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The Impacts of Integration and Trade on Labor Markets

*Methodological Challenges and Consensus Findings
in the NAFTA Context*



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Introduction

In light of the recent negotiations towards the Free Trade of the Americas Agreement (FTAA), studies on the effects of economic integration on labor and labor markets have intensified. Similar academic and policy interest was also evident in the early 1990s, in the run-up to the North American Free Trade Agreement (NAFTA). In designing research to analyze the effects of integration on smaller economies in the Americas, it is sensible to survey the methodologies that were used in forecasting the effects of NAFTA, as well as the more recent studies that seek to evaluate the Agreement's actual effects on labor and labor markets.

The objective of this paper is to examine the different methodologies employed, in the North American context, to determine the impact of economic integration on labor markets, as well as the accompanying complexities and challenges involved in drawing out their implications. While brief summaries of the results of several important studies will be presented and larger consensus views described, the main goal of this paper is to survey and evaluate the methodologies used in this literature and to highlight the challenges and complexities in undertaking such research.¹

The paper will first describe the methodologies used to predict and/or analyze the effects of trade liberalization in the NAFTA context and identify the merits and uses for each methodology. Non-methodological limitations and complexities of undertaking such research will then be discussed. Next, pre- and post-NAFTA research findings pertaining to the Agreement's effects on trade, employment, and wages and income distribution will be presented, with a focus on identifying consensus views and "best fit" methodologies. Finally, based on the previous analysis, conclusions will be made and lessons drawn that might assist others,

especially developing countries, in the study of trade liberalization effects.

Methodologies²

The study of NAFTA and its effects on labor markets can be broken down into two distinct time periods – pre- and post-NAFTA research. Obviously, most research completed prior to the implementation of the Agreement involved economic forecasting, using simulation models and techniques to estimate its potential effects on the individual countries' labor markets. Post-NAFTA research, while occasionally involving forecasting, is primarily concerned with evaluating the effects of NAFTA (i.e., analyzing the data and pinpointing changes that can be attributed specifically to the Agreement). Common methodologies did emerge, depending on the focus of the study (i.e., projection *or* evaluation focus) and the availability of data.

The forecasting method that typically encompasses the largest number and breadth of macroeconomic variables is *Linked Macroeconomic Models (LMM)*, a technique that involves connecting a large-scale macroeconomic forecasting model of one country to that of another country. Most economic forecasting of a country's aggregate economic activity is done via macroeconomic models (U.S. DOL, 1993). Such models employ a large set of consistently estimated equations that reveal long-term relationships between key economic variables (GDP, employment, unemployment, CPI, etc.). The expected effect of a policy change, such as introducing NAFTA, on any variable is measured as the difference between the baseline forecast and the revised forecast that includes the policy change. For example, in examining the potential effects of NAFTA, trade equities and tariff reductions would be simultane-

ously added to *both* countries' macroeconomic models, thereby allowing for analysis of the projected effects on each country (ibid).

A second forecasting methodology that was widely used to predict the impact of NAFTA was *Computable General Equilibrium (CGE)* models. CGE models allow for the isolation of the direct and indirect effects of a trade agreement on factors such as overall trade, production and sectoral employment (Burfisher et al., 2001). CGE models simulate the relationships between all sectors of the economy and allow for assumptions about economic behavior (e.g., perfect or imperfect competitive, scale economies, standard neoclassical trade theory, Armington assumption).³

The U.S. Department of Labor describes the development of a CGE model as follows:

“The construction of a CGE model involves an extensive data exercise in developing social accounting and input-output or transactions matrices, including trade, on the flow of income to factors by various institutions (i.e., specification of detailed intersectoral relationships in a given year). Available parameter estimates from the literature are used for sectoral production, consumption, and trade relationships. Given the mass of data required, CGE models are usually highly aggregated and highly stylized.” (U.S. DOL, 1993, p.4)⁴

The primary difference between LMM and CGE models is that LMMs rely upon historical data relationships to simultaneously set parameters for the individual variables (through confidence intervals for parameter estimates). CGE models, in contrast, employ sensitivity analysis to gauge the robustness of the experiment's results on the individual variables' parameter estimates.

The primary function of both methodologies is economic forecasting; therefore, it is not surprising that they were used for the majority of

studies on the *potential* effects of NAFTA. Because these large-scale models allow for the control of numerous labor market variables, an individual model can produce results on a variety of indicators (employment, trade flows, wages, etc.).

Once NAFTA came into effect on January 1, 1994, analysis shifted to evaluating its effects. Within this framework, *partial equilibrium* methods, which emphasize regression analysis (e.g., “gravity” models and “shift and share” methods) and/or available multipliers controlling for a single or small number of variables, became popular.⁵

Partial equilibrium methods attempt to estimate the effects of a policy on one or more variables by holding other potentially affected variables constant. These studies tend to focus on an individual variable (e.g., income distribution, employment, wages, productivity) and interactions between other variables are usually not tested. However, more recently there have been studies that, while classified as partial equilibrium analyses, possess some attributes of CGE models. For example, Robertson's (2000 and 2003) research employs some aspects of CGE modeling – using firm equations to estimate supply and demand; however, the model is considered partial equilibrium because it does not compute the production and consumption functions together, and it focuses on the labor market as opposed to the capital market.

