Does Trade Liberalization Foster Intimate Partner Violence?

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Abstract: We exploit unexpected and drastic tariffs reductions in Peru during the 2000s. We find that in districts where male employment was more vulnerable to these reductions, we observe a statistically significant increase in intimate partner violence with respect to less vulnerable districts. Our results are robust to falsification, placebo, and permutation tests, initial conditions, conflation of past and current shocks, migration, and intermediate inputs considerations. Our findings are consistent with the theory of exposure whereby increased physical interaction in the household, for instance due to unemployment, may result in increased domestic violence and may be furthered triggered by alcohol consumption.

JEL Classification Codes: O19, O24, F13, J12.

Keywords: Domestic violence, Tariff reduction, Gender-specific shocks, Differences-in-Differences, Latin America

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1 Introduction

Whereas from a macroeconomic perspective there is little doubt that trade liberalization is beneficial to countries, recent studies demonstrate that productive reallocation among sectors due to liberalization may redistribute gains unevenly and may even result in undesirable effects, for instance, in terms of inequality, poverty, crime, mental distress, and child labor among others.[1]

In this research we go a step further and consider the fact that trade liberalization may also impact female and male labor differently. This, because gender composition may be skewed towards either males or females depending on the specific economic activity under consideration. When trade liberalization impacts industries more predominantly associated with male-related activities, within-household dynamics may evolve differently compared to how liberalization may impact more predominantly women-related industries. In particular, it may be argued that the magnitude, uncertainty and pervasiveness of the shocks may impact males and females differently in terms of stress and anxiety, which may result in increased intimate partner violence (Tauchen, et al., 1991).[2]

Our research is related to the so-called Theory of Exposure by which intimate partner violence may be a function of how females are actually physically exposed with respect to males in the household, as physical interaction may influence household dynamics and may serve as a way to relieve frustration caused by adverse shocks (Tauchen, et al., 1991). For instance, in a traditional household, a male breadwinner that suddenly losses his job may find the situation extremely difficult to manage, a situation that may become negatively exacerbated by his constant physical presence in the household.[3] Similarly, if both partners are employed, they may spend less time together, which implies that the probability that

[1] Examples are Edmonds et al. (2009, 2010), Autor, et al. (2018), Kis-Katos and Sparrow (2015), Dix-Carneiro and Kovak (2015, 2017), Dix-Carneiro et al. (2018), Colantone et al. (2019), Pierce and Schott (2020), and others.

[2] Intimate partner violence is also known simply as domestic violence and it is defined as physical or psychological harm by a current or former partner or spouse. This type of violence can occur among heterosexual or same-sex couples and does not require sexual intimacy. For more information, refer to the Centers for Disease Control and Prevention website.

[3] The very recent COVID-19 pandemic provides corroborating anecdotal evidence to this theory, as shelter-in-place lockdowns appear to have resulted in dramatic increases in the incidence of intimate partner violence around the world.

intimate partner violence may occur decreases (Dugan, et al., 1999).[4] In addition, certain emotional cues may trigger episodes of domestic violence including some uninhibiting contributing factors more specifically increased alcohol consumption, which has shown a very strong association to intimate partner violence (e.g., Feshbach, 1964; Foran and O'Leary, 2008; Angelucci, 2008; Card and Dahl, 2011).[5]

Overall, the rates of intimate partner violence in many countries around the world are high and pervasive. This is particularly true in developing countries, as they are more traditional and more male-dominated. According to the Pan American Health Organization (2019), physical or sexual intimate partner violence has affected more than a quarter of women at some point in their lives. Furthermore, intimate partner violence has long-term effects on women's health. Women abused by their partners are 16% more likely to give birth to a low weight baby (World Health Organization, 2013), and are associated with higher substance abuse, worse mental health, and a higher incidence of chronic diseases (Coker et al 2002; Ackerson and Subramanian, 2008; Ellsberg et al., 2008).

In our research we focus on the process of trade reform in the case of Peru during the 2000s. Specifically, between 2004 and 2011 trade openness in the country increased rapidly, substantially and unexpectedly, as tariffs in thousands of different products were drastically reduced as a result of a large and drastic liberalization policy. The average tariff was reduced from 10.34% in 2004 to 2.96% in 2011. These reductions were concentrated in mostly highly protected sectors. This is illustrated by the fact that prior to the reform no sector had tariff rates of 0%, but after policy implementation, around 50% of (six-digit level) industries became fully unprotected by tariffs.[6] Methodologically, we employ a differences-in-differences approach by exploiting gender-related labor composition by industry and district level. For example, if male labor is mostly specialized in mining when tariffs are reduced in a particu-

[4] In fact, intimate partner violence is not limited to developing countries where traditional societies are more prevalent. The same COVID-19 experience strongly shows that the exposure reduction theory may be applicable to developed countries, as well.

[5] Openness may also contribute to the reallocation of sectorial employment and result in different impact by gender, especially when viewed as imperfect substitutes, which may foster skill-biased technical change (e.g., Galor and Weil, 1996; Black and Brainerd, 2004; Gaddis and Pieters, 2017). If trade liberalization decreases the skill premium and females are the more skilled gender then their negotiating power may decrease and impact intimate partner violence (Juhn, 2014).

[6] Own calculations.

lar district, they will become relatively more vulnerable to trade liberalization with respect to male workers in other districts. Likewise, if female labor within a district specializes in textiles when tariffs are reduced, they will become relatively more vulnerable to trade liberalization with respect to female workers in other districts. We compute gender-specific measures of vulnerability to trade liberalization, which in order to simplify we call "male tariffs vulnerability" (MTV) and "female tariffs vulnerability" (FTV) measures. In addition, we control for district fixed effects and a set of initial conditions interacted with quadratic trends as it is usual in the literature measuring the effect of trade liberalization, and cluster standard errors at the district level.[7]

We find that trade liberalization appears to foster intimate partner violence in Peruvian districts where tariff rate reductions affected male employment the most. For the period from 2004 to 2011, districts experiencing an average [interquartile range] decrease in our measure of MTV saw their figures on physical intimate partner violence increase in 24.96 [7.29] percentage points relative to districts experiencing no change. Similarly, physical intimate partner violence increased in 7.01 [6.23] percentage points in districts experiencing an average [interquartile range] decrease in our measure of FTV. By focusing on differences across districts we assess how intimate partner violence changes relative to other districts.[8] Moreover, we find considerable heterogeneity and in particular, education and age of first marriage appear to be key variables that correlate with our findings. Women with less education and thus with likely less bargaining power appear to suffer from more physical intimate partner violence. Similarly, the impact of trade liberalization seems to be larger among women that were aged 19 or less when they first married.

Our findings are consistent with the Theory of Exposure described above, whereby increased physical interaction in the household, for instance due to unemployment, may

[7]Our identification strategy is similar to Autor, et al., (2018) and Shenhav (2016). The former employs gender-specific components of U.S. labor demand shocks coming from competition with China to explore whether changes in relative economic outcomes of young men versus young women affected marriage and fertility during 1990-2014. The latter exploits gender-specific Bartik shocks and gender differences in occupational choice to test their impact on relative gender earnings in U.S. states. In contrast to Bartik shocks, which are typically exploited as local labor demand shifters, our identification variation comes from the reduction in tariffs.

[8]Given our empirical approach, we are unable to identify the economy-wide effect of the reduction in tariffs.

result in increased domestic violence and may be triggered by particular behaviors. In particular we find that trade liberalization positively impacts alcohol consumption. We find that an average [interquartile] decrease in MTV and FTV increases alcohol consumption in 0.331 [0.097] and 0.097 [0.086] standard deviations relative to less affected districts, respectively. Since the latter has long been demonstrated to be highly correlated to increased unemployment and stress (e.g. Pierce and Schott, 2020; Dix-Carneiro and Kovak, 2015, 2017; Kis-Katos and Sparrow, 2015) it follows that alcohol may serve as a key causal mechanism between trade liberalization and domestic violence (e.g., Feshbach, 1964; Foran and O'Leary, 2008; Angelucci, 2008; Card and Dahl, 2011).[9] Moreover, we test if trade liberalization affected women's views with respect to the justifiabiluty of violence, and we also find evidence that in districts were MTV and FTV decreased, women were more prone to justify wife beatings.

We pursue a comprehensive battery of tests in order to confirm our findings. We find that intimate partner violence is not correlated with post-reform tariff changes, which is consistent with no pre-existing trends. We apply placebo tests by using a pre-reform measure of intimate partner violence. We test whether the initial measures employed to construct our tariffs vulnerability indices are exogenous conditional on observables. We address the possibility of conflating short- and long-term effects. We study inward and outward migration patterns and apply permutation tests as well. Finally, we exploit the fact that trade liberalization does not only impact the prices of output goods, but also of intermediate inputs.

The rest of the paper is organized as follows. Section 2 provides institutional background. Section 3 describes the data and the empirical strategy. Section 4 presents our findings, briefly explores input tariff considerations and heterogeneous effects, and provides robustness tests. Finally, Section 5 concludes.

[9]The recent COVID-19 pandemic also gives cues on this regard.

