The employment effect of a regional integration: The case of the Canadian and the US integration since the 80's, keeping EU-15 as benchmark.

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Abstract: In present world economy the advancement in the communication and globalization have made the physical distance between two countries, a thing of past. In the present era, developed countries are forging trading treaties with rest of the world to be able to sustain a certain economic growth. This paper investigates the effect of one of these treaties on the Canadian employment at industry level, keeping EU- 15 countries as a benchmark. I find that the FTA had a negative impact on Canadian employment, even though which is negligible, though within industries we do get to see significant swings in employment level over the time. Over all CUSTA did more good than harm to the Canadian Economy, contrary to what was suggested by the critics.

Introduction:

Globalization and leapfrog achievements in communications have made significant contributions in the way policy makers analyze trade. In 1989, Canada and the United States of America (US) signed the Free Trade Agreement (FTA). In this agreement, the two governments agreed to gradually bring the tariffs down to zero for all industries over a period of ten years. For the past two decades, trade liberalization has been a topic of interest with Canadian policy makers. In theory, economist's boasts in regards to trade liberalization, as post 1973 economic recession they relied on innovation to spur productivity growth. This jolt in the economy is directly related to employment levels at aggregate levels and within industry levels. In terms of economic theory, trade liberalization brings changes to the set of opportunities which firms search for within industries. This could be due to the policy for an industry or set of industries or change in the tariffs. As a result, firms start to investigate options regarding the new set of rules, which leads to the re-organization of firms not only at industry level, but at micro levels as well. Firms tend to learn from their past experiences. When this trend is investigated at aggregate levels, the economy tends to see adoption of new technologies, leading to a shift or change in the employment levels at inter and intra industry levels. As trade liberalization leads to an adjustment process in the economy due to specialization within the industries.

Economists expected the Canada-United States Free Trade Agreement (CUSTA) to rationalize the production in manufacturing industries and the reallocation of labour from high to low cost producers in Canada (Beaulieu, 2000). This resulted in the specialization and trade creation within industries, leading to an expansion in industries with a comparative advantage and vice-versa.

There has been a large number of studies completed on the effects of international trade on labour markets, but few have focused on the impact of CUSTA on the Canadian labour market, as noted in studies completed by

Beaulieu (2000) and Trefler (2001). Hence, the primary focus of this paper is to study the impact of trade liberalization on the Canadian labour market.

In an empirical examination of effects of CUSTA on the Canadian labour market, there was one important Canadian study performed by Gaston and Trefler (1997) that was of great significance. One important finding in their study is that tariff reduction accounted for only a fifteen percent decline overall in Canadian employment.

In this empirical study, I am looking at the empirical evidence post CUSTA period (i.e. 1989) to present available data (2007). My goal in this paper is to capture the effect of trade liberalization (i.e. tariff reductions) on the Canadian employment at industry level while keeping the European Union 15 (EU-15) as a benchmark. As Canada is actively engaging with the European Union (EU) in signing a FTA by the end of 2012, to be able to kick start the recent decline in economic growth and contain the large budget deficits.

Due to new trade talks, Politicians and Civic society is again fielding the same questions which were raised when Canada was going to sign the FTA with the US in 1989; whether the FTA with the EU will deplete jobs, will local sourcing of goods and services vanish, will drug and medical costs rise, etc. In order to provide an answer to the critics of the Canada-EU FTA, we have to study the impact of CUSTA on Canadian Labour markets first and foremost. Although this study will not be providing a precise answer to the critics, it will surely give some insight to a well-documented trade treaty. As to, how did the labour market react since the implementation of the CUSTA in 1989, at aggregate and industry level? Did the Canadian economy become more efficient in terms of productivity?

I think CUSTA acted as a lifesaver for the Canadian economy, as trade liberalization weeded out the inefficient players. As a result, we could see a decline in employment at the industry level, but it also provided cheap and easy access to the efficient players with massive growth potentials.

In section 2, I provide a detailed overview of the methodology applied in this empirical study and description of my data. Section 3 outlines the

econometrics behind my empirical study. I discuss the results in section 4 and provide with analysis, followed by the conclusion in section 5.

Section 2: Methodology And Data

I am using the entire European Union-15 as one of my independent variables rather than taking individual countries within the EU. I personally think the economic size, economic activity, production and technology of the US and EU-15 are comparable. Currently, the European Union (EU) is Canada's second largest merchandise export market after the US. In addition to this, it is one of Canada's largest investors second only to the US. As a result, it becomes easier to compare the two economies in relation to trade effect with Canada. I am specifically looking at US and EU economies because prior to the financial crisis in 2008, Canadian-US trade accounted for approximately seventy percent of total Canadian trade with the world. The crisis highlighted the dependence of Canada on US as a trading partner and its urgent need to diversify trading partners.

My model is based on the Daniel Trefler's (working paper 8293, 2001) analysis of Canada-US FTA. I will be modeling my analysis in line with this simple regression equation used by Trefler (2001):

$$\Delta y_{is} = \theta + \beta \Delta \tau_{is}^{FTA} + \gamma \Delta y_{is}^{US} + \varepsilon_{is}, \qquad s = 0, 1.$$

In this equation (y_{is})is the log change of Canadian Employment, where (i) is the years and (s) is pre and post FTA data analysis (where 0 is for pre and 1 for post FTA. (t_{is}) is the change in Canadian tariffs, that is the trade liberalization of Canadian trade due to the FTA. (y_{is}^{US}) is the log change of US employment and (ε_{is}) is the error term.

I have modified this regression equation used by Trefler (2001), by adding the imports and exports to EU-15 as a benchmark. Instead of doing a pre and post FTA study, I will be only analysing post FTA data (1989-2009).

$$\Delta y_i = \alpha + \beta \Delta t_i^{Imports} + \eta \Delta t_i^{Exports} + \gamma \Delta y_i^{US} + \varepsilon_i$$

Where (α) is a period dummy $= \alpha_1 - \alpha_0$

(ε) is error term.

(y_i) is log change of employment.

To achieve this, I am regressing Canadian log change of the employment share at industry level against multiple variables over time. These variables include: Log change of employment share at industry level for USA, Ratio of imports and exports from USA over EU-15. Due to data constraints, I do not have employment share for the EU-15, as I would like to introduce this variable as well in the regression analysis. I am adding US and EU-15 benchmarks so that I am able to compare after effects of the FTA with US and what can be expected after Canada-EU FTA at the industry level. I am using the import/export data from EU-15 to study the changes in Canadian trade pattern (post Canada-US FTA.), due to the trade liberalization. My main focus is on capturing changes in employment at industry level.

I will be using Fixed Effect (FE) estimator method to analyse the regression. Trefler and a few other noted researchers have also used IV method for this type of analysis, but I have decided to use FE estimator.

Overall, collecting the data was challenging since data available for tariff at industry level changes is not available for public use. In order to capture the effects in employment through tariff changes, I am using the import and export data from USA and EU-15 at industry levels from 1988 until 2009. Analysis of tariff changes is based on:

$$\Delta t_i^{Imports} = Log\ change\ in\ USA\ imports / Log\ change\ in\ EU(15)\ imports$$

$$\Delta t_i^{Exports} = Log\ change\ in\ USA\ exports / Log\ change\ in\ EU(15)\ exports$$

where (i) is number of years. These import and export ratios help me to capture the tariff effect, as I am anticipating decline in tariff rates will increase imports

from and exports to US rather than EU-15. For the industries to be able to maximize welfare.

My employment data is the percentage share of total employment at industry levels for Canada and the USA. However, I am experiencing trouble in finding data for EU-15 since data for a few countries is not available. With the available data, I have created a panel data set to be able to analyse the regression.

List of the Chosen Industries:

Agriculture, Forestry and Fishing; Mining and Quarrying; Total Manufacturing; Wood and Cork; Pulp, Paper, Printing and Publishing, Coke refined petroleum and nuclear fuel; Pharmaceuticals; Rubber and Plastic, Machinery and Equipment; Transport Equipment; High technology, Medium-High tech, Medium-Low tech and Low technology manufacturers.