The final methodology used to study the effects of NAFTA is what may be referred to as *qualitative/quantitative* research. This method is not as structured or econometrics-based as the previous examples. It usually entails a survey of existing research with primary analysis of various economic indicators to highlight general *trends* that have surfaced since NAFTA. While causal relationships are not definitively proven, supposition and

strong quantitative reasoning often lend credence to the original hypotheses. Such work is common in the political science and political economy disciplines, relying upon observations and deductive reasoning.

Deciding upon the best methodology to employ depends upon several factors. First, LMMs and CGE models are forecasting methods, while partial equilibrium and qualitative/quantitative studies are better suited to identify effects that have already occurred.

A second consideration is the focus of research. To complete an LMM, a researcher must be able to *link* two large-scale macroeconomic models; thus, such models must be already available and/or the appropriate and comparable data in existence to build them. As mentioned earlier, the strength of macroeconomic models is that they are most effective at predicting common aggregate economic indicators and activity. Likewise, the strength of linking the models of two countries (i.e., an LMM) is that it allows for the simultaneous forecasting of the effect of a policy change on the individual countries' aggregate economy.

The virtue of using CGE models for forecasting is that they allow the researcher to set controls and include assumptions (perfect markets, the Armington assumption, neoclassical trade theory, etc.); therefore, there is a lot of variation between individual CGE models, allowing analysis to be very specific regarding the policy's direct and indirect effects.⁶ Specific sectors and industries can also be analyzed. Conversely, LMMs tend to show only the effects of a policy on aggregate economic indicators.

In evaluating the predictive success of pre-NAFTA CGE model-based studies, Kehoe (2003) found that they (i.e., the three cases analyzed) drastically underestimated the effects on trade.

While he does state that CGE modeling has been accurate as a forecasting measure in other examples, namely Spain, Kehoe reiterates that in order for CGE models to produce accurate results the models must: 1) include theoretical trade-generating mechanisms that allow for large increases in trade for sectors with little or no previous trade; and 2) be able to effectively capture changes in productivity emanating from increased foreign investment. Kehoe stresses the need for ex-post performance evaluations that add external shocks to the original model in testing its predictive capacity; there has been a lack of CGE model evaluation research.

The strength of partial equilibrium models is the flexibility they bring to analysis of the impacts of a policy. Various judgmental assessments are rigorously tested in a quantitative manner through extrapolation. The ability to control dependent variables to determine the effects/impacts on an independent variable is a major benefit to partial equilibrium methods.

Qualitative/quantitative methods are beneficial in their ability to observe and report upon phenomena in a combined statistical and qualitative way, as opposed to being confined to purely statistical relationships between variables. The broader aspects of a policy are often missed, or not taken into account, by exclusively quantitative forms of research; the broad focus and dual function of qualitative/quantitative methods often capture more effects and impacts of an individual policy.

Nonmethodological limitations and complexities of NAFTA-related research

Aside from the differences in methodologies, each of which has its own strengths and weaknesses depending on the focus of analysis, there are other factors

that make it difficult to study NAFTA's effects. First and foremost, until recently, the availability of data across the three countries hindered partial equilibrium studies. As Krueger stated in 2000:

"To date, however, most empirical work estimating the effects of NAFTA has been based on simulation models. This is largely because the NAFTA has been so new that data were not available with which to attempt an estimate of the initial impacts of the agreement on trade flows." (Krueger, 2000, p.762)

The abundance of recent regression studies that estimate the effects of NAFTA on individual labor market indicators is largely due to the current availability of data, coupled with the increased validity associated with time series versus cross-sectional data. With this in mind, one should expect such research to grow, especially given the lessons that FTAA-negotiating countries can learn from the NAFTA experience.

Inadequate data comparability can be an impediment to reliable cross-country research, as the results depend greatly upon comparing (or inputting into a model) "like" with "like" indicators. Often, an indicator might have the same name (e.g., "the number of unemployed persons") across countries, but the individual statistical agencies may employ different concepts and inputs for their definition. Comparing or inputting this variable into a model "as-is" without recalibrating the data to increase comparability is the equivalent of comparing apples with oranges. Furthermore, in some instances, recalibrating or massaging the data might be impossible.

Across the three NAFTA countries, there are some problems with the comparability of various labor market indicators. First and foremost, there are differences in industrial classifications that create measurement error when ascribing NAFTA

effects on all indicators involving specific sector and industry breakdowns. In Canada, the classification of data by industry follows the North American Industry Classification System (NAICS); in the United States, all employment-related data follow NAICS, although some of the historical data are classified according to the previous Standard Industry Classification System (SIC); some Mexican data follow NAICS, but most historical data are classified according to the Mexican Classification of Activities and Products (1994). It should be noted that all three countries are presently revising their historical data into NAICS categories, so this problem will eventually be remedied.

