Course: Econ 490 Professor: Marit Rehavi Student: Yuri Tricys Date: December 5th, 2011

Trade Liberalization and Sector Productivity

Abstract

This paper analyzes the effects of trade liberalization on productivity at the sector level. This is done with a multivariable regression of relative gross labour productivity on sector trade, between the U.S. and Canada, relative to total trade, between Canada and the world. A set of before and after treatment variables are used to distinguish the difference between the effect of trade openness before the NAFTA preferential trade agreement and after the agreement. The regression is done using business sector controls, a data set spanning a 20 year period and, 6 North American Industrial Classification System (NAICS) sectors[1]. The results indicate a positive correlation between trade openness and productivity. More precisely the percentage change in trade openness across the implementation of the North American Free Trade Agreement (NAFTA) was matched with a 2% change in average annual productivity.

Introduction

The effects of trade liberalization on the economic progress of an economy have been debated since Ricardo challenged the corn laws with a theory of comparative advantage. Today the topic remains hotly controversial. Usually in the context of small business survival, the effects of mercantilist trade practices on third world welfare or domestic income distribution. Economists, on the other hand, more frequently seek insights into the positive outcomes of trade liberalization. Does trade liberalization lead to GDP growth? Does it divert trade or create it? What kind of industry dynamics can we expect to encounter? Which firms survive? What happens to employment? These are the questions economists more often set out to answer. In this paper, we address some of these questions by examining the effects of trade liberalization between Canada and the US on productivity before and

1 Agricultural Products and Live Animals are combined into one sector.

after the implementation of a preferential trade agreement (PTA). That is to say, we would like to confirm and quantify any change in correlation between the increases in trade by sector relative to total trade and the productivity of those sectors, before and after a policy treatment.

Canada/US Trade

Canada and US are prolific trading partners. Historically, there have been many trade agreements between the two nations. For the purposes of this paper, we are interested in the Free Trade Agreement between Canada and the United States (FTA), signed in 1988, that called for virtually total elimination of tariffs between US and Canada by 1998, and NAFTA, the agreement that superseded it. NAFTA came into force on January 1st, 1994. Economists estimate, since then, trade between Canada and the US increased by 80%[2]. Both NAFTA and the FTA before it, but more particularly the FTA, have been favourites among trade economists because they came about at a time rather free from exogenous influences[3]. There were no prominent currency crisis, international global recessions or major wars that could have influenced heavily the construction of the trade barrier reductions themselves. This “almost random” interpretation of the causes of the FTA agreement, however, doesn't simplify the challenge of differentiating the effects of the PTA itself from the effects of the various changes in other productivity related variables. This problem, a daunting one when the FTA is the focal point, is even more daunting when NAFTA is the focal point. This is because the NAFTA deal itself did not initiate original tariff reductions but rather introduced an array of single market, trade barrier reducing initiatives[4] .

Trefler (2001) dealt with this challenge by grouping the FTA tariff reductions with the superseding NAFTA single market initiatives and estimating the total effect of the FTA and NAFTA. Indeed, other than isolating a trend in the FTA effects, prior to NAFTA, then extending that trend through the NAFTA time line, such that one can subtract the FTA effects from the sum of the FTA and

2 Statistics Canada

3 See Trefler (2001)

4 For example, increasing border crossing efficiency, harmonizing coding and labelling laws, simplifying travel for business persons and making FDI a more attractive proposition, to name but a few initiatives.

the NAFTA effects, there seems no way to distinguish the effects of NAFTA itself. For this reason we focus on NAFTA as our treatment time, but, as did Trefler (2001), incorporate its effects with those from the prior trade agreement.