I am analyzing and interacting US employment with Canadian Imports ratio and Exports from the US. Adding these new variables in the regression allows me to analyze the effect on Canadian employment if Canada decides to switch imports or exports to the EU-15 rather than continuing to trade with the USA for a given commodity.

i.e. $Interact = Log\ of\ US\ employment * Canadian\ Imports\ ratio\ (US/EU15)$

$Interact1 = Log\ of\ US\ employment * Canadian\ Exports\ ratio\ (US/EU15)$

Hence now my final regression will look like:

$$\Delta y_i = \alpha + \beta \Delta t_i^{Imports} + \eta \Delta t_i^{Exports} + \gamma \Delta y_i^{US} + \emptyset\ Interact_i + \partial Interact1_i + \varepsilon_i$$

Due to the nature of data and the possibilities of manipulating the financial markets at Industry level for personal monetary gains, the Canadian tariff data is classified by the Canadian government, stated in Treflers (2001) working paper as well. The entire data set at industry level is from Organisation for Economic Co-operation and Development's (OECD) structural analysis statistics (STAN) library website. The mentioned 14 industries import/export data used in this study is based on the industries that trade most actively with the USA. Hence, the

Canadian-EU (15) trade (import/export) data is based on these 14 industries to follow the symmetry. The employment share data for Canadian and USA economy at the chosen industry level is also from OECD's STAN Indicators website. The industry level data is at ISIC revision 3 (A-X) codes. In order to analyze the data and perform regression analysis, I had to bring the corresponding units to same level. Hence, my entire data set is converted to log point change and the coefficient's of my determinants can be represented as elasticity's.

Section 3: Econometrics

I am using Fixed Effect (FE) estimation for my regression in order to control for unobserved heterogeneity. In this panel data set, heterogeneity lies within the Industries as my data is at industry level. The reasoning behind heterogeneity is that firms or individuals have some unique characteristics that are known to the firm or individual but not to the econometrician that needs to be taken into account, as stated in Pedra Todd (2007) and Yair Mundlak's (1961) FE model.

Some econometrician's can argue that Random Effect (RE) can also be used for regression analysis, as RE is efficient and FE is inefficient. It can be shown in a few econometric theories that RE is preferred over FE if we can be sure individual specific effect is an unrelated effect. Since one of the main assumptions made in RE is that individual specific effect is uncorrelated with the explanatory variables of all past, current, and future time periods of the same individual. This is a very strong assumption made in the analysis, and in most cases FE estimator is more convincing than RE estimator. This theory is tested under the Hausmann test, where we compare the $\hat{\hat{\beta}}$'s of RE and FE for the subset of co-efficient of time-varying variables, as stated by Kurt Schmidheiny (Spring, 2012):

$$H = (\hat{\beta}_{FE} - \hat{\beta}_{RE})'[\hat{V}\hat{\beta}_{FE} - \hat{V}\hat{\beta}_{RE}]^{-1}(\hat{\beta}_{FE} - \hat{\beta}_{RE}) \overset{A}{\sim} \chi^2_J$$

Where the null hypothesis states that individual-specific effect is uncorrelated with the regressors and the errors are equicorrelated. Meaning under H_0, $\hat{\hat{\beta}}$ for RE is consistent and efficient, $\hat{\hat{\beta}}$ for FE is inefficient, but consistent. Under alternate hypothesis (H_A):$\hat{\hat{\beta}}$ for RE is inconsistent, but $\hat{\hat{\beta}}$ for FE remains consistent.

Hence, I ran both Fixed and Random Effect to be able to compare respective $\hat{\hat{\beta}}$ for Hausmann Test. My test results are also in line with the economic theory suggested above. $\hat{\hat{\beta}}$ for Fixed Effect estimation is consistent under both H_0 and H_A. On the other hand, $\hat{\hat{\beta}}$ for Random Effect estimation is inconsistent underH_A and efficient under H_0.

One of the drawbacks of using FE estimator is that it still assumes

$$Cov(x_{it}, \epsilon_{is}) = 0, \text{ for all t and s.}$$

The above assumption is for strict exogeneity. If this assumption is violated then we have to deal with the problem of an endogeneity, that is the independent variable and the idiosyncratic error term are correlated. As the theory suggests under endogeneity the Fixed Effect-estimator will be biased. Hence endogeneity will be problematic even with panel data. This endogeneity problem could arise due to the following factors:

- Period Effects, meaning there were systematic shocks in the economy after X was altered. In this study, Canadian employment (Δy_i) was effected by the changes in tariffs and after that the economy went through systematic shocks (which could be related to the technology/natural resources and financial markets boom and bust).
- Unobserved heterogeneity due to the omitted variables.
- Simultaneity and Measurement error (i.e. errors in reporting of X, in this study it will correlate to the employment.).

To overcome the endogeneity issue, theory suggests the use of structural equation model or I.V. method of estimation. This was also noted by econometric study done by Trefler (2001), Baeaulieu (2000), as his study states I.V. estimation implies larger Free Trade Impacts than the Ordinary Least Squares (OLS) results. He also agrees with the econometric theory mentioned above, as I.V estimation requires very strong assumptions regarding instrument validity. As a result, I have not considered doing I.V. estimation.

Section 4: Results

The empirical analysis suggests a different picture on the aggregate Canadian employment within these most traded industries, over the period of 20 years (that is from 1989 until 2009). The independent variable of US employment has a positive sign in front of its co-efficient, and this variable is statistically significant. The positive sign can be interpreted as; the US economy saw an overall gain in the employment share from the trade liberalization with Canada post 1989, within these industries. Meaning with a rise of employment by 1 percent in US, Canadian employment rose by 0.0611 percent. Mean while Canadian economy witnessed a fall in employment within these industries as exports rose. Meaning Canadian employment fell by 0.0000462 percent with 1 percent change in exports. On the other hand, with 1 percent change in imports by Canadian economy, employment fell by 0.0418 percent. Though we can disregard these falls in employment, as they are statistically insignificant at 5 percent level. Common sense would suggest us; if exports in an economy are rising then there should be a positive effect on the employment rate. But the results contradict, due the weeding out of inefficient players. This directly corresponds to the rise in unemployment; most of these employees are re-hired or absorbed by the efficient players, there is always a fraction of residual group of who are not able find a job. Hence the negative sign in front of the coefficients.

I am most amazed by the results of interacting US employment share with imports and exports ratios (*Interact* and *Interact1*). The negative sign in front of

Interact and positive sign in front of *Interact1*, suggests one percent change in Imports from US will approximately correspond to 0.0136 percent fall in Canadian employment than compared to EU-15 countries. Similarly, one percent change in Exports to US will approximately correspond to 0.601 percent rise in Canadian employment than compared to EU-15 countries. Though the later coefficient is statistically insignificant. Hence, the interaction of employment share with exports and imports portray a small effect of CUSTA on the Canadian employment.

After graphing and analyzing Employment share at fourteen of the most traded Canadian industries in terms of imports and exports. It could be concluded that Total Manufacturing, which has the highest employment share out of the chosen industries saw a steep fall in employment from 1989 until 1994. After 1994 the total manufacturing industry in Canada saw an increase in employment until 2002 and then it began to decline. However; it is interesting to note that through 1992 to 1994 both countries had approximately the same share of employment in total manufacturing.

Although the Mining and Quarrying industries saw some labour adjustments post FTA period, over the years a positive trend can be seen for employment within the industry, with a sharp rise in employment post 2002.

Canadian Wood and Cork Industry saw a sharp decline in employment immediately following the implementation of FTA for two years, then an increase employment until 1994. After 1994, we can see a steady fall in employment with few gains in the late 1990's. On the other hand, during the same period US employment in the same industry saw modest fall and gains, but over the years FTA in general did not have a major visible impact on employment within industry. This could be attributed to the Wood and Cork industry being protected within Canada and post FTA, larger efficient players either bought out inefficient players or they were forced to shutdown. Therefore there was a significant number of lay offs rights after implementation of the FTA. The steady decline in the employment post FTA until recent years can also be attributed to the availability of cheaper products from the USA; therefore, it becomes cheaper to

import from USA rather than have products made in Canada (economies of scale.).

Similarly the Pulp, Paper, Printing and Publishing Industries saw a considerable fall in employment post FTA until 1994 and then it plateaued. Overall, this industry also witnessed a decline in employment over the years post FTA implementation. Although employment in the USA within the industry was not effected drastically compared to the Canadian employment, it did see a modest decline in employment over the years.