There are also more detailed conceptual and definitional differences for various key labor market indicators. For example, the definitions used for the classification of persons as "employed," "unemployed" and "inactive" vary across all three countries. Mexico's methodology used to tabulate "hours worked" is different than those of Canada or the U.S., which makes indicators such as productivity, unit labor costs and hourly compensation costs difficult to compare. Finally, the inclusion of all industries in a sample, as well as problems associated with the actual sample changing from one year to the next (as occurred with the Mexico's National Employment Survey (ENE) from 1994-1995), often causes problems with data comparability.

An unavoidable difficulty for research on the impact of trade liberalization is the inability to construct a controlled experiment; as in most social science research, extraneous variables often affect the dependent variable or even the control group. In relation to the study of the effects of NAFTA, Krueger has indicated five extraneous events/factors affecting results (Krueger, 2000, pp. 762-765):

1. The anticipation of the NAFTA began in 1990; thus, trading relations between the three countries were affected prior to the Agreement actually coming into force.
2. Not all tariffs were removed upon enactment; in fact, for many categories of products (namely commodities) there was a phasing-in period of 10 to 15 years. Thus, generalized deductions about trade effects of NAFTA on “all industries” are often over-simplified.
3. Trade liberalization is occurring with and in other areas of the world; therefore, trade patterns for individual North American countries are not exclusively affected by NAFTA. Furthermore, increased trade with other nations (e.g., China) can have labor market effects on NAFTA countries.
4. Mexico began its trade liberalization on a unilateral basis in the early 1980s; thus the trade patterns experienced after 1994 were as much a continuation of previously rising trade flows as they were the beginning of trade liberalization for the country.
5. The appreciation of the Mexican peso from 1987-1994 and the subsequent depreciation make empirical findings regarding the impact of NAFTA difficult to accurately quantify.

Research findings regarding NAFTA and its effects on the labor market

In reporting on this literature, it is important to make a few qualifications. For purposes of brevity, this survey is confined to studies dealing with trade flows, employment levels, income distribution, and wages. Studies involving NAFTA effects on other indicators, such as FDI, GDP and capital markets will not be analyzed in this paper.

Second, while there is an abundance of studies on U.S./Canada and U.S./Mexico, there is limited research analyzing all three countries in the

region, and even fewer studies focusing on Canada/Mexico. Thus, examples of three-country analysis using a single methodology throughout are difficult to find in the literature.

NAFTA effects on trade

Prior to NAFTA, virtually every study predicted that the Agreement would be net-trade creating, with all three countries benefiting and Mexico experiencing the most significant gains (Burfisher et al., 2001).⁷ Furthermore, there was an underlying presumption that NAFTA could possibly be trade diverting. In this case, trade diversion refers to North American trade being diverted away from non-NAFTA countries. To summarize, the consensus view was that the Agreement would increase overall trade for the three countries and would also intensify trade *between* the NAFTA countries while diverting trade with nonsignatory nations.⁸

Post-NAFTA qualitative/quantitative studies typically cite increasing trade figures in the NAFTA period and usually attribute this rise to the Agreement.⁹ Post-NAFTA econometric research is focused on the various aspects of trade flows (direction of flows, sectors, industries, controlling for trade diversion, etc.) and usually employs partial equilibrium analysis using gravity functions. This form of regression analysis allows the researcher to control for extraneous effects and macroeconomic shocks, thereby making it possible to test for the effects *of* NAFTA, rather than merely the effects observed *since* NAFTA (the latter being the scope for most qualitative/quantitative studies). Some examples of econometric research on NAFTA's effects on trade flows and diversion are given in the following paragraphs.

Gould (1998) employs a “gravity” partial equilibrium model to estimate the effects of NAFTA on all three signatory countries. He uses quarterly

trade data from 1980-1996, as well as GDP price deflators, real exchange rates and dummy variables, to reveal changes in the trade regimes during the reference period. The major drawback of this research is that it covers only the Agreement's initial three years (1994–1996); nonetheless, it does provide a comprehensive evaluation of NAFTA's early years. His results show that the Agreement alone 1) may have increased U.S. aggregate exports to Mexico, but not imports from Mexico; 2) did not affect U.S.-Canada and Canadian-Mexican trade; and 3) had a negligible effect on trade diversion.

Krueger (1999) also examines the effects of NAFTA on trade during its first three years. She employs a partial equilibrium “shift and share” analysis of numerous sectors at the three-digit SIC level. Her results show that, while trade did increase for Mexico in the early days of NAFTA, factors such as Mexican trade liberalization in the mid-1980s and the change in the real exchange rate had the largest effect. Krueger's research also suggests that trade diversion did not occur and that categories where Mexican exports to the U.S. grew most rapidly (e.g., commodities) were also the categories that experienced the most export growth with the rest of the world.