The Standard Model:

To estimate the effect of NAFTA on productivity[5], we regress sector productivity on trade openness and use our results to interpret the changes in the coefficient of our key independent variable. We use a standard trade regression model and adapt it to our purpose.

$$\ln(\pi_{i,t}) = \alpha_i + \beta_1 \ln(\tau_{US,i,t}) + \beta_2 \delta_t + \epsilon_{i,t}$$

Here $\ln(\pi_{i,t})$ is a measure of productivity, α_i are time fixed effects, $\ln(\tau_{US,i,t})$ is a measure of trade liberalization between Canada and the US and δ_t are time varying effects. To see the changes in sector productivity, across the NAFTA implementation time line, we use the before NAFTA data as a control group and compare it to the after NAFTA treated group. To accurately capture gradual time trends we introduce a binomial indicator $D_t = 1$ for time periods after January 1st, 1994 and $D_t = 0$ for time periods before January 1st, 1994. We also introduce a set of binomial indicators for each sector where $D_i = 0$ if the sector does not belong to sector i and $D_i = 1$ if the sector does belong to sector i. To isolate the effect of NAFTA trade liberalizations on productivity we introduce a product variable $D_t * \ln(\tau_{US,i,t})$, the inclusion of which illustrates the difference between the coefficient of sector trade shares, across the data set time period, and the coefficient of sector trade shares after the treatment. In the latter process the biases caused by industry specific fixed effects are assumed to cancel[6]. Finally, to capture the effects of the NAFTA treatment by sector we interact $D_i * D_t * \ln(\tau_{can,i,t})$ for each i, 1 through 6.

Regressing the effects of trade liberalization on sector profits is quite obviously an

5 NAFTA and the FTA are hereby referred to as NAFTA.

6 Standard differencing. The assumption of that industry specific omitted variables are constant is of course a strong one.

asymptotically biased affair. Correlation between our estimator and our error term leads to an omitted variable bias. To minimize this we include time varying variables we expect have non-zero correlations with our relative trade share variables and our dependent productivity variable. We redefine the standard model such that:

$$\beta_2 \delta_t = \beta_3 \ln(\tau_{Row,t}) + \beta_4 \ln(gdp_{Can,t}) + \beta_5 \ln(gdp_{US,t}) + \beta_6 \ln(r_{Can,t}) + \beta_7 \ln(r_{US,t}) + \beta_8 \ln(q_{Can/US,t}),$$

where, $\ln(\tau_{Row,t})$ is the natural log of a measure of trade between Canada and the Rest of the World (Row), relative to total Canadian trade, $\ln(gdp_{Can,t})$ is the natural log of a measure of Canadian GDP per-capita, $\ln(gdp_{US,t})$ is the natural log of a measure of US GDP per-capita, $\ln(r_{Can,t})$ is the natural log of a measure of the Canadian interest rate, $\ln(r_{US,t})$ is the natural log of a measure of the US interest rate and $\ln(q_{Can/US,t})$ is the natural log of a measure of the real exchange rate, between the US and Canada. Our adapted regression model is now:

$$\ln(\pi_{s,t}) = \alpha_s + \beta_1 D_t + \beta_2 D_i + \beta_3 \ln(\tau_{US,i,t}) + \beta_4 D_t \ln(\tau_{US,i,t}) + \beta_5 D_i D_t \ln(\tau_{US,i,t}) + \beta_6 \delta_t + \epsilon_{i,t}.$$

Measurements

Lileeva (2008), Bernard, Jensen, Schott (2003) and Trefler (2001) each use productivity as a their dependent variable. This seems a much more reasonable measure than pre-tax accounting profit relative to sales revenue and we employ it here[7]. Trefler (2001) notes that the ideal measure of productivity is total factor productivity but, in light of his claim that capital inputs are poorly measured in the available data, he chooses gross output relative to labour hours as his preferred productivity measure. In this way he avoids an under-bias of his estimated effect due to measurement error, we do the same here[8:]

$$\ln(\pi_{i,t}) = productivity = \ln\left[\frac{(Gross\ Domestic\ Product_{i,t})}{(Total\ Labour\ Hours_{i,t})}\right].$$

7 With productivity as a measurement one presumably does not have to account for windfall gains or losses.

8 This would be an over-bias in our case as our openness variable moves inversely to a tariff reduction measure, and the measurement error is in the dependent variable. This also avoids any downward bias caused by positive correlation between the Canadian trend toward part-time employment and the upward trend in sector openness (see Trefler (2001).

Our productivity data is an annual average measured relative to 2002. Here it has been converted to the natural log of a fraction of 2002's productivity.

