Do Legislators Consider the Economic Vulnerability of their Constituents when Liberalising Trade? An Empirical Examination of the Voting Record on NAFTA[*]

ECON 491/492: Yale Economics Senior Thesis

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Abstract

We use U.S. Congressional voting roll call data as well as U.S. Census data from 1990-2000 to examine the voting behaviour of the House of Representatives on the North American Free Trade Agreement (NAFTA). Specifically, we investigate the impact of economic vulnerability of their constituents to free trade with Mexico on the Representatives' voting decision. Using a weighted local average tariff of each Congressional District as a measure of its vulnerability, we find a strong and significant effect even with the presence of other controls. This allows us to conclude that Representatives did base their votes on the anticipated economic effect on their constituencies. This suggests that politicians are aware of and take into account directly the economic impact of trade legislation on the citizens they represent, and to a greater degree than factors such as personal ideology, party affiliation and political contributions. We also find a lack of significant relationship between local vulnerability and labour contributions.

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I. Introduction

Rodrik (2000) argues that no other area of economics exhibits such divergence between what economists preach and what policymakers endorse as international trade. Although economists are almost entirely unified in their endorsement of free trade (U. Chicago, 2012), there is a consistent controversy and reluctance on the part of legislative bodies surrounding the adoption of bills that bring about trade liberalisation.

Perhaps no trade bill has been as controversial or polarising as the NAFTA signed in 1993 between the U.S., Mexico and Canada. Signed into law by President Clinton on the 8th December 1993, NAFTA went into effect on the 1st January 1994. Although Mr. Clinton declared upon his signing of the bill: "NAFTA means... good-paying American jobs, If I didn't believe that, I wouldn't support this agreement"[1], subsequent reception of this trade bill has been less unabashedly enthusiastic. Discussion of the legacy of this trade agreement has surfaced in almost every U.S. Presidential election since then, most notably with the then-candidate President Donald Trump's calling it the "single worst trade deal ever approved [in the U.S.]" in the most recent election cycle[2]. With the election of Mr. Trump and the general perceived rise of anti-globalisation forces in world politics, the landmark U.S. trade bill of this generation invites further examination. A common sentiment around the time of the election was that "the system isn't working" for many segments of American society, particularly with regards to the effects of globalisation[3]. We therefore wish to examine the question: when congressional legislators voted on NAFTA in 1993, did they take into account the economic interests of their constituents?

Given its importance, there have been a number of studies that analyse the economic effects of NAFTA on the labour markets and income distribution in the U.S. Most of these studies focus on macroeconomics and aggregate impacts of NAFTA (Caliendo and Parro

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[1]Mr. Clinton made this remark in a White House press release immediately following the signing of the NAFTA bill

[2]Mr. Trump made this statement during the first Presidential debate against Secretary Hillary Clinton.

[3]*European Populism in the Age of Donald Trump*, New York Times, 2016

(2015), Burfisher et al. (2001), Romalis (2007). Only relatively recently have there emerged studies that attempt to examine the domestic geographic effects of NAFTA and other trade policies. The treatment of NAFTA's local labour market effects by McLaren and Hakobyan (2015), in particular, heavily influences the data analysis of this paper.

Parallel to this, there are studies in the political economy sphere that focus on voting behaviour surrounding trade policies. Here, we make the distinction between the economic effects of legislation and the political considerations that influence the way legislators vote. These political considerations include party considerations (voting along party lines), ideological considerations (voting in line with personal ideology) and funding considerations (voting in line with the agendas of political contribution sources). Though these studies inform in part the methodology of this paper, much of their analysis focuses on the political considerations of the individual legislators more than on the economic effects of these measures on their constituents.

I contribute towards existing literature surrounding the political economy of trade economics by examining the degree to which the local economic impacts of trade legislation informs the voting behaviour of legislators. Specifically, this paper will examine the voting behaviours of the House of Representatives in the 103rd United States Congress and focus on whether the votes of the Representative took into account the anticipated effects of NAFTA on their constituents, as measured by whether the local vulnerability of their Congressional district had a significant impact on their voting decision.

Section II will first provide a history and overview of NAFTA, with a particular focus on the U.S. In Section III, we will briefly discuss some of the existing theories and models in international economics relevant to our analysis. Section IV will provide a review of the existing literature relevant to this study. We will present our data and methodology in Section V, and present our regression model and its results in Section VI. We discuss our findings in Section VII and conclude in Section VIII. **N.B. Tables are displayed at the end of the paper.**

II. A Brief Overview of NAFTA

Today, NAFTA represents the world's largest free trade area, both in terms of area and GDP of constituent nations. The trade bloc is home to some 477 million inhabitants and has a combined economic output of around $20 trillion. As of 2015, the member states of NAFTA traded $1.1 trillion worth of goods and services with each other[4].

Although signed into law by the Clinton administration in 1993, the idea behind NAFTA has its origins under President Reagan, who proposed a North American Common Market on the campaign trail in 1980. Mr. Reagan's efforts resulted in the signing of the Canada-U.S. Free Trade Agreement (CUFTA) in 1988. Under President George H W Bush, the negotiations for a trilateral trade deal between the U.S., Mexico and Canada were largely concluded. President Bush, along with Canadian Prime Minister Brian Mulroney and Mexican President Carlos Salinas, signed the NAFTA agreement on the 17th of December 1992. Due to his term expiring, President Bush was unable to push ratification through Congress, resulting in the agreement being passed to his successor, President Clinton.

Unlike the relatively smooth passage of CUFTA in the U.S., NAFTA faced a prolonged and emotional debate in Congress due to the widely differing natures of the U.S. and Mexican economies, especially in terms of average labour costs and areas of comparative advantage. The bill was subject to lobbying by interest groups, such as vulnerable companies, labour unions, and environmental organisations.

Destler (1995) described the struggle over NAFTA as the "most prominent and contentious domestic debate on trade since the Smoot-Hawley Tariff Act of 1930". The vigour of the debate was embodied by 1992 third party Presidential candidate Ross Perot's famous warning of a "giant sucking sound" of jobs leaving the U.S. for Mexico, as well as his highly publicised live television debate with Vice President Al Gore on the issue the following

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[4]World Bank DataBank.

year[5].

In broader terms, the agreement aimed to integrate a low-wage, developing country (Mexico) with two high economically developed, high wage countries and promised to increase the economic growth of its participants. This caused anxiety on the part of U.S. legislators concerning the agreement's impact on the U.S. labour market given its cost asymmetry with Mexico. The average hourly compensation in Mexican manufacturing was 14% of the U.S. average ($2.17 vs. $15.45)[6].

This led to fears of a manufacturing jobs exodus from the U.S. to south of the border as American workers became suddenly uncompetitive against their Mexican counterparts in the absence of trade protection and prompted the mobilisation of organised labour. Furthermore, labour unions saw NAFTA as the possible starting point for creating similar free trade agreements with other low-wage countries, furthering putting pressures on returns to the manufacturing sector (Destler, 1995).

Environmental groups were also opposed to NAFTA on the basis of weak environmental regulation south of the border, particularly with regards to the polluting activities of the *maquiladoras*, factories that import components and raw materials and export processed end-products, often back to the country of origin of the components. These factories are predominantly situated along the U.S.-Mexico border, and have long had a reputation within the U.S. for having poor working conditions and environmental negligence[7]. Environmental groups were also concerned that U.S. firms would relocate production to Mexico to take advantage of the cheaper regulatory costs associated with lax environmental laws, pressuring lawmakers to ease regulations domestically.

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[5]The debate took place on an episode of *Larry King Live* in 1993. Mr. Perot made his famous "sucking sound" statement during the 2nd U.S. Presidential debate in 1992.

[6]Figures are given in USD in 1993

[7]Numerous U.S. environmental agencies, such as the EPA and U.S. Geological Survey have published studies on the polluting impacts of *maquiladora* activities.
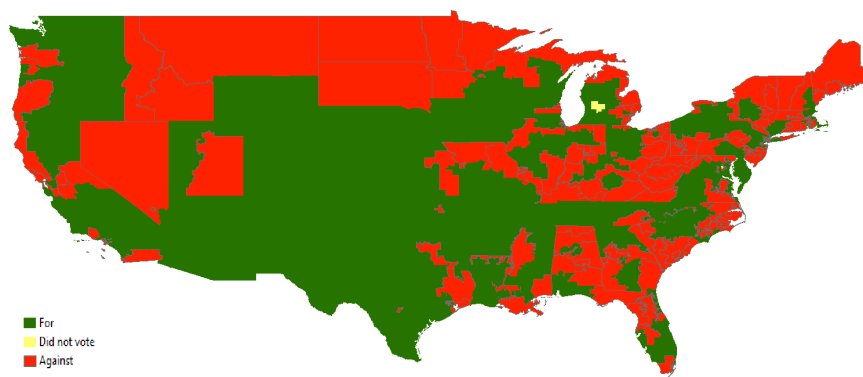
Figure 1: U.S. House of Representatives NAFTA vote. Data obtained from House of Representatives roll call votes.

Eventually, the treaty was ratified with a 234-200 majority vote in the House (see **Figure 1** for a geographic breakdown of the voting in the House) and a 61-38 vote in the Senate[8]. Along with the ratification of the main NAFTA treaty, Mr. Clinton also negotiated the signing of the North American Agreement on Environmental Cooperation (NAAEC) and the North American Agreement on Labour Cooperation (NAALC) as side-treaties to NAFTA. The NAAEC and NAALC represent a commitment on the part of all signatories to uphold their environmental and labour laws respectively, and provide mechanisms for dispute resolution in case of failure to uphold these standards[9].