Romalis's (2001) study focuses on U.S. effects but uses data from all three countries. Employing reduced-form partial equilibrium equations of U.S. imports of commodities from Canada and Mexico, Romalis controls for tariff preferences for the latter two countries. He also controls for time-varying effects on tariffs, and corrects for commodity and industry characteristics. The time frame for this study is 1989-2000 (i.e., analyzing seven years of NAFTA). Romalis's results show that NAFTA had a significant effect on U.S. imports of commodities from *both* Canada and Mexico. Romalis states that there is evidence of

trade diversion emanating from NAFTA, a finding that runs counter to the results of Gould and Krueger's three-year (1994-1996) analyses.

Fukao et al. (2003) focus on selected manufacturing goods from 1992 to 1998 to test for the presence of trade diversion as a consequence of NAFTA. They use a partial equilibrium gravity model that is “in the same spirit as Romalis insofar as (it) use(s) an explicit theoretical model and econometric analysis to try to identify the forces at work that have affected NAFTA's trade” (Fukao et al., 2003, p. 7). Their results show that there was some trade diversion in reference to Mexican textile and apparel imports to the U.S. However, in areas such as trade in automobiles and TV receivers, other influences, such as changes in FDI and outsourcing, had a larger effect than tariff preferences, thus indicating no trade diversion.

During the NAFTA period (1994–present), overall trade between the NAFTA parties has increased dramatically: during the 1993–2000 period alone, Canada-U.S. trade doubled, while Mexico-U.S. and Mexico-Canada trade tripled (Huffbauer and Vega-Cànavas, 2003). Despite these impressive increases, it is not sufficient to attribute this phenomenon exclusively to NAFTA, as there have been other events (global trade liberalization, pre-NAFTA tariff reductions, currency swings, etc.) that undoubtedly affected trade across the continent.

The consensus among most post-NAFTA econometric studies is that the Agreement: 1) increased imports from Mexico to the U.S.; 2) had a smaller, albeit discernible effect on the increased exports from Canada to the U.S.; and 3) had a minimal effect on overall U.S. trade. These results are consistent with the CGE projections and other studies that had been conducted prior to NAFTA.

Evidence of trade diversion as an effect of NAFTA is less clear. Pre-NAFTA projections are either rare or not robust because: 1) it is difficult, and time-consuming, to predict worldwide trade patterns; 2) modeling an external country's response to tariff reductions occurring within a trading zone is problematic; and 3) competition and exchange rates, both difficult to predict, have a large effect on trade amongst countries.

The results of post-NAFTA research on trade diversion have been mixed. While there is reported diversion shown in some sectors and industries, there is no evidence in others. Methodology plays a key role in these results, and the economics community has yet to agree on a common and accurate method to test for trade diversion.¹⁰

NAFTA effects on employment

During the early 1990s, much of the debate surrounding NAFTA centered on its potential employment effects. Business in all three countries tended to support the idea that liberalized trade would foster employment gains as lower tariffs helped expand markets for products creating a need to increase output, leading in turn to stronger employment demand. Conversely, organized labor and various civil society groups voiced fears of negative employment repercussions. In Canada and the U.S., it was argued that manufacturing and other blue-collar jobs would be lost to Mexico as a result of lower wages in that country. Similarly, Mexican labor worried that their agriculture sector would be unable to compete with more technically advanced U.S. and Canadian operations.

Just as the arguments differed, econometric projections of NAFTA's employment effects were also mixed. The U.S. International Trade Commission (USITC) (1991), using a CGE model, predicted that a free trade agreement with Mexico would

have little or no effect on U.S. employment levels, but that employment shifts among occupations could occur, particularly a shift in employment demand from low-skill to high-skill jobs.

DRI/McGraw-Hill (1992), using a linked macroeconomic model, predicted two scenarios using different trade growth figures: from 1993 to 2000, the U.S. economy would experience average annual growth of either 160,000 jobs or 221,200 jobs, depending on the growth of trade. In any case, DRI/McGraw-Hill projected that a NAFTA would boost U.S. employment.

Conversely, Faux and Rothstein (1991), using a partial equilibrium model with trade multipliers, projected that the U.S. would lose investment, production and employment to Mexico as a result of the Agreement. Hufbauer and Schott (1992) used a similar macroeconomic model and came to the opposite conclusion – that the U.S. would show positive employment gains from NAFTA. Hufbauer and Schott built their model around the assumption that NAFTA would increase U.S. exports more than imports, whereas Faux and Rothstein worked from an opposite assumption.

Clearly, the research on the potential employment effects of NAFTA was mixed, often depending on which inputs and assumptions were included and controlled for. As such, no consensus emerged pertaining to the Agreement's effects on employment in the individual countries. Furthermore, aside from methodology, external factors such as economic recession, political crisis, and escalating trade with countries outside of NAFTA all had extraneous effects on any results. As Sidney Weintraub (1997, p.12) states, in reference to the U.S. economy:

“Even if understated by a factor of two or three, job losses due to NAFTA are dwarfed by other developments in the U.S. economy. The same would be true for job gains as a result of

NAFTA, if we tried to measure these. This is the main reason why job measurement is a faulty criterion for evaluating NAFTA. Job creation and loss are overwhelmingly a function of conditions in the U.S. economy. Foreign trade with a single country is marginal in this respect.”