Alcala and Ciccone (2003) seek the effect of openness on productivity. As is conventional in multiple cross-country comparisons, they begin with a traditional measure of openness, total trade relative to GDP. Their concern is that the “trade-related” Balassa-Samuelson effect will undermine the consistency of their predictor. That is to say if productivity gains in trade-able sectors raise prices in non-traded sectors, productivity may decrease openness. To address this issue they amend their openness measure to one of “real” openness, where total trade is measured relative to purchasing power parity GDP[9]. Trefler (2001) addresses a similar issue by including a control for US productivity, essentially a cross-border mirror image of his dependent variable[10]. To control for changes in underlying supply and demand we include a measure of the real exchange rate as a control, which we calculate as the natural log of a yearly average of the Canada/US exchange rate multiplied by a ratio of US CPI relative to CDN CPI,

$$\ln(q_{Can/us,t}) = \ln[E_{Can\$/US\$,t} * \frac{CPI_{US,t}}{CPI_{Can,t}}] .$$

However, unlike Alcala and Ciccone (2003), we turn away from measuring total trade relative to GDP as our openness indicator and instead measure it relative to total trade. We do this to avoid enlarging the standard errors of our relative trade measures[11]. Our openness indicator, then is the natural log of a ratio of the sum of customs based imports and exports, between Canada and the US, relative to a Balance of Payments based measure of total trade between Canada and the world,

$$\ln(\tau_{US,i,t}) = openness = \ln[\frac{(CBE_{US,i,t} + CBI_{US,i,t})}{(BOP\ Total\ Trade_{World,t})}] .$$

9 GDP measured with prices relative to a benchmark country.

10 His concern is that omitting technology change in the US will cause an underlying supply and demand bias.

11 To avoid incorporating the same GDP in our dependent variable, our independent variable and one of our controls.

Where Lileeva (2008) and Trefler (2001) use a measure of trade-liberalization between Canada and the US relative to trade-liberalization between Canada and the world[12], we include as one of our controls a measure of Canadian trade with ROW This is intended to capture the effect of trade-liberalization between Canada and the US holding the effect of trade-liberalization between Canada and the ROW constant[13,]

$$\ln(\tau_{ROW,i,t}) = \ln[\frac{(CBE_{Row,i,t} + CBI_{Row,i,t})}{(BOP\,Total\,Trade_{World,t})}] .$$

Our other regressors are included to control for key determinants of supply and demand that affect productivity, and fluctuations in the level of productivity function inputs. For Canadian demand driven productivity we include a measure of Canadian GDP per-capita,

$$\ln(gdp_{Can,t}) = \ln[\frac{Gross\,Domestic\,Product_{Can,t}}{Population_{Can,t}}]$$

For US demand driven productivity we include a measure of US GDP per-capita.

$$\ln(gdp_{US,t}) = \ln[\frac{Gross\,Domestic\,Product_{US,t}}{Population_{US,t}}]$$

The productivity function input we are most concerned with is the cost of capital. We therefore include a measure of the Canadian interest rate and a measure of the US interest rate.

$$\ln(r_{Can,t}) = \ln[3 - month\,treasury\,bill_{Can,t}] \qquad \ln(r_{US,t}) = \ln[3 - month\,treasury\,bill_{US,t}]$$

---

12 The Trefler (2001) tariff data set measures tariff reductions against multilateral MFN reductions.

13 The elephant in the room is that NAFTA included Mexico which we have allotted to ROW. We did this because , according to the United Nations Economic Commission for Latin America and the Caribbean, “In 1996, imports from Mexico represented just 2.6% of total Canadian imports, and exports to Mexico 0.4% of Canadian total exports.”

Hypothesis

A two-tailed hypothesis test is used to measure the statistical significance of the effect on productivity of the key independent variable of interest, $\ln(\tau_{US,i,t})$. The same test is used to measure the significance of the effect of the control variables and the product of the key variable and the NAFTA time dummy. The null hypothesis is that the variables in question have no distinguishably significant effect on the dependent variable, while the alternative hypothesis is that there are significant non-zero effects. $H_0 : \beta_l = 0$, $H_1 : \beta_l \neq 0$, for all $l = [1, \ldots, 11]$.