2 Institutional Background

During the 2000s, the Peruvian economy enjoyed a very favorable external environment due to a sharp increase in commodity prices. Between 2000 and 2010, exports grew from around US$ 8,000 million to more than US$ 40 million and the gross domestic product per capita increased by fifty percent. The aim was to further take advantage of the favorable environment by seeking new international markets and signing free trade agreements with other countries. Interestingly, the administration at the time pursued a drastic and unexpected policy change with little warning. Tariffs were cut drastically and unilaterally between 2007-2008 and again between 2010-2011 albeit somewhat less dramatically. These actions were not consulted with the private sector and took practically all the economic agents by surprise. In fact, this surprising action is highlighted by the fact that even the own government documents describe pursuing a policy of slowly reducing tariffs as a very important policy strategy so as to not compromise in any way the bargaining position of the Peruvian government when negotiating free trade agreements with other nations, a crucial policy objective at the time (MEF, 2006).[10]

The main reduction in tariffs occurred during 2007 and was rather large. It included nearly 5,000 different products and eliminated most tariffs and related fees. Unsurprisingly, the sectors that were the most protected, were also the most affected by the reduction in tariffs. This can be seen in Figure 1. After the reform, tariff rates were simplified in two categories 9%, or 17% and around half of the six-digit level products were assigned no tariff at all.[11]

[Figure 1 here]

[10] The surprise in the government's actions is illustrated by the comments made by José Luis Silva Martinot at that time, who in 2011 was the previous head of the most important association of exporters. He remarked: "with free trade agreements, tariffs were going to be cut after 10 to 17 years, others after a shorter time and some others not at all. However, in the end they were all totally eliminated." Similarly, Eduardo Farah, ex-head of the National Society of Industries said: "with these measures, the country loses bargaining power for the negotiation of future free trade agreements" (La Republica, 2011). Context is important: the President that pursued these policies, Alan García, was the same one who a decade earlier had brought the country to the brink of political and economic meltdown, with terrorism at its highest and skyrocketing inflation rates. When García was re-elected he was eager to reposition himself as market friendly and as such, did everything in his power to pursue pro-business policies.

[11] Prior to the 2007 trade reform not a single product was tariff free.

A second wave of tariff reductions occurred in 2010 and 2011 and while still significant, this wave was less dramatic than the first one. Figure 2 illustrates these tariff reduction waves. Panel A shows the evolution of average tariffs. On average, they decreased from 10.35% in 2004 to 2.98% in 2011. Panel B shows tariff reductions by sectors. As described in detail the next section, the differences in the timing of introduction of tariff reductions including the magnitude of reduction along with the district-level variation in industrial employment composition taking into account the differential intensity in the use of male and female workers by industry provide our identifying variation.

[Figure 2 here]

3 Data and Empirical Strategy

3.1 Data

The data for this research come from several sources. We first construct a measure of tariffs vulnerability to trade liberalization for each period between 2004 and 2011 for each of the districts available in our data. In particular, we employ the 1993 Peruvian Household Census, which contains info on individuals living in 1793 districts, to compute employment shares by industry and gender for each district. We then use these employment shares to weigh how tariff reductions may impact each of these areas. The data on tariffs come from the World Bank webpage. We use data on Most-Favored-Nation (MFN) tariffs[12] at the six-digit level of the Trade Classification Harmonized System (HS). We match the industry codes reported by the World Bank (i.e. HS2007) to the industry code used in the Census (i.e. ISIC3).[13] It is important to stress out that we use data from the 1993 Census microfiles as these are the closest available to the first wave of tariff reductions in 2007.[14]

[12] According to the World Bank, "in current usage, MFN tariffs are what countries promise to impose on imports from other members of the World Trade Organization (WTO), unless the country is part of a preferential trade agreement. In practice, MFN rates are the highest and most restrictive that WTO members charge one another."

[13] We employ the concordance table provided by the World Bank here.

[14] Whereas another National Census was carried out in 2007, just when the reform was starting, we avoid using it given endogeneity concerns. In this regard, Jaeger, et al., (2018) argue that lagging the base period used to weigh tariff cuts and construct the can help with identification by minimizing the correlation between

The data on intimate partner violence come from the Demographic and Health Surveys (DHS), which were conducted by the Ministry of Health between 2004 and 2011 and consists of several cross-sections.[15][16] In general, the survey contains detailed information on the characteristics of females and the incidence of intimate partner violence. The data consist of women aged 15 to 49 who are asked if they have ever suffered from emotional or physical violence by a partner by any different means. In the case of physical violence, women report in different items of the survey if they have ever been (i) pushed, shook, or thrown something at, (ii) slapped or arm twisted, (iii) punched with fists or something harmful, (iv) kicked or dragged, (v) strangled or burnt, (vi) threatened with a knife, gun or other weapon, (vii) attacked with a knife, gun or other weapon, (viii) forced to have sex when not wanted, and (ix) forced to make other sexual acts when not wanted by her spouse.[17][18]

We construct a dummy variable that accounts for physical intimate partner violence (PIPV) according to the nine means of violence described above and focus on females that are in a relationship, only.[19] We also compute a dummy describing emotional intimate partner violence (EIPV) and controlling behavior.[20] An important caveat is that these variables refer to a past episode of violence, whereas the standard approach is to use any

tariff changes and current demand shocks.

[15]Peru as of 2018 was divided into 25 regions, 196 provinces and 1874 districts.

[16]We were able to match our tariffs vulnerability data to the 1066 districts that were available in the survey (out of the 1793 districts that existed in 1993). We use appropriate district identifiers to secure consistency throughout our period of analysis.

[17]These questions have been included in 122 surveys in 61 developing countries.

[18]Aguero and Frisancho (2019) measures misreporting of physical and sexual intimate partner violence using direct questions applied by the DHS. They compare rates of intimate partner violence from these questions against an alternative method that provides with increased privacy for women. They find no significant differences across DHS methods and the alternative method in average. However, they do find that misreporting is higher among women with tertiary education.

[19]In our survey data a couple refers to a male and a female, only.

[20]Details regarding the construction of these variables are available in Appendix B. According to the World Health Organization it is possible to differentiate between emotional intimate partner violence (i.e. husband humiliating his wife, threatening to harm her or to take away her children) and controlling behavior (i.e. husband trying to limit his wife's contact with her family or friends, being jealous or insisting on knowing where she is). Furthermore, whereas it is conceivable to find instances of physical intimate partner violence among adults from females to males, the overwhelming majority of cases in our country of study, Peru, occur from males to females (96% according to the Ministry of Women and Vulnerable Populations (2019)). Moreover, whereas most of our findings using emotional intimate partner violence and controlling behavior are consistent with the results we find for physical intimate partner violence, it is true that the first two may occur with more frequency from females to males. Results on emotional violence and controlling behavior are available on Table A.2.

incidence over past 12 months. We believe this should not be a big problem because we are exploiting a differences-in-differences design and any long past episode of violence should be partialled out by one of the differences. In addition, we employ several demographic variables available in the survey. Finally, other data collected are exports (aggregated to the 6-digit level) and foreign direct investment by industry (aggregated to the 2-digit level, the highest available), which we use as controls. Appendix B provides definitions and description of the data.

Table 1 provides summary statistics. The average incidence of PIPV, EIPV and controlling behavior in Peru is 38.7%, 30.2% and 67.7% respectively. While in 2004, 43.0%, 32.9% and 67.7% of women reported to have suffered corresponding episodes of physical and emotional violence by 2011 these figures were of 37.6%, 29.0% and 65.7%, respectively. In addition, we find that other variables show a pattern that is consistent with the literature on intimate partner violence such as the age of the brides, the age difference with the partner, and the education gap between couples.[21]

[Table 1 here]

3.2 Empirical strategy

Our identification approach is analogous to other research on trade liberalization such as Edmonds et al. (2009, 2010), Kis-Katos and Sparrow (2015), Gaddis and Pieters (2017), Dix-Carneiro and Kovak (2015, 2017) where the main idea is to exploit the distribution of *overall* employment within each district and across industrial sectors in order to measure how households are impacted by tariff changes. Unlike previous research, we exploit the pre-reform composition of *male and female* employment in addition to the time-series variation stemming from tariff changes.[22] As shown in Table A.1 the labor force is predominantly male in a significant number of industries and it is predominantly female in others.

As described above, this is relevant as trade liberalization may end up impacting males

[21] See for instance Jensen and Thornton (2003), Yount, et al. (2018), Mabsout and van Staveren (2010), Heath (2014), Aizer (2010), Fiedberg and Webb (2006), Hidrobo and Fernald (2013), among others.

[22] Notice that the share of female workers per industry in 1993 is uncorrelated with tariff reductions in the period 2004-2011, as shown in Figure A.1.

and females differently. As a simple example, consider the case where male labor is mostly specialized in mining when tariffs are reduced in a particular district. If this occurs the treated male workers will become relatively more vulnerable to trade liberalization with respect to unexposed male workers in other districts. Likewise, if female labor in a particular district specializes in textiles when tariffs are reduced, they will become relatively more vulnerable to trade liberalization with respect to unexposed female workers in other districts. Our differences-in-differences strategy is closest to Autor, et al., (2018) and Shenhav (2016). The former employs gender-specific components of the United States large labor demand shocks coming from competition with China to explore whether changes in relative economic outcomes of young men versus young women affect marriage and fertility. The latter exploits gender-specific Bartik shocks and gender differences in occupational choices to test their impact on relative gender earnings in the United States.[23]

We compute two sex-specific measures of tariffs vulnerability to trade liberalization for each district d and year t, which to simplify we simply call "male tariffs vulnerability" (MTV) and "female tariffs vulnerability" (FTV):

$$MTV_{d,t} = \sum_i \frac{L^M_{1993,i,d}}{L_{1993,d}} \times tariff_{i,t} \tag{1}$$

$$FTV_{d,t} = \sum_i \frac{L^F_{1993,i,d}}{L_{1993,d}} \times tariff_{i,t} \tag{2}$$

where $L^G_{1993,i,d}$ is the number of workers of gender $G = \{M, F\}$,[24] employed in sector i in district d in 1993, $L_{1993,d}$ is the district d's total number of workers in 1993, and $tariff_{i,t}$ is the Most-Favored-Nation (MFN) tariff of industry i at year t.

Given that mechanically tariffs are assigned zeros in the non-tradable sector, districts with larger non-tradable sectors will automatically yield a lower value for both MTV and FTV.[25] If the size of the non-tradable sector in 1993 is correlated with any unobserved

[23] See also Chauvin (2018).