Weintraub’s allusion to “other developments” in an economy holds true for the other two countries as well, although, due to the sheer size and diversity of the U.S. economy, North American trade does have a larger effect on the economies, and therefore employment levels, of Canada and Mexico. Despite these difficulties, some major research studies evaluating NAFTA’s effects on employment include the following.¹¹

Hinojosa et al. (2000) use partial equilibrium analysis to analyze the effect of Mexican exports on U.S. production and employment. With 1990-1997 as the reference period (four years of NAFTA), they find that the effect has been relatively small: there would be a loss of 37,000 jobs per year due exclusively to imports from Mexico affecting U.S. demand for domestic production. However, they put this in perspective by stating that during this same period, the U.S. economy produced an average of 200,000 net jobs per month.

The *NAFTA at Seven* series of papers from the Economic Policy Institute (2001) also studies job losses resulting from the Agreement. Robert E. Scott’s contribution focuses on job loss in the U.S. Scott uses a partial equilibrium model developed by Rothstein and Scott (1997a and 1997b) that factors in exports as well as imports. A single employment multiplier is applied to all industries, which are broken down to the three-digit SIC level. The model is based on the U.S. Bureau of Labor Statistics’ 192-sector requirements table. Scott’s analysis leads him to conclude that “NAFTA eliminated 766,030 actual and potential U.S. jobs

between 1994 and 2000 because of the rapid growth in the net U.S. export deficit with Mexico and Canada” (EPI, 2001, pp.3). While he concedes that U.S. employment during the period experienced a rapid expansion, Scott argues that the increase was due to other economic forces. He also cites Bernstein (2001) to show that, between April 1998 and 2001, U.S. manufacturing shed 759,000 jobs, claiming that such numbers will only increase if the U.S. continues to run a trade deficit with NAFTA countries.

The Mexican contribution to the EPI volume, by Carlos Salas, uses a qualitative/quantitative method. Salas states that Mexico’s high 1995-1999 annual average employment increase, 3.7 percent (33.9 to 39.1 million employed), is contentious because INEGI changed the National Employment Survey’s (ENE) sample in 1998. While conceding that employment increased *since* NAFTA, Salas argues that the characteristics of employment have changed and the quality of jobs has decreased – citing a decline in the number of salaried jobs with benefits and a lack of strong nonagricultural employment growth.

In the final study of the EPI volume, Bruce Cambell uses a qualitative/quantitative method to show that from 1989 to 2000 Canadian manufacturing employment fell 6 percent, with the industry shedding 414,000 jobs during the initial four years of the Canada-U.S. Free Trade Agreement (CUFTA) signed in 1989. Cambell claims that industries with high tariffs prior to CUFTA and NAFTA were most negatively affected by both agreements. The main aim of Cambell’s study is to show that Canada’s income distribution widened considerably during the 1990s, a negative result of NAFTA (this will be addressed in the next section).

Trefler (2004) uses a rigorous partial equilibrium model to examine the effects of CUFTA on

employment and other indicators. His analysis benefited from the use of four-digit SIC codes, which allows for comparable disaggregated tariff data. While the study falls outside the NAFTA-specific scope of this paper, CUFTA allows for a better test time period than NAFTA, as it reduced tariffs between Canada and the U.S. while keeping tariffs with other countries constant. Trefler controlled for numerous extraneous variables, including industry-specific supply and demand shocks and secular growth trends. His results reveal that, in industries undergoing the greatest Canadian tariff cuts, employment declined by 12 percent, while industries receiving the largest U.S. tariff cuts experienced no employment gains or losses; plant-level productivity grew significantly in both categories of industries. These results reinforce an earlier qualitative/quantitative study by Smith (2001, p.42), stating that CUFTA and NAFTA did lead to some job losses between 1989 and 1994, predominantly in industries that previously had high tariffs, and where “an agreement-induced inward investment flow brought imports in its wake”. Smith states that most of this negative effect occurred in manufacturing, but he is optimistic about Canada’s ability to retain its labor market institutions despite trade liberalization.

Polaski (2004) uses a qualitative/quantitative method that rigorously surveys previous studies and makes primary observations from general macroeconomic data. This study benefits from its three-country analysis, a rarity in the NAFTA literature. She finds that NAFTA has produced a small number of jobs for Mexico, 30 percent of which were in the maquiladora sector during the first few years of the Agreement; however, these jobs have since been lost to relocations of plants to Asia, notably China. Polaski states that the effect of NAFTA on U.S. employment has been “minis-

cule,” a result of the size of the U.S. economy coupled with its numerous trading partners outside of NAFTA. Canadian manufacturing employment was negatively affected by CUFTA; however, employment in this sector had reached its previous levels by the end of the 1990s and is currently growing. Polaski also cites a recent USTIC model, based upon numerous preconditions and assumptions, which shows a small net positive gain in U.S. employment due to NAFTA.¹²

Another method for pinpointing NAFTA-related job loss is via certified NAFTA-Trade Adjustment Assistance Program (NAFTA-TAA) petitions. The NAFTA-TAA is an assistance program set up by the U.S. government to extend benefits such as training and additional income to workers whose jobs are displaced by imports from Canada and Mexico.¹³ However, there are three major problems with supposing that NAFTA-TAA certifications capture the overall employment effects of NAFTA: 1) Canadian and Mexican workers are not covered by similar programs, making it a U.S.-centric statistic; 2) because not all U.S. NAFTA-induced job losers are aware of the program, the numbers are probably underestimated; and 3) NAFTA-TAA statistics do not report numbers of jobs that were *created* because of NAFTA.