The aim of NAFTA is the integration of the economies of the North American nations through the elimination of trade tariffs. The agreement eliminated tariffs on 50% of Mexico's imports to the U.S. and around 30% of U.S. exports to Mexico, and called for a gradual phasing out of all U.S.-Mexico tariffs within 10 years, with a 5-year extension for certain agricultural goods. In addition to tariff elimination, NAFTA also established

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[8]Voting data was obtained from House of Representatives and Senate roll call votes

[9]These side-treaties stipulated, amongst other measures, the creation of a Council of Ministers and arbitration organs.

procedures for resolving trade disputes and protecting intellectual property rights across the bloc (Holbein and Musch, 1994). As most of the Canada-U.S. trade already occurred on a duty-free basis through the earlier CUFTA, the economic impact on the U.S. came mostly through the effects on Mexico-U.S. trade.

The passage of the bill through Congress was accompanied by a flurry of activity, with economists attempting to predict the effects of the trade agreement. At the time of passage of the bill, most economic studies projected a modest but positive effect on the U.S. economy and a larger positive effect for Mexico, due in part to a greater reliance of Mexican exporters on U.S. markets. When NAFTA was ratified, less than 10% of total U.S. trade volumes were between the U.S. and Mexico, while 83% of Mexico's exports and 71% of Mexican imports were conducted with the U.S. As an example of the prevailing sentiment, the U.S. Congressional Budget Office (CBO, 1993) projected that U.S. GDP would exhibit a long run growth of around 0.25% due to the effects of NAFTA.

With regards to the labour markets, the general economic consensus of the U.S. community was that fears of the kind raised by Mr. Perot were overblown. The U.S. Department of Labour (DoL, 1993) conducted a study which revealed that the sectoral employment changes would be small, with turnover rates of less than 2% of sectoral employment at the pre-NAFTA levels. The predictive wage effects of NAFTA were also downplayed; the International Trade Commission (ITC, 1992) surveyed a symposium of academic research and concluded that NAFTA would result in a small aggregate increase of real wages (> 1%).
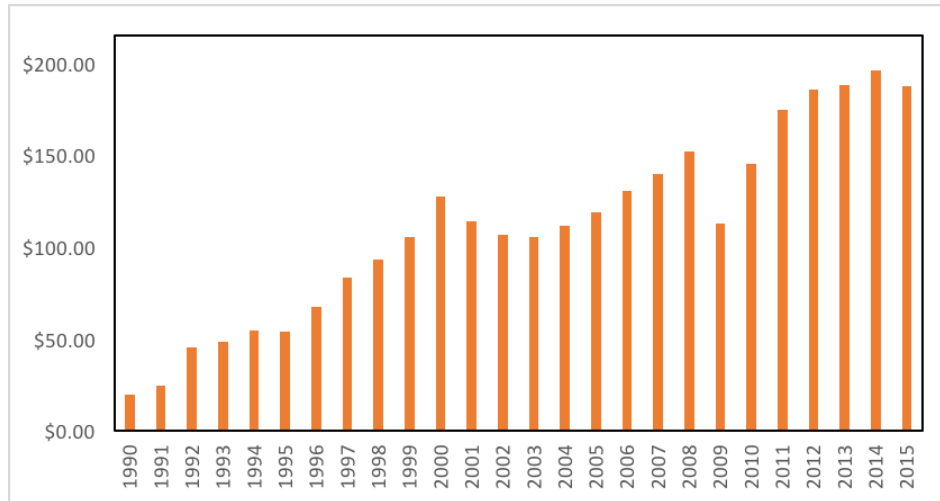
Figure 2: Volume of U.S. imports from Mexico in USD Billions. Data obtained from UN Comtrade.
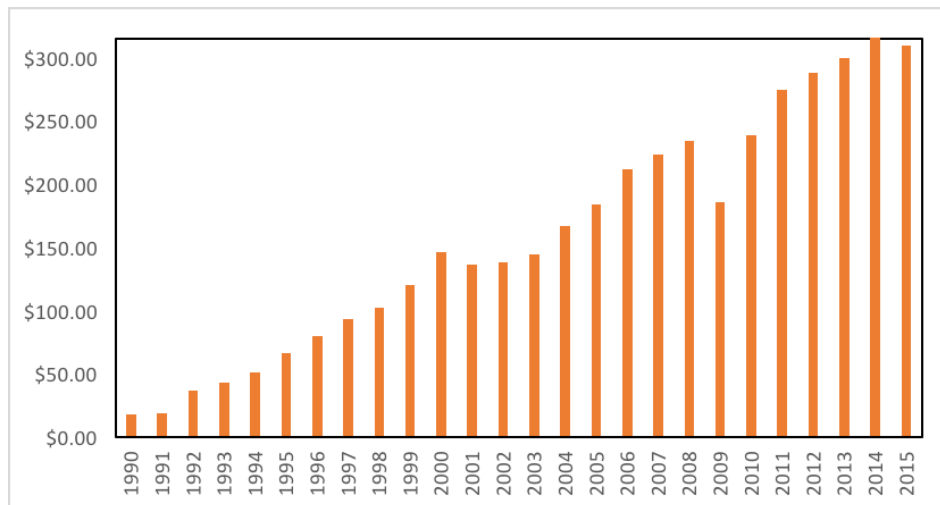
Figure 3: Volume of U.S. exports to Mexico in USD Billions. Data obtained from UN Comtrade.

The years following the creation of NAFTA saw a drastic increase in U.S.-Mexico trade volumes, with the growth rate exceeding the growth rate of U.S. trading volumes with the rest of the world (See **Figure 2** and **Figure 3** for Mexico-U.S. trading volumes. Caliendo and Parro (2015), using a general equilibrium model, analysed NAFTA and found an increase in intra-bloc trade of 118% for Mexico and 41% for the U.S. Their study also found that the creation of NAFTA prompted an increasing specialisation of the Mexican

economy towards sectors that were oriented towards exports (see **Figure 4** and **Figure 5**). In addition to this, Caliendo and Parro found that the U.S. experienced a welfare increase from NAFTA to the amount of 0.08% of pre-NAFTA levels.

Figure 4: Mexico's revealed comparative advantage in manufactured goods. Data obtained from UN Comtrade.

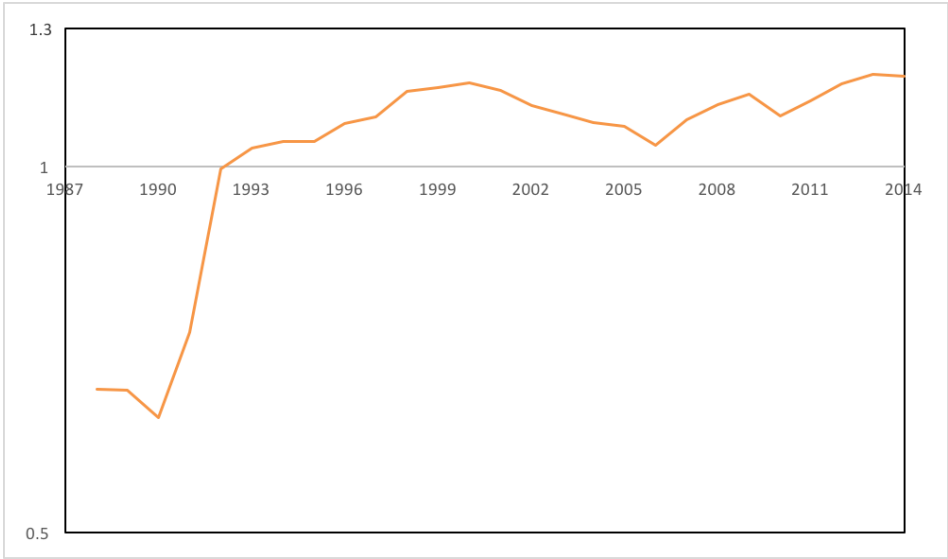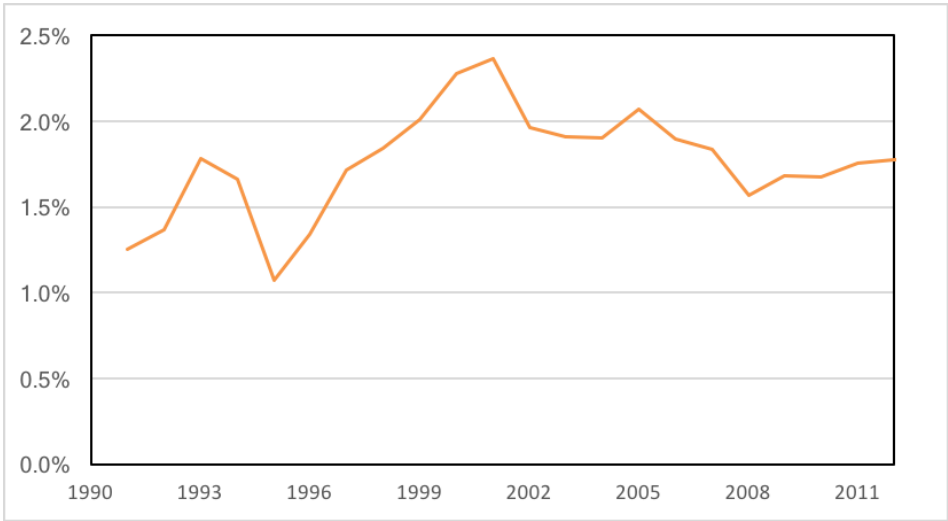Figure 5: Mexico's share of value added in global manufactured goods. Data obtained from UN Comtrade.