[24] M and F stands for male and female, respectively.

[25] We follow Topalova (2005, 2010), Edmonds et al. (2009, 2010), and Kis-Katos and Sparrow (2015) and define our variable of interest at the district level. According to Census data, in 2017 approximately 70% of employed individuals work in the same district they live.

determinant of current intimate partner violence within households the resulting coefficients may be biased. For example, the size of the non-tradable sector may be correlated with female employment, which in turn may be correlated with intimate partner violence within households (Gaddis and Pieters, 2017; Aizer, 2010). Given the above, the evidence presented in this research fully excludes the non-tradable sector in the construction of our measures of tariffs vulnerability, which has become standard practice in the literature (Kovac, 2013).[26] Figure 3 graphically shows the variation of tariff reductions by district. The darker the district, the deeper the tariff reduction faced.[27]

[Figure 3 here]

Based on our approach above, we estimate the following reduced form:

$$\begin{aligned} y_{j,d,t} &= \alpha + \beta_1 MTV_{d,t} + \beta_2 FTV_{d,t} + \alpha_d + \alpha_t + \\ &+ f(W_{d,1993}, trend, \gamma_1) + [\gamma_2^{'} X_{j,d,t} + \gamma_3^{'} Z_{d,t}] + \varepsilon_{j,d,t} \end{aligned} \tag{3}$$

where $y_{j,d,t}$ is a dummy that takes the value of 1 if women j reports to have ever been attacked by her partner. α_d and α_t are respectively district and year fixed effects. α_d capture time-invariant heterogeneity at the district level, while α_t controls for macroeconomic shocks affecting the country as a whole. We also include a set of 1993 initial conditions (i.e. $W_{d,1993}$) interacted with time trends as it is usually done in the literature (e.g. Edmonds et al, 2009, 2010; Gaddis and Pieters, 2017; Kis-Katos and Sparrow, 2015; and Topalova, 2010.). It is important to control for these trends because there may be some characteristics, correlated with the 1993 initial conditions, capable of predicting developments in intimate partner violence. Hence, by including these trends we attenuate potential bias produced by the dynamics stemming from these initial conditions (Goldsmith-Pinkham, Sorkin and

[26] We also exclude these four 4-digit ISIC3 industry codes, 1110, 0111, 0112, and 0121, which account for extraction of crude petroleum and natural gas; growing of cereals and other crops; growing of vegetables, horticultural specialties and nursery products, and farming of cattle, sheep, goats, horses, asses, mules and hinnies. We do this because tariff changes in these sectors were not parallel to tariffs changes in other sectors during the period prior to the first wave of tariff reductions. It should be said that we do not find any significant differences in our results when including these industries.

[27] This figure should be seen just as a reference because the variation we are actually exploiting comes from year–to–year changes in the vulnerability variables rather than the long-differences depicted here.

Swift, 2018). In our baseline specification we consider the following set of initial conditions interacted with linear and quadratic trends: the district's population size, the share of individuals with complete primary, high school and post-secondary education, the share of female employment, and the share of employment destined to agriculture and fishing, mining, manufacture and construction. The aim is to capture the broad employment structure of each district, which may be correlated with household dynamics. Furthermore, we consider initial conditions with regard to educational levels as Goldsmith-Pinkhman, et al., (2019) show that in Autor, et al., (2013) the industries driving identification were located in more educated areas. In Section 4.5.2 we conduct some robustness exercises by trying with different sets of initial conditions.

We also consider a set of time-varying individual and household level covariates, $X_{j,d,t}$, which follows the standard literature of determinants of intimate partner violence (Jensen and Thornton, 2003; Yount, et al., 2018; Mabsout and van Staveren, 2010; Heath, 2014; Aizer, 2010; Hidrobo and Fernald, 2013; among others). These covariates consist of the woman j's age and years of education, her partner's age and years of education, her age when she first married, a dummy whether she speaks Spanish, the household's size, and the sex of the household head. In addition, we include the altitude at where the household is located.[28] Finally, $Z_{d,t}$ is a set of time-varying district level variables that may be correlated with MTV and FTV. This set consists of a measure of vulnerability to exports and to foreign direct investments as well as a measure of vulnerability to input tariffs.[29] During the period of analysis exports and foreign direct investment grow exponentially and heterogeneously across sectors. Just as with MTV and FTV, this growth may affect a district in a particular way depending on how specialized the district is with respect to an industry. We also include a measure of vulnerability to input tariffs, as tariff changes may influence households not only through final output prices, but also through intermediate input prices (Edmonds, et al., 2010).[30] Details on the construction of the time-varying district level variables

[28] In Peru, there is a negative correlation between the altitude and access to health services and economic development.

[29] We have not gender weighted these measures of vulnerability, although all of our results are unaffected by this weighting.

[30] We follow Edmonds, et al., (2010) and use the 1993 Peruvian national input-output table, the 1993

considered in the analysis is available in Appendix B.

The male and female vulnerability coefficients, β_1 and β_2, are our parameters of interest. They measure the impact of a change in tariff protection in industries that are more male-predominant or female-predominant on the probability of suffering intimate partner violence. Throughout all this paper we report these coefficients multiplied by minus one to facilitate the reading of our tables as we are interested on the effect of a decrease in tariffs. We identify β_1 and β_2 by comparing more vulnerable to less vulnerable districts hence as with any differences-in-differences framework we are not identifying the effect of trade liberalization in the economy as a whole, but its differential effect on the more vulnerable districts (Topalova, 2005, 2010). The assumption implicitly made in order to estimate β_1 and β_2 is that any unobserved district-specific time varying shock affecting the chances of suffering intimate partner violence is uncorrelated with any change in our two measures of tariffs vulnerability over time. Since our measures of tariffs vulnerability, MTV and FTV, are simply the interaction between the 1993 initial industrial composition with the national level tariff changes, the only source of bias comes from differential time-trends in intimate partner violence correlated with both sources of variation simultaneously (Topalova, 2005, 2010).

4 Baseline Results

4.1 Intimate partner violence

Table 2 presents our findings. From column 1 to column 3, each reports a different version of equation (3). All regressions include district and year fixed effects as well as a set of initial conditions interacted with linear and quadratic trends, as was explained above. Standard errors are clustered at the district level. Column 1 shows that a unit decrease in the measure of male tariffs vulnerability increases violence physical in 1.24 percentage points. On the other hand, tariff cuts on industries that are predominantly female trigger an increase in intimate partner violence of 3.00 percentage points. These results are robust

national census and the World Bank's data on output tariffs to construct this measure.

to the inclusion of individual and household level covariates (see column 2). In column (3), when we control for time-varying controls at the district level (i.e. FDI, exports and input tariffs), the coefficients on both MTV and FTV become larger.

Two points are important to consider. First, we believe that controlling for input tariffs increases the magnitude of the coefficient on MTV and FTV, because tariff changes may influence households through final output prices, but also through intermediate input prices (Edmonds et al., 2010) and these impacts may be opposite in coefficient sign. When we ignore input tariffs, our measures of vulnerability are conflating both effects. For instance, lower output tariffs may negatively impact industries as they lose their protection. In contrast, lower input tariffs may positively affect certain industries through access to cheaper inputs. To the extent that these opposing effects are transmitted to within-household dynamics, we should observe opposite effects of output and input tariffs on the incidence of intimate partner violence. Similar conclusions have been reached in the literature for other outcomes. For example, Kis-Katos and Sparrow (2015) find that decreases in output tariffs raise poverty, whereas decreases in input tariffs have the opposite effect. Similarly, Amiti and Cameron (2012) show that input tariffs reductions contributed to the closure of the industrial skill wage gap in Indonesia, whereas Dix-Carneiro and Kovak (2015) show that cuts in output tariffs modestly widened the skill wage gap in Brazil.[31]

[Table 2 here]

Second, these effects are of economic significance. According to our preferred estimates—those from column 3—a unit decrease in MTV while keeping FTV constant, increases physical intimate partner violence by 2.79 percentage points. This translate to an average [interquartile] effect of 24.96 [7.29] percentage points relative to districts experiencing no change in MTV. In addition, a unit decrease in FTV while keeping MTV constant, increases physical intimate partner violence in 4.47 percentage points. Again, this means that the average [interquartile] effect of FTV is of 7.01 [6.23] percentage points. Note that even though the coefficient on FTV is larger than the coefficient on MTV, the average effect

[31] We explore the issue of input tariffs in Section 4.3.

of MTV is larger. This is because in average male employment was more protected than female employment before the reform. In 2004, the average measure of MTV was 13.73, while the average measure of FTV was 2.61. After the reforms, in 2011, these measures were 4.79 and 1.04 respectively.

To further analyze the economic significance of our findings, we focus on the general effect of trade liberalization reported in column 4. We construct this measure in a similar fashion as before. The main difference is that here we employ the initial shares of the *overall* industrial employment, as it is usually done in the literature (please refer to Appendix B for details in the construction). We show that for each unit decrease in the measure of tariffs vulnerability, intimate partner violence increases by 2.82 percentage points relative to districts that were less intensively exposed. This coefficient implies an effect of 29.64 [3.36] percentage points on districts experiencing the average [interquartile] tariff cut on local industries relative to districts experiencing no change at all.[32]

Finally, as an alternative scale of physical intimate partner violence, we compute a measure of intensity of physical violence by simply adding up all the corresponding dummy variables that refer to a particular episode of physical intimate partner violence in our survey.[33] This measure of intensity goes from zero to nine. In addition, we also use principal components with these variables and calculate its components. We run specification (3) using all these as dependent variables. Results are shown from column 5 to column 8 in Table 2. We find similar results as those shown above, although the impact of FTV is not statistically different from zero most of the time.[34][35]

[32] Figure 3 suggests that reductions in MTV and FTV are correlated, which is in fact true as their correlation is about -73.3%. However, we reach similar conclusions if we consider each of these variables separately. On the one hand, if we add MTV only and run the same specification as that from column 3 the estimated coefficient is 0.0166, which is significant at the 5% level and 25% smaller than the coefficient from the same column. On the other hand, if we add FTV alone, its coefficient is 0.0184 but not statistically significant.