In the case of Coke, Refined Petroleum and Nuclear Fuel Industries; employment took a major toll and fell drastically after the implementation of the FTA until 2002. Post 2002, employment in this industry took a U-turn and Canadians saw a spike in employment. This spike in employment can be attributed to the full potential production of Crude Oil from Oil Sands in Alberta, since in 2002 Canada reached its highest oil production post FTA period. Hence a shift in work force due to the shortage of labour on supply side within the industry.

I think the Pharmaceutical and Rubber/Plastic Industries benefited the most during this period (i.e. 1989-2007). Both industries saw few surprises during the period, but witnessed employment rise on average, more specifically within the Rubber and Plastic Industries, as post 1989 it saw a decline in the workforce, but after 1993 on average it saw a steady rise in employment. Yet again, one of the reasons for this could be the restructuring of the industry, inefficient players leaving a market reflecting the decline in employment, and efficient players gaining the vast US market due to the reduction in trade barriers. Trade liberalization also brought easy capital access, which is much needed for the investment in Research and Development within Pharmaceutical industry. Hence, we see significant rise in employment from 1993 until 2007.

The Machinery and Equipment Industry is one of the biggest losers in terms of employment through trade liberalization. The share of employment in this industry fell drastically after 1989, then plateauing until the late 1990's and

early 2000, but after that we see a constant decline. One of the reasons for this drop could be again relocating multi-national organizations, as it was now cheaper for them to produce in the US and export the product to Canada due to trade liberalization. This coupled with weeding out of inefficient players from Canadian markets. Another reason for this sharp fall could also be due to the globalization and rise of Sino manufacturing, as Canadian producers shifting their production to China due to abundance of cheap labour and lower production costs.

One of the other most protected industries in Canada pre-1989 era was the Agriculture, Forestry and Fishing Industries. This was due to the sheer size of the US economy and the basic economic principle of economies of scale. Due to the size of US economy and its reach, the availability of cheaper agriculture and fishing products can be attributed to the protection of this industry. Hence we can see a sharp fall in employment within this industry post FTA untill 2007. Specially the fishing industry, as most of the North Atlantic Canadian coast's livelyhood was dependent on fishing industry, but the availabilty of cheaper products from the US and coupled depleting fishing reserves can be attributed to the sharp fall in the employment within this industry.

Transport Equipment Industry also saw a sharp fall in employment from 1989 until 1993, post 1993 we can see a rise in employment until 1995, through 1995 we can see employment reaching a plateau until 1999 and post 1999 sharp decline in the employment. Yet again, this trend can be attributed to the weeding out of inefficient players from the Canadian market, coupled with the availability of cheaper labour in China and South-Eastern Asian countries. Also the rise of local players from Asian countries, as post FTA there hasn't been any major investment made to upgrade transport infrastructure in Canada as compared to China and other Asian giants. As a result, Canadian transport equipment makers had to compete with major European and local manufacturers.

Employment in High Technology Manufacturing Industry did not see drastic change than its other manufacturing peers. Still this industry did see a

negative trend in employment within the industry, this could be due to the fact that High Technology is a niche industry. Due to the protection of intellectual property it is hard to shift production and gain highly skilled labour, but the fall in employment can be attributed to the brain drain. On the other hand Medium-High, Medium-Low and Low Technology manufactures saw sharp fall in the employment within respective industries post 1989 until 2007. Fall in these industries again can be attributed to the shifting of production facilities outside of Canada, due to access of cheaper production costs that came from the implementation of FTA in 1989. Not only, the weaker and inefficient players where weeded, but trade liberalization brought cheaper avenues for production.

To conclude my regression results, we can see positive fixed effect between US and Canadian employment, as the constant has a positive value, even though statistically it is insignificant at 5 percent level. This positive sign can be comprehended as, if a particular industry hires employees in US, the same positive effect can be seen in Canadian Industry.

4.1 Result Analysis:

As economists cannot provide a solution to the problem, they can provide policy makers with options and then it is up to them to decide the path they want the economy to move. There is neither a specific formula nor a method to access and predict the full effects of an economic policy until we actually witness the results. Similarly, after analyzing these empirical results I can confidently say that at the industry level the Canadian labour market went through turmoil. Heavily protected industries had more of a negative impact than others, plus the economy saw classic effects of trade liberalization as well. Meaning, inefficient players were either bought or forced out of the market, as it was reflected in the sudden fall of employment after implementation of CUSTA in 1989. Though the decline in employment in the Canadian economy cannot just be attributed to the effects of trade liberalization, as prior to CUSTA multi-national companies (MNC) were producing products in Canada just for Canadian markets. With trade liberalization, it was economically efficient and availability of cheaper logistics for

these MNC's to consolidate their production (applying economies of scale). For example; General Motors was producing cars and trucks in Canada specifically for the Canadian markets prior to the CUSTA, but after the FTA was introduced they reorganized production by shifting production of certain vehicles to the US and importing them back into Canada. Though most of the parts were manufactured in Canada, but post FTA it was cheaper and more profitable for General Motors to produce Canadian market bound cars in US. This shifting of production can also be attributed to the decline in employment at industry levels, and vice-versa. This phenomenon is called 'hollowing out'; as it implies firms maintain some local presence rather than exiting the local market, but import most of the value-added products from offshore facilities (Baldwin and Gu, 2004).

Interesting fact is that when we analyse the regression results we can conclude that yes indeed the Canadian economy saw a decline in employment, but at aggregate level it does not have major significance. For example, employees who were given pink slips in a certain industry eventually found jobs in other growing/expanding industries. Hence implying, re-structuring of Canadian industries, in return industries gained competitive advantage over its internal peers and vice-versa. Prior to 1989, the Canadian economy was running large trade deficits and massive debt levels to be able to fill the budgetary gaps this lead economist to believe that Canada was an underachiever amongst the developed nations. Now after two decades of CUSTA, it can be definitely comprehended that the Canadian economy has restructured and is much more efficient than before, though most of the brunt of restructuring was bared by the labour industry. FTA with EU will also increase the welfare effect for the consumers; with additional variety of products to choose from and competitive prices for products due to rise in competition.

Section 5: Conclusion

I can conclude that signing a Free Trade Agreement with the EU will certainly affect Canadian labour and industries, but yet again we need these

reforms and re-structuring to be able to compete with rising Asian-Powers and G8 countries. The new FTA with the EU will certainly have impacts on industries that are still heavily protected. For example; highly subsidized and supply managed agriculture industry. On the other hand, Canadian industries that have a competitive advantage will gain cheap and easier access to a $17 trillion economy with a population of 500 million.

Hence the aim of this empirical study was to provide an over view of the impact of CUSTA on the Canadian employment. Yes! The critics of CUSTA were right in raising their concerns, but apart from a small negative impact on the employment level, Canadian economy came out as a mature and refined competitive economy. This study is also able to capture the tariff effect, as we saw fall in Canadian employment with rise of imports from US rather than from EU-15 countries. To be able to project Canada's economic might and solidity, it still needs major reforms in certain industries and these reforms will come as a by-product of FTA with European Union.

