INTERNATIONAL TRADE, LABOUR TURNOVER, AND THE WAGE PREMIUM: TESTING THE BHAGWATI-DEHEJIA HYPOTHESIS FOR CANADA

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Abstract

In this paper we examine the impact of international trade on the absolute and relative wages of educated and less-educated workers in Canada over 1993-96. We show that after correcting for the relative supply effect of educated to less educated workers the wage differential would have been on an upward trend. Moreover, after controlling for other relevant factors influencing real wages, trade had a statistically significantly positive impact on the wages of both educated and less educated workers. However, the impact on the educated workers was four times stronger, roughly the same as the impact of technology on relative wages. We show that the observed relationship between trade and the relative wage of educated to less-educated workers does not fit the Stolper-Samuelson theoretical explanation. The observed results are more in line with the Bhagwati-Dehejia hypothesis, which posits a link from trade to wages through volatility, labour turnover, and jobless spells.

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1 Introduction

During the 1980s and 1990s the wage differential between skilled and less-skilled workers widened in almost all developed countries. Countries with relatively inflexible labour markets experienced an increase in unemployment of less-skilled workers over the same period. Two widely suggested causes of the relative wage change phenomenon are trade liberalization and a skill-biased technological change. The former is usually assumed to work through the Stolper-Samuelson Theorem (SST) that implies that the reduction in trade barriers will increase the real return to the factor that is relatively abundant in the country, and decrease the real return to the relatively scarce factor. Since the North is abundant in skilled labour and the South in unskilled labour, the SST seems to provide a prima facie plausible explanation for the observed trends.

A consensus emerged from the empirical literature that both skilled-biased technological change and international trade were affecting relative wages in the same direction. However, although international trade was found to play a role empirically, the empirical evidence was not consistent with the SST. There are two important problems that the SST has in explaining wage inequality. First, although there is convincing empirical evidence that increased trade volumes are associated with increased wage inequality the SST connects output prices to factor prices and is silent on the relationship between trade volumes and wages. There is no evidence that changes in goods prices increased wage inequality. Second, a number of studies have shown that international trade increased wage inequality in both skill-abundant and skill-scarce countries. Therefore, there was a need for an alternative explanation that was trade-dependent but

did away with SST. This is what Bhagwati and Dehejia (1994) did in their widely cited article, "Freer Trade and Wages of the Unskilled--Is Marx Striking Again?". The proposed explanation that they put forward has come to be known in the literature as the "Bhagwati-Dehejia hypothesis" (BDH).[1]

The BDH is based on the hypothesis that trade liberalization has made many industries "footloose" (i.e. small shifts in costs can cause comparative advantage to shift suddenly from one country to another), hence making comparative advantage "Kaleidoscopic" (i.e. one country may have comparative advantage in X and another in Y one day, and next day it may suddenly be reversed). This in turn leads to increased labour turnover. The added turnover means that mobile workers could be accumulating less skills causing a reduction or stagnation in the real wages of the affected workers. However, it is assumed the less-educated will be affected by more. These factors as a whole provide a trade-depended explanation for the observed wage differential between educated and less-educated labour.

The purpose of this paper is to examine the empirical relationship between trade and wages in Canada within a well-grounded theoretical framework. We present a formal theoretical model of the BDH and derive some reduced form estimating equations from the model. The theoretical model predicts a causal relationship between trade volumes and relative wages. The model also provides a mechanism through which trade volumes affect relative wages. The model predicts that high trade volatility increases labour turnover and that increased turnover will increase the wage premium of skilled over unskilled. Panel labour force data are the appropriate data for examining turnover and wages. We use the Survey of Labour and Income Dynamics (SLID) data from 1993-

[1]See, for example, Feenstra and Hanson (1996).

96 to study the impact of trade liberalisation on absolute and relative wages of educated and less-educated workers in Canada. The educated workers consist of people who received a university degree, certificate or diploma, ranging from bellow Bachelor's to Ph.D. as defined by the SLID survey.

We show that after correcting for the relative supply effect of educated to less educated workers the wage differential would have been on an upward trend. Moreover, after controlling for some of the most likely factors influencing real wages, it is found that trade had a significantly positive impact on the wages of both educated and less educated workers. However, the impact on educated workers seems to have been some four times stronger, roughly the same as the impact of technology on relative wages. We also show that the observed relationship between trade and the relative wage of educated to less-educated workers does not fit the SST explanation. Rather, the theoretical explanation provided by BDH is more in line with the results observed in this paper.

Very little research has been conducted examining the issue of trade and wages for Canada. The only paper that explicitly investigates the trade effect alongside the technological change effect on the relative wages of non-production (skilled) to production (unskilled) workers is that of Baldwin and Rafiquzzaman (1998). They investigate if technological change and trade could have been responsible. Their conclusion is that both are at work. Their study, however, is limited in the sense that it does not take other factors – particularly the labour supply effect -- into account.

Unfortunately, like most of the studies done for the U.S., Baldwin and Rafiquzzaman as well investigated the causal links between the volume of trade and relative wages without grounding their empirical findings in a theoretical framework. It is

also fair to say that their study was geared more toward investigating the impact of technology rather than that of trade. This paper, nonetheless, investigates the channels through which trade is hypothesized to have caused the wage differential. The by-product obtained from investigating the channels such as the impact of trade liberalization on labour turnover and of labour turnover on skill accumulation will certainly add to important empirical findings about the Canadian labour market.

Freeman and Needels (1993) and Murphy, Riddell and Romer (1998), whose main focus is on the relative wage effect of the relative labour supply of educated workers in Canada and in the US, argue that neither trade nor technology is the culprit in influencing relative wages in either country. They maintain that both over time and between countries the variation of rate of growth in relative wages is due to variation in the relative supply of more-educated workers alone. For example, the more conspicuous rise in the educated workers' relative wages in the US and a less-evident rise (or, no rise at all) in Canada has more to do with a relatively higher growth in the relative supply of educated workers in Canada over the period under investigation than anything else.

While the adverse effect on the educated workers' relative wages of their relative supply may not be disputed, the finding of a non-increase or even a decrease in the wage premium of the educated cannot be counted as an evidence against the positive impact of trade liberalization on the wage differential because it could just be that the supply side might have overwhelmed the demand side. We find that trade has a significantly positive impact on the wages of both educated and less educated workers, however, the impact on the educated workers seems to be some four times stronger, roughly the same as the impact of technology on relative wages. Moreover, since the results in this paper show

that the widening of educated/less-educated wage differential doesn't come even partially at the expense of less-educated workers, the result doesn't fit the Stolper-Samuelson theoretical trade explanation. We find that the result is consistent with the explanation provided by Bhagwati and Dehejia (1994).