[33] Even though intensity is better measured by frequency of abuse rather that variation in category of abuse, women in our survey were not asked about how frequent the episodes of violence were.

[34] We also estimate the impact of MTV and FTV on emotional intimate partner violence and on controlling behavior. Our results are similar, as male vulnerability to trade liberalization increases emotional violence in similar magnitudes. The main difference is that the coefficient on FTV is considerably smaller and not significant. Results are shown in Table A.2.

[35] Another recent approach to estimate similar regressions consists of running first-stage regressions at the individual level that include controls for demographics (age, schooling, etc.) and a full set of district dummies.

4.2 Alcohol consumption as a trigger mechanism

Using Peruvian Department of Health Services (DHS) surveys we show that vulnerability to tariff cuts may increase alcohol consumption in males. In particular, in DHS surveys females are requested to answer about alcohol consumption of their partners in the following categorical manner: (i) never, (ii) almost never, (iii) sometimes, and (iv) very often. Responses are coded in a scale from 0 to 3. We use these four categories as the dependent variable. Corresponding finding are reported in column 1 in Table 3. We find that reductions in male and female vulnerability may increase alcohol consumption. The coefficients from this table imply that a decrease in a unit of MTV increase alcohol consumption in 0.037 standard deviations, which is then translated into an average [interquartile] effect of 0.331 [0.097] standard deviations. Similarly, coefficients from this table imply that a unit decrease in FTV increase alcohol consumption in 0.072 standard deviations, which means that there is an average [interquartile] effect of 0.097 [0.086] standard deviations.

Interestingly, these findings are consistent with the theory of exposure by which increased physical interaction at home may increase the likelihood of intimate partner violence. Since in traditional societies in developing countries such as Peru males tend to be the sole breadwinners and females tend to be stay-at-home mothers, a job loss in the household can be rather traumatic and introduce extreme stress and anxiety, which can negatively impact household dynamics and even lead to intimate partner violence (Tauchen, et al., 1991). This might be further compounded by the consumption of alcohol [36] exacerbating the likelihood of violence through its inhibiting effects. This is supported by the psychology and epidemiological literature, which recognize a strong association between alcohol consumption and marital violence and some empirical work in economics.[37]

The dummies' coefficients give the averages of the outcome of interest net of demographic confounders at the district level. The second stage uses these dummies as dependent variable and the tariff shock and additional controls as independent variables. In unreported regression we try this approach and the results are similar to those outlined above. We prefer to follow previous papers such as Edmonds et al (2009, 2010) and perform our analysis at the individual level, as overfitting the data may be a concern in this approach.

[36] e.g. Feshbach (1964), Foran and O'Leary (2008), Angelucci (2008), Card and Dahl (2011)

[37] It may be possible that other existing theories may help further explain our findings. On the one hand, in the "bargaining power theory" domestic violence depends on bargaining power between males and females. When females improve their relative income in the household, they are able to suffer less violence, but if the threat of ending a relationship with a partner is not credible enough, they may end up suffering from more

The fact that intimate partner violence is mainly observed in the case of male vulnerability to trade liberalization and far less in the case of female vulnerability appears to be consistent with the fact that in Peru females within the household see themselves as part of a patriarchal, traditional society and as such, tend to accept this situation. We employ the Peruvian DHS data and codify whether females find any justification for a wife being beaten. In particular, we specify the following reasons: (i) neglecting her children, (ii) going out without telling her husband, (iii) arguing with her husband, (iv) refusing to have sex with her husband and (v) burning lunch or dinner. Using these questions, we compute a dummy variable which takes the value of one if she thinks wife beating is justified by any of these reasons. We run our preferred specification using this variable as our dependent one and report results in column 2. We find that both cuts in MTV and FTV are positively related to the justifiability of violence. In fact, an average [interquartile] decrease in MTV and FTV implies an increase of the justifiability of violence of 7.7 [2.2] and 3.6 [3.2] percentage points relative to less affected districts, respectively.

[Table 3 here]

4.3 Sex-specific vulnerability to input tariffs

Tariff cuts affect prices of both output goods and intermediate inputs. However, reductions in output and input prices may have opposing effects over households. Lower output prices may negatively impact certain households as some industries lose their protection to international competition. In contrast, lower input prices may positively affect households by increasing access to cheaper inputs and varieties of better quality (Amiti and Konings, 2007; Topalova and Khandelwal, 2011; Goldberg et al, 2010; Fieler et al, 2018). To the extent that these two effects are transmitted to within-household dynamics, we should observe opposite

violence when trying to gain independence (e.g., Aizer, 2010; Eswaran and Malhotra, 2011; Anderberg et al., 2016). On the other hand, in the "male backlash theory" changes in the economic relationship between males and females matter, so that when females improve their income position within the household they may end up suffering from violence, as a reaction of males to a perceived threat in terms of a potential change in the status quo. Violence occurs as a way for males to assert their power and recover any perceived loss in authority (Macmillan and Gartner, 1999; Heath, 2014; Hidrobo and Fernald, 2013). From our perspective, pursuing these lines of inquiry go beyond the scope of our research.

effects of output and input tariffs on the likelihood of intimate partner violence. This is an empirical question. Analogous conjectures have been tested in the literature for other outcomes. Kis-Katos and Sparrow (2015) find that decreases in output tariffs raise poverty, whereas decreases in input tariffs have the opposite effect. Similarly, Amiti and Cameron (2012) show that input tariff reductions contribute to the closure of the industrial skill wage gap in Indonesia, whereas Dix-Carneiro and Kovak (2015) show that cuts in output tariffs modestly widened the skill wage gap in Brazil.

In what follows, we test whether reductions in output and input tariffs have coefficients of opposite sign. We already have shown that reductions in output tariffs increases the likelihood of violence. To test whether input tariffs cuts reduce the likelihood of violence, we compute two additional measures of vulnerability to input tariffs (i.e. $MITV$ and $FITV$) by exploiting the pre-reform composition of male and female employment to weigh input tariffs accordingly.[38] We estimate the following specification, which is analogous to equation (3):

$$\begin{aligned} y_{j,d,t} &= \alpha + \beta_1 MTV_{d,t} + \beta_2 FTV_{d,t} + \rho_1 MITV_{d,t} + \rho_2 FITV_{d,t} \\ &+ \alpha_d + \alpha_t + f(W_{d,1993}, trend, \gamma_1) + [\gamma_2^{'} X_{j,d,t} + \gamma_3^{'} Z_{d,t}] + \varepsilon_{j,d,t} \end{aligned} \tag{4}$$

where ρ_1 and ρ_2 measure the impact of input tariff reductions on the likelihood of physical intimate partner violence in more vulnerable districts relative to less vulnerable districts. This time, the set of time-variant district-level covariates, $Z_{d,t}$, does not consider input tariffs as they have already been included. Table 4 shows our results. For ease of comparison, under column 1 we show the same estimation exhibited under column 3 of Table 2, including the coefficient on the overall measure of input tariffs vulnerability, which we used as a district-level covariate.

Column 1 suggests that reductions in input tariffs are negatively associated with increases in intimate partner violence. From column 2 to column 4, we disaggregate overall input tariffs by sex-predominance in industry as explained above. Column 4 is our preferred specification as it includes individual- and district-level covariates. MTV is still associated

[38] Please see Appendix B.

with increases in intimate partner violence, but FTV is now statistically non-significant. For input tariffs, we find that larger reductions in MITV and FITV decrease violence, albeit the coefficient on the latter is not statistically different from zero. These results confirm our conjecture that the effects of output tariffs and input tariffs should be of opposite sign, which goes in line with findings in the literature.

[Table 4 here]

4.4 Heterogeneous Effects

We discuss whether the effect of trade liberalization is larger on different female sub-samples, including females that: (i) are younger than their partners (Friedberg and Webb, 2006; Mabsout and van Staveren, 2010), (ii) are very young when they first married (Jensen and Thornton, 2003; Heath, 2014; Yount, et al., 2018), (iii) have little education (Heath, 2014; Aizer, 2010), and (iv) are less educated than their partners (Mabsout and van Staveren, 2010; Hidrobo and Fenald, 2013; Aizer, 2010). Each of these categories is associated with a higher probability of suffering intimate partner violence according to the literature.

In Table 5 we show the results of estimating the following equation:

$$\begin{aligned} y_{j,d,t} &= \alpha + \beta_1 MTV_{d,t} + \beta_2 FTV_{d,t} + \alpha_d + \alpha_t + f(W_{d,1993}, trend, \gamma_1) + \\ &+ \delta_0 D_{i,t} + \delta_1 [D_{i,t} \times MTV_{d,t}] + \delta_2 [D_{i,t} \times FTV_{d,t}] \\ &+ [\gamma_2^{'} X_{j,d,t} + \gamma_3^{'} Z_{d,t}] + \varepsilon_{j,d,t} \end{aligned} \tag{5}$$

where $D_{i,t}$ can be: (i) a dummy variable that takes the value of 1 whether the woman "j" is older than her partner (see column 1), (ii) a dummy whether she was at least 19 years old when she first married (see column 2)[39], (iii) a dummy whether she has completed high-school (see column 3), and (iv) a dummy whether she is more educated than her partner (see column 4). The coefficients δ_1 and δ_2 measure the heterogeneous effect of trade liberalization. The row labeled 'Test Male' shows the p-value of testing the null hypothesis:

[39] 19 years old is the median age of first marriage in our sample

$\beta_1 + \delta_1 = 0$. Likewise, the row labeled 'Test Female' shows the p-value of testing the hypothesis: $\beta_2 + \delta_2 = 0$.