Appendix:

List of EU (15) Countries:

Austria
Belgium
Denmark
Finland
France
Germany
Iceland
Italy
Greece
Luxembourg
Netherlands
Norway
Portugal
Spain
Sweden

REGRESSION RESULTS:

		Fixed Effect	Random Effect
R-sq:	within =	0.3305	0.3299
	between =	0.3711	0.3959
	overall =	0.3322	0.3333

	Robust Coefficients	
Canadian Employment l	Fixed Effect	Random Effect
US Employment l	0.6110727 *(0.000)**	0.6290151 *(0.000)*
Ratio US/EU(15) Exports l	-4.62e-07	-0.0000152
	(0.987)	*(0.573)*
Ratio US/EU(15) Imports l	-0.0004182	-0.0004227
	(0.057)	*(0.038)*
Interact l	-0.0136114	-0.0131625
	*(0.014)**	*(0.014)*
Interact1 l	0.0060114	0.0021602
	(0.282)	*(0.680)*
time l	-0.0018324	-0.0018342
	*(0.000)**	*(0.000)*
timedum2 (1989) l	(dropped)	(dropped)
timedum3 (1990)l	-.032303	-0.0322706
	*(0.000)**	*(0.000)*
timedum4 (1991)l	-.0352775	-0.0354258
	*(0.001)**	*(0.000)*
timedum5 (1992)l	-0.0109709	-0.0111404
	(0.292)	*(0.205)*
timedum6 (1993)l	0.003731	0.0036483
	(0.729)	*(0.729)*
timedum7 (1994)l	0.0064256	0.006085
	(0.622)	*(0.626)*
timedum8 (1995)l	0.0205832	0.0201896
	(0.087)	*(0.078)*

timedum9 (1996)l	0.0237474	0.0232942
	*(0.013)**	*(0.004)*
timedum10 (1997)l	0.0318183	0.0316459
	*(0.010)**	*(0.014)*
timedum11 (1998)l	-0.0010066	-0.0020451
	(0.928)	*(0.827)*
timedum12 (1999)l	0.026088	0.0258783
	*(0.019)**	*(0.022)*
timedum13 (2000)l	0.0408029	0.0404918
	*(0.001)**	*(0.002)*
timedum14 (2001)l	-0.0005528	-0.000147
	(0.969)	*(0.992)*
timedum15 (2002)l	0.0269119	0.026956
	*(0.012)**	*(0.003)*
timedum16 (2003)l	0.0449588	0.0452734
	*(0.013)**	*(0.013)*
timedum17 (2004)l	0.0365082	0.0364003
	*(0.005)**	*(0.005)*
timedum18 (2005)l	0.0245263	0.0243376
	*(0.002)**	*(0.002)*
timedum19 (2006)l	0.0045332	0.0044295
	(0.660)	*(0.654)*
timedum20 (2007)l	(dropped)	(dropped)
timedum21 (2008)l	(dropped)	(dropped)
timedum22 (2009)l	(dropped)	(dropped)
_cons l	3.649927	3.653755
	*(0.000)**	*(0.000)*

* Significant at 5 percent significance level.

Random Effects
note: timedum2 dropped because of collinearity
note: timedum20 dropped because of collinearity
note: timedum21 dropped because of collinearity
note: timedum22 dropped because of collinearity

(Durbin-Wu-) Hausman Test: Fixed Effect Versus Random Effect

---------- Coefficients ----------				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	b_RE	b_FE	Difference	S.E.
US Employment	.6290151	.6110727	.0179423	.
Ratio US/EU(15)	-.0000152	-4.62e-07	-.0000147	.
Exports				
Ratio US/EU(15)	-.0004227	-.0004182	-4.49e-06	.
Imports				
Interact	-.0131625	-.0136114	.0004489	.
Interact1	.0021602	.0060114	-.0038512	.
time	-.0018342	-.0018324	-1.72e-06	.
timedum3 l	-.0322706	-.032303	.0000324	.
timedum4 l	-.0354258	-.0352775	-.0001482	.
timedum5 l	-.0111404	-.0109709	-.0001695	.
timedum6 l	.0036483	.003731	-.0000827	.
timedum7 l	.006085	.0064256	-.0003406	.
timedum8 l	.0201896	.0205832	-.0003937	.
timedum9 l	.0232942	.0237474	-.0004532	.
timedum10 l	.0316459	.0318183	-.0001724	.0041947
timedum11 l	-.0020451	-.0010066	-.0010385	.
timedum12 l	.0258783	.026088	-.0002097	.0022335
timedum13 l	.0404918	.0408029	-.0003111	.0057753
timedum14 l	-.000147	-.0005528	.0004058	.000581
timedum15 l	.026956	.0269119	.0000441	.
timedum16 l	.0452734	.0449588	.0003146	.0033908
timedum17 l	.0364003	.0365082	-.0001079	.0021064
timedum18 l	.0243376	.0245263	-.0001887	.
timedum19 l	.0044295	.0045332	-.0001037	.

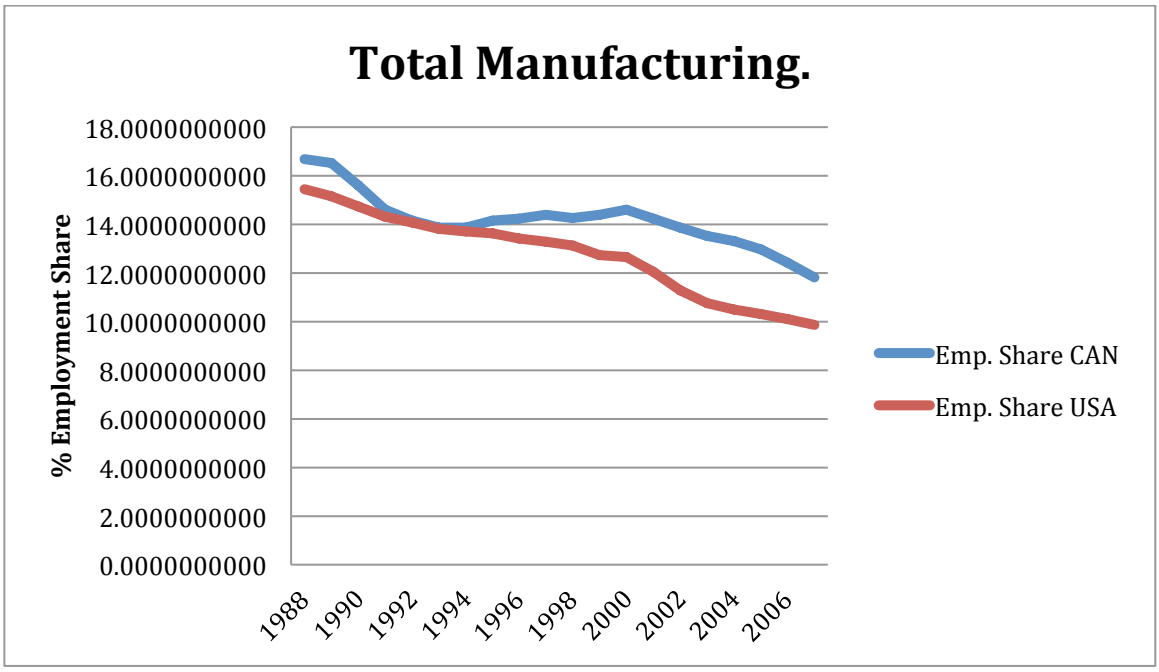
b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

χ^2 (23) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 1.77
Prob>χ^2= 1.0000
(V_b) – (V_B) is not positive definite.

Graphs:

1.