Other economic agencies concluded around the time of NAFTA's ratification that the effects on NAFTA in terms of aggregate employment were small, and were offset by

other greater macroeconomic trends. Although the aggregate effects on employment were small, much of the subsequent political opposition to NAFTA has been centred around the geographically disparate impact that it has on the U.S. workforce. Much of the research of the economic effects of NAFTA revolve around claims that the agreement disproportionately impacted certain geographic groups and regions, though these claims have been difficult to address directly given the historically predominant focus on the aggregate country-wide effects of NAFTA. The recent emergence of studies that focus on the local area effects of trade deals facilitates the remaining research conducted in this paper.

III. Review of Relevant Theoretical Concepts in International Trade and Political Economy

Because this paper examines the disparate impact of trade liberalisation on different segments of the economy, as do studies surrounding NAFTA more broadly, it is useful to consider the Heckscher-Ohlin and Ricardo-Viner trade models. Both models can be considered extensions of the classic Ricardian trade model, since they introduce the concept of multiple factors of production, and also contain implications for different returns to factors due to changes in price levels resulting from trade.

The basic Heckscher-Ohlin (H-O) model assumes two countries, each endowed with a combination of two different factors of production, which produce two different goods[10]. Under the H-O model, we assume that factors can move freely between industries but cannot move between countries and that differences in the endowment mix of countries drive their comparative advantages. An interesting result of this model is the Stolper-Samuelson (S-S) theorem, which stipulates that a decline in the world price of a good

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[10]The model can be extended to accommodate multiple goods, factors, and countries, but the classic "2-2-2" model is sufficient for us to discuss its results and implications

will lead to a decline in the returns to the factors used more intensively in its production and an increase in the returns of the other factors, and vice versa. According to the S-S theorem, as a result of trade liberalisation with Mexico, we would expect to see a fall in the U.S. price of goods that are imported from Mexico, and therefore a fall in the wages of those employed in that industry.

The Ricardo-Viner (R-V) or Specific Factor model is similar to the H-O model in that it assumes multiple factors of production producing multiple goods. However, it relaxes the assumption that factors can move frictionlessly between different industries. In the basic formulation of the model, one factor of production can move freely within the domestic economy, while the other one is fixed producing a particular good. In this model, as the price of a good changes due to trade policy, the mobile factor of production can move between industries to ensure factor price equality across the two industries. However, the fixed factor of production cannot move and its real returns depend heavily on the price of good that it is stuck producing; if the industry in which the fixed factor is employed suffers a price decline, the real returns to that factor will decline, whereas the returns to the same fixed factor in the other industry will increase.

These two trade models have stark implications for the U.S. workforce and its reaction to the implementation of NAFTA. We can see that the ability for workers to adjust to trade shocks depends heavily on their mobility in the economy. We can observe that in the short run, mobility between sectors may be limited due to friction in the labour markets, favouring use of the R-V framework in these situations. The S-S theorem stipulates that some factors of production will see a long-run decline in their returns after trade shock, based on their industry of employment. Much of the subsequent discussion in this paper, either regarding previous work done or new analysis, will refer back to one or both of these models.

We now turn our attention to a survey of some of the existing frameworks in the context of voting behaviours, especially with regard to trade policy.
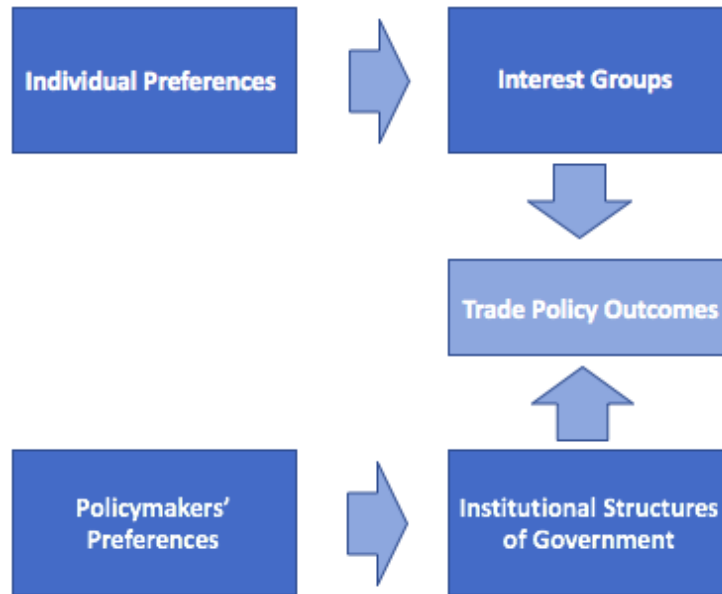
Figure 6: A theoretical mechanism for the creation of trade policy outcomes.

A basic political economy model of trade policy is laid out in Rodrik (2000), which is depicted pictorially by **Figure 6**, and must contain four elements. It must describe the individual preferences of the electorate/constituents. It must be able to have some mechanism for aggregating these preferences in the form of lobbying or special interest groups. This makes up the public or "demand" side of trade policy. On the government or "supply" side, we have the electoral and ideological preferences of the individual legislators, as well as the mechanism and structure of the government (Congress, Parliament etc.). All of these elements work together to produce trade policy. Note that under one interpretation of this framework, lawmakers do not directly base their decisions on the economic welfare of their constituents, but rather on lobbying as a proxy for the desires of the electorate.

IV. Review of Existing Literature

In this section, we will examine some of the existing literature in the fields of political economy and trade theory.

Literature Relating to Political Economy

Previous studies have demonstrated the effect of political considerations on lawmakers' voting behaviour with respect to trade liberalisation. Baldwin and Magee (2000) examined the role of campaign contributions on U.S. legislators' voting behaviour during NAFTA, granting Most Favoured Nation (MFN) status to China and the Uruguay Round Agreement. They collected data on the roll call votes of House and Senate members on these trade legislations, along with characteristics about their constituencies and their ideological positions. The latter two factors were used as controls in examining the impact on voting behaviour of contributions from special interests groups. Baldwin and Magee subdivided the special interest groups into pro-labour (largely unions) and pro-business (corporate donations and business PACs), with the hypothesis that trade liberalisation is opposed by the pro-labour groups and supported by pro-business ones. The authors were able to confirm their hypothesis, finding statistically significant results that demonstrated these relationships. In addition, the authors estimated that the pro-labour lobbying won 67 extra votes against NAFTA and pro-business lobbying won 41 extra votes in favour of NAFTA, with each vote costing around $352,000.

Conconi et al. (2013) built upon the methodology of Baldwin and Magee to examine links between term times and duration of electoral mandates of legislators and protectionist voting behaviour. The authors gathered voting roll calls on major U.S. trade bills starting from the Trade Act of 1974, seeing whether or not the legislator in question voted in favour of additional trade liberalisation. The paper regresses the voting behaviours of U.S. Congressmen on various characteristics of the legislators and their constituents. Controlling for factors such as the economic attributes of their constituencies as well as ideology and campaign funding of the Congressmen, Conconi et al. find that legislators who are about to face re-election are more likely to vote against liberalisation than those who have just started their terms. Legislators who held "safe" seats that were won by a large margin or who were nearing retirement were also more favourably inclined towards

trade liberalisation. Although the House as a whole tends to be more protectionist than the Senate, this inter-cameral difference disappears once the term differences between Representatives and Senators are taken into account.

Levitt (1996) examines the voting behaviours of U.S. senators in terms of weights in some maximisation of an unobserved voting utility function. Levitt (1996) assumes that each Senator takes into account four different sets of interests when contemplating voting decisions: i) overall preferences of the state, ii) preferences of the senator's own political supporters within the state, iii) party line, and iv) the senator's personal ideology. Although the paper cannot be directly applied to this particular analysis, as the author uses House roll call votes as indicative of voter preferences while we examine whether the House took into account their constituents' economic vulnerability, we can nevertheless extract useful insights from the study. Levitt constructs various instrumental variables to proxy for the other three interest sets and finds that the average Senator only places around one-quarter weight on overall state voters' preferences in his voting utility function. The weight of the national party line is also quite small; the majority of the senators' utility maximisation seems to come from voting in line with personal ideology.

Grossman and Helpman (1994) devised a model to describe the voting choices faced by legislators over issues relating to trade policy by studying equilibrium in a small economy. In Grossman and Helpman's model, individuals derive income from wages, government transfers and ownership of industry-specific factors of production. The government can set tariffs on certain imports and subsidise the production of certain exports. Individuals attempt to maximise utility derived from consuming goods in the economy subject to their income. The government maximises its objective function that is composed of a linear sum of welfare and political contributions. In this model, individuals group together to form lobbies that tender "offers" to the government for various forms of trade protection. The Grossman-Helpman model is therefore in effect a two-stage auction, in which the different lobbying groups make simultaneous bids in the first stage and the

government sets trade policy in the second stage. Goldberg and Maggi (1999) conducted an empirical investigation of the Grossman-Helpman model by verifying the consistency of its predictions with real world data. In the paper, the authors find that the model was qualitatively accurate in its predictions, in that the explanatory variables specified in the model did in fact determine the model, and other factors were not statistically significant. The authors also found that the government's objective function weighted the welfare component of their function many times more than they did the political contributions component[11].

