Lucian Blaga University of Sibiu. His academic background was completed by a one year training at the University of Missouri. He was, for six years consecutively, visiting professor at

J.W. University of Frankfurt/Main. He authored a number of books, monographs, textbooks dealing with many a topic in such fields as international trade, economic policy, international business, economic history, central banking. He also published several articles in international journals such as: “Romania’s Economic Policy – the Rulers’ Wisdom Will Lead Us” (Journal of Organizational Change Management); “New EU Member Countries are Phasing Out Labor-Intensive Activities: An Econometric Approach” (Studies in Business and Economics) etc.