Although not all the interactions with MTV are statistically significant, the negative signs of the coefficients suggest that increases in intimate partner violence are smaller among females that ex-ante were well positioned in their household. Females that are older than their partners (column 1), that are aged 19 or more when they first married (column 2), or that have at least completed high school (column 3), experience smaller increases in intimate partner violence. For, FTV, interactions are not statistically different from zero.

[Table 5 here]

4.5 Robustness and Threats to Identification

4.5.1 Falsification and placebo tests for pre-existing trends

Whereas recent research shows that current productivity of Peruvian industries may not predict future tariffs (Baldarrago and Salinas, 2017) the possibility that pre-existing trends may be correlated with changes in the outcome being studied still needs to be addressed, as the government may endogenously protect certain industries depending on their productivity.

We follow Topalova (2010) and test whether pre-existing trends in intimate partner violence are correlated with post-reform tariff changes. If tariff cuts are correlated with pre-existing trends in intimate partner violence, the coefficients β_1 and β_2 should be similar whether we use pre- or post-reform data. Since the first wave of tariffs cuts occurred between 2007 and 2008 and the second wave occurred between 2010 and 2011 we use the period 2004 to 2007 as pre-reform data. We run two regressions. The first one links the 2004-2007 incidence of intimate partner violence using 2007-2010 tariff data to take advantage of the first wave of tariff reductions. The second one relates intimate partner violence with the 2008-2011 tariff data to take advantage of the second wave.[40]

[40]To clarify, in the first regression we match 2004 data on intimate partner violence with 2007 tariffs, 2005 data with 2008 tariffs, 2006 data with 2009 tariffs, and 2007 data with 2010 tariffs. For the second regression, we match the data on intimate partner violence from 2004 with 2008 tariffs, 2005 data with 2009 tariffs, and so on.

The results from these regressions are reported in the first two columns in Table 6. We estimate our preferred specification, which includes individual- and district-level covariates. We can compare these results to those under column 3 in Table 2. The estimated coefficients for MTV in columns 1 and 2 are negative and around six and forty times smaller in absolute value than our baseline estimates, respectively. Both are statistically indistinguishable from zero. Similarly, our estimates for FTV in column 1 and 2 are around two and seven times smaller in absolute value and are statistically indistinguishable from zero, respectively.

We also run a placebo test exploiting one particular question from our survey data: "Have your father ever beaten your mother?" Since women from the survey are adults, this episode of physical intimate partner violence refers to a *past* event, long before tariffs were first cut. We can think of this variable as a pre-reform measure of intimate partner violence at the household level. Then, we run a regression between this variable and our measures of tariff cuts vulnerability. We report our results in column 3 in Table 6. We find an estimated coefficient for MTV that is around sixty times smaller compared to that of our baseline estimation and statistically indistinguishable from zero, which is reassuring of our identification strategy, especially considering that this question has a great explanatory power when predicting intimate partner violence. However, our estimation of the coefficient of FTV is statistically significant at the 10% level and positive, which suggests that our estimation of β_2 may be upward biased in our baseline specifications of Table 2. In unreported regressions, once we include this question as another control, the coefficient for FTV decreases from 0.0447 to 0.0309, while the coefficient for MTV increases from 0.0279 to 0.0353. Both remain statistically significant.

[Table 6 here]

4.5.2 Sensitivity to initial conditions

Whereas we employ a more general estimator, it still may be viewed as part of the family of shift-share identification instruments and in particular Bartik estimators. Goldsmith-Pinkhman, et al., (2019) show that there are two set of alternative identification conditions in this context. First, if the number of industries is fixed, we require, conditional on observ-

ables, exogenous initial employment shares—those employed to construct the Bartik shock. This is because the two-stage least square estimator is equivalent to a generalized method of moments estimator using the initial shares as instruments.[41] The second alternative identification condition states that when the number of industries goes to infinity along with the number of locations, what matters is whether the tariff cuts are uncorrelated with the bias stemming from the initial shares. If this is the case, the presence of a large number of shocks causes the bias to average out. This latter identification condition seems to be more relevant in our context since (i) we employ a "large" number of industries (i.e. 76 different industries) and (ii) tariff cuts were a consequence of an unexpected and massive trade reform and do not seem to be correlated with pre-existing trends in our outcome of interest.

For the sake of the argument, let us assume that that tariff cuts are indeed correlated with the potential bias generated by the initial shares, even though it does not seems to be the case. We test whether the initial shares used to construct our measures of tariffs vulnerability are exogenous conditional on observables. If so controlling by different sets of initial conditions should not affect our estimates. We run specification (3) testing different sets of initial conditions, $W_{d,1993}$, interacted with linear and quadratic linear trends. In the first column of Table 7 we report our baselines results. Recall that with this set, our intention was to capture broad employment structure of each district, which may be correlated with household dynamics. In the second column, we report our results when controlling the employment structure of each district but differentiating between male and female employment. In the third column, we consider variables related to household dynamics, demographics and social norms in addition to those considered in column 1: the share of individuals that live together, the share of individuals that are Catholics, and the share of individuals that are Evangelists, where other beliefs is the omitted category. To control for demographics at the district level we use the share of Spanish speakers, female, younger than 18, aged 18 to 40, aged 40 to 65; older than 65 is the omitted category. In column 4, we consider other variables linked to the structure of labor markets. These are

[41] One caveat is that not *every* share should be exogenous. Goldsmith-Pinkhman, et al., (2019) show that in practice just a small number of industries tends to account for a large portion of the identifying variation.

the share of overall employment, and the share of workers employed in small and medium firms. In column (5) we consider all these variables together and in column (6) we replace them with region-year fixed effects. Results are robust in all specifications. This suggests that either our baseline specification is already partialling out the potential bias generated by the initial shares or tariff cuts are indeed uncorrelated with this potential bias.[42]

[Table 7 here]

4.5.3 Conflating past and current shocks

In recent years shift-share instruments have been criticized. Jaeger, et al., (2018) argue that if it takes time for markets to adjust, shift-share instruments may conflate short-term responses and long-term effects. In this situation they suggest adding lagged measures of the instrument. However, to be able distinguish between short- and long-term effects, the variation of the instrument across time periods should be independent enough. In our context, the composition of industries affected by tariff reductions and their magnitudes vary across time, which is reflected in the fact that the auto-correlation in tariff changes across districts once we condition on district fixed effects seems to be low. Following Jaeger, et al. (2018) we calculate the serial correlation of the first difference of our variables of interest. Results are shown in Table A.3 and Table A.4. Compared to Jaeger et al. (2018) our serial correlations seem to be low. As such, we control for dynamic responses by adding lagged measures of MTV and FTV and include five lags.[43] Results are shown in Table 8. Overall, β_1 and β_2, remain almost unchanged if we add these lags.

Furthermore, using coefficients in column 4 we can construct estimates for the accumulated effect of MTV and FTV over a period of three years.[44] These are shown in Figure 4. The effect of MTV on physical intimate partner violence seem to be triggered contemporaneously with tariff cuts, and not after. Not surprisingly, after three years point estimates

[42] Our findings are similar if we consider year dummies instead of linear and quadratic trends.

[43] Jaeger, et al., (2018) estimate mid-to-long-term impacts of immigration inflows employing data from different decades. We focus on short-term impacts as we exploit year-to-year changes. It is reasonable to expect more persistence as it takes time for markets to adjust.

[44] We use estimates from this column rather than column 5 or 6 because adding further lags seem to generate noisier results as suggested by the statistically significant coefficients on terms lagged five years. A priori, we cannot think in any reason why we would observe an effect after five years and not before.

are not statistically different from zero although they remain fairly constant. For FTV we find a similar dynamic profile, albeit at first increasing in time and overall noisier. Perhaps, the reason we observe that the accumulated effect of trade liberalization is mostly constant in time is related to our measure of intimate partner violence which is cumulative in nature. In particular, if a previous shock triggered an increase in intimate partner violence in the past, today we should still observe such differences in more affected districts.

[Table 8 here]

[Figure 4 here]

4.5.4 Selective migration

Selective migration may bias our results as it may affect the composition of victims between highly and lowly affected areas. For instance, if females that were already victims before liberalization migrate to highly affected areas, we will observe that trade liberalization is associated with a higher prevalence of violence. The opposite is true if female victims migrate from high to low vulnerable areas. This is because our dependent variable asks about past episodes of violence, including those that happened before liberalization.

However, given that we exploit year-to-year changes in tariffs vulnerability, migration may not be a problem. This is especially true if we consider that the short- and medium-term migration rates seem to be low. In fact, only 5.10% and 16.4% of our sample have changed their residence in the last year and in the last five years, which means that the share of people reallocating from one district to another is even lower, as these figures consider both inter-district and within-district reallocation. In fact, according to 2007 Census data, in the last five years, the inter-district migration rate of females between 15 and 49 years old was of 16.1% (and 15.9% in 2017 according to the 2017 Census).

Moreover, migration does not appear to be related to MTV and FTV, at least in the short term. In Table 9 we estimate equation (3) using dummies indicating if individuals have changed their residence as dependent variables. These are: (i) a dummy variable that takes the value of 1 whether the female "j" has at least changed her residence once during

her lifetime, M_{ever}; (ii) a dummy whether she has changed her residence at least once since 1991, M_{1991}; (iii) a dummy whether she has changed her residence at least once in the last five years, M_{5yrs}; and (iv) a dummy whether she has changed her residence at least once in the last year, M_{1yr}. Our results show that MTV and FTV in general are not statistically associated with the probability of changing residence. Although, for lifetime migration in column (1) we do find a statistically significant result at the 10% for the coefficient on MTV. In conclusion, endogenous sorting does not seem to be a problem in our setting, especially in the short-term. This goes in line with Dix-Carneiro et al. (2015) as they show that migration may play a limited role as an adjustment mechanism to tariff cuts in Brazil.