The remaining of this paper is structured as following: In Section 2 we present the model through which we intend to fit the trade explanation of the educated/less-educated wage differential into a theoretical framework. In Section 3 we examine the nature of education premium in Canada and examines the relationship between trade and the wages and wage differential of the educated and the less-educated. Section 3 also investigates the impact of trade volatility on labour turnover and the impact of jobless spells on educated/less-educated skill accumulation. Section 4 furnishes the concluding remarks.

2 The Model: Kaleidoscopic Comparative Advantage and Labor Turnover

The BDH alternative trade explanation is based on the hypothesis that trade liberalization has made many industries "footloose", hence, making comparative advantage "kaleidoscopic". "Footloose" is a situation in which small shifts in costs can cause comparative advantage to shift suddenly from one country to another, while "Kaleidoscopic" refers to a situation in which one country may have comparative advantage in X and another in Y one day, and next day it may suddenly be reversed.

This hypothesis above in turn leads to four main consequences: (1) increased *ceteris paribus* labour turnover; (2) the added turnover means that the mobile less-educated labour could be accumulating less skills due to the "rolling-stone-gathers-no-moss" effect, causing a reduction or stagnation in real wages of less educated workers (the educated workers are assumed to be shielded from the "rolling-stone-gathers-no-

moss-effect" for reasons explained in chapter 2); (3) longer jobless spells for the unskilled as against the more skilled, reinforcing the flatter earnings profile for the former group; (4) these factors as a whole provide a trade-dependent explanation for the observed wage differential between skilled (or educated) and less-skilled (or less-educated) labour. Bhagwati and Dehejia, nevertheless, admit that they "doubt that this alternative explanation can carry the weight that the technical-change (and technological) explanation probably does, but it could well be a contributory factor of some, perhaps also growing importance".

The hypothesis that trade liberalization has made comparative advantage "kaleidoscopic" is based on the observed evidence that "the world economy is now increasingly integrated and that the convergence of technology among the Organization for Economic Cooperation and Development (OECD) countries and the spread of global multinational corporations around the world have brought many modern industries within the grasp of countries. Many more industries, therefore, are now 'footloose' than before" (Bhagwati and Dehejia, 1994). The evidence of increasing globalization is documented by many researchers such as Baumol, Backman and Wold (1989), Frankel (1994) and Dunning, Kogut and Blomstrom (1990).

One of the most significant characteristics of the globalization of production is the extent to which it aids the mobility of assets, notably money capital and innovatory capacity, and of intermediate products, notably technology and management skills, across national boundaries. This mobility immediately offers the owners of these assets and products a wider option in their location of use – hence described as "footloose".

Bhagwati and Dehejia (1994) sketch a theoretical model which fits the BDH. This is taken up further in Dehejia (1996), who presents a formal model and presents numerical simulation results which exemplify the BDH. We are not concerned in this paper with theoretical model-building. Rather, we deploy a basic model, reflecting conventional wisdom as well as the BHD, which is amenable to testing.

The basic model we use to motivate our analysis is based on a constant elasticity of substitution (CES) production function of the type used by Bound and Johnson (1992) in which the output of each of the J industries (Y_j) depends on physical capital intensity (k_j) and a constant elasticity of substitution aggregator of the i education groups (L_i).

$$Y_j = F(k, L, t, \tau, T) = k_j \left[\sum_i \phi_{ij} \left(A_i(t, \tau, T) L_{ij} \right)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} \qquad (1)$$

where ϕ_{ij} is the share of workers belonging to education group i hired by industry j. $A_i(t,T,\tau)$ captures both a technological change which is a function of time t, and learning by doing which in turn is a function of potential experience defined as age minus years of schooling minus six and is denoted by T and on the job tenure τ. They all augment the services of education group i workers. The elasticity of intra-labour substitution, σ, is assumed to be equal across industries.

Adding the process of learning by doing, however, distinguishes our model from the one used by Bound and Johnson. Moreover, we know of no other model that enters so explicitly the process of learning by doing the way we have (below). In a competitive market in each industry the real wage rate of each type of labour is equal to its marginal product so that:

$$w_{ij}(t,\tau,T)=\frac{\partial Y_j}{\partial L_{ij}}=k_j\phi_{ij}\left[A_i(t,\tau,T)\right]^{\frac{\sigma-1}{\sigma}}\left[\sum_i\phi_{ij}\left(A_i(t,\tau,T)L_{ij}\right)^{\frac{\sigma-1}{\sigma}}\right]^{\frac{1}{\sigma-1}}\mathrm{L}_{ij}^{\frac{-1}{\sigma}} \quad (2)$$

Dividing and multiplying (2) by $Y_j^{\frac{1}{\sigma}}$, the wage equation can be simplified to:

$$w_{ij}(t,\tau,T)=\left[\frac{Y_j}{L_{ij}}\right]^{\frac{1}{\sigma}}\phi_{ij}\left[k_jA_i(t,\tau,T)\right]^{\frac{\sigma-1}{\sigma}} \quad (3)$$

Let us define:

$$A_i(t,\tau,T)=N_i(t)e^{\delta_i\left(\sum_l^M\tau_l+E\left(T-\sum_l\tau_l\right)\right)} \quad (4)$$

N is a technology argument that is a function of time t, and δ_i captures learning by doing by worker i which can be convex, concave or linear in potential experience T and of on-the-job-tenure τ depending on whether the partial derivatives of δ_i with respect to T and τ are smaller, greater or equal to zero respectively. *l*=1,2…M is the number of jobs individual i has had over the period of potential experience T. This implies that $\sum_l\tau_l\le T$. E is an operator that can take different values depending on whether an individual is educated or less-educated. It, however, is assumed by Bhagwati and Dehejia to take a value of 1 if an individual is educated and 0 if less-educated. The assignment of the binary values is based on the assumption of "rolling stone gathers no moss effect with educated labour being shielded from that effect." Taking the logarithms of (4) we can write:

$$\ln A_i(t,\tau,T)=\eta_i(t)+\delta_i\left(\sum_l^M\tau_l+E\left(T-\sum_l\tau_l\right)\right) \quad (5)$$

In equation (5) η_i captures worker type i skilled-biased technological change and δ_i captures the learning by doing of worker i.