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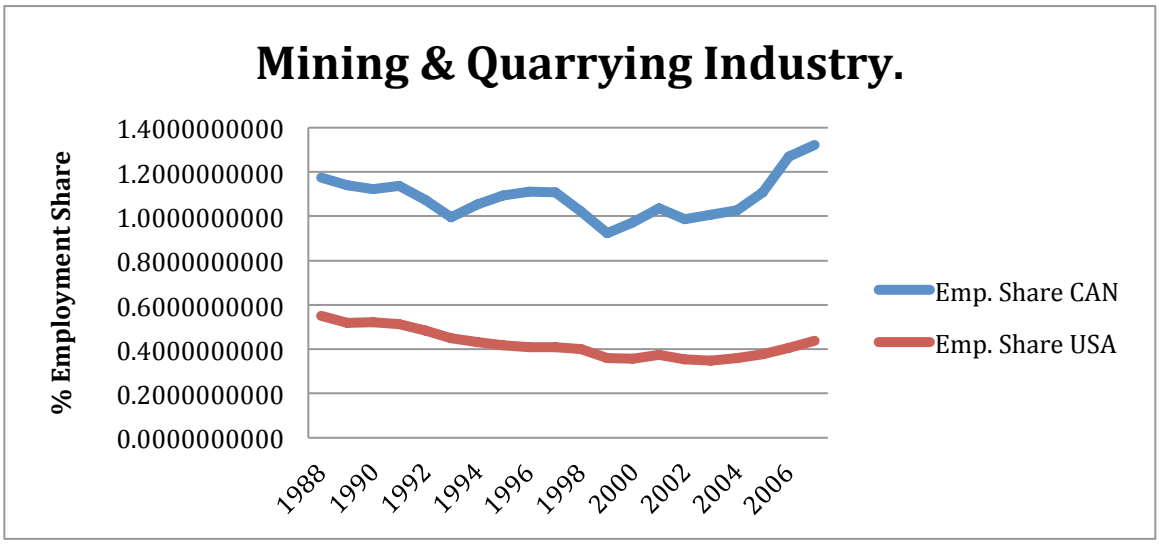
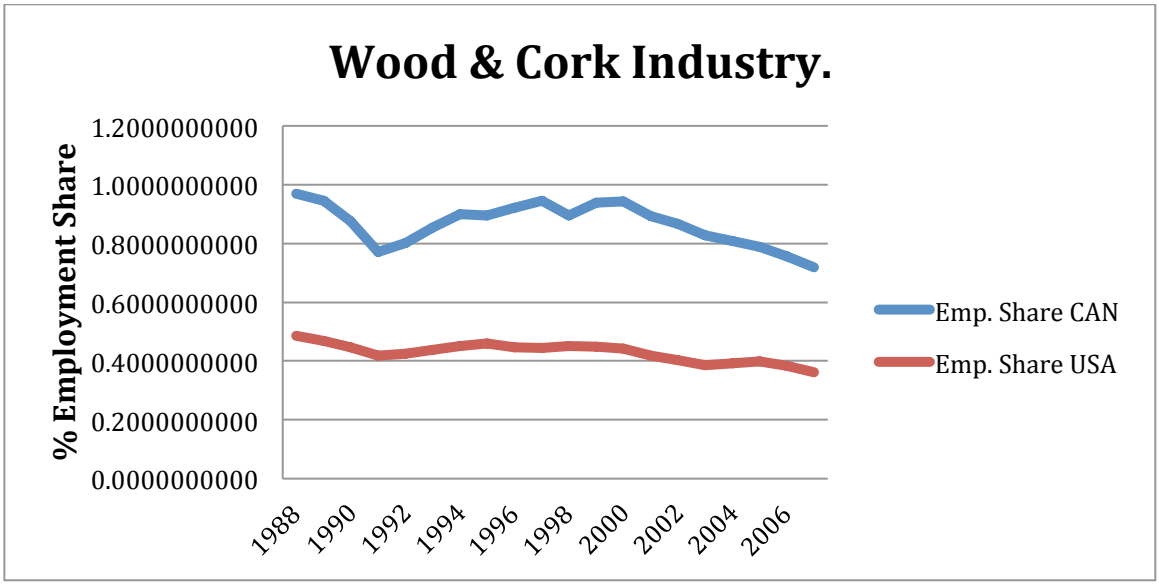
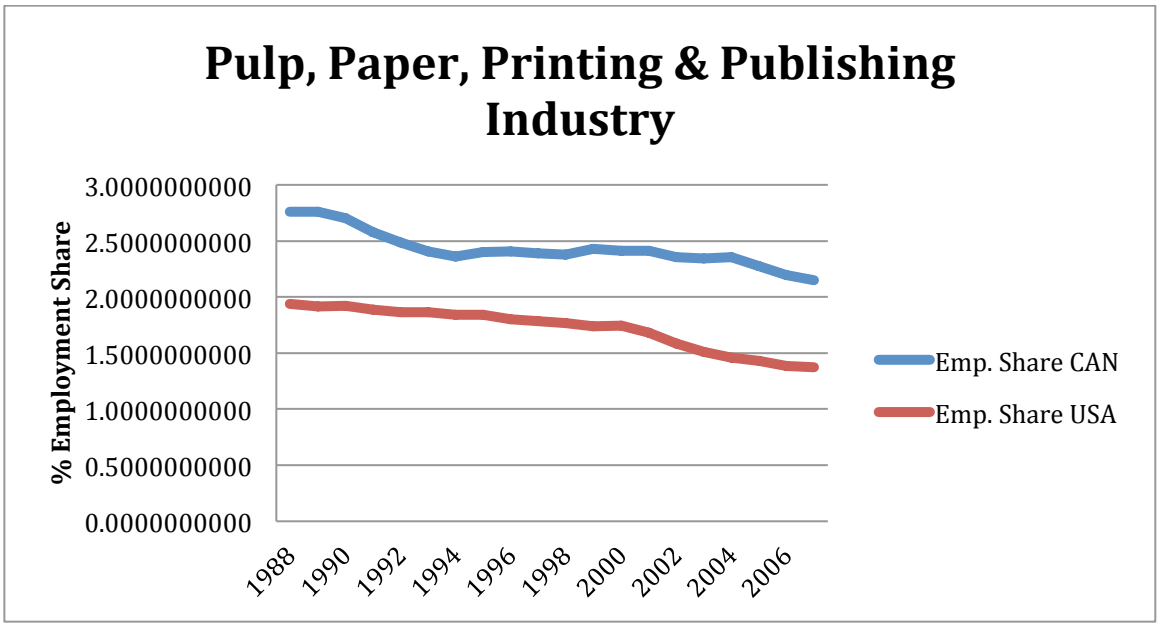

Mining & Quarrying Industry.
% Employment Share
1.4000000000
1.2000000000
1.0000000000
0.8000000000
0.6000000000
0.4000000000
0.2000000000
0.0000000000
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
Emp. Share CAN
Emp. Share USA

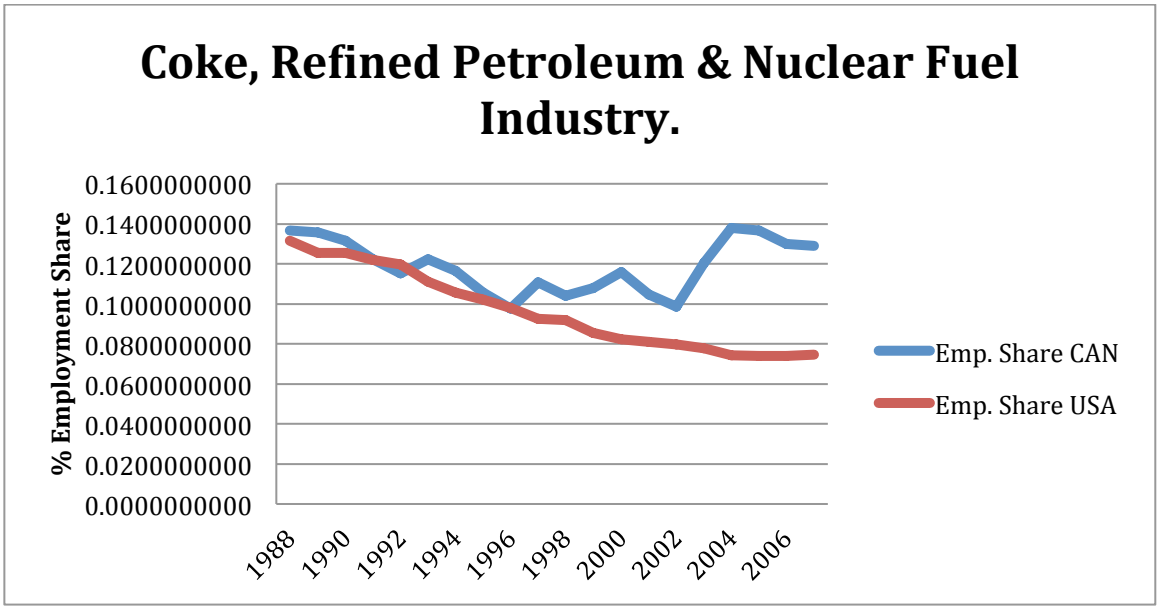
3.


Wood & Cork Industry.
% Employment Share
1.2000000000
1.0000000000
0.8000000000
0.6000000000
0.4000000000
0.2000000000
0.0000000000
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
Emp. Share CAN
Emp. Share USA

4.


Pulp, Paper, Printing & Publishing Industry
% Employment Share
3.0000000000
2.5000000000
2.0000000000
1.5000000000
1.0000000000
0.5000000000
0.0000000000
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
Emp. Share CAN
Emp. Share USA

5.