Literature Relating to Labour Market Effects of Trade Liberalisation

Autor et al. (2016) examines the effect on U.S. local labour markets of the rise of China as a global exporter. The authors implement a general equilibrium model in the style of an Eaton-Kortum model[12] to examine the trade shock of the influx of Chinese imports over the last two decades. Autor et al. examines economic data at the level of Commuting Zones (CZ), which can represent geographic groupings of similar economic and business activity. From their paper, the authors were able to conclude that the regions most exposed to trade from China were disproportionately negatively affected compared to other regions. They showed further that adjustment from this shock took far longer to manifest than predicted by previous macroeconomic models, with some labour markets taking as long as a decade to adjust. The findings also show that this slow rate of adjustment is unaffected by the magnitude wealth transfer measures, and that furthermore not much welfare was transferred overall from the "winners" to the "losers" of this trade shock. These findings are corroborated by Acemoglu et al. (2016) which showed that slowed job growth in

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[11]We note that the Grossman-Helpman model is not actually a model of voting behaviours, in that it is agnostic to the way in which the government sets trade policy. However, in the scope of NAFTA in the U.S., tariffs were changed due to actions in the legislature. We may therefore consider the voting of lawmakers as an extension of the policy-making aspect of the Grossman-Helpman model.

[12]The Eaton-Kortum model is a model of international trade that tries to unite the concepts of gravity, factor price inequality, and inter-country differences in industrial productivity in a single general equilibrium framework. For detail and implications of the model, see Eaton and Kortum (2013).

the early 2000s were due to import competition from China, and that rising Chinese imports from the period 1999-2011 costs the U.S. economy around 2.0-2.4 million jobs, predominantly in manufacturing.

Chiquiar (2004) examines the effects of NAFTA on regional wage differences in the context of the Stolper-Samuelson theorem. In his paper, Chiquiar divides Mexico into five regions demarcated by distance from the U.S.-Mexico border, and gathered economic variables concerning these regions with a special focus on receipts of foreign direct investment and *maquiladora* activity. Chiquiar's paper used these variables as a measure of the connectedness of the region to the international economy. In regions with greater ties to Mexico's trading economy, the author found that unskilled workers, who comprise a significant portion of Mexico's exporting activities, tended to experience increases in wages compared to workers in other areas of the workforce as well as to unskilled workers in less globally connected regions. This study appears to confirm the validity of the Stolper-Samuelson theorem, albeit with an additional spatial dimension.

McLaren and Hakobyan (2015) studied the impact of NAFTA on local labour markets in the U.S. in terms of vulnerability to Mexican imports. McLaren and Hakobyan used data from the 1990-2000 U.S. Censuses to examine the impact of the removal of tariffs as part NAFTA upon wage growth rates geographically. The authors calculated vulnerability to Mexican imports in each census area and controlled for geography and education levels to examine the impact on log-wages. The paper showed that there existed significant effects both by geography and by sector; workers with lower levels of education and in locations more exposed to Mexican imports exhibited slower wage growth rates, and especially worse than predicted by aggregate general equilibrium models. As this paper informs a major part of the analysis conducted in this paper, we will expand further upon its findings and methodology in subsequent sections.

Artuç et al. (2008) simulated a dynamic equilibrium model based on the Ricardo-Viner model to examine local labour market adjustment to trade shocks. The model estimated

by Artuç et al. uses a small open economy with two goods that are produced under CRS technology. Capital is inelastic in supply and sector specific whilst the total supply of labour is an exogenous input. Labour is allowed to switch between sectors, but only at a certain rate and with an associated cost. In this simulation, the authors initialise the model into a steady state with a tariff that is removed over the course of the simulation. They find that under reasonable assumption in terms of discount factor, variance of trade shocks, and relocating costs of labour, it can take a surprisingly long time for labour markets to adjust; indeed, the model revealed that the post-tariff labour market can take up to a decade to adjust to 95% of the steady state implied by the parameters. The findings of this paper are consistent with those of Autor et al. (2016).

Topalova (2007) analysed the effect of trade liberalisation on poverty in India following the reduction of import tariffs starting in the early 1990s. Notable in her analysis is the creation of a local average tariff, which will be employed in the analysis contained in this paper as well as in other papers referenced therein. Topalova found that regions suffering greater tariff changes on average saw an increase in poverty. She also found that areas with rigid labour laws (making it difficult to switch sectors) saw an increase in poverty while areas with more flexible labour laws saw an increase in inequality, phenomena consistent with the Heckscher-Ohlin and Ricardo-Viner models discussed previously. Kovak (2013) took a similar approach with regards to trade liberalisation in Brazil during the same period, and found that regions experiencing a 10% larger price decline as a result of trade liberalisation experienced a 4% greater wage decline.

Pierce and Schott (2016) examines the drop in manufacturing employment in the U.S. and links it to the U.S. granting Permanent Normal Trade Relations (PNTR) to China in 2000 and China's accession into the WTO in 2001. Prior to being granted PNTR status, China was subject to annual reconfirmation of Normal Trade Relations (NTR) in Congress. Under the PNTR and NTR statuses, China was able to enjoy low tariffs of around 4% on its exports to the U.S.; without them, China would have had incurred tariffs that averaged

39% in 1999. The authors of this paper uses a difference-in-differences strategy to assess the potential impact of Chinese trade in the case that Congress failed to approved NTR status. They examined the differences in NTR gaps, a measure derived from the difference between the tariff that China would have incurred had it not achieved PNTR status and the tariff that China actually paid. Pierce and Schott found that industries with larger NTR gaps experienced on average greater employment loss, and that plants in these industries shifted activity towards less labour intensive methods of production. This effect was robust when controlling for other factors of employment loss and after using the EU, which did not enact similar measures with regards to China, as a control.

We can see that there exists a wealth of literature studying both the labour effects of trade liberalisation, as well as the political economy of voting on trade-related legislation. However, there is currently a disjoint between these two areas of study. Studying the labour market impact of tariff reductions segmented by geography and industry is still a relatively new area of international economics. Much of the existing literature in political economy only looks at the political considerations of legislators and their susceptibility to lobbying (often in the form of political contributions), but does not take into account potential labour market effects. By examining whether the local vulnerability to Mexican imports and the impact of trade liberalisation on their constituents play a significant part in voting decisions on NAFTA, we hope to contribute towards the literature by combining these two disjoint areas of study.

V. Data and Methodology

We will turn our attention to a discussion of the data used and methodology employed in our analysis in this section of the paper.

This paper primarily uses U.S. Census data collected at the 5% level in 1990 and 2000 to assess the local labour market effects of NAFTA. The data in question was collected

from usa.ipums.org which stores U.S. Census microdata that we use in this study. We filter our data for workers aged between 25 and 64 who reported a positive income the year before the censuses were conducted. Along with income characteristics, the data collected includes details on the education level of the respondents, their ethnicity, English speaking abilities as well as their industry of employment and area of residence. Information on industry-specific levels of U.S. tariffs on Mexican imports was obtained from Feenstra et al. (2002). This information was mapped onto the traded industries information contained in the Census data to create the measure for industry tariffs.

We note that there is some coarseness of geographic accuracy due to the nature of the U.S. Census data. Starting in 1990, the U.S. Census Bureau demarcated the population into census blocks of at least 100,000 people called Public Use Microdata Area (PUMA), and took a sample of 5% from each PUMA block. No PUMA overlaps with another and all PUMAs are contained within a single state. PUMA blocks, however, do not align exactly with county boundaries, and one PUMA may include parts of different adjacent counties. For confidentiality concerns, the publically available microdata for each individual in the census only contains information on the PUMA in which they are located, and not their county of residence; the PUMA is therefore the most granular of data blocks that we can use in this analysis.

The state governments re-drew the PUMA blocks for the 2000 census to adapt to changing population patterns. Because the study in question concerns the impact of NAFTA over time, we are interested in using census data longitudinally to track changes across time. To do this, we use the 1990-2000 Consistent Public Use Microdata Areas (CONSPUMA) in our analysis of the census data. Each CONSPUMA is made up of a group of 2000-era PUMAs that closely correspond with 1990-era PUMAs based on visual inspection of the boundaries. In effect, CONSPUMAs adjust for the re-drawing by mapping 1990-era PUMA blocks to 2000-era PUMA blocks. In this way, we can conduct analysis on labour market changes on the local level, based on census data, from the inception of

NAFTA to 2000.

Voting data on the NAFTA bill is easily obtained from Congressional voting roll calls. Since legislators in the U.S. House of Representatives represent fewer constituents more directly than do Senators, we focus on the passage of NAFTA in the House for additional granularity. We therefore obtain voting roll call for HR 3450 (the House Resolution that concerns the ratification of NAFTA) from Congressional records. We combine the voting roll call with information on each Representatives' individual characteristics, such as party affiliation, time spent in office, and the market concentration of import- and export-competing industries in their district. We can also obtain data on the individual sources of campaign contributions categorised into business and labour contributions from Makinson and Goldstein (1996).