Under free trade, the home and foreign countries' aggregate demand for the output of industry j produced at home (Q_j) relative to the same good produced in the foreign country is assumed to be:

$$Q_j=\theta_j P_j^{-\varepsilon} \qquad (6)$$

Where P_j is the price of good j produced at home relative to that in the foreign country; θ_j is an exogenous demand shift parameter reflecting consumer taste and other factors and is assumed to be identical across countries; and ε is the absolute price elasticity of product demand for each industry. Substituting (4) and (6) into (3), then taking its logarithms yields the following wage equation for workers of type i in any given industry j:

$$\ln w_{ij} = c + \frac{1}{\sigma}\ln\theta_j - \frac{\varepsilon}{\sigma}\ln P_j - \frac{1}{\sigma}\ln L_{ij} + \ln k_j + \ln\phi_{ij} + \frac{\sigma-1}{\sigma}\left[\eta_i(t) + \delta_i\left(\sum_l^M \tau_l + E\left(T - \sum_l \tau_l\right)\right)\right] \qquad (7)$$

Equation (7) is quite comprehensive in the sense that it relates the wage rate to most of the widely discussed worker-type-specific and firm-specific factors set forth to date. For example, the wage rate of worker type i in industry j is positively related to: 1) the demand shift for good j (θ_j); 2) capital intensity in industry j (k_j); 3) a positive demand shift for worker type i in industry j (ϕ_{ij}); 4) worker-type-i skill-biased technological change (η_i); 5) learning by doing (δ_i). It is negatively related to: 6) the increase in supply of worker of education type i who has industry j specific skills (L_{ij});

and 7) the loss of comparative advantage in production of good j at home represented by an increase in P_j.

It is important to note, however, that when σ goes to infinity – that is when labour types are perfect substitutes across industries – industry specific demand shocks such as changes in θ_j and P_j and labour specific supply shocks such as changes in L_{ij} will have a vanishingly small impact on the wages of workers within an industry. This is because the impact of such shocks will spread out across all types of workers across all industries.

In order to derive an equation for the relative wage rate of labour of one education type to some other education type from equation (3) -- say the relative wage rate of labour of education type i to education type k -- we can write:

$$\frac{w_{ij}}{w_{kj}}(t,\tau,T) = \left[\frac{L_{ji}}{L_{kj}}\right]^{\frac{-1}{\sigma}} \left[\frac{A_i(t,\tau,T)}{A_k(t,\tau,T)}\right]^{\frac{\sigma-1}{\sigma}} \qquad (8)$$

Suppose that worker i is educated and worker k is less-educated. Let's also assume that E takes a value of 1 for worker i and 0 for worker k as suggested above. Then $A_i(t,\tau,T)$ and $A_k(t,\tau,T)$ are reduced to $\eta_i(t) + \delta_i T$ and $\eta_i(t) + \delta_i \sum_l^M \tau_l$ for educated and less-educated workers respectively. Let us further assume that labour is immobile across countries but freely mobile within a country across industries. This insures that for a given potential experience and on-the-job-tenure the wage rate is the same across industries for workers of the same education level – the subscript j is therefore discarded hereafter. After substituting for $A_i(t,\tau,T)$ and $A_k(t,\tau,T)$ and taking logarithms equation (8) becomes:

$$\ln \frac{w_i}{w_k}(t,\tau,T) = \ln \frac{\phi_i}{\phi_k} - \frac{1}{\sigma}\ln\left[\frac{L_i}{L_k}\right] + \frac{\sigma-1}{\sigma}\left[\eta_i(t) - \eta_k(t)\right] + \frac{\sigma-1}{\sigma}\left[\delta_i T - \delta_k \sum_l \tau_l\right] \qquad (9)$$

Suppose worker i is educated (skilled) and worker k is less educated (less-skilled) then there are four important explanations nested in the above equation for the widening of skilled to less-skilled workers' wage differential. The first and second terms on the right hand side provide the demand and supply explanations respectively. The demand-shift in favor of educated workers increases the wage differential, whereas, the increase in the relative supply of educated workers decreases it.

The third term furnishes the skill-biased technological change explanation – that is if $\eta_i(t) > \eta_k(t)$ the wage differential will increase over time. The fourth and last term on the right hand side is the Bhagwati-Dehejia "rolling-stone-gathers-no-moss-effect-with-skilled-worker-sheilded-from-that-effect" trade dependent explanation as discussed above.

For an illustration let us hold constant the impact of all other variables and suppose that $\delta_i(\tau)=\delta_k(\tau)=\delta\tau$. Next suppose that during time period T both educated and less educated workers experience labour turnovers and resulted jobless spells for a sub-period $\check{T}$ – so that $\check{T} = T - \sum_l \tau_l$. Since educated workers are assumed to be unaffected by the turnover and the resulting jobless spell, their log real wage rate due to learning by doing will have increased by δT the end of T. Whereas, that of the less-educated workers will have increased only by $\delta \sum_l \tau_l$. The log relative wage rate will, therefore, have widened by $(\sigma\text{-}1)\check{T}$.

A distinguishing feature of this model is that it does not rule out other explanations but rather adds the Bhagwati-Dehejia explanation for an additional role just as suggested by Bhagwati and Dehejia (1994). We can even further simplify equation (9) by following Murphy, Riddell and Romer (1998) in assuming that the shift in the demand for products is felt proportionately by all type of workers and that the ratio of one type of labour to another does not change across industries. Equation (9), can be rewritten as:

$$\ln \frac{w_i}{w_k}(t,\tau,T) = C - \frac{1}{\sigma}\ln\left[\frac{L_i}{L_k}\right] + \frac{\sigma-1}{\sigma}\left[\eta_i(t) - \eta_k(t)\right] + \frac{\sigma-1}{\sigma}\left[\delta_i T - \delta_k \sum_l \tau_l\right] \qquad (10)$$

where C is a constant. Numerous testable forms of Equations (10), (9) and (7) are essentially what we intend to confront with the data for empirical investigation

3 The Empirical Analsysis

The previous section presented a theoretical model which predicts that trade volatility increases labour turnover and that increased labour turnover impacts wages. The theory predicts that skilled workers out-perform unskilled workers a labour market characterized by increased turnover. We analyse a panel survey of Canadians from 1993-1996 and take a reduced form approach to empirically examine the empirical veracity of the theoretical model. Before examining the relationship between international trade and relative wages in Canada, we examine the impact of changes in the relative supply of skilled to unskilled wages. Second we examine whether trade volumes had an impact on relative wages in Canada over this period. Third we examine whether trade volatility had an impact on labour turnover in the Canadian labour market over this period and finally we examine whether jobless spells affected relative wages.