Coke, Refined Petroleum & Nuclear Fuel Industry.
% Employment Share
0.1600000000
0.1400000000
0.1200000000
0.1000000000
0.0800000000
0.0600000000
0.0400000000
0.0200000000
0.0000000000
1988
1990
1992
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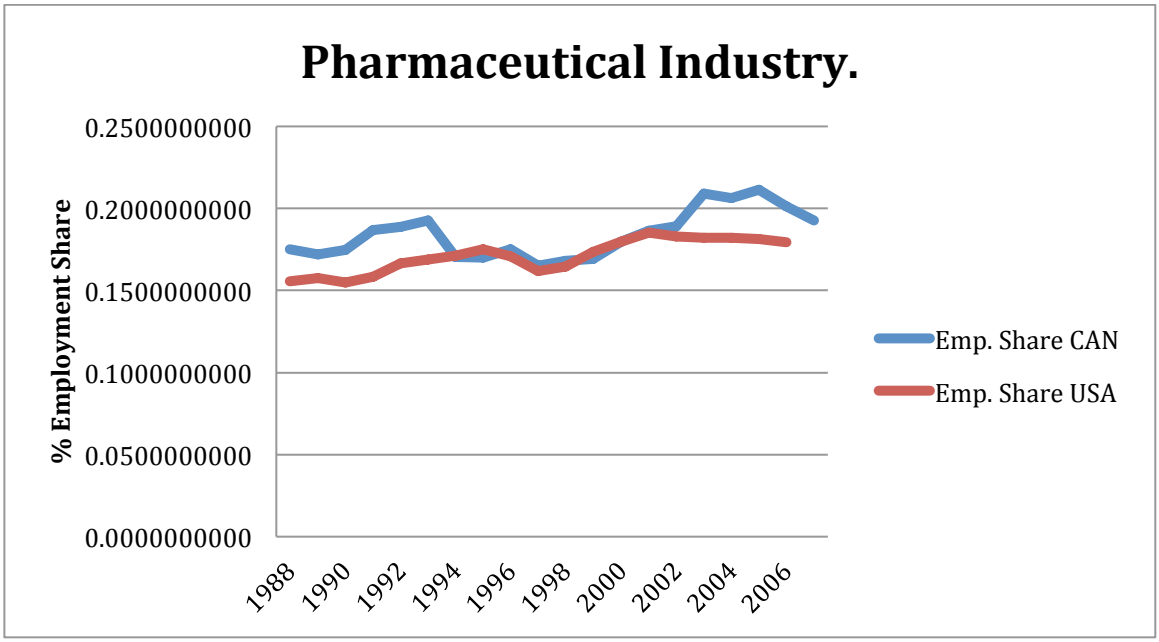
1996
1998
2000
2002
2004
2006
Emp. Share CAN
Emp. Share USA

6.


Pharmaceutical Industry.
% Employment Share
0.2500000000
0.2000000000
0.1500000000
0.1000000000
0.0500000000
0.0000000000
1988
1990
1992
1994
1996
1998
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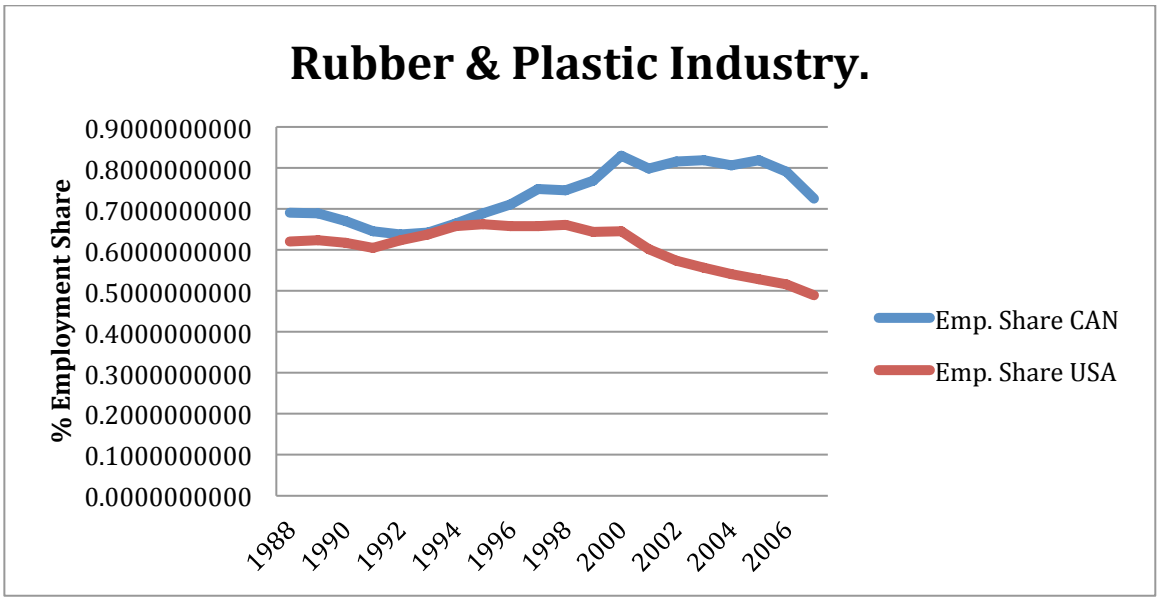
2002
2004
2006
Emp. Share CAN
Emp. Share USA

7.


Rubber & Plastic Industry.
% Employment Share
0.9000000000
0.8000000000
0.7000000000
0.6000000000
0.5000000000
0.4000000000
0.3000000000
0.2000000000
0.1000000000
0.0000000000
1988
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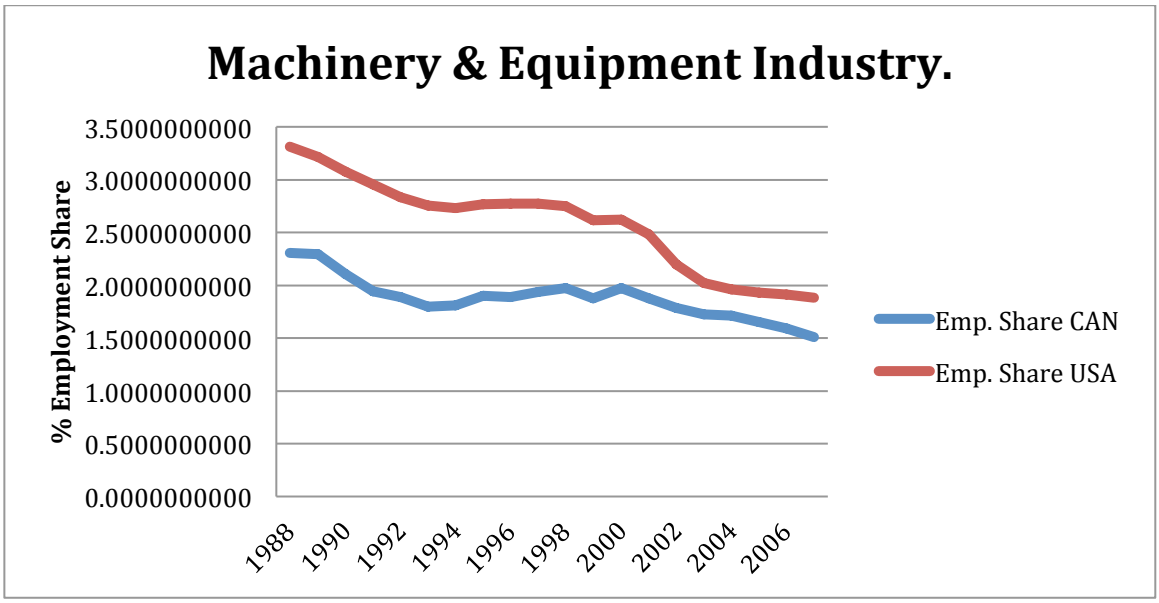
2002
2004
2006
Emp. Share CAN
Emp. Share USA

8.