The anticipated overall effect of the product term is a positive one. That is trade openness between Canada and the US, caused by NAFTA, is understood to predict positive gains in productivity. The sector by sector effects are not so predictable, given that some sectors are expected to see declining percentages of trade relative to total trade, while other sectors are expected to see increasing trade relative to total trade. The anticipated coefficients of the control variables are much more straight forward. Interest rates are expected to be negatively correlated with productivity, while GDP in both Canada and the US is expected to be positively correlated with productivity. Anticipating the sign of the real exchange rate coefficient is another matter. An appreciation of the real exchange rate would be expected to lower productivity in exporting sectors, as demand for those exports would decline; however, an appreciating real exchange rate would be expected to raise productivity in sectors where imports are driving productivity. These might include manufacturing sectors where raw materials or production inputs are imported.

Sectors

Sectors included in the model are sorted by NAICS-5 coding. They are given below with a 3 digit NAICS code in brackets:

- 1: Paper Products (322)
- 2: Electronic components (335)
- 3: Agricultural and Animal Products (111, 112)
- 4: Computer products (334)
- 5: Motor Vehicles (336)
- 6: Beverage and Tobacco (312)

These sectors were chosen because they each demonstrate a different set of NAFTA conditions. For example, the beverage and tobacco sector is known to have had high tariffs prior to the FTA, it then is an example where tariffs were greatly reduced. The agricultural and animal products sector was a sector largely influenced by NAFTA single market initiatives, like harmonized labelling and enhanced border crossing efficiency. The motor vehicle sector accounted for an extraordinarily large percentage of US/Canada trade by value: 30% of Canadian exports to the US and 25% of US exports to Canada. The computer products sector may provide an example where Canada/US trade shares remained relatively low, yet Canada/World trade shares rose remarkably. In addition, after controlling for business cycle effects, the effect of computer product sector liberalization should be relatively low[14]. The paper products sector is a heavily export oriented sector. These sectors then should give a broad example of NAFTA effects, while allowing us to test the accuracy of our chosen model.

14 The year 2000 "dot com" business cycle expansion and concurrent rapid rises in technology product demand should account for most of the productivity gains in this sector. It is also anticipated that considerable improvements in computer technology producing technologies, via spill-over effects, would account for large shares of productivity improvements.

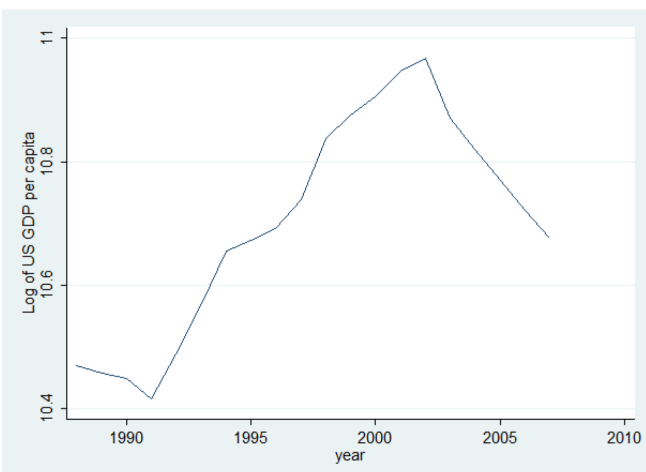
Model Selection

Variable	(1) log of productivity	(2) log of productivity	(3) log of productivity
$D_t * \ln(\tau_{US,i,t})$	0.0235	0.0250*	0.0274*
	[1.78]	[2.07]	[2.19]
$\ln(\tau_{US,i,t})$	0.0309	0.0425	0.0344
	[0.57]	[0.81]	[0.63]
$\ln(\tau_{Row,t})$	0.109**	0.0982**	0.0832*
	[2.93]	[2.72]	[2.28]
$\ln(gdp_{Can,t})$	0.825***	0.777***	-0.688
	[4.93]	[4.35]	[-1.06]
$\ln(gdp_{US,t})$	0.565***	0.447**	3.044**
	[4.38]	[2.91]	[2.93]
$\ln(r_{Can,t})$		-0.0459	-0.000694
		[-0.91]	[-0.01]
$\ln(r_{US,t})$		-0.0293	0.0661
		[-0.48]	[1.11]
$\ln(q_{Can/US,t})$			-2.671*
			[-2.48]
Constant	-14.48***	-12.96***	-24.44***
	[-10.45]	[-6.29]	[-5.49
Observations	120	120	120
Adjusted R-squared	0.784	0.786	0.806