3.1 The skill premium and labour supply

First we examine the trend of educated to less-educated (alternatively, skilled to less-skilled) workers' wage differential over the period. There is some mixed evidence on the trend in the skill premium in Canada. Baldwin and Rafiquzzaman (1998) find a widening of the education differential but Freeman and Needels (1991) argued that the rise was next to nil and Murphy, Riddell and Romer (1998) present evidence of a declining education premium over the same period. However, the evidence is not as mixed as first appears. Both Freeman *et al* (1991) and Murphy *et al* (1998) argue that the education premium would have increased significantly were it not for a greater growth of the educated labour and a greater strength of the Canadian unions in wage-setting. Therefore, before examining the impact of international trade on the wage premium we examine the impact of correcting for the supply effect on the wage premium.

To see how educational earning differentials have evolved over the 1993-96 period we calculate the average wage premium for educated workers for each year.[2] In the top panel of Table 1 we present the wage premium of educated to less-educated workers for all workers, by gender and age (18-34, 35-44 and 45-64 year old). The results are mixed. Columns 1, 3 and 6 show a decline in the average education premium of for all workers (0.25%), female workers (2%) and the 45-64 age group (10.3%). Whereas columns 2, 4 and 5 reveal an increase in the average

[2] Although we compute the wage premium using regression analysis and controlling for other determinants of wages later in the paper, examining average wage differentials by gender and age provides a useful summary of the trends and is similar to the predicted wage premium calculated later in the paper. The average percentage wage premium for workers type i over workers type j in year t is calculated as:

wages of skilled to unskilled workers for males (1.57%), those aged 18-24 years (7.11%) and those 25-44 years old (3.34%).

However, the relative wages of more educated to less educated workers fall when the supply of educated workers outpaces its demand. Murphy, Riddell and Romer (1998) found the wage elasticity of the relative labour supply of educated workers to be about 0.75 in Canada. That is, holding everything else fixed, if the relative labour force of educated workers goes up by 1%, their relative wage rate falls by about 0.75%.

The middle panel in Table 1 shows that over the 1993-96 period a marked increase in the relative supply of educated workers, indeed, did occurred. The percentage increase in the relative supply of educated workers for all workers, male, female, 18-24, 25-34, and 35-44, 45-64 age group workers over the period 1993-1996 has been 19%, 16%, 22.7%, 9%, 18.6% and 24.8% respectively. We used the Murphy, Riddell and Romer elasticity to calculate the values by which the skill premium in Canada has been suppressed due to the relative labour force growth reported in the middle panel of Table 1. For example between 1993 and 1994 relative supply of all educated workers increased by about 10% $\left(\frac{0.855-0.777}{0.777}*100\right)$. Multiplying that by 0.75 will give us the 7.53 skill premium suppressed due to a relative supply increase. We used this same approach to adjust the top panel of Table 1 and estimate what the education premium would have been in the absence of a relative supply growth of educated labour. These estimates are

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$\frac{wage_t^i - wage_t^j}{wage_t^j}*100$, where $wage_t^i$ is the real wage of workers type i in year t.

reported in the bottom panle of Table 1. For example, the education premium suppressed for all workers in 1994 is 7.53% and the corresponding wage premium in the top panel of Table 1 is 47.18%. Thus the education premium for all workers in 1994 in the absence of a relative supply change is 7.53+47.18=54.71 – a value reported in the bottom panel of Table 7 in the cell for all workers and 1994.

As seen in the last row of the bottom panel of Table 1, the labor force adjusted skill premium increased over the 1993-1996 period for all workers as a whole and for every category of workers individually except for workers aged 45+. Notice that the increase in the skill premium is higher for male workers than that for female workers: 3.1% for men as opposed to 1.4% for women. Secondly, the increase in the skill premium decreases for higher age groups (i.e. from 10.2% to 3.1% to –7.8% respectively). This perhaps is due to one of the two phenomena: 1) it is the more recent or more modern and technical education that drives the education premium up and that older educated workers do not benefit from this trend; or 2) the older less-educated workers are more protected by their experience and seniority from a decline in their relative wages than their younger counterparts. Looking at the declining education premium of 45+ age group workers it is even possible that for older workers experience (rather than education) is getting more and more recognized.

It can be argued that even the adjusted changes in skill premium recorded in the bottom panel of Table 1 understate the market shifts against the less-educated if shifts in labour market conditions alter their labour utilization as well as their rates of pay (Freeman and Needels, 1991). More specifically, the relatively small increase in

skill premiums in Canada may have been offset by smaller utilization differentials between less-educated and educated labour. The relative unemployment rates of less-educated to educated workers provides some evidence of utilization rates.

Table 2 presents the percentage difference in unemployment rates between less-educated and educated workers in Canada. The evidence summarized in Table 2 shows that the relative employment prospects of less-educated workers worsened over the period 1993-1996. It should be noted that the increase in the relative unemployment rates for male and younger less-educated workers was more dramatic: 17.16% for male, 29.95% and 13.28% for workers aged 18-24 and 25-44 respectively.

The evidence in Table 2 is consistent with the proposition that Canada has responded to the deteriorating job market for less-educated with a relatively greater quantity adjustment than with wage adjustment. Had the price adjustment been left loose, the wage premium documented in Table 1 would have been higher, as noted by Freeman and Needels (1991).

An increase in wage differentials reported in Table 1 could be due either to a leftward shift in relative supply or a rightward shift in relative demand of educated workers, or some combination of both. As shown above over the period the wage differential widened and the relative supply actually shifted to the right. This suggests that the change in wage differentials would have been higher in the absence of a relative supply change. This suggests that the widening in the educated to less-educated wage differential could be the work of a positive relative demand shift. Trade intensity is one of the factors that has the potential of shifting the relative

demand in favor of the educated workers. In the subsequent section it is precisely that what we investigate.

3.2 The Education (Skill) Premium in Canada

Educated workers are defined as those who received university degrees, certificates or diplomas, ranging from college graduates to Ph.D. Conversely, less-educated workers include those who did not receive university degrees or diplomas,or, certificates or diplomas from community colleges.

Table 3 presents summery statistics for some of the key variables in the sample described above. It shows that real wages (in constant 1992 dollars deflated in the consumer price index) have declined for both educated and less educated workers over the four-year period. More noteworthy is the fact that the relative wages of educated to less educated workers have slightly fallen between 1991 and 1994. This is in contrast to what have been observed in the United States. However, in Section 3.1 we show that if we account for the increasing relative supply of educated to less-educated workers, the relative wage rate of the educated to less-educated in Canada would have actually increased.

The *years of schooling* row of the table reveals that between 1993 and 1996 the average years of schooling completed by both educated and less-educated workers has increased by some 1% and 3% respectively. This is also reflected by the decreasing values for the *years of experience* row for both types of workers since potential experience is defined as age minus six minus years of schooling. This upward trend in education acquisition, perhaps, is a response to an increasing demand for more educated

labour represented by a decreasing relative unemployment rate of the educated to less-educated workers.