[Table 9 here]

We also evaluate if the effect of MTV is larger on the sample of migrants compared with the sample of nonmigrants. On the one hand, if female victims are migrating *from* districts in which male employment was hit harder by liberalization, we would be underestimating the effect of MTV on the whole sample. Hence, the effect on the sample of nonmigrants should be larger. On the other hand, if female victims are migrating *into* affected districts, we would be overstating the effect of MTV and the effect on the sample of nonmigrants should be smaller. The same logic applies for FTV.[45] To carry out this exercise, we estimate the following equation:

$$\begin{aligned} y_{j,d,t} &= \alpha + \beta_1 MTV_{d,t} + \beta_2 FTV_{d,t} + \alpha_d + \alpha_t + f(W_{d,1993}, trend, \gamma_1) + \\ &+ \delta_0 M_{i,t} + \delta_1 [M_{i,t} \times MTV_{d,t}] + \delta_2 [M_{i,t} \times FTV_{d,t}] \\ &+ [\gamma_2^{'} X_{j,d,t} + \gamma_3^{'} Z_{d,t}] + \varepsilon_{j,d,t} \end{aligned} \tag{6}$$

Where $M_{i,t}$ is one of the dummies defined above. The coefficients δ_1 and δ_2 measure the difference in the effect of trade liberalization between migrants and non-migrants. We show the results of estimating equation (6) in Table 10. The row labeled 'Test Male' shows the p-value of testing the null hypothesis: $\beta_1 + \delta_1 = 0$. Likewise, the row labeled 'Test Female'

[45] We should note that positive or negative selection into migration could also affect the magnitude of the effect of MTV The direction of this bias is difficult to know a priori.

shows the p-value of testing the hypothesis: $\beta_2 + \delta_2 = 0$. Table 10 shows that the effect of trade liberalization is similar among those that have changed their residence and those that have not.

[Table 10 here]

4.5.5 Permutation tests

We carry out a number of permutation tests to show that our main results are not driven by spurious effects caused by (i) trends in intimate partner violence and (ii) time invariant cross-sectional patterns across districts. We randomize our sample to generate false data that we use to re-estimate equation (3). These placebo tests are useful to check whether our model is mis-specified and to calculate empirical p-values (Hsiang and Jina, 2014). We randomize the vector $[MTV_{d,t}, FTV_{d,t}]$ 2,000 times, with replacement and holding everything else fixed. We re-estimate equation (3) each time (the same equation estimated for column 3 in Table 2).[46]

Following Hsiang and Hina (2014), we conduct this randomization in two ways. First, we randomize the cross-sectional structure between districts. That is, we randomly re-assign each district's complete history of MTV and FTV to another district while preserving the ordering of years. Since this preserves the time structure within the data, this exercise serves to test whether national trends are generating spurious correlations. Second, we randomize the time structure within districts. Put it differently, we randomly re-order each district's time-series of MTV and FTV while keeping them assigned to the original district. Since this preserves the cross-sectional structure of the data and only alters its time structure, this exercise serves to test whether time invariant cross-sectional patterns across high and low vulnerable districts are generating spurious results.

Figure 5 shows our results. We confirm that both randomization procedures give two distributions properly centered at zero. Furthermore, both empirical p-values are below 0.001. Hence, there is no evidence from this exercise that neither national trends nor cross-

[46] i.e. including the set of initial conditions interacted with linear and quadratic trends, and the set of time-varying district level covariates. Our results are similar if we do not include them.

sectional patterns differentiated between high and low vulnerable districts are driving our results.

[Figure 5 here]

5 Concluding Remarks

We ask whether trade liberalization may impact household dynamics and increase physical intimate partner violence. This question, one that has not been addressed before, is rather relevant as countless people around the world suffer from physical violence on a daily basis. We exploit an unexpected tariff reduction across several industries in Peru during the 2000s and find that in districts where male employment was more vulnerable to the reform, physical intimate partner violence increased with respect to control districts. We find that a unit decrease in MTV while keeping FTV constant, increases physical intimate partner violence by 2.79 percentage points. This is translated to an average [interquartile] effect of 24.96 [7.29] percentage points relative to districts experiencing no change in male vulnerability. In districts were female employment was more vulnerable to the reform we also find that violence increases, but this finding tends to be significantly less robust as in the case of males.

Our findings are consistent with the theory of exposure by which increased physical interaction at home increases the likelihood of intimate partner violence.[47] Since in traditional societies in developing countries, such as Peru males tend to be the sole breadwinners and females tend to be stay-at-home mothers, a job loss in the household can be rather traumatic and introduce extreme stress and anxiety, which in the context of increased physical interaction at home is consistent with an increase in the likelihood of violent episodes between partners, especially when alcohol is involved, as shown in our findings. This is also

[47] As mentioned above, it may be the case that other existing theories may help further explain our findings. On the one hand, in the "bargaining power theory" domestic violence depends on bargaining power between males and females. When females may improve their relative income in the household, they may be able to suffer less violence, but if the threat of ending a relationship with a partner is not credible enough, they may end up suffering from more violence. On the other hand, according to the "male backlash theory" when females improve their income position they may end up suffering from violence, as males may feel threatened. Pursuing these lines of inquiry go beyond the scope of our research.

consistent with the fact that in industries where females tend to be more vulnerable to trade liberalization, the corresponding impact on intimate partner violence tends to less robust, but likely not inexistent. In fact, in a traditional society as Peru both females and males appear to justify female beatings, regardless of whether the male or female loss their jobs.[48] In addition, it is somewhat rare for women to be the sole breadwinner. As a result, the fact that our male vulnerability findings are statistically significant and very robust, while our female vulnerability findings are less so appear to be fully consistent with the Peruvian societal context.

Our findings are robust to falsification and placebo tests, sensitivity to initial conditions, conflation of past and current shocks, selective migration, permutation tests and input-tariffs considerations. Also, we find considerable heterogeneity, as education and the age of first marriage appear to be key variables that correlate with our findings. Finally, we also exploit the fact that when overall tariffs are reduced, both prices of output goods and intermediate inputs are affected. In particular, these reductions in output and input prices may have opposing effects over households. Lower output prices may negatively impact certain households as some industries lose their protection to international competition. In contrast, lower input prices may positively affect households by increasing access to cheaper inputs and varieties of better quality. We find that these opposing effects may transmit to household dynamics as male and female vulnerability to input tariff cuts are associated with decreases and increases in physical intimate partner violence respectively.

From a policy perspective, our findings demonstrate that sometimes, sensible economic policies can have negative, unexpected repercussions. They also provide an opportunity to policymakers to pursue proactive policy measures in order to help prevent or alleviate this issue. Two specific measures that governments may find useful are educational messages for instance, via traditional and social media and an increase in peer awareness on the typical red flags associated with intimate partner violence.

[48] For example, according to a national survey carried out in 2019 by a Ipsos, a consulting firm, 71% of Peruvians say that is justifiable to physically assault women in case of infidelity.

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Table 1: Intimate Partner Violence – Summary Statistics

Panel A: Pooled sample					
Variable	Number Obs	Mean	Std. Dev	Min	Max
PIPV	78,276	0.387	0.487	0	1
EIPV	78,276	0.302	0.459	0	1
Controlling behavior	77,450	0.677	0.468	0	1
Age at marriage	78,276	19.951	4.600	10	48
Age	78,276	33.604	8.189	15	49
Partner's age	78,263	37.653	9.354	15	96
Years of educ. (YoE)	78,276	8.182	4.540	0	17
Partner's YoE	77,925	9.122	3.956	0	17
HH. head is women	78,276	0.079	0.270	0	1
Non-spanish	78,269	0.150	0.358	0	1
HH. size	78,276	4.856	1.818	1	19
Altitude	78,276	1517	1503	0	5037
Panel B: Average violence by survey year					
Variable	2004	2006	2008	2010	2011
PIPV	0.430	0.402	0.380	0.367	0.376
EIPV	0.329	0.319	0.298	0.279	0.290
Controlling behavior	0.677	0.674	0.694	0.666	0.657

Notes: The sample consists of women that were in a relationship when they were surveyed and that report whether they have ever suffered physical intimate partner violence or not. PIPV and EIPV stands for physical and emotional intimate partner violence. Definitions of variables are described in Appendix B.

Table 2: The Effect of Trade Liberalization on Physical Intimate Partner Violence (PIPV)

	Has suffered from PIPV				Violence intensity		1st principal component	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MTV	0.0124	0.0128	0.0279		0.0361	0.0779	0.0131	0.0283
	(0.0054)**	(0.0053)**	(0.0088)***		(0.0200)*	(0.0365)**	(0.0074)*	(0.0134)**
FTV	0.0300	0.0246	0.0447		0.0400	0.0975	0.0190	0.0397
	(0.0158)*	(0.0.0159)**	(0.0190)**		(0.0550)	(0.0646)	(0.0204)	(0.0240)*
TV				0.0282				
				(0.0088)***				
Mean dep. var.	0.387	0.388	0.388	0.388	1.119	1.119	0.422	0.422
N. districts	1066	1066	1066	1066	1066	1066	1066	1066
Adjusted R^2	0.0500	0.0738	0.0739	0.0739	0.0968	0.0968	0.0992	0.0993
N	78276	77906	77906	77906	77906	77906	77906	77906
District and year FE	X	X	X	X	X	X	X	X
Initial conditions	X	X	X	X	X	X	X	X
Individual-level covariates		X	X	X	X	X	X	X
District-level covariates			X	X		X		X

Notes: Standard Errors clustered at the district level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
PIPV stands for physical intimate partner violence. *MTV* stands for "male tariffs vulnerability", while *FTV* stands for "female tariffs vulnerability". Note that we have multiplied the coefficients on *MTV* and *FTV* by minus one to facilitate the reading of our tables as we are interested in the effect of a reduction in tariffs. *TV* stands for tariffs vulnerability. **The set of initial conditions** includes the district's population,the share of individuals with complete primary, high school and post-secondary education, the share of female employment, the share of employment destined to agriculture and fishing, mining, manufacture and construction. Each of these variables is interacted with linear and quadratic trends. **The set of individual-level covariates** includes the age and years of education of both partners, the age of the female when first married, a dummy that captures whether the female speaks Spanish, the size of the household, the sex of the household head, and the altitude at which the household is located. **The set of district-level covariates** includes a measure of vulnerability to foreign direct investment, a measure of vulnerability to exports, and a measure of vulnerability to input tariffs. Details on the construction of these variables can be found in Appendix B.