Machinery & Equipment Industry.
% Employment Share
3.5000000000
3.0000000000
2.5000000000
2.0000000000
1.5000000000
1.0000000000
0.5000000000
0.0000000000
1988
1990
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1994
1996
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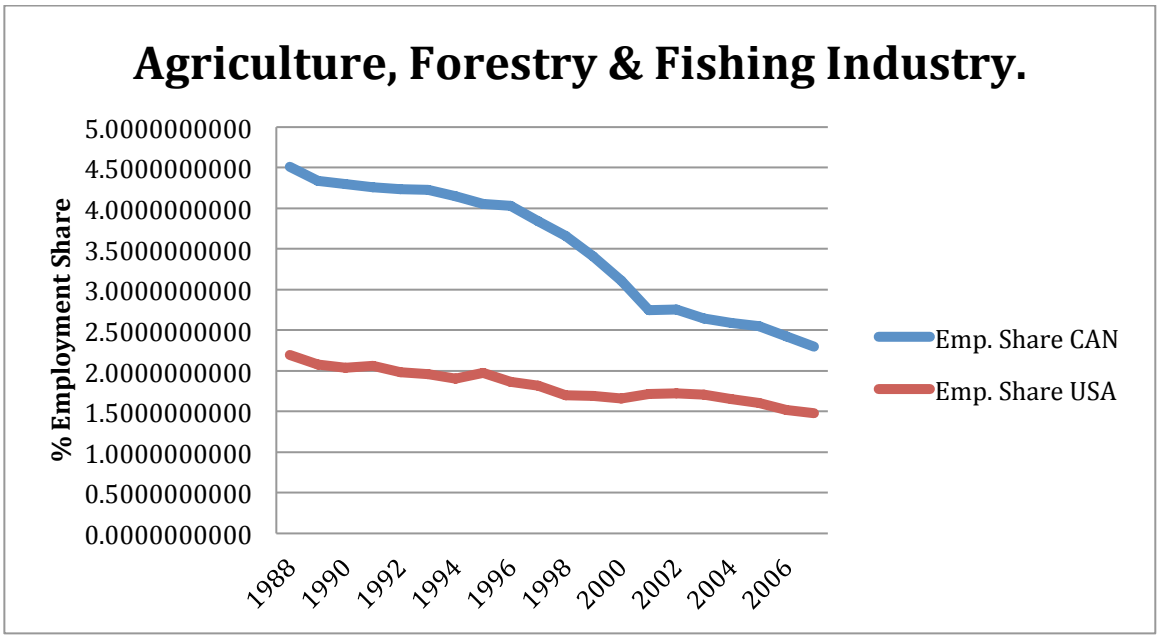
2002
2004
2006
Emp. Share CAN
Emp. Share USA

9.


Agriculture, Forestry & Fishing Industry.
% Employment Share
5.0000000000
4.5000000000
4.0000000000
3.5000000000
3.0000000000
2.5000000000
2.0000000000
1.5000000000
1.0000000000
0.5000000000
0.0000000000
1988
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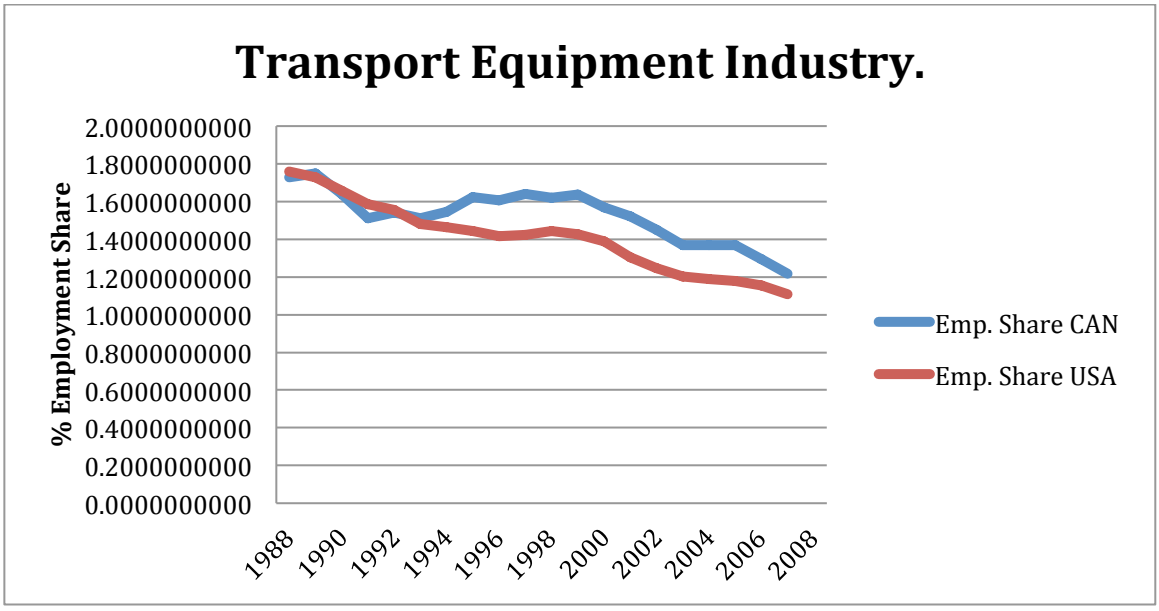
2004
2006
Emp. Share CAN
Emp. Share USA

10.


Transport Equipment Industry.
% Employment Share
2.0000000000
1.8000000000
1.6000000000
1.4000000000
1.2000000000
1.0000000000
0.8000000000
0.6000000000
0.4000000000
0.2000000000
0.0000000000
1988
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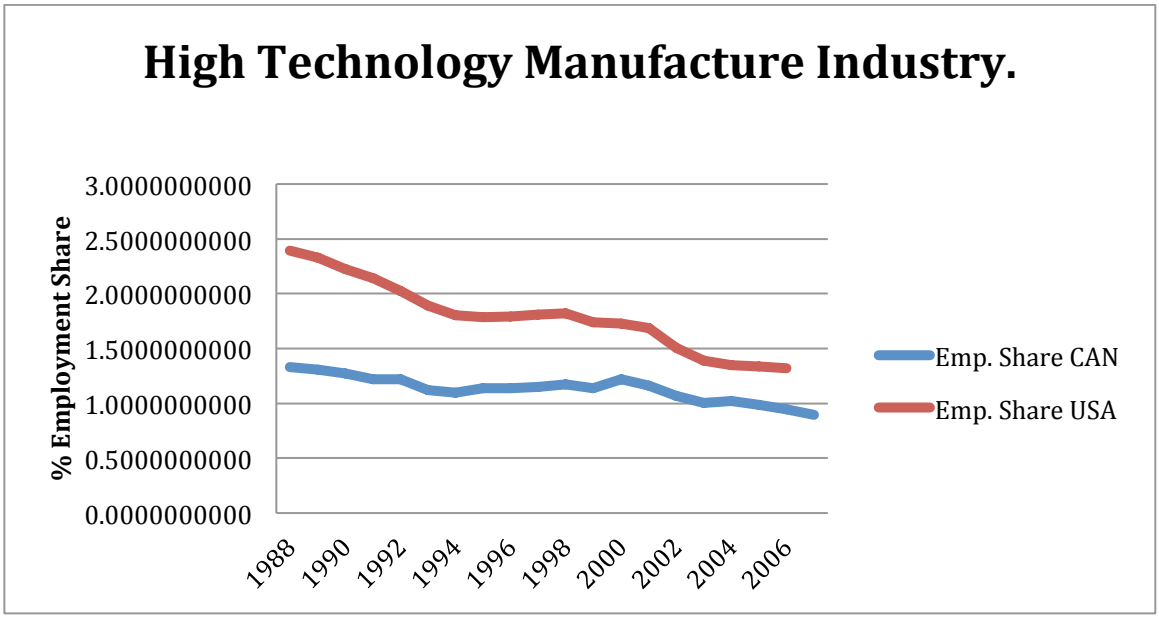
2008
Emp. Share CAN
Emp. Share USA

11.