The row on *job tenure* shows that on the job tenure is decreasing quite dramatically for both types of workers, particularly more so for educated workers. This is consistent with the hypothesis of an increasing turnover due to the emergence of trade-liberalisation-pushed kaleidoscopic comparative advantage that make industries footloose. However, other factors cannot be ruled out either.

The important things in the *labour supply* and *unemployment rate* rows to look at are the relative labour supply and relative unemployment rate of educated to less educated workers. As can be noticed the first is rising whereas the latter is falling. In a simple demand and supply diagram the first pushes the relative wages of the educated workers down; the latter suggests that the sluggish demand for less-skilled workers has responded with a quantity adjustment (i.e. higher unemployment) rather than a price adjustment (i.e. lower wages). Both of these factors, therefore, imply that the relative real wage rate of educated workers would have been a lot higher in their absence. In Section 3.1 we examined the relative wage of educated to less-educated workers in the absence of these two factors.

Lastly, the *full-time/part-time* row shows that the ratio has slightly slipped over the period 1993-1996. The falling relative full-time/part-time jobs rate is consistent with increasing incidences of labour turnover which in turn could be caused (in addition to other factors) by trade volatility due to trade liberalisation. The *unionisation rate* row shows that the unionisation rates have fallen for both educated and less-educated workers, however, with that of educated workers by more than less-educated workers

(indicated by the falling ratio of educated to less-educated workers' unionisation rates). This, as suggested by some labour market studies, could probably be due to unions' protection of the less-educated workers from external competition.

3.3 Trade and the Education Premium in Canada

Little research has been done investigating the changes in wages of educated and less-educated workers in Canada but in the literature there is a general consensus that there has been a positive shift in relative demand for the educated (or, skilled) workers (Gera, Gu and Lin, 1999). The disagreement, nevertheless, surfaces when it comes to explaining the factors behind the positive demand shift.

The two most familiar explanations for a rightward shift in the relative demand for skilled workers in Canada are trade liberalization and a skilled-biased technological change – the latter being more popular than the first one. To investigate the relative contribution of trade and technologies to changes in the educated and less-educated workers' wages and wage differential we run the following multivariate regression:

$$W_{it} = \alpha_1 + \beta_1(TRADE_{jt}) + \beta_1(E*TRADE_{jt}) + \pi_1(TECHj) +) + \pi_2(E*TECHj) + \eta(CAPITAL_{jt}) + \theta X_{it} + \mu Z_i + \psi Y_t \quad (11)$$

where W_{it} is the real wage rate of worker i in time t; E is a dummy variable that takes a value of 1 if individual i is educated (i.e. ever received a university degree, certificate or diploma, ranging from below Bachelor's to Ph.D.) and 0 if less-educated (otherwise). Since less-educated workers are the reference group, the coefficients on E and any continuous variable interacted with E measure the differential effect of being an educated worker relative to less-educated worker.

$TRADE_j$ is the variable representing trade intensity by 3-digit SIC level (the subscript j represents industries) and is equal to total exports plus total imports divided by total output by industries. $E*TRADE_j$ is $TRADE_j$ interacted with E. $TECH_j$ is a technology variable for industry j. It is a dummy variable taking a value of 1 if an industry is technology-intensive and 0 otherwise. $CAPITAL_j^t$ is the physical capital intensity in industry j in time t. X is a vector of labour-market-specific characteristics such as changes in the labour supply and unemployment rates of educated and less-educated workers; Z is a vector of individual-specific characteristics such as potential experience, on the job tenure, gender, if full time and if unionized; Y controls for a time trend or business cycle.

The results of regression (11) are presented in Table 4. The difference between columns 1, 2, 3 and 4 are that in the former two we estimate semi-log multivariate regressions, whereas, in the latter two we take the log of all variables except the dummy variables. In addition, In columns 1 and 3 the variable CAPITAL is not included, whereas, in the columns 2 and 4 it is. The data for CAPITAL for 1996 was not available, thus, the regressions that include CAPITAL are run on fewer observations.

The coefficients on *TRADE* and *E*TRADE* are positive in all four regressions implying that trade has had a positive impact on the real wages of both educated and less-educated workers. This perhaps is due to trade putting pressure on domestic industries to become more competitive and therefore more productive, enhancing the marginal productivity of labour. The significantly positive coefficients on *E*TRADE* support the hypothesis that trade widens the educated/less-educated workers' wage differential.

According to the results in Table 3 a 1% increase in the volume of trade of goods to output ratio will widen the educated/less-educated wage gap by about 2% to 3%. However, it is important to reiterate that the widening of the educated/less-educated workers wage differential doesn't come at the expense of the less-educated workers as both workers benefit from trade. However, in relative terms the educated workers benefit by more.

Moreover, as expected the coefficients on technology are quite significant for both educated and less-educated workers and that its impact on the educated is some three to four times higher than that of the less-educated. Nevertheless, the magnitude of the impact of technology on the relative wages of educated to less-educated workers is no more than that of trade. This result is in line with that found by Baldwin and Raiquzzaman *op cit* , however, it is in sharp contrast to that found by Gera, Gu and Lin *op cit* who find that technology has a much more favorable effect on the relative wages than trade does.

Gera, Gu and Lin find strong evidence that advanced technologies are biased toward the use of skilled labour and thus conclude that skill-biased technological change perhaps is the most important factor in shifting the skilled labor relative demand curve to the right. Similarly, Baldwin and Rafiquzzaman (1998) find both trade and technology as contributing factors toward the widening wage differential phenomenon. As they put it:

> The past twenty years have seen a change in earnings inequality, both in the United States and Canada. The debate over the causes of increasing inequality has focused on whether it is changes in trade patterns or whether it is technological change that is at fault. This paper has demonstrated that both are at work….

The coefficients on all other variables, with the exception of labour supply, are in the

expected direction in all of the regressions. Looking at Table 3, column 1, they could be interpreted as following: holding for everything else constant, a year added to potential experience raises the real wage of all workers by about 1.8%; a month added to on-the-job tenure pushes the real wage up by 0.25%; a full-time job pays an hourly wage that is 10% higher than a comparable part-time job; on average men's wage is 22% higher than that of women; one percent increase in national unemployment rate suppresses real wages by 2.1%; unionized jobs pay 9.5% more than non-unionized; the coefficient on capital intensity, as expected, is positive. The result in columns 2, 3 and 4 is identical to that in column 1 in terms of signs and significance, however, values for some variables are slightly different.