*T-statistics are given in brackets, (*p<0.05 **p<0.01 ***p<0.001)*

In each of the three models given above, the binomial indicators for sectors were included, giving a complete panel of data. The regressions without business sector controls are omitted as the results are severely underestimated[15]. The key variable of interest is smaller in the first model where only GDP per-capita controls are included. In the second model, interest rate controls are added. The result is an improvement in the significance of the NAFTA treatment indicator. In addition, the business sector controls illustrate the proper coefficients. The third model is included to highlight the effect of the real exchange rate variable. It distorts the model radically, such that the role of the CDN GDP indicator and the US GDP indicators are reversed. In addition, the CDN interest rate and the US interest rate change roles. This is because the log of the real interest rate and the log of US GDP per-capita move in tandem, as we can see below.

US GDP per-capita



Real Exchange Rate Can/US

The implications of this are minimal, in that movements in cross-border supply and demand effects on productivity, at the price level, are accurately captured in the GDP controls and the real exchange rate indicator is not necessary. The chosen model then is the second model. In this model it can be seen that average productivity across chosen sectors in Canada is particularly sensitive to movements in Canadian GDP per-capita and American GDP per-capita. More precisely, a one percent increase in

15 Note that Trefler (2001) had severely over-estimated effects with business cycle controls excluded.

CDN GDP per-capita is met by a 0.78 percent increase in average productivity across sectors and a one percent increase US GDP per-capita is met by a 0.45 percent increase in average productivity across sectors. The model two coefficients for the interest rates also show the correct signs. Interpreting the Canadian interest rate coefficient would suggest that a doubling of the interest rate would decrease average productivity across sectors by 4.5%, it must be noted however, that the interest rate coefficients are insignificant at the 5% level and have test statistics with absolute values less than one.

The trade share coefficients, $\ln(\tau_{US,i,t})$ and $\ln(\tau_{Row,t})$, suggest a doubling of the ratio of Canadian/US customs based trade, relative to Canadian total trade with the world, would increase productivity by some 4 %, while a doubling of the ratio of Canadian/ROW customs based trade , relative to Canadian total trade with the world, would increase productivity across sectors by 9%[16]. That said, the insignificance of the Canadian/US relative trade share variable renders the comparison ineffective, which is noteworthy, as we would expect the larger share of bilateral trade between US and Canada to have a stronger effect on productivity than that of multilateral trade[17].

The most interesting results in the model are given on the first line of the model selection table. The product term $D_t * \ln(\tau_{US,i,t})$ is a measure of the effect of NAFTA trade openness on productivity. The coefficient is significant to the 0.05% level and indicates that changes in trade shares across the NAFTA time line predict 2.5% increase in productivity across given sectors. Though these results are very close to Trefler's 5% FTA tariff reduction effects on productivity, the underestimation remains a deep concern. The issue is that the model itself is not up to the task we have set for it. We will discuss this further in the model analysis section, but first we will look at the by sector results.

Several models were examined to identify the effects of NAFTA on a per-sector basis. The majority of these regressions were insignificant and had largely varying coefficients across models. The best of these sector regression models revealed an overall NAFTA effect on productivity that was

16 Here total trade includes trade in services.
17 Given that Canadian/US trade accounts for some 70% to %80 of total Canadian trade.

essentially zero, yet the coefficients on the by-sector NAFTA effects show the results we might expect for the given sectors, including a negative NAFTA effect for the computer products sector. This is particularly surprising because, across the 20 period time line, larger relative shares of computer product trade shifted rapidly from US Canada trade to Canada world trade, reflecting movements forward in computer product productivity in the Asian countries. Again the results are displayed here, but only as a starting point for future research—the standard errors are all very large and none of the coefficients are significant.