High Technology Manufacture Industry.
% Employment Share
3.0000000000
2.5000000000
2.0000000000
1.5000000000
1.0000000000
0.5000000000
0.0000000000
1988
1990
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1996
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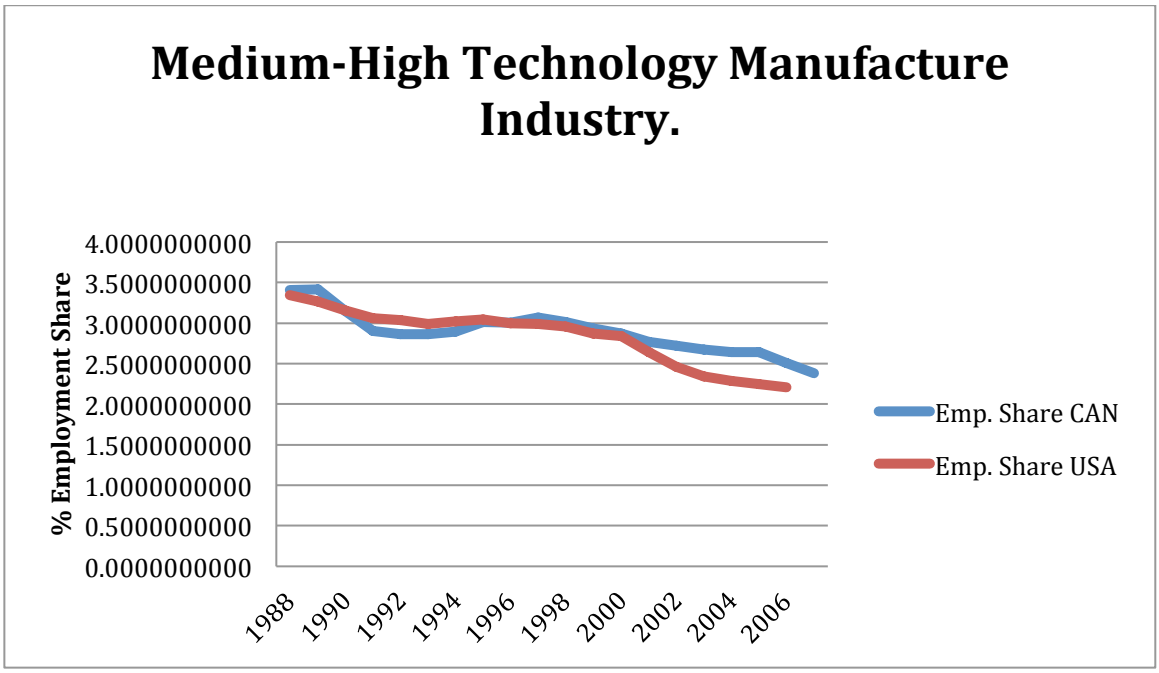
2002
2004
2006
Emp. Share CAN
Emp. Share USA

12.


Medium-High Technology Manufacture Industry.
% Employment Share
4.0000000000
3.5000000000
3.0000000000
2.5000000000
2.0000000000
1.5000000000
1.0000000000
0.5000000000
0.0000000000
1988
1990
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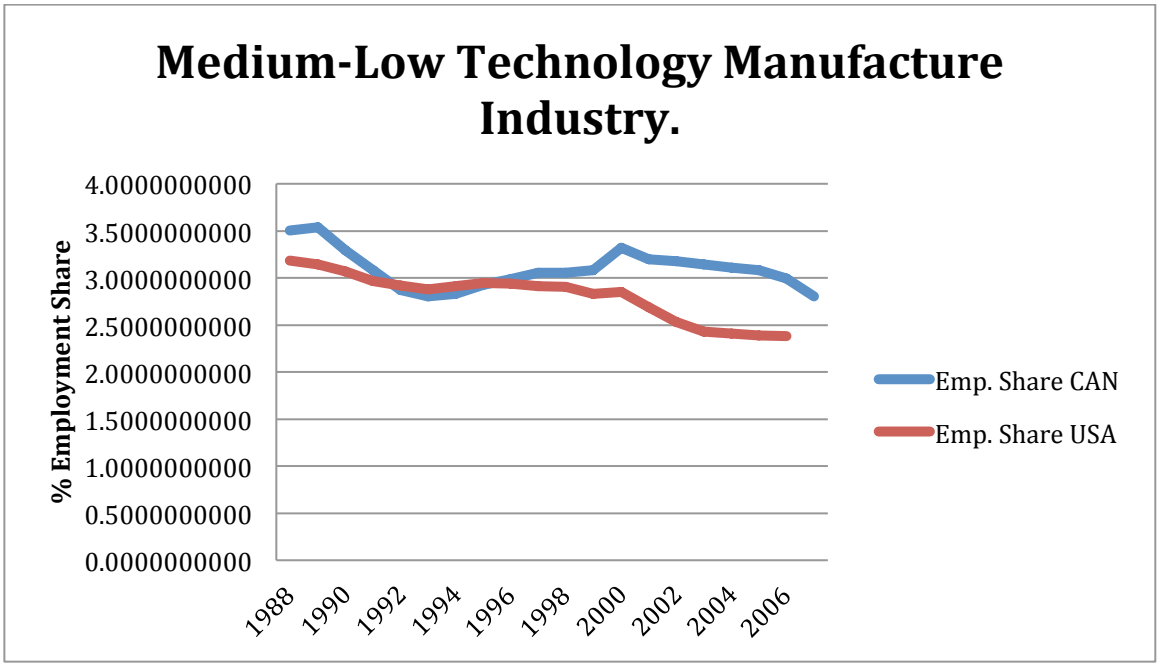
2004
2006
Emp. Share CAN
Emp. Share USA

13.


Medium-Low Technology Manufacture Industry.
% Employment Share
4.0000000000
3.5000000000
3.0000000000
2.5000000000
2.0000000000
1.5000000000
1.0000000000
0.5000000000
0.0000000000
1988
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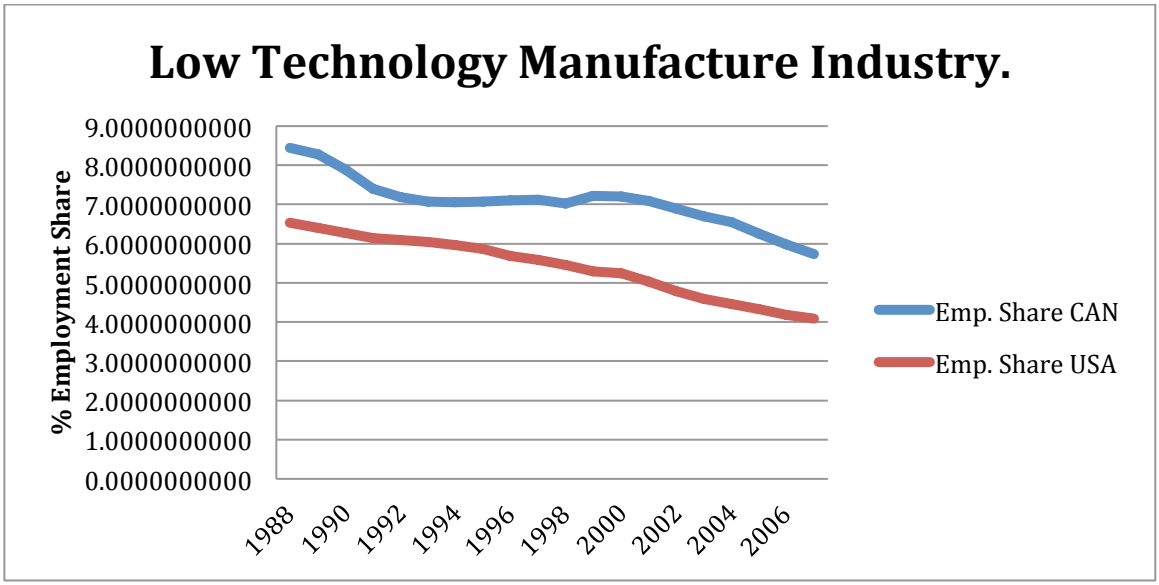
Emp. Share CAN
Emp. Share USA

14.



STAT CODING:

Qui tab time, g(timedum)

Drop timedum1

Xtreg logofcanemp logofusaemp logratiouseuexport logratiouseuimports interact interact1 time*, fei(induscode) vce (robust)

estimates store b_FE

xtreg logofcanemp logofusaemp logratiouseuexport logratiouseuimports interact interact1 time*, re i(induscode) vce (robust)

estimates store b_RE

hausmanb_FEb_RE

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