Table 3: The Effect of Trade Liberalization on Alcohol Consumption and Justifiability of Violence

	Partner's alcohol consumption	Justifiability of violence
	(1)	(2)
MTV	0.0346	0.0086
	(0.0160)**	(0.0047)*
FTV	0.0662	0.0230
	(0.0320)**	(0.0098)**
Mean dep. var.	1.471	0.0605
N. districts	1066	1035
Adjusted R^2	0.0707	0.0538
N	77917	80335
District and year FE	X	X
Initial conditions	X	X
Individual-level covariates	X	X
District-level covariates	X	X

Notes: Standard Errors clustered at the district level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

MTV stands for "male tariffs vulnerability", while *FTV* stands for "female tariffs vulnerability". Note that we have multiplied the coefficients on *MTV* and *FTV* by minus one to facilitate the reading of our tables as we are interested in the effect of a reduction in tariffs.

The set of initial conditions includes the district's population,the share of individuals with complete primary, high school and post-secondary education, the share of female employment, the share of employment destined to agriculture and fishing, mining, manufacture and construction. Each of these variables is interacted with linear and quadratic trends. **The set of individual-level covariates** includes controls for age, age squared, years of education, years of education-squared, the size of the household, a dummy that captures whether the female speaks Spanish, and the sex of the household head. **The set of district-level covariates** includes a measure of vulnerability to foreign direct investment and a measure of vulnerability to exports. Details on the construction of these variables can be found in Appendix B.

Table 4: The Effect of Lower Input Tariffs on Physical Intimate Partner Violence

	Has suffered from PIPV			
	(1)	(2)	(3)	(4)
MTV	0.0279	0.0221	0.0225	0.0293
	(0.0088)***	(0.0077)***	(0.0079)***	(0.0084)***
FTV	0.0447	0.0334	0.0233	0.0280
	(0.0190)**	(0.0391)	(0.0399)	(0.0400)
ITV	-0.0590			
	(0.0321)*			
$MITV$		-0.0552	-0.0535	-0.0598
		(0.0295)*	(0.0305)*	(0.0316)*
$FITV$		-0.0384	-0.0287	-0.0278
		(0.0670)	(0.0687)	(0.0684)
Mean dep. var.	0.388	0.387	0.388	0.388
N. districts	1066	1066	1066	1066
Adjusted R^2	0.0739	0.0500	0.0739	0.0739
N	77906	78276	77906	77906
District and year FE	X	X	X	X
Initial conditions	X	X	X	X
Individual-level covariates	X		X	X
District-level covariates	X			X

Notes: Standard Errors clustered at the district level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

PIPV stands for physical intimate partner violence. MTV stands for "male tariffs vulnerability", while FTV stands for "female tariffs vulnerability". ITV stands for "input tariffs vulnerability". Similarly, $MITV$ and $FIPV$ stands for "male input tariffs vulnerability" and "female input tariffs vulnerability". Note that we have multiplied the coefficients on MTV, FTV, ITV $MITV$ and $FIPV$ by minus one to facilitate the reading of our tables as we are interested in the effect of a reduction in tariffs.

The set of initial conditions includes the district's population,the share of individuals with complete primary, high school and post-secondary education, the share of female employment, the share of employment destined to agriculture and fishing, mining, manufacture and construction. Each of these variables is interacted with linear and quadratic trends. **The set of individual-level covariates** includes the age and years of education of both partners, the age of the female when first married, a dummy that captures whether the female speaks Spanish, the size of the household, the sex of the household head, and the altitude at which the household is located. **The set of district-level covariates** includes a measure of vulnerability to foreign direct investment and a measure of vulnerability to exports. Details on the construction of these variables can be found in Appendix B.

Table 5: Heterogeneous Effects on Physical Intimate Partner Violence

	Has suffered from PIPV			
	(1)	(2)	(3)	(4)
MTV	0.0284	0.0295	0.0316	0.0296
	(0.0088)***	(0.0089)***	(0.0088)***	(0.0088)***
FTV	0.0453	0.0454	0.0447	0.0468
	(0.0189)**	(0.0190)**	(0.0192)**	(0.0190)**
Older than partner $\times MTV$	-0.0025			
	(0.0019)			
Older than partner $\times FTV$	-0.0023			
	(0.0062)			
$\geq$ 19 when married $\times MTV$		-0.0033		
		(0.0014)**		
$\geq$ 19 when married $\times FTV$		0.0011		
		(0.0051)		
High-school $\times MTV$			-0.0069	
			(0.0017)***	
High-school $\times FTV$			0.0091	
			(0.0061)	
More educated $\times MTV$				-0.0020
				(0.0014)
More educated $\times FTV$				-0.0063
				(0.0045)
Mean dep. var. (D=0)	0.386	0.421	0.407	0.393
Mean dep. var. (D=1)	0.397	0.360	0.359	0.382
Test Men	0.0038	0.0034	0.0056	0.0018
Test Women	0.0302	0.0164	0.00490	0.0353
N. districts	1066	1066	1066	1066
Adjusted R^2	0.0740	0.0741	0.0744	0.0740
N	77906	77906	77906	77906
District and Year FE	X	X	X	X
Initial conditions	X	X	X	X
Individual-level covariates	X	X	X	X
District-level covariates	X	X	X	X

Notes: Standard Errors clustered at the district level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

PIPV stands for physical intimate partner violence. MTV stands for "male tariffs vulnerability", while FTV stands for "female tariffs vulnerability". Note that we have multiplied the coefficients on MTV and FTV and in the interaction terms by minus one to facilitate the reading of our tables as we are interested in the effect of a reduction in tariffs.

The set of initial conditions includes the district's population,the share of individuals with complete primary, high school and post-secondary education, the share of female employment, the share of employment destined to agriculture and fishing, mining, manufacture and construction. Each of these variables is interacted with linear and quadratic trends. **The set of individual-level covariates** includes the age and years of education of both partners, the age of the female when first married, a dummy that captures whether the female speaks Spanish, the size of the household, the sex of the household head, and the altitude at which the household is located. **The set of district-level covariates** includes a measure of vulnerability to foreign direct investment, a measure of vulnerability to exports, and a measure of vulnerability to input tariffs. Details on the construction of these variables can be found in Appendix B.

Table 6: Falsification and Placebo Tests, Physical Intimate Partner Violence

	Falsification: PIPV (2004-2007)		Placebo: PIPV between parents
	(1)	(2)	(3)
MTV (2007-2010)	-0.0065		
	(0.0078)		
FTV (2007-2010)	-0.0238		
	(0.0146)		
MTV (2008-2011)		0.0009	
		(0.0070)	
FTV (2008-2011)		-0.0061	
		(0.0134)	
MTV (2004-2011)			-0.0006
			(0.0078)
FTV (2004-2011)			0.0310
			(0.0175)*
Mean dep. var.	0.405	0.405	0.482
N. districts	595	595	1066
Adjusted R^2	0.104	0.104	0.0506
N	29330	29330	73733
District and year FE	X	X	X
Initial conditions	X	X	X
Individual-level covariates	X	X	X
District-level covariates	X	X	X

Standard Errors clustered at the district level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

PIPV stands for physical intimate partner violence. MTV stands for "male tariffs vulnerability", while FTV stands for "female tariffs vulnerability". Note that we have multiplied the coefficients on MTV and FTV by minus one to facilitate the reading of our tables as we are interested in the effect of a reduction in tariffs.

The set of initial conditions includes the district's population,the share of individuals with complete primary, high school and post-secondary education, the share of female employment, the share of employment destined to agriculture and fishing, mining, manufacture and construction. Each of these variables is interacted with linear and quadratic trends.**The set of individual-level covariates** includes the age and years of education of both partners, the age of the female when first married, a dummy that captures whether the female speaks Spanish, the size of the household, the sex of the household head, and the altitude at which the household is located. **The set of district-level covariates** includes a measure of vulnerability to foreign direct investment, a measure of vulnerability to exports, and a measure of vulnerability to input tariffs. Details on the construction of these variables can be found in Appendix B.

Table 7: Sensitivity to initial conditions

	Has suffered from PIPV					
	(1)	(2)	(3)	(4)	(5)	(6)
MTV	0.0279	0.0250	0.0317	0.0261	0.0281	0.0206
	(0.0088)***	(0.0093)***	(0.0091)***	(0.0088)***	(0.0095)***	(0.0088)**
FTV	0.0447	0.0535	0.0385	0.0407	0.0452	0.0337
	(0.0190)**	(0.0202)***	(0.0186)**	(0.0192)**	(0.0208)**	(0.0170)**
Mean dep. var.	0.388	0.388	0.388	0.388	0.388	0.388
N. districts	1066	1066	1066	1066	1066	1066
Adjusted R^2	0.0739	0.0741	0.0744	0.0739	0.0745	0.0743
N	77906	77906	77906	77906	77906	77906
District and Year FE	X	X	X	X	X	X
Individual-level covariates	X	X	X	X	X	X
District-level covariates	X	X	X	X	X	X
Initial conditions: baseline	X		X	X		
Initial conditions: by sex		X			X	
Initial conditions: demographics			X		X	
Initial conditions: labor				X	X	
Region-year FE						X

Notes: Standard Errors clustered at the district level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

PIPV stands for physical intimate partner violence. *MTV* stands for "male tariffs vulnerability", while *FTV* stands for "female tariffs vulnerability". Note that we have multiplied the coefficients on *MTV* and *FTV* by minus one to facilitate the reading of our tables as we are interested in the effect of a reduction in tariffs.