As a measure of political ideology, we will use the DW-NOMINATE (Dynamic, Weighted, Nominal Three-step Estimation) scores devised in Poole and Rosenthal (1985) to measure the ideological location of political figures. DW-NOMINATE places each legislator on a two-dimensional Euclidean space in which the individuals maximise a normally distributed utility function that is maximised at one value[13]. Therefore, legislators will tend to vote as close to their "ideal" value as possible, and this allows us to cluster legislators with others who have a similar voting history in this space. The DW-NOMINATE scores are divided into two dimensions; the first dimension measures the traditional liberal-conservative spectrum on economic affairs, while the second dimension measures the stance on a contemporary topic, such as civil rights or bimetallism. Further research by Poole and Rosenthal has shown that most legislators tend to vote on a unidimensional basis around the first dimension only, and therefore this is the dimension that we will focus on in our analysis.

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[13]The DW-NOMINATE procedure is essentially a Multidimensional Scaling (MDS) algorithm that takes in individual legislators' voting data as its inputs. MDS algorithms create projections of data points onto some n-dimension space in such a way that best preserves their inter-object distances. In this case, DW-NOMINATE creates a projection of "ideologically" close legislators onto a 2-dimensional space. For details of assumptions and procedure of DW-NOMINATE and other similar NOMINATE scaling methods, see Poole and Rosenthal (1985).

Although other papers referenced in Section IV used ratings by various political advocacy organisations such as the American Conservative Union (ACU) as a proxy for lawmakers' ideology, we have instead opted to use the DW-NOMINATE scores in our research. The reasons for this are twofold. Firstly, political advocacy groups by their definition are not unbiased observers, and ratings that they assign are typically closely tied to some narrow and well-defined legislative agenda. For example, the American Federation of Labour and Congress of Industrial Organisations (AFL-CIO) awards ratings based on how closely legislators vote in line with the interests of labour unions, and the Federation for American Immigration Reform (FAIR) assesses whether legislators adheres to the group's agenda on immigration laws. In contrast, DW-NOMINATE places each lawmaker on a common ideological space along a liberal-conservative spectrum that is independent of specific issues. Secondly, ratings by political advocacy groups are highly dependent on the era in which the ratings were awarded. DW-NOMINATE was designed to allow for cross-generation comparison of legislators and using it allows us to place lawmakers in a more understandable context in today's political environment.

The original study by McLaren and Hakobyan uses a sample size of 10,320,274 workers. However, for examining the data on the level of Congressional districts, we calculate an aggregate average for each CONSPUMA for both the 1990 and the 2000 statistics. After aggregating the statistics by CONSPUMA, we come to the problem of matching the CONSPUMA to the Congressional Districts of the 103rd Congress. Due to the practice of gerrymandering in the U.S., the boundaries of the Congressional Districts do not match up to those of the counties, let alone those of the CONSPUMA. Each PUMA is made up piece-wise of disjoint Congressional Districts. Here, our analysis is simplified by the fact that neither the PUMAs nor the Congressional Districts cross state lines. From the Missouri Census Data Centre, we were able to find data describing the proportion of each 1990 PUMA residing in each of its component Congressional Districts. Combining this with data on the composition of the 1990-2000 CONSPUMA, we are able to calculate

the relevant statistics on a population-weighted basis for each Congressional District. Data concerning other economic patterns of the district, such as the market concentration statistics obtained from the CBP data were weighted in a similar way to our treatment of CONSPUMAs described above.

Now, we turn our attention to the discussion of the relevant statistics that we calculated. Here, we describe the calculations for local vulnerability to Mexican imports and discuss the findings presented in McLaren and Hakobyan (2015). Similar to both Kovak (2013) and Topalova (2007), McLaren and Hakobyan calculated each region's local average weighted tariff using the following formulation:

$$locvul^d = \frac{\Sigma_{j=1}^{N_{ind}} L_d^j RCA^j \tau_{1990}}{\Sigma_{j=1}^{N_{ind}} L_d^j RCA^j} \tag{1}$$

This describes a way of calculating the local average weighted tariff, **which we shall henceforth refer to as "local vulnerability"**, for a given district d. Here, L_d^j represents the number of workers employed in industry j and resident in district d, and τ_{1990} is the 1990 tariff level associated with that industry. RCA is the revealed comparative advantage of Mexico in industry j. The inclusion of the RCA makes up the "weighted" component of the local average weighted tariff.

The RCA captures the fact that Mexico is good at exporting in certain industries and not others. We can calculate the RCA using the formulation originally derived in Balassa (1965):

$$RCA^j = \frac{\left(\frac{x_j^{MEX}}{x_j^{ROW}}\right)}{\left(\frac{\Sigma_i x_i^{MEX}}{\Sigma_i x_i^{ROW}}\right)} \tag{2}$$

The numerator represents the proportion of Mexico's total exports that is made up of good j, and the denominator represents Mexico's exports as a proportion of total global exports. The intuition of this concept is the follow: a RCA > 1 indicates that Mexico

imports more than its "fair share" of the good in question; RCA = 1 implies that Mexico exports a proportion of the good that is commensurate with its share of global exports on the aggregate level; and a RCA < 1 means that Mexico exports less than expected of a certain good. By multiplying the tariff level by the RCA of each good, the *locvul* defined in **Equation 1** captures the differing abilities for U.S. industries to compete against imports from Mexico.

We can come up with a similar formulation for the change in local average tariff, represented as:

$$locdt^d = \frac{\sum_{j=1}^{N_{ind}} L_d^j RCA^j \Delta\tau^j}{\sum_{j=1}^{N_{ind}} L_d^j RCA^j} \tag{3}$$

where $\Delta\tau^j$ is the change in tariff applied to industry j, to represent the change in each districts *locvul* after the creation of NAFTA. **This term shall be referred to as the "change in local average (weighted) tariff" for the remainder of this paper.** To omit the effect of the non-traded industries, the RCA of such industries is set to zero, in a similar approach to the one taken in Kovak (2013) when accounting for the general equilibrium effect of the non-traded sector after trade liberalisation. Since NAFTA only reduced the tariffs, the values for the change in local average weighted tariff will all be negative. However, since we are interested in the comparative magnitudes of the change, we take the absolute value of the tariff change for a more natural interpretation (a higher change in local average weighted tariff implies greater vulnerability).

In our analysis of the effect of a tariff reduction, we keep track of both the initial tariff and the change in tariff. The purpose of this is to account for the fact that tariffs falling at different rates for different industries may affect the labour markets differently. For example, an industry that is protected by a tariff of 5% in 1990 that is removed completely by 2000 may have different effects from an industry whose tariff falls from 15% to 10%

over the same period[14]. Reasons may be due to the fact that the latter industry might be associated with the expectation of undergoing further liberalisation over the coming years, which has been shown in Artuç et al. (2008) to impact labour markets and wage levels.

As it does for many free trade agreements, the issue of agriculture presented a difficult case for NAFTA. Agriculture was the only sector in NAFTA for which tariffs were not negotiated trilaterally between the signatories but on an individual, bilateral basis. Many agricultural products were given a five-year extension on top of the original ten years for the phasing out of tariffs and quotas. A further issue is the lack of granularity in the census data. The U.S. Census does not distinguish between different types of produce and instead groups all agriculture into one catch-all industry. This presents some issues for data analysis as some U.S. agricultural products, corn in particular, would have benefitted from the removal of tariffs and quotas impeding their entry into Mexico whereas others, such as tomatoes and avocado, would have faced increase competition from Mexican imports (Málaga and Williams, 2006). The solution to this with use of census data is to omit agricultural products completely by setting the tariff rate to zero. We construct this alternative specification as $locvul\_noag$, and $locdt\_noag$ and will use the results of these variables in parallel regressions.

While other papers have used the ratio of number of workers employed in exporting industries to the number of workers engaged in importing industries as the marker for local vulnerability to trade, we instead use the local average weighted tariff vis-á-vis trade with Mexico. We consider this to be a better measure for the purposes of this study due to its greater focus on Mexico as a trading partner. The ratio of exporting workers to the ratio of importing workers is a coarser variable that is not as finely attuned to the effect of NAFTA specifically.