NAFTA-TAA petition and certification numbers have been low in relation to the size of the U.S. economy. Hinojosa et al. (2000) report that, as of July 1999, there have been a total of 238,051 certifications; the yearly average has been declining since NAFTA’s enactment.

In sum, just as there was no consensus on NAFTA’s effects on employment prior to the Agreement, the research that has been conducted post-NAFTA is similarly varied. The two competing interpretations are both hindered by difficulties

associated with attributing employment gains or losses solely to NAFTA. Also, the use of partial equilibrium analysis to estimate job gains or losses (using growth multipliers) is strongly affected by the inputs selected to estimate export growth with and without the trade agreement. Trefler's study is by far the most rigorous in its attempt to disentangle employment movements due specifically to trade, and this study still accepts that the exigencies of the macro economy inevitably play a crucial role in affecting employment levels.

Finally, studies giving a negative view of NAFTA's effects on employment are hindered by the fact that employment in Mexico and the United States has experienced strong gains since 1994; Canada has also shown significant increases, albeit not at the same pace as its southern neighbors.

NAFTA effects on wages and income inequality

The major pre-NAFTA projections regarding wages and income inequality are included in the studies referred to in the previous section (*NAFTA effects on employment*); this is due to the wide scope of these econometric models, as well as the natural synergies existing between employment and wages. Burfisher et al. (2001, p.128) report that "empirical studies at the time of the NAFTA debate ... predicted very small wage effects" and, therefore, limited effects on income inequality. They base this statement on an analysis of early research by the International Trade Commission (1992), the Congressional Budget Office (1993) and Lustig et al., (1992) Brookings Institute summary of the literature. Organized labor, following international trade theory, feared a slide in lower and middle-class wages and increasing income inequality. Thus, as in the employment debate, no consensus emerged regarding NAFTA's potential effects on wage movement and widening.

The literature on international trade theory builds upon the Heckscher-Ohlin model and is at the heart of the wage/inequality debate. The Stolper-Samuelson theorem and Factor-Price Equalization theorem use the Heckscher-Ohlin model to round out trade theory.¹⁴ To summarize, the Stolper-Samuelson theorem states that if the price of goods using unskilled labor declines in relation to goods using mostly skilled labor, then the wages of unskilled labor should fall relative to those of skilled labor (or vice versa). The result for recently trade liberalizing countries with an abundance of highly skilled labor (e.g., the U.S. and Canada) would be a decline in unskilled-labor intensive products and a decline in wages for unskilled workers towards an absolute international level (Factor-Price Equalization theorem). Obviously, a country with a predominance of low-skilled/low-waged workers (e.g., Mexico) would experience an increase in demand for their unskilled-labor intensive products; however, this demand might not necessarily result in increased wages for these workers.

To summarize, in physical and human-capital rich countries that have previously placed import restrictions on goods made with less-skilled labor, less-skilled workers will experience lower wages when trade liberalization occurs (USTIC, 2003). The result of declining wages for lower-skilled and increasing returns for higher-skilled workers increases income inequality in a skill-abundant country.

From the aforementioned theoretical constructs, the pre-NAFTA arguments are easy to understand. Clearly, critics of the Agreement in Canada and the United States feared both a loss in jobs and decreases in wages for the low-skilled, thus providing a basis for the assumption that income inequality would increase. Conversely, proponents

of the Agreement countered that competition would lead to increased technological change and training, thereby elevating productivity, which would translate into higher wages (not to mention the widening of markets for domestically produced products). In Mexico, the consensus opinion from both sides was positive – any increase in FDI and expanded access to U.S. markets would elevate employment levels and productivity, leading to higher wages for Mexican workers collectively. Organized labor did have some concerns, but its general perception of NAFTA was positive.

The results of post-NAFTA studies analyzing the Agreement's effects on wages and income inequality are mixed. They, like studies on other labor market indicators, are hindered by the effects of extraneous variables within the macro economy. Also, methodological differences can make the validity of results debatable. The remainder of this section describes some major research studies of the effects of NAFTA on wages and income inequality.¹⁵

There has been an abundance of qualitative/quantitative, or even simple regression, analysis reporting on wage and income inequality statistics *since* NAFTA; research pinpointing the specific effect of NAFTA has been less frequent. The results of the former category of research are varied and include: Borjas, Freeman, Katz (1997), Commission for Labor Cooperation (1997, 1998, 2000), Polaski (2004), EPI (2001).