The puzzling part, however, is the positive coefficient on the labour supply: an increase in the labour supply pushes real wages up. When we separated the educated and less-educated it was found that the positive effect of labour supply on the real wages of educated workers is 6.5 times stronger than that of less-educated. This perhaps is a support to some sorts of Lucas type positive externality attached to the size of the skilled labour stock. However, the positive coefficient on the less-educated labour supply is puzzling.

The result of regression (11) supports the proposition that trade plays a significant role in the widening of educated/less-educated wage differential. However, since the widening doesn't come even partially at the expense of less-educated workers the result doesn't fit the Stolper-Samuelson theoretical trade explanation. Instead, below we turn to the model we developed in section II to explain the relationship of trade and wages as evidenced by the result in this section.

3.4 Trade Volatility and Labour Turnover

In order to investigate the effect of trade volatility on labour turnover we run the following regression:

$$TURNOVER_{it} = \alpha_1 + \beta_1(CVTRADE_{jt}) + \beta_1(E^{*}CVTRADE_{jt}) + \pi_1(TECHj + \eta(CAPITAL_{jt}) + \theta X_{it} + \mu Z_i + \psi Y_t \qquad (12)$$

where now *TURNOVER* is a dummy variable taking a value of 1 if worker i experiences a labour turnover and 0 otherwise. *CVTRADE* is the coefficient of variation of the *TRADE* variable, representing trade volatility.

The results of regression (10) are recorded in Table 5. Like in Table 4, the second column of Table 5 includes the variable *CAPITAL* whereas the first one does not. In both columns the coefficients on *CVTRADE* (coefficient of variation of the *TRADE* variable) are significantly positive implying that the trade variation significantly intensifies the incidence of labour turnover. The result is in line with that reported by Heisz (1996) in which it was shown that over the period we suspect trade liberalization to have made industries "footloose' (perhaps, through kaleidoscopic comparative advantage) job turnover rates in almost all industries have increased. Similarly, Baldwin and Rafiquzzaman (1994) in their paper, *Structural change in the Canadian manufacturing sector 1970-1990*, report a marked increase in labour turnover in all manufacturing industries -- the highest turnover occurring in industries that are relatively more exposed to international competition.

The coefficients on other variables can be interpreted as following. Holding everything else constant the incidence of labour turnover is higher among educated workers, men and unionized workers; labour turnover rates increases with the intensity

in technology; it falls with potential experience but increases with on-the-job tenure. An increase in labour supply also increases labour turnover but higher unemployment rate reduces it. Full time workers experience lower incidence of labour turnover than part-time workers.

3.5 Jobless Spells and the Educated/less-educated Relative Wages

In Section 6 it was shown that increasing trade volatility intensifies labour turnover (or jobless spell). In this section we check if the length of jobless spell slows down skill accumulation of less-educated workers by more than that of the educated as suggested by Bhagwati and Dehejia.

To investigate the impact of increased labour turnover and jobless spell on skill accumulation and hence on growth profile of relative wage rates we confront the regression equation (7) with the data using the Instrumental Variable Estimation technique[3]. The results are presented in Table 6. As in Tables 4 and 5, the second column of Table 6 includes the variable *CAPITAL* whereas the first one does not. The significantly positive differential impact of potential experience (the coefficients on E*EXP – i.e. Ψ_2's) on the wages of educated workers is what was hypothesized. However, the positive coefficients on E*TR (ρ_2's) are contrary to what was suggested a priori. This perhaps implies that either, unlike we suggested, it is the educated workers whose knowledge is more industry specific, or that the econometric estimators employed are not fitting the type of data being utilized.

One of the problems inherent in panel data is heterogeneity. Although in Table 6 we control for observed heterogeneity among workers, we do not do so for unobserved

heterogeneity. Unobserved heterogeneity is a time-invariant latent individual effect correlated with the explanatory variables. If there is no unobserved heterogeneity present in the data then the result obtained from regression (7) would be unbiased and consistent, otherwise it won't be[4] (Greene 1997). However, with a panel data it is likely the case that the data is tormented by it[5]. For example, a higher wage rate associated with higher tenure may not be due entirely to skill a worker accumulates through on-the-job-learning-by-doing but it might be due to his/her latent individual specific ability, and because of that ability the worker may have a longer tenure on the job in the first place. The same argument goes for education: the fact that an educated worker commands a higher wage rate may not be due to his/her high education but rather to his/her individual specific ability which probably also has helped him/her to achieve higher education.

One way of correcting for unobservable heterogeneity is the Fixed Effect approach[6]. This eliminates the individual effects in the sample by transforming the data into deviations from individual means and, therefore, is dubbed the Within Group Estimator (WGE). Thus we run the following WGE Fixed Effect regression model:

$$w_{it}=\alpha_1+\rho_1(tenure_{it})+\rho_2(E*tenure_{it})+\sigma_1(tenure_{it})^2+\sigma_1(E*tenure_{it})^2+\psi_1(exp_{it}) +\psi_2(E*exp_{it}) +\xi_1(exp_{it})^2+\xi_2(exp_{it})^2 \quad (13)$$

Where, $w=W_i^t-W_{I*}$; $tenure=TENURE_i^t-TENURE_{i*}$; $exp=EXP_i^t-EXP_{I*}$. W_i^t is the wage rate of an individual in group i in time t and W_{i*} is the mean wage of an individual belonging to group i. $TENURE_i^t$, $TENURE_{I*}$, EXP_i^t, and EXP_{I*} have similar interpretation. The

[3] The results are based on an Instrumental Variable Estimation approach in which trade and technologies are two of the instruments.
[4] Greene 1997.
[5] Hausman and Taylor 1981; Osberg 1986.
[6] Greene 1997; Johnston and DiNardo 1998.

coefficients of (13) are of a different scale, however, their interpretations are similar to that of regression (7).

The results of equation (13) are presented in Table 7, column 1. The significantly positive coefficients on both ***e*tenure*** and ***e*exp*** make the result identical to that obtained from equation (4) and the issue that jobless-spell has dissimilar effect on the educated and less educated is therefore not resolve. However, the issue can be resolved by resorting to the regression of equation (8) in which jobless-spell is an explicit variable. In Table 7 column 2 we report the WGE Fixed Effect regression result of equation (8) in which *spell* = $SPELL_i^t$-$SPELL_i$, whereas, $SPELL_i^t$ is jobless spell of an individual in group i in time t and $SPELL_I$ is the mean jobless spell of group i. The significantly negative coefficients on *spell* and the significantly positive coefficients on *E*spell* clearly are testament to the hypothesis that jobless spell slows down the skill accumulation of less-educated workers by more than that of educated workers.