McLaren and Hakobyan's study shows that these local vulnerabilities and changes in local average weighted tariff do have a statistically significant and negative impact on

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[14]This phenomenon arises because NAFTA places different timing conditions on the relaxing of tariffs for different industries.

local wage growth[15]. This impact was especially pronounced amongst workers who had not completed high school, with a coefficient of around -2.2. Since the most vulnerable CONSPUMAs had a local average tariff of around 4%, this implies that high school dropouts in the most vulnerable CONSPUMAs faced a reduction in wage growth of around 8% compared to CONSPUMAs not vulnerable to trade with Mexico. The coefficient is reduced the higher the worker's level of education, with the coefficient losing its statistical significance for college graduates. The authors also undertake series of placebo regressions and controls to isolate the effects from Chinese competition as well as existing trends in wage growth rates. After the imposition of controls, the removal of tariffs associated with NAFTA remained significant. This suggests that the changes in local average tariff rates do indeed measure accurately the economic vulnerability to Mexico and that we can use this measure in our analysis of Representatives' voting behaviours.
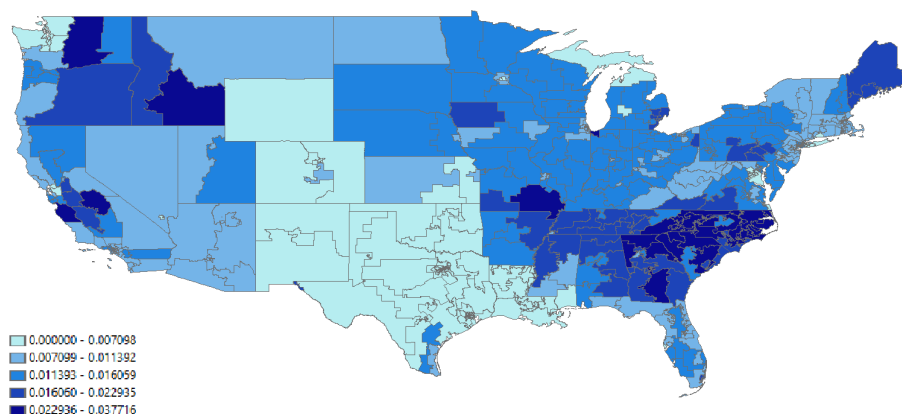
Figure 7: Local Vulnerability by Congressional District

[15]McLaren and Hakobyan regresses the log-wage of each worker on control variables and on variables of interest such as the *locvul* and *locdt* as well as their interaction effects with the level of education of workers, their industry of employment and their area of residence. The authors were able to show that the level of wage growth had both an industry and geographic effect by attaining significant and negative coefficients with the interaction effects, showing that areas with higher vulnerability had lower wage growth than areas with lower vulnerability. For further details, see McLaren and Hakobyan (2015).
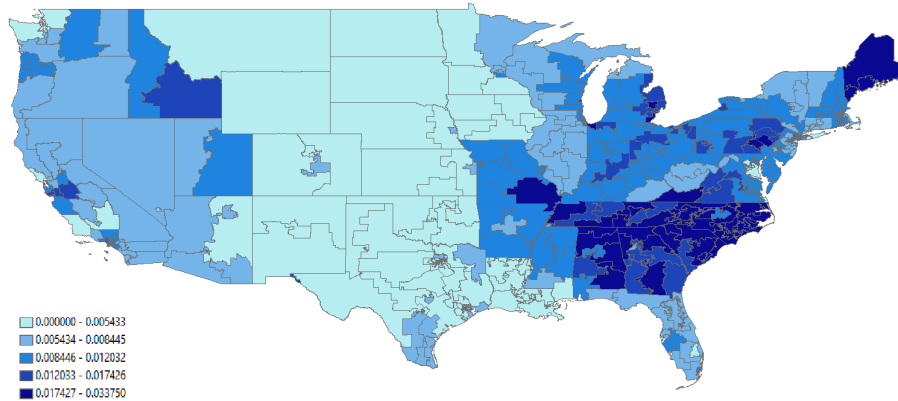
Figure 8: Local Vulnerability by Congressional District (agriculture omitted)

Using the methods described previously, we collate data on the relevant economic variables on the level of the Congressional District in 1993, and we present our variables in **Table 1**. **Table 2** provides some of the characteristics of the data that collected. We have also constructed maps that display the vulnerability of the 103rd Congressional Districts in **Figure 7** and **Figure 8** as well as detailing the 20 most and least vulnerably Congressional Districts in **Table 3**.

VI. Model and Results

We are primarily interested in whether legislators directly factor the economic impact of trade liberalisation on their constituents into their voting decisions. Using the Congressional District variables which we created and described in the previous section, we run a probit regression according to the specification laid out in **Equation 4**. We have picked this specification to examine the effect of change in local average weighted tariff on the legislators' voting decision owing its success at replicating results obtained in previous

literature[16].

$$Prob(Vote_i = 1) = \Phi(\alpha_0 + \alpha_1 locvul_i + \beta\mathbf{X} + \gamma\mathbf{Z}) \tag{4}$$

Here **X** and **Z** are vectors of control variables that have to do either with the characteristics of the Representative herself and those of her district, respectively.

We report our findings in **Table 4** for the various permutations of the above regression. We regress the likelihood that the Representative votes in favour of NAFTA against the main variable of interest, the change in local average weighted tariff due to NAFTA, along with certain control variables. We can see that the change in local average weighted tariff has a significant effect under all the specifications. The other coefficients are also similarly reported. We note that we can obtain the same results when we use a logistic regression instead of a probit model[17]. For the remainder of the analysis in this section, we will focus on the results produced by the probit model, as laid out in **Table 4**.

By interpreting the coefficients of the probit regression, we can conclude that an increase in the drop in local average weighted tariff has a negative impact on the probability of voting against NAFTA. This implies that the more vulnerable a Congressional District is to trade with Mexico, the less likely its Representative was to vote in favour of NAFTA. This effect is strong and robust across specifications, even after we control for other possible explanatory variables, such as the effect of party affiliation, personal ideology and business patterns in the constituency. A higher population of the Congressional District has a small but significantly negative impact on the likelihood of a yea-vote. We note that the effect of increased business contributions is to increase the likelihood of a yea-vote towards NAFTA and that the effect of increased labour contributions is to reduce the same likelihood. We can see that party affiliation does not have a statistically significant

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[16]Specifically, we have successfully replicated the results presented in Conconi et al. (2013) and Baldwin and Magee (2000).

[17]We obtain the same results in terms of directionality of influence and significance of the variables. We present the results of the probit model to avoid using the less intuitive log-likelihood.

impact on voting behaviour. Our measure of political ideology using the DW-NOMINATE scores has a slightly positive impact on the likelihood of a yea-vote for NAFTA – the more conservatively the legislator is located along the political spectrum, the more likely he is to vote for the passage of NAFTA. However, this variable loses its significance as we add more controls. We note that the statistical insignificant result obtained differs from results obtained in previous literature[18], due to the inclusion of the DW-NOMINATE scores. We have also added as controls the Herfindahl-Hirschman Indices (HHI) on a Congressional District basis for firms that are predominantly involved in imports and predominantly involved in exports. The HHI is a measure of market concentration – the higher the index, the greater the degree of oligopoly within an industry. We find that the coefficients associated with those variables are insignificant. Indeed, besides the small effects of political contributions and the district population, the effect of the vulnerability of a district is the only consistently significant regressor that we have identified across all specifications.

In the table presented, we have only included the change in local average tariff without the effect of agriculture as our variable of interest, but the results and interpretation are the same for the local vulnerability, with and without agriculture. We do not include, as McLaren did, both the vulnerability and the change in local average weighted tariff; since the two measures correlate almost perfectly (with a r coefficient of 0.99), including both the variables at once reduces the explanatory power of this metric.

Issues of Endogeneity and Robustness

We have included contributions from political interest groups as control variables in our examination of voting behaviours. As past literature (Chappell (1982) and Stratmann (1991)) indicates, there is the potential for endogeneity issues when regressing voting

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[18]We refer specifically to Conconi et al. (2013), in which the effect of party affiliation was significant under some specifications of the model. However, we note that we have controlled for ideology in a more robust manner than Conconi et al., which has eliminated the effect of party affiliation.

decision on political contributions received. The issue here is one of simultaneity bias between political contributions received and voting behaviour (as an illustrative example, does Bernie Sanders vote for pro-labour legislation because he receives a large amount of contributions from labour unions, or do labour unions contribute significantly to his campaigns because he tends to vote for pro-labour legislation?) We can examine the endogeneity of political contributions in our model by conducting a Durbin-Wu-Hausman test using the following setup.

We first construct an equation to describe political contributions from labour unions, using exogenous variables.

$$lab\_con_i = \alpha_0 + \alpha_1 lab\_com_i + \alpha_2 educ_i + \alpha_3 log\_inc_i + \alpha_4 dw\_nom_i + \beta \mathbf{Y} \qquad (5)$$

Where lab_con, $educ$ and log_inc have been defined in **Table 1** and $\mathbf{Y}$ is a vector of ratings from various political advocacy groups (we have used the League of Conservative Voters (LCV), American Conservative Union (ACU), Chamber of Commerce (COC) and AFL–CIO). lab_com is a dummy variable which takes the value of 1 if the Representative was a member of the House Committee on Education and Labour during the time of the NAFTA vote. We estimate the residuals from this regression model as lab_res and include it as a new independent variable in our original probit regression in **Equation 4** to obtain:

$$Prob(Vote_i = 1) = \Phi(\alpha_0 + \alpha_1 locvul_i + \beta \mathbf{X} + \gamma \mathbf{Z} + \alpha_2 lab\_res_i) \qquad (6)$$

The final stage of the Hausman test consists of testing whether $\alpha_2 = 0$. We do this for both the labour and business contribution variables and obtain the results presented in **Table 5**. From the results of the test, we can reject at the 5% level that labour contributions are exogenous, but we cannot reject the null hypothesis of exogeneity for business contributions at the 5% level.

We can now discuss various ways in which we might solve the issue of endogeneity.

One possible approach is the use of an instrumental variable (IV). Determining a good IV for political contributions can be difficult. One candidate IV could be the use of political contributions in years past. Since these contributions took place years before NAFTA's conception, one can reasonably discount the possibility of one direction of the simultaneity bias – that political interest groups contributed in the past based on their beliefs concerning the legislators' expected vote on NAFTA. However, this usage of past contributions has issues of its own. Firstly, owing to redistricting and term times of Congressmen, many Representatives will not have records of past political contributions and some congressional districts may not even exist. Secondly, it is unclear whether using past political contributions would resolve all of the endogeneity issues; presumably, both past political campaign contributions and voting behaviour on NAFTA still depend on the same unobserved variable of propensity of voting in favour of pro-trade legislation.