In all three of its individual country studies, the EPI finds that the real wages of lower-skilled workers decreased and income inequality increased because of NAFTA. Polaski (2004) finds that real wages for most Mexicans are lower today than when NAFTA began; however, much of this is due to the peso crisis of 1994-1995. She does state that Mexican productivity increases have not

translated into wage increases. Polaski finds that NAFTA effects on U.S. wages, as on employment, are minimal, but the widening gap between high-skilled and low-skilled workers – some of which is due to trade – has increased income inequality. Her research finds that neither NAFTA nor CUFTA affected wages in Canada, but, as in Mexico, productivity gains did not translate to higher wages.

The aforementioned research is insightful in presenting statistics on wage and income inequality movement in relation to policy introductions such as NAFTA or the peso crisis; however, the results do not prove causation. Econometric research separating cause and effect from simple phenomena is rarer, but still available.

Much of the econometric literature uses product prices to infer the effect of trade on wages, therein beginning from the Stolper-Samuelson theorem. Some examples include Harrigan (2000), who finds that the direct impact of import prices on U.S. wages is insignificant. Slaughter (2000), in a review of nine price-based studies, finds that the effect of price changes from tariffs on wages often depends on the industries selected, the weighting employed and measurement choice. Slaughter therefore warns that attributing any changes specifically to trade liberalization is highly susceptible to error.

Slaughter (1999), in looking at worldwide trade liberalization, finds a link between trade and income inequality in developed nations. Little research has been completed on the effects in the developing world. The exception is a study by Wood (1995), which synthesizes results from numerous studies on various developing countries and finds that sharp increases in income inequality usually follow trade liberalization. Wood attributes this to a rising demand for skilled workers, consistent with the Stolper-Samuelson theorem.

Robertson (2000), employing a partial equilibrium regression model, highlights a link between trade and income inequality. He finds that changes in relative prices resulting from tariffs contributed to wage inequality; it should be noted that Robertson concedes that this is not purely a NAFTA effect, as trade liberalization began in Mexico in the mid-1980s.¹⁶ Interestingly, Robertson finds that while the increase in overall wages supports the Heckscher-Ohlin-Samuelson framework, the rise in inequality contradicts the traditional framework because “if Mexico were actually abundant in less-skilled workers, then the relative price of skill-intensive goods should have fallen when the tariffs fell. However, Mexico used trade protection policy to protect less-skill-intensive industries and cut these tariffs more, causing this change in relative prices” (Robertson, 2000, p. 828). The relative price of Mexico’s skill-intensive goods did rise when the tariffs were removed; this is consistent with the Stolper-Samuelson theorem. A forthcoming paper by Robertson uses more recent data to reinforce these findings.

The literature on wages and income inequality is more heavily weighted toward qualitative/quantitative research, presenting the statistics since NAFTA in light of policy changes. Rigorous econometric research is much more limited and tends to group numerous developing or numerous developed countries. There is a dearth of studies involving individual NAFTA countries specifically, or a three-country comparison, the work of Robertson being the exception to the former.

The general conclusions from both qualitative/quantitative and econometric studies are mixed. The consensus of research on wages is that they have not increased because of NAFTA. Conversely, while there is no denying that income inequality has increased *since* NAFTA, attributing this *to* NAFTA

is difficult. As a result, studies attempting to show this link have not won widespread acceptance.

Lessons for smaller economies attempting to study trade liberalization effects

There are a number of caveats and difficulties to be addressed prior to projecting and analyzing the effects of trade liberalization on labor markets. Obviously, larger countries are usually less impacted by a single agreement, as they tend to have numerous trading partners and a more diversified economy, whereas smaller economies may be impacted by any small change in policy. The trade *openness* of a country can also affect the extent of a trade agreement’s impact, since a country with a history of extensive trade relations will probably be less strongly impacted by a new trade deal than a nation that has a tradition of high tariffs/protectionism.

As shown in this paper, there is no consensus in the economics community regarding a single “best” methodology to gauge the effects of trade liberalization on labor markets; therefore, there will always be a debate over the results of various types of research. Despite this lack of consensus, there are methodologies that are more commonly used, and are perhaps more effective, for different research objectives: LMMs and CGE models tend to be used for forecasting, while partial equilibrium and qualitative/quantitative methods are typically employed for evaluation and reporting on past behavior. The choice of a particular methodology is also affected by the availability of data required to complete the research. LMMs and GCEs tend to require more aggregate data, and LMMs specifically need pre-existing large-scale aggregate models to properly link data.