4 Concluding Remarks

In this paper we studied the trend of educated and less-educated workers' absolute and relative wages over the period covered by the Survey of Labour and Income Dynamics (SLID) data and investigated if they are causally linked to international trade. We also provided a trade dependent theoretical explanation for the causal links between the two variables: trade and the educated/less-educated wages.

We showed the widening of educated/less-educated wage differential was an occurring phenomenon (albeit not as strong as that in the US or some other developed countries) in at least the groups of workers that are more likely to be exposed to international competition brought about by trade. We also demonstrated that the

differential would have been a lot higher in the absence of changes in the relative supply of educated workers and in the absence of quantity adjustment (increasing relative unemployment of less-educated workers) rather than price adjustment (wage changes).

We identified trade as a significant contributor to the rising education premium and showed that its impact on relative wages of educated to less-educated workers was just as a great as that of technology. Although the result implicated trade as a possible cause of the widening in educated/less-educated wage differential, it was found that trade was not necessarily harmful to less-educated workers. The real wages of both type of workers respond positively to increased trade liberalization -- it just is that the educated benefit by more than the less-educated. This finding would add some valuable information for some redistribution or compensation policies that are designed to counteract or alleviate the effect of trade liberalization on some workers.

Moreover, we found that trade volatility (represented by the coefficient of variation of the trade variable) to be a statistically significant determinant of labour turnover. We found that jobless spells (due to increased labour turnover) have affected educated workers more favorably than less educated workers that resulted in the widening of their relative compensation. This provided an empirical support for the alternative theoretical explanation for trade and wages developed by Bhagwati and Dehejia.

Table 1: Average Relative Wages and Employment of Skilled and Less-skilled Workers in Canada: 1993-96

Ratio of Skilled to Less-skilled Average Wages (in percent)

	All workers	Male	Female	18≤Age<25	25≤Age<45	Age≥45
1993	51.22	47.37	57.12	42.76	44.27	59.62
1994	47.18	43.64	52.76	36.23	43.36	59.63
1995	51.70	50.57	53.99	46.87	46.97	53.80
1996	50.97	48.95	55.09	49.87	45.51	49.29
Percentage change 96-93	-0.25	1.57	-2.02	7.11	1.28	-10.32

5 Relative employment of educated workers

	All workers	Male	Female	18≤Age<25	25≤Age<45	Age≥45
1993	0.77	0.76	0.79	0.32	1.02	0.73
1994	0.85	0.82	0.88	0.32	1.12	0.85
1995	0.89	0.86	0.93	0.33	1.18	0.88
1996	0.92	0.88	0.97	0.35	1.21	0.91
Percentage change 96 –93	19.04	16.03	22.68	9.06	18.64	24.79

Ratio of skilled to less-skilled wages adjusted for the relative supply growth (in percentage)

	All workers	Male	Female	18≤Age<25	25≤Age<45	Age≥45
1993	51.22	47.37	57.12	42.76	44.27	59.62
1994	54.71	50.30	61.37	37.27	50.59	71.54
1995	55.33	53.92	57.93	49.26	51.19	56.97
1996	53.32	50.46	58.49	52.99	47.37	51.81
Percentage change 96-93	2.095	3.08	1.37	10.22	3.09	-7.82

Source: authors' calculation from the SLID data.

Table 2: Percentages by which less-educated unemployment rate exceeds that of educated

	All workers	Male	Female	18≤Age<25	25≤Age<45	Age≥45
1993	86.447	85.350	85.714	68.888	90.909	67.355
1994	84.895	85.205	85.797	87.511	90.620	53.666
1995	94.531	99.527	87.692	95.408	103.437	54.414
1996	90.526	100	78.260	89.523	102.985	50.442
Percentage change 96-93	4.71	17.16	-8.69	29.95	13.28	-25.11

Source: Authors' calculations from LFS and SLID surveys.

Table 3: Descriptive Statistics of Educated to less-educated Workers

Variables		1993	1994	1995	1996
real wage rate	• educated	19.13	18.72	18.46	18.26
		(0.18)	(0.17)	(0.18)	(0.12)
	• less-educated	12.25	12.107	12.05	12.01
		(0.05)	(0.05)	(0.05)	(0.04)
	educated to less-educated	1.561	1.546	1.532	1.521
Years of schooling	• educated	17.45	17.47	17.56	17.63
		(0.05)	(0.04)	(0.04)	(0.03)
	• less-educated	12.21	12.33	12.44	12.57
		(0.02)	(0.02)	(0.02)	(0.02)
	educated to less-educated	1.429	1.416	1.412	1.402
Years of experience	• educated	13.31	12.70	12.76	12.49
		(0.23)	(0.23)	(0.23)	1
	• less-educated	12.59	12.30	12.32	(0.14)
		(0.09)	(0.10)	(0.23)	12.46
	educated to less-educated	1.057	1.032	1.036	(0.06)
					1.002
job tenure (years)	• educated	9.802	8.277	7.629	6.962
		(0.82)	(2.08)	(2.06)	(1.28)
	• less-educated	6.803	5.99	5.648	5.523
		(0.82)	(0.79)	(0.79)	(0.52)
	educated to less-educated	1.441	1.380	1.350	1.260
Labour supply (thousands)	• educated	6415	6840	7060	7279
		(12.33)	(12.79)	(13.32)	(8.59)
	• less-educated	8248	7992	7868	7866
		(6.88)	(7.29)	(7.90)	(5.40)
	educated to less-educated	0.777	0.855	0.897	0.925
Unemployment rate (percentage)	• educated	8.085	7.611	6.809	7.054
		(0.04)	(0.03)	(0.03)	(0.02)
	• less-educated	13.72	12.78	11.94	12.45
		(0.03)	(0.03)	(0.03)	(0.02)
	educated to less-educated	0.589	0.595	0.570	0.567
Full time/part-time ratio		3.956	3.956	3.676	3.279
Unionisation rate (percentage)	• educated	46.00	45.00	43.00	40.00
	• less-educated	30.00	28.00	28.00	27.00
	educated to less-educated	1.533	1.607	1.535	1.481
No of observations	All	16734	16977	15982	36297
	• male	8749	8853	8196	18522
	• female	7985	8124	7786	18270
	• educated	2262	2391	2327	5686
	• less-educated	14472	14586	13655	30611

Standard errors in parenthesis.

Source: author's weighted calculation from the SLID.

Table 4: Results of regression (9) with technology specified as the first type.