Another potential approach is to utilise a simultaneous equations model (SEM) as has been used in previous literature. Chappell (1982) specifies a simultaneous equations model using a probit model for the voting behaviour and a Tobit model for the propensity for political contributions. A Tobit equation is appropriate for examining political contributions as the dollar amount of contributions is left-censored at zero. Under this approach, we would set up the following system of equations to estimate the variables simultaneously.

$$Prob(Vote_i = 1) = \Phi(\alpha_0 + \alpha_1 locvul_i + \beta \mathbf{X} + \alpha_2 Contributions_i + \eta_i)$$

$$Contributions_i = \begin{cases} \gamma \mathbf{Z} + \epsilon_i & if\ \gamma \mathbf{Z} + \epsilon_i \geq 0 \\ 0 & if\ \gamma \mathbf{Z} + \epsilon_i < 0 \end{cases} \qquad (7)$$

We can see that under the specification defined in **Equation 7**, each equation can stand alone *ceteris paribus*, allowing us to employ a SEM in the analysis of this system.

Contributions refers to both business and labour contributions and **Z** represents a vector of variables than can exogenously define political contributions, similar to **Equation 5**. We note that this setup requires a strong set of assumptions, namely satisfaction of the rank and order conditions as well as the independent and identical distribution of η_i and ϵ_i.

We discuss the issue of endogeneity as it relates to the effects of campaign contributions to more thoroughly address issues in the data and suggest possible remedies. Since we are primarily concerned with the impact of anticipated change in local average weighted tariff (our measure of vulnerability) on the legislators' voting decisions, we will consider an implementation of the measures above to be beyond the scope of this paper, and leave them as suggestions for further studies. We note however, that we cannot reject the exogeneity hypothesis for business contributions at the 5% level, and that the coefficients associated with both variables are small. Furthermore, given the observation in Baldwin and Magee (2000) that assuming exogeneity did not change the qualitative results of their study of the impact of campaign contributions on voting behaviour, we can be reasonably confident of the robustness of our results.

Relationship Between Local Vulnerability and Labour Contributions

We notice that there is very little correlation between labour contributions and the local vulnerability to NAFTA. To further study its driving factors, we run the regression below and display its output in **Table 6**:

$$lab\_con_i = \beta_0 + \beta_1 locvul_i + \beta_2 \mathbf{X} \tag{8}$$

We can see that in all of the specifications, the local vulnerability does not have a significant impact on the amount of labour contributions received by the Representatives — legislators from vulnerable regions do not receive more labour campaign contributions. Instead, the significant influencers of labour contributions appear to be the educational

levels of the workforce and the average weekly income. Intuitively, the directionality of influence is consistent with economic theory. The greater the level of average income, the greater the disposable income that is available for contributing to political causes. We also observe that the more educated the workforce in the Congressional District, the less actively labour union PACs will donate to legislators. The corollary of this is that the less educated the workforce in the district, the greater the level of union activity. This is also unsurprising. As we have discussed in Section II, the S-S theorem implies that increased trade with Mexico will lead to a decline in the returns to unskilled labour, owing to Mexico's comparative advantage. Combining this explanation with the relative immobility of unskilled workers and its implications under the R-V model, it is expected that districts with a higher proportion of unskilled labour will form stronger labour unions which may contribute more proactively to acquire economic protection. We note that a greater market concentration of import-competing industries has a positive impact on the contributions levels of labour organisations in the district. However, the main coefficient of interest, the local vulnerability, is statistically insignificant.

VII. Discussion

Through our analysis, we obtain the somewhat surprising result that legislators did take into account the local vulnerability to a reduction in tariffs against Mexico when voting on the creation of NAFTA. Although we find that campaign contributions do play a part in the decision-making of individual legislators, we notice that the anticipated economic effect on their constituents appears to be the most significant factor out of the ones that we have identified.

To return to our discussion of the political economy of trade policy, we can interpret our significant results in light of our original hypothesis. We set out to examine whether the change in local average weighted tariff significantly informed legislators voting decisions

in the NAFTA bill. We find that we can reject the null hypothesis that the change in local average tariff (our measure of vulnerability) had no effect on voting decisions of the Representative; we showed that legislators from districts more vulnerable to trade with Mexico were significantly more likely to vote against the creation of NAFTA. In doing this, we can see that our original hypothesis was essentially two composite hypotheses. For the local vulnerability of their constituents to have an impact on the legislators' decision to vote, two conditions are implied. Firstly, that the legislators can accurately identify the local vulnerability of their constituents, and secondly, that legislators actively factor in the economic interests of their constituents into their voting behaviour. We can observe that a failure to satisfy either of these conditions will result in a failure to detect a significant result. We note the degree to which politicians seem to take into account their voters' economic interests; the effect of local vulnerability is much stronger than other salient factors such as party affiliation, political contribution and personal ideology. In some ways, this result is reminiscent of the Grossman-Helpman model and Goldberg and Maggi's empirical investigation which showed that policymakers placed far greater weight on the constituents' welfare function part of their own objective function maximisation problems, than they did on other components.

Another interesting result is the insignificant relationship between political contributions and the economic vulnerability of the congressional district. We have shown that there is a significant relationship between the contribution received by the lawmaker and her voting decision of NAFTA. Furthermore, we can reasonably assume that lobbying groups do anticipate that their contributions will have an effect on policy decision; if they did not, there would be no incentive to contribute at all. This could suggest either one of two explanations: either the special interest groups were unaware of their economic vulnerability to certain trade policies when they donated, or that they were aware of this vulnerability, but chose to contribute based on other policy interests. Given our previous discussion of the highly public debates and the political attention captured by NAFTA,

it is likely that NAFTA was the defining economic, if not the defining legislative, issue of 1993-1994, the period for which we have collected campaign contribution data. It is therefore unlikely that lobbying groups disregarded NAFTA in their contribution decisions over that period. Still, other political interests may have additionally influenced lobbyists' decisions to contribute. A reason for the poor coordination between vulnerability to NAFTA and campaign contributions may also be the specifications this paper uses to examine vulnerability, which relies upon the relatively technical economic concepts of RCA and weighted average tariffs that may have been unfamiliar to lobbyists. Another possible explanation involves the treatment of agriculture in this paper. Since Census data does not contain enough granularity to segregate the agricultural industry by produce to the same detailed level as NAFTA did, we may not be able to accurate identify the effects on the agricultural sector, which has traditionally been a powerful force in the lobbying of Washington.

Since we have only conducted this analysis for the effects relating to the NAFTA bill, we turn our discussion to the generalisability of these results across the study of trade policy. That is to say, can we assert that lawmakers place more weight on the economic ramifications for their constituents than on factors such as political contributions, personal ideology or party line? Here, we outline some factors relating to NAFTA and its circumstances that likely make it a special case in the study of international economics. Firstly, NAFTA took place in a general era of increasing prominence of major international free trade agreements (the WTO was created in 1995 shortly after NAFTA, and China was granted PNTR status in 2000). Secondly, as noted in previous sections, the passage of NAFTA was surrounded by a period of intense public debate and economic scrutiny; indeed, NAFTA still remains a polemic issue in U.S. politics today, as seen by the last cycle of elections. As mentioned before, the candidacy of Mr. Perot and his debate against Mr. Gore highlight the public visibility of NAFTA. This kind of intensity rarely accompanies debates surrounding trade policy, with the possible exception of China. However, much

of the debate regarding economic relations with China is couched in human rights and security concerns, in a way that was notably absent with Mexico. Thirdly, the political climate during which NAFTA was passed was less polarised and partisan in nature than it is today. We have already identified in our regression results that party affiliation was not a significant factor in the voting decision. We can also observe this "anecdotally" given that Democrat President Clinton was able to pass this legislation through Congress with more Republican support than support from his own party (132 Republican Representatives and 34 Republican Senators voted in favour of this bill, compared to 102 Representatives and 27 Senators from the Democratic Party). The increased polarisation in today's U.S. politics can be seen in studies concerning the evolution of NOMINATE scores such as Bonica et al. (2013). These factors suggest that the inception of NAFTA took place in an economic and political climate that does not exist in the U.S. currently and that (extrapolating from the increasing trend towards partisanship and anti-globalisation) is unlikely to be replicated in the near future. Therefore, although these factors do not diminish the significance of our findings with regards to NAFTA, they suggest the prudence of parsimony when attempting to extend the results to the political economy of other trade bill and trade policy in general.

VIII. Conclusion

In this paper, we have tried to examine the degree to which lawmakers were aware of the vulnerability of their constituents to NAFTA and whether they factored that vulnerability into their voting decisions. To do this, we derived a measure of economic vulnerability to the tariff reductions brought about by NAFTA at the level of the Congressional District and examined whether this had a significant impact on the legislators' voting decisions. Works cited in this paper have shown that local vulnerability does have a significant impact on local long-term wage growth. The possible negative impact of trade liberalisation on

35

local labour markets is a well-studied phenomenon, as shown in the literature review. We have shown through our analysis that there was a significant relationship between the vulnerability of a congressional district to trade liberalisation vis-à-vis Mexico and that district's Representative's voting decision in NAFTA. This effect is strong and robust across specifications even with the addition of other determinants of voting behaviour as controls.