By Sector NAFTA Effects $D_i * D_t * \ln(\tau_{US,i,t})$

log of productivity	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
log bilateral trade %	0.1175552	0.0671013	1.75	0.083	-0.0155557	0.2506661
log multilateral trade %	0.0143194	0.0352508	0.41	0.685	-0.0556088	0.0842475
log GDP per capita US	2.402285	0.5715971	4.2	0	1.26839	3.53618
Log GDP per capita Can	-0.3366354	0.3743021	-0.9	0.371	-1.07915	0.4058792
log real exchange rate	-2.107041	0.5971148	-3.53	0.001	-3.291556	-0.9225261
paper sector Nafta effects	0.0652908	0.0970179	0.67	0.502	-0.1271667	0.2577484
beverage sector Nafta effects	0.0508577	0.130534	0.39	0.698	-0.2080866	0.3098021
agriculture and animal Nafta effects	0.0410626	0.1222129	0.34	0.738	-0.2013748	0.2835001
Electronics Nafta effects	0.0845821	0.1159767	0.73	0.468	-0.1454845	0.3146486
Computer Nafta effects	-0.0641294	0.1021089	-0.63	0.531	-0.266686	0.1384273

A second table is displayed to illustrate the NAFTA effects specific to the motor vehicle sector:

By Sector NAFTA Effects $D_i * D_t * \ln(\tau_{US,i,t})$

log of productivity	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
log bilateral trade %	0.1175552	0.0671013	1.75	0.083	-0.0155557	0.2506661
log multilateral trade %	0.0143194	0.0352508	0.41	0.685	-0.0556088	0.0842475
log GDP per capita US	2.402285	0.5715971	4.2	0	1.26839	3.53618
Log GDP per capita Can	-0.3366354	0.3743021	-0.9	0.371	-1.07915	0.4058792
log real exchange rate	-2.107041	0.5971148	-3.53	0.001	-3.291556	-0.9225261
paper sector Nafta effects	0.0144331	0.0355333	0.41	0.685	-0.0560554	0.0849216
motor vehicle sector Nafta effects	-0.0508577	0.130534	-0.39	0.698	-0.3098021	0.2080866
agriculture and animal Nafta effects	-0.0097951	0.0131069	-0.75	0.457	-0.0357957	0.0162055
Electronics Nafta effects	0.0337243	0.0195877	1.72	0.088	-0.0051324	0.0725811
Computer Nafta effects	-0.1149871	0.036275	-3.17	0.002	-0.186947	-0.0430273

Model Analysis.

There are two immediate reasons the results of our model are to be interpreted as general guidelines to the effects of NAFTA trade-liberalization on productivity. The first reason is found in the choice of key regressors. At the theoretical level, we must consider the direction of causality between productivity and relative sector trade flows. Does productivity itself lead to greater trade flows? Intuitively, we would conclude that this is indeed the case. We would expect that highly productive firms would make use of internal and external economies of scale and be more likely to compete for foreign market shares. Furthermore, to the extent that higher productive firms would make for more highly productive sectors, correlations between higher sector productivity and higher sector profits would be expected to shift sector risk preference functions, such that highly productive sectors would on average contain firms more likely to engage in riskier business transactions. All else remaining equal, these sectors would have higher associated trade shares.

The cure for this simultaneous causality concern is either to fix the direction of causation or separate the effects of productivity on trade shares from those of trade shares on productivity. The former can be done by exchanging the regressor itself for a measure of tariff reductions--because it can be argued that tariff reductions are only very slightly endogenous--the latter can be done by employing an instrumental variable. In both cases, the first best choice seems to be a measure of tariff reductions and trade costs. It is interesting to note, however, that Alcala and Ciccone (2003) made use of another instrumental variable. They used the results of a gravity model regression as an instrument, to isolate the effects of trade shares on productivity from those of productivity on trade shares. This technique, though associated with its own set of challenges, could be very useful in cross referencing other techniques[18].

The second reason the results of our model are to be used general guidelines for interpreting the effects of NAFTA trade-liberalization on productivity, is that the data panel itself is not exhaustive

18 Especially if one is intent on separating the NAFTA effects from the underlying FTA effects.

enough to account for the full sample of available trade data, or the variations in business cycles at the seasonal level. That is to say, the productivity data used in this model is on a yearly average basis. Expanding this productivity data to a monthly or quarterly basis could allow for more rigorous business cycle controlling. Further, expanding the data set to include all available sectors and non-traded sectors would allow for a more accurate understanding of between sector changes in productivity across the NAFTA time line.