	(1) Semi-log ML Estimates	(2) Semi-log ML Estimates	(3) Log-Linear Estimates	(4) Log-Linear Estimates
Intercept	2.055362	2.034451	1.7132	1.7743
	(98.294)	(73.354)	(37.9066)	(30.0616)
TRADE	0.009787	0.005437	0.0077	0.00366
	(5.438)	(2.074)	(5.2367)	(1.7234)
ETRADE	0.022638	0.020211	0.03413	0.03252
	(6.684)	(4.611)	(8.5179)	(6.2003)
TECH1	0.064665	0.07007	0.0498	0.05095
	(5.834)	(4.87)	(5.6332)	(4.4368)
ETECH1	0.149657	0.133147	0.1307	0.11500
	(5.949)	(4.075)	(4.5482)	(3.07224)
EXP	0.018865	0.019901	0.0595	0.07637
	(19.276)	(15.497)	(4.9261)	(5.0631)
EXP^2	-0.000324	-0.000339	0.00199	-0.00242
	(-17.888)	(-14.306)	(0.6396)	(-0.6112)
TENURE	0.002589	0.002592	0.0071	0.00862
	(33.345)	(26.07)	(0.9375)	(0.8698)
$TENURE^2$	-0.000004052	-0.00000401	0.01192	0.01460
	(-19.407)	(-15.287)	(10.0465)	(9.4727)
FT	0.104002	0.093069	0.1074	0.1153
	(10.269)	(6.864)	(8.1129)	(6.5842)
LS	0.000018374	0.000016149	0.0472	0.03692
	(4.68)	(3.074)	(8.9918)	(5.3657)
SEX	0.228312	0.231183	0.2558	0.2506
	(37.256)	(28.76)	(36.5369)	(27.1739)
UNEMP	-0.021394	-0.021087	-0.01855	-0.01881
	(-26.098)	(-20.025)	(-18.8315)	(-14.9259)
UNIION	0.095322	0.093077	0.1200	0.10948
	(15.047)	(11.418)	(17.5823)	(12.3101)
Y1994	0.002841	0.006118	0.00637	0.00842
	(0.231)	(0.492)	(0.6748)	(0.8926)
Y1995	-0.009203	-0.004431	0.00245	0.0059
	(-0.731)	(-0.347)	(0.2509)	(0.6039)
Y1996	-0.01744	-------	-0.0107	-------
	(-1.63)		(-1.2993)	
CAPITAL	--------	0.011643	------	0.013559
		(2.017)		(3.0335)
Rsq	0.3669	0.3699	0.4409	0.4485
Durbin-Wat	2.103	2.1028	1.395	1.369
No of obs	19039	11049	15539	8982

t-ratios in parenthesis.

Table 5: Results of regression (10) from Logistic Procedure of Maximum Likelihood Estimation.

	(1)	(2)
Intercept	-0.9273 (42.247)	-0.6389 (11.439)
E	0.4053 (24.551)	0.4099 (13.168)
CVTRADE	0.0131 (32.340)	0.0153 (25.416)
TECH1	0.2712 (28.666)	0.2793 (16.242)
EXP	-0.0106 (35.096)	-0.0128 (29.782)
TENURE	0.0323 (2255.806)	0.0309 (1387.345)
FT	-0.2865 (20.046)	-0.363 (17.482)
LS	0.000267 (102.608)	0.000254 (50.449)
SEX	0.1564 (13.852)	0.1582 (7.889)
UNEMP	-0.0393 (42.011)	-0.0418 (27.716)
UNIION	0.0641 (1.836)	0.0809 (1.702)
Y1994	0.0861 (1.854)	0.0737 (1.356)
Y1995	0.2044 (10.147)	0.1893 (8.562)
Y1996	0.4143 (56.079)	-----
CAPITAL	-----	-0.067 (5.590)
No of obs	19083	11067

Chi-square statistics in parenthesis.

Table 6: Results of regression (7).

	(1) Instrumental Variable Estimates	(2) Instrumental Variable Estimates
Intercept	1.9545	2.0105
	(73.7144)	(101.565)
EXP	0.0170	0.01581
	(13.632)	(16.559)
EXP^2	-0.00028	-0.00025
	(-8.740)	(-10.183)
E*EXP	0.01224	0.01546
	(2.818)	(5.068)
$E*EXP^2$	-0.00015	-0.00029
	(-1.207)	(-3.242)
TENURE	0.00258	0.00255
	(22.662)	(28.629)
$TENURE^2$	-4.23E-06	-4.15-E-06
	(-14.091)	(-17.353)
E*TENURE	0.00305	0.0031
	(5.982)	(8.119)
$E*TENURE^2$	-9.42E-06	-9.28E-06
	(-6.404)	(-8.248)
FT	0.10515	0.10392
	(6.785)	(9.071)
LS	4.32-E-05	4.76E-05
	(7.532)	(11.236)
SEX	0.24309	0.24939
	(27.677)	(37.487)
UNEMP	-0.01482	-0.01511
	(-12.375)	(-16.323)
UNION	0.12595	0.14391
	(14.389)	(21.549)
Y1994	0.00760	0.00473
	(0.836)	(0.5182)
Y1995	0.01020	-0.0077
	(1.081)	(0.742)
Y1996	-----	-0.00775
		(-0.984)
CAPITAL	0.03156	------
	(8.365)	
Rsq	0.4697	0.4592
No of obs	9575	16804

t-ratios in parenthesis.

Table 7: Results of regression (11).

	(1) Fixed-Effect WGE Estimates	(2) Fixed-Effect WGE Estimates
Intercept	0.793819	-0.511095
	(27.877)	(-9.898)
E	0.777371	-0.673385
	(10.257)	(-4.006)
Tenure	0.020224	0.013803
	(57.867)	(22.789)
$tenure^2$	-0.000008237	0.000021733
	(-4.868)	(7.325)
*E*tenure*	0.005807	0.011495
	(6.604)	(6.78)
$E*tenure^2$	-0.0000445	-0.000002559
	(-8.973)	(-0.283)
Exp	0.090366	0.095702
	(43.916)	(38.735)
exp^2	-0.004949	-0.003401
	(-40.195)	(-21.164)
*E*exp*	0.148269	0.115023
	(21.874)	(11.131)
$E*exp^2$	-0.00649	-0.004627
	(-13.872)	(-6.169)
Spell	-------	-0.006165
		(-8.604)
$spell^2$	-------	0.000005397
		(5.861)
*E*spell*	-------	0.003607
		(1.761)
$E*spell^2$	-------	-0.00000431
		(-2.223)
Rsq	0.1752	0.1393
Durbin-Wat	1.1185	1.3266
No of obs	85980	28305

t-ratios in parenthesis.

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