Within the context of methodologies, other more general caveats must be considered in researching trade effects:

- The comparability of data can drastically influence any results. Data for individual countries often use different definitions, concepts and sample stratifications, all of which have repercussions on the results of comparative research.
- Economic research often employs or builds upon a previous assumption (trade theory, the Armington assumption, perfect competition, etc.) that is factored into the model, thereby having an influence on output.¹⁷ Such subjective decisions, made by the individual researcher, can make consensus findings rare and contentious.
- Attributing changes in labor market indicators exclusively to NAFTA is susceptible to overgeneralization and error. The proliferation of globalized trade, the conditioning in of tariffs after an agreement is signed, previous trade agreements, etc., all affect labor markets and make it difficult to determine what changes were due *to* NAFTA as opposed to those that have simply occurred *since* NAFTA.
- The appropriate elapsed time, since an agreement is signed, to accurately measure

effects is open to debate. To clarify, can the effects of NAFTA on various labor market indicators be accurately gauged after only a few years of the Agreement's existence, or do we need to wait much longer to observe the real effects on variables?

- The pre- and post-NAFTA research has shown that, for trade, employment, wages and income inequality, the projected results were varied, as are the actual results. Therefore, establishing a foolproof method of inquiry is impossible.

All these challenges must be considered by developing nations that are interested in predicting the influence of a trade liberalizing agreement. Appropriate and comparable data must be available, the presence of extraneous variables and events accepted, and the desired results/focus established before a decision on methodology can be made. For developing nations looking to gauge the effects of a recent trade agreement, the same factors must be considered. Thus, it is imperative for these nations to ensure that the proper mechanisms for evaluation – including a reliable statistics agency that collects and monitors the appropriate data – are all in place.

Notes

¹This paper was commissioned in March 2004 for an Inter-American Conference of Ministers of Labor (IACML) workshop to be held in May 2004, thus the findings are preliminary. The author welcomes suggestions on any missed studies, to be included in an expanded version. It should be noted there are hundreds of articles written on various aspects of trade integration and its effects on labor markets in the NAFTA context. This paper represents an effort to include only the most important and relevant documents of research.

²This section borrows from the classifications employed by the U.S. Department of Labor in its 1993 Economic Discussion Paper 44.

³Perfect competition is a theoretical type of market structure in which price competition is dominant and: 1) All firms sell an identical product; 2) All firms are price takers; 3) All firms have a relatively small market share; 4) Buyers know the nature of the product being sold and the prices charged by each firm; and 5) The industry is characterized by freedom of entry and exit. Imperfect

competition describes a market situation when a single producer can affect the market price by varying the amount of product available in the market; it is the opposite of perfect competition – examples include monopoly and oligopoly.

Economies of scale in production occur when cost per unit made declines with the number of units produced.

The neoclassical model of trade without exogenous shocks (e.g., productivity increases or population changes) presents a steady state capital-labor ratio determined by equating the real marginal product of capital and the discount rate. Any policy which raises the marginal product of capital will also raise the steady state capital-labor ratio, inducing output to grow faster in the medium term as capital accumulation takes place at a higher level (Solow, 1956; Baldwin, 1993). Also see the section *NAFTA effects on wages and income inequality* in this paper.

The Armington assumption states that commodities imported and exported are imperfect substitutes of domestically produced and used commodities. This assumption is necessary to take into account two-way trade while an unrealistically high degree of specialization is avoided.

⁴ For more information of the construction of CGE models for policy analysis, see Antweiler and Trefler (2000), Robinson et al. (1999) and Hinojosa et al. (1999).

⁵ See Krueger (2000) for a description of “gravity” and “shift and share” methods.

⁶ See note 3.

⁷ As mentioned earlier, pre-NAFTA forecasting studies predominantly used CGE models.

⁸ For examples of research involving pre-NAFTA forecasting models reinforcing the positive trade-producing aspects of a North American Free Trade Agreement see: linked mac-

roeconomic models – INFORUM-CIMAT (1991), DRI-McGraw-Hill (1992); CGE models – USITC (1991 and 1993), KPMG Peat Marwick (1991), Hinojosa and Robinson (1991). For references to more articles projecting the effects of NAFTA see U.S. Department of Labor in its 1993 Economic Discussion Paper 44.

⁹ For evidence of increased trade in North America during the NAFTA period, see Griswold (2002), Courchene (2003), Huffbauer and Vega-Cànavas (2003), Polaski (2004), Lederman et al. (2003).

¹⁰ For additional articles regarding NAFTA’s effects on trade diversion, see Solaga and Winters (2001), Wall (2002) and Agma and McDaniel (2002).

¹¹ Given the large number of studies involving NAFTA and employment, this section will only summarize more recent publications. Studies focusing on NAFTA’s early years include: Bolle (1996), Hinojosa et al. (1999), USITC (1997).

¹² See USTIC (2003) for a summary of the inputs and assumptions of this model.

¹³ For more information on the impetus and implications of the NAFTA-TAA, see Rosen (1994).

¹⁴ For analysis and discussion on international trade theory and the aforementioned model and theorems, see: USTIC (2003), Krugman and Obstfeld (2000), Bagwhati et al. (1998), Wong (1995).

¹⁵ Similar to employment effects, there is an immense literature evaluating wages and income inequality and NAFTA; as such, this section will only summarize more recent publications.

¹⁶ Mexico entered the General Agreement on Tariffs and Trade (GATT) in 1985.

¹⁷ See note 3.

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