The findings of this paper imply that, for the case of NAFTA, policymakers did factor in the impact of trade liberalisation on their constituents when crafting trade policy. This goes some way in addressing the gap identified in Rodrik (2000) between what economists preach and what policymakers do on issues of free trade. On an aggregate level, free trade will increase the welfare of all parties involved. However, different sectors of the economy which respond to trade liberalisation in different ways are clustered geographically, and we have shown that political representatives are sensitive to the different economic impacts of free trade on their constituents. Therefore, to better represent the interests of their constituents, legislators may not always vote in a way that an economist, who is concerned with overall effects on the national economy, would expect. In a way, this is consistent with the principles of representative democracy.

Possible areas for further research include extending this study to examine voting on trade bills in similar representative democracies to the U.S. Another area of interest may be to examine some of the more recent trade bills to see whether this significant relationship between constituents' vulnerability to trade liberalisation and legislators' voting decisions persists, even in this climate of increased political polarisation. Another approach to this study might be to conduct a longitudinal study of trade bills throughout American history and analyse whether the degree to which constituents' economic vulnerability to trade liberalisation affected lawmaker's voting decisions changes over time. These studies will shed further light on whether the findings in this paper only apply for the special case of NAFTA, or whether they are present in trade policy in general.

Table 1: Description of Variables

Variable	Description	Source
locvul	As defined in **Equation 1**	Calculated from 1990-2000 Census Data
locvul_noag	As defined in **Equation 1** (agriculture omitted)	Calculated from 1990-2000 Census Data
locdt	As defined in **Equation 3**	Calculated from 1990-2000 Census Data
locdt_noag	As defined in **Equation 3** (agriculture omitted)	Calculated from 1990-2000 Census Data
agr	Age of the Representative at time of vote	ICPSR Study 7803
safe	Dummy = 1 if margin of victory $\geq$ 60%	ICPSR Study 7803
bus_con	Contribution from business interest groups ($000s)	Makinson and Goldstein (1996)
lab_con	Contribution from labour interest groups ($000s)	Makinson and Goldstein (1996)
democrat	Dummy = 1 if member of Democratic Party	House of Representatives Archival Data
log_inc	Logarithm of average district weekly income in 1990	Calculated from 1990-2000 Census Data
hhiIMP	Herfindahl-Hirschman Index of Import oriented industries	County Business Patterns
hhiEXP	Herfindahl-Hirschman Index of Export oriented industries	County Business Patterns
dw_nom	DW-NOMINATE scores (1st dimension)	voteview.com
educ	Proportion of population with at a bachelor's degree or greater	1990 Census Data
dist_pop	Population of Congressional District in 1990 (0,000s)	Missouri Census Data Centre

Table 2: Descriptive Statistics

Variable	Observations	Mean	Standard Deviation
locvul	434	0.012	0.0056
locvul_noag	434	0.0098	0.0050
locdt	434	0.011	0.0053
locdt_noag	434	0.0088	0.0047
age	434	52.30	9.94
safe	434	0.11	0.31
bus_con	434	153.92	123.91
lab_con	434	53.43	61.14
democrat	434	0.59	0.49
log_inc	434	532.64	89.36
hhiIMP	434	0.16	0.072
hhiEXP	434	0.36	0.098
dw_nom	434	-0.022	0.39
educ	434	0.20	0.080
dist_pop	434	5.70	0.26

N.B. We only represent 434 Congressional Districts, as one Congressman (Representative Paul Henry of Michigan's 3rd District) was not present for the vote.

Table 3: 20 Most and Least Vulnerable Congressional Districts

Rank	District	Population Centres	loc_vul(%)	loc_dt
		Panel A: Top 20 Most Vulnerable 103rd Congressional Districts		
1	SC 5th	York, Chester, Lancaster, Newberry and Winsboro	3.77	3.63
2	SC 3rd	Oconee, Anderson, Abbeville, and McCormick	3.49	3.33
3	GA 9th	Murray, Chattooga, Gordon and Forsyth	3.35	2.84
4	NC 6th	Chatham, Randolph, Guildford and Alamanca	3.03	2.88
5	SC 4th	Greenville, Spartanbug, Laurens and Union	2.98	2.83
6	WA 4th	Yakima, Chelan, Klickitat and Okanogan	2.96	2.87
7	NC 10th	Burke, McDowell, Avery and Alexander	2.96	2.82
8	GA 10th	Athens, Elbert, Hart and Madison	2.86	2.46
9	NC 8th	Stanly, Anson, Montgomery, Richmond and Scotland	2.77	2.66
10	CA 17th	San Benito, Monterey with Santa Cruz	2.77	2.68
11	NC 1st	Northampton, Gates, Hertford and Washington	2.77	2.66
12	NC 3rd	Dare, Hyde, Carteret and Currituck	2.72	2.62
13	IN 1st	Lake, Porter, LaPorte with Jasper	2.70	2.18
14	NC 5th	Sparta, Dobson, Danbury and Wentworth	2.69	2.56
15	SC 6th	Florence, Clarendon, Williamsburg, and Berkeley	2.69	2.56
16	NC 9th	Mecklenburg, Shelby, Gaston with Charlotte	2.68	2.55
17	NC 2nd	Nash, Franklin, Wilson and Johnston	2.67	2.56
18	GA 8th	Brooks, Cook, Tift and Turner	2.60	2.37
19	CA 19th	With Mariposa, Madera, Fresno and Tulare	2.59	2.49
20	NC 11th	Graham, Swain, Cherokee and Macon	2.56	2.44
		Panel A: Top 20 Least Vulnerable 103rd Congressional Districts		
1	VA 8th	Arlington, Fairfax, Alexandria and Falls Church	0.34	0.31
2	MD 4th	Prince George's	0.37	0.33
3	AK 1st	Juneau, Anchorage, Fairbanks	0.37	0.30
4	MD 8th	Montgomery	0.42	0.38
5	LA 2nd	Jefferson with New Orleans	0.43	0.35
6	TX 7th	Houston Metro Area	0.44	0.36
7	TX 29th	Houston Metro Area	0.44	0.36
8	TX 18th	Houston Metro Area	0.44	0.36
9	LA 1st	Livingston, St. Helena, Washington with Baton Rouge	0.44	0.36
10	NV 1st	Las Vegas, Paradise and Henderson	0.44	0.40
11	TX 25th	Houston Metro Area	0.45	0.37
12	FL 10th	St. Petersburg	0.45	0.41
13	VA 2nd	Virginia Beach	0.46	0.41
14	MD 5th	Charles, St. Mary's and Calvert	0.47	0.42
15	LA 3rd	St. Mary, LaFourche, Assumption with New Orleans	0.47	0.39
16	WY 1st	Cheyenne, Casper and Laramie	0.47	0.40
17	LA 7th	Cameron, Vermillion with Lafayette	0.49	0.40
18	OK 5th	Osage, Pawnee with Oklahoma City	0.49	0.41
19	OK 6th	Cimarron, Beaver, Harper with Oklahoma City	0.49	0.41
20	OK 1st	Tulsa	0.49	0.41

Table 4: Results of Regression in **Equation 4**

	(1)	**(2)**	**(3)**	**(4)**
locdt_noag	−44.62***	−39.57***	−47.12***	−40.98***
	(13.13)	(13.73)	(14.14)	(14.50)
dist_pop		−0.86***	−0.77**	−0.80**
		(0.31)	(0.32)	(0.33)
democrat		−0.156	-0.055	0.094
		(0.31)	(0.32)	(0.33)
age		0.0080	0.0021	0.0017
		(0.0065)	(0.0068)	(0.0068)
dw_nom		1.09***	0.46	0.58
		(0.40)	(0.42)	(0.43)
safe		-0.22	-0.14	-0.092
		(0.21)	(0.22)	(-.22)
bus_con			0.0022***	0.0023***
			(0.0058)	(0.00059)
lab_con			−0.0078***	−0.0081***
			(0.0017)	(0.0017)
hhiEXP				0.069
				(0.70)
hhiIMP				0.064
				(0.10)
educ				2.11
				(0.91)

This table displays the coefficients of the variables defined in **Equation 4**. Different specifications of the regression model are represented in the columns. Standard errors are displayed in brackets. *** denotes significance at the 1% level; ** significance at 5%; and * significance at 10%.

Table 5: Results of Hausman Test in **Equation 6**

Variables	χ^2 **Statistic**	**Prob** $(> \chi^2)$
lab_res	7.57	0.0059
bus_res	2.75	0.097

We run a Hausman test to see whether the coefficient associated with the residual variables in the table are significantly different from 0. We have posted the χ^2 statistics as well as the associated *p*-values.

Table 6: Results of Regression in **Equation 8**

	(1)	(2)	(3)	(4)
locvul_noag	-201.25	-248.71	-276.93	-412.41
	(628.13)	(641.92)	(631.87)	(633.91)
educ		-13.83	-121.29^{***}	-137.83^{***}
		(37.67)	(46.45)	(46.81)
log_inc			87.27***	82.72***
			(22.72)	(22.91)
hhiEXP				-15.74
				(30.66)
hhiIMP				100.47
				(42.26)

This table displays the coefficients of the variables defined in **Equation 8**. Different specifications of the regression model are represented in the columns. Standard errors are displayed in brackets. *** denotes significance at the 1% level; ** significance at 5%; and * significance at 10%.

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