Conclusion

In this paper, a trade value data set of 6 NAICS sectors, spanning a 20 year period, and a multivariable regression were used to estimate the effects of NAFTA induced increases in customs based sector trade, between Canada and the US, relative to total trade, between Canada and the world, on labour productivity by sector. The regression was run while controlling for business cycle induced productivity, productivity caused by world trade increases, and fluctuations in productivity function inputs. The results indicate the elasticity of productivity, with respect to NAFTA induced trade share increases, is approximately 2.5%. That is to say, the NAFTA induced increases in trade shares are correlated with a 2.5% increase in productivity across sectors. When these results are compared with the results of Trefler (2001), it is apparent that our model underestimates the effects of NAFTA on productivity. This under-bias suggest our model is not accurately controlling for omitted variables, or simultaneous causation. In the model analysis section of the paper, we analyzed some short comings of the model and confirmed that a more accurate measure of the effects, and of the within sector comparisons, will require expanding the data set and incorporating instrumentation.

Furthermore, in our work we found a shortfall of research that attempts to separate the effects of NAFTA from those of the FTA preceding it. This is an area of particular interest but future trade agreements promise to focus more prominently on non-tariff reducing policies, given of course, that enhanced globalization across the last 20 years has resulted in dramatic tariff reductions already. One example of these pending PTAs is the Comprehensive Economic Trade Agreement, between Canada and the EU, which has been relegated to the back burner, in light of recent fluctuations in Euro-Zone stability. We have suggested in the paper that there are instrumentation methods that could be applied to the NAFTA and FTA cases, that might allow a more accurate measure of the NAFTA effects in isolation. This research would allow for an enhanced understanding of what to expect from CETA and consequently enable policy makers to pursue negotiations optimally.

DATA

Customs based trade data was compiled using the World Trade Analyzer Data Base, from the University of Toronto (http://datacentre.chass.utoronto.ca/datalist.html). These data were adjusted from nominal CDN dollar measures to a real CDN dollar measure relative to 2002, using a CPI downloaded from the Statistics Canada E-stat Cansim data archives (Table 176-0003). The Balance of Payments measure of total trade between Canada and the world is from Cansim (Table 380-0027), in chained 2002 CDN dollars. Custom based data were harmonized from HS-10 and HS-8 codes (HS-10 for imports and HS-8 for exports) to NAICS-5 codes using a standard Statistics Canada concordance file, found on the UBC Abacus data library. Canadian GDP per-capita was compiled with Cansim GDP (Table 380-0016), similarly adjusted to 2002 dollars relative to population data also taken from Cansim. US GDP per-capita was taken from *Louis Johnston and Samuel H. Williamson, "What Was the U.S. GDP Then?" Measuring Worth, 2011.*It was converted to 2002 dollars using an implicit price deflator taken from OECD (2010), "Main Economic Indicators - complete database". It was then converted to CDN dollars using a yearly average of the nominal Canadian/US historical external exchange rate, as recorded on the University of British Columbia's Pacific Exchange Rate Service. The real interest rate was calculated with the same exchange rate data, the above CDN CPI measure and a measure of US CPI found on the Federal Reserve Bank of Minneapolis website. The US interest rate measure is historical 3-month constant maturity treasury bill data, also taken from the US Federal Reserve Bank (http://www.federalreserve.gov/releases/h15/data.htm). The relative productivity measures are from Cansim Table (383-0022).

Bibliography

Daniel Trefler, 2001. ***The Long and Short of the Canada-U.S. Free Trade Agreement***. NBER Working Paper No. 8293

Francisco Alcala, Antonio Ciccone, 2001. ***Trade and Productivity.*** CEPR Discussion Paper No. 3095

Andrew Bernard, J. Jensen, Peter K. Schott, 2003. ***Falling Trade Costs, Heterogeneous Firms, and Industry Dynamics***. NBER Working Paper No. 9639

1. Alla Lileeva, 2008.***Trade liberalization and productivity dynamics: evidence from Canada.*** Canadian Journal of Economics. Vol.41, Issue 2, pages 360-390