Initial conditions: baseline. This set includes the population's size, the share of female employment, the share of employment destined to agriculture and fishing, mining, manufacture and construction. Each of these variables is interacted with linear and quadratic trends. **Initial conditions: by sex.** This set includes the share of male and female employment destined to agriculture and fishing, mining, manufacture and construction. We also consider the population's size and the district's aggregate share of female employment. Each of these variables is interacted with linear and quadratic trends. **Initial conditions: demographics.** This set includes the share of individuals that live together, the share of individuals that are Catholics, and the share of individuals that are Evangelists. We also consider the share of the population that speaks Spanish, the share of the population that is female, and the share of people younger than 18, aged between 18 and 40, and aged between 40 and 65. Each of these variables is interacted with linear and quadratic trends. **Initial conditions: labor.** This set includes the share of overall employment, and the share of workers employed in small and medium firms. We interact these variables with linear and quadratic trends. Each of these variables is interacted with linear and quadratic trends. **The set of individual-level covariates** includes the age and years of education of both partners, the age of the female when first married, a dummy that captures whether the female speaks Spanish, the size of the household, the sex of the household head, and the altitude at which the household is located. **The set of district-level covariates** includes a measure of vulnerability to foreign direct investment, a measure of vulnerability to exports, and a measure of vulnerability to input tariffs. Details on the construction of these variables can be found in Appendix B.

Table 8: Controlling for previous shocks

	Has suffered from PIPV					
	(1)	(2)	(3)	(4)	(5)	(6)
MTV	0.0279	0.0319	0.0306	0.0337	0.0344	0.0344
	(0.0088)***	(0.0100)***	(0.0102)***	(0.0105)***	(0.0106)***	(0.0106)***
FTV	0.0447	0.0435	0.0446	0.0397	0.0370	0.0364
	(0.0190)**	(0.0177)**	(0.0178)**	(0.0182)**	(0.0183)**	(0.0183)**
L1.*MTV*		-0.0071	-0.0036	-0.0067	-0.0067	-0.0066
		(0.0056)	(0.0072)	(0.0075)	(0.0075)	(0.0074)
L1.*FTV*		0.0079	0.0028	0.0165	0.0225	0.0243
		(0.0205)	(0.0227)	(0.0243)	(0.0246)	(0.0247)
L2.*MTV*			0.0066	0.0133	0.0122	0.0128
			(0.0061)	(0.0098)	(0.0100)	(0.0101)
L2.*FTV*			0.0177	-0.0054	-0.0054	-0.0028
			(0.0260)	(0.0290)	(0.0291)	(0.0289)
L3.*MTV*				-0.0115	-0.0262	-0.0262
				(0.0360)	(0.0398)	(0.0398)
L3.*FTV*				0.0549	0.0519	0.0589
				(0.0508)	(0.0526)	(0.0524)
L4.*MTV*					-0.0136	-0.0138
					(0.0122)	(0.0172)
L4.*FTV*					-0.1007	-0.1462
					(0.0401)**	(0.0574)**
L5.*MTV*						0.0020
						(0.0106)
L5.*FTV*						-0.0610
						(0.0311)*
Mean dep. var.	0.388	0.388	0.388	0.388	0.388	0.388
N. districts	1066	1066	1066	1066	1066	1066
Adjusted R^2	0.0739	0.0739	0.0739	0.0739	0.0739	0.0739
N	77906	77906	77906	77906	77906	77906
District and year FE	X	X	X	X	X	X
Initial conditions	X	X	X	X	X	X
Individual-level covariates	X	X	X	X	X	X
District-level covariates	X	X	X	X	X	X

Notes: Standard Errors clustered at the district level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

PIPV stands for physical intimate partner violence. MTV stands for "male tariffs vulnerability", while FTV stands for "female tariffs vulnerability". Note that we have multiplied the coefficients on MTV and FTV by minus one to facilitate the reading of our tables as we are interested in the effect of a reduction in tariffs.

The set of initial conditions includes the district's population,the share of individuals with complete primary, high school and post-secondary education, the share of female employment, the share of employment destined to agriculture and fishing, mining, manufacture and construction. Each of these variables is interacted with linear and quadratic trends. **The set of individual-level covariates** includes the age and years of education of both partners, the age of the female when first married, a dummy that captures whether the female speaks Spanish, the size of the household, the sex of the household head, and the altitude at which the household is located. **The set of district-level covariates** includes a measure of vulnerability to foreign direct investment, a measure of vulnerability to exports, and a measure of vulnerability to input tariffs. Details on the construction of these variables can be found in Appendix B.

Table 9: The Effect of Trade Liberalization on Migration

	Has changed residence at least once ...			
	... ever	... since 1991	... in the last 5 years	... in the last year
	(1)	(2)	(3)	(4)
MTV	-0.0172	-0.0084	0.0056	0.0028
	(0.0100)*	(0.0103)	(0.0069)	(0.0040)
FTV	0.0042	0.0167	0.0151	0.0014
	(0.0196)	(0.0183)	(0.0130)	(0.0073)
Mean dep. var.	0.559	0.420	0.164	0.051
N. districts	1066	1066	1066	1066
Adjusted R^2	0.140	0.147	0.116	0.0571
N	77891	77891	77891	77891
District and year FE	X	X	X	X
Initial conditions	X	X	X	X
Individual-level covariates	X	X	X	X
District-level covariates	X	X	X	X

Notes: Standard Errors clustered at the district level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

MTV stands for "male tariffs vulnerability", while *FTV* stands for "female tariffs vulnerability". Note that we have multiplied the coefficients on *MTV* and *FTV* by minus one to facilitate the reading of our tables as we are interested in the effect of a reduction in tariffs.

The set of initial conditions includes the district's population,the share of individuals with complete primary, high school and post-secondary education, the share of female employment, the share of employment destined to agriculture and fishing, mining, manufacture and construction. Each of these variables is interacted with linear and quadratic trends. **The set of individual-level covariates** includes the age and years of education of both partners, the age of the female when first married, a dummy that captures whether the female speaks Spanish, the size of the household, the sex of the household head, and the altitude at which the household is located. **The set of district-level covariates** includes a measure of vulnerability to foreign direct investment, a measure of vulnerability to exports, and a measure of vulnerability to input tariffs. Details on the construction of these variables can be found in Appendix B.

Table 10: The Effect of Trade Liberalization by Migration Status

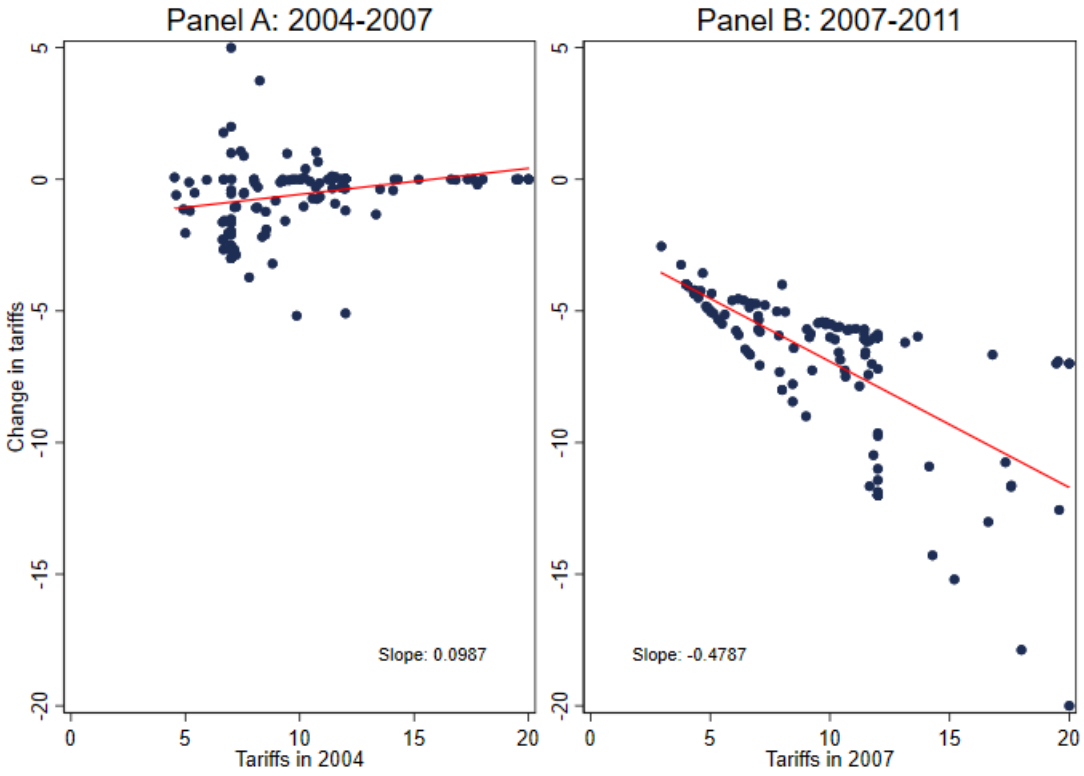
	Has suffered from PIPV			
	(1)	(2)	(3)	(4)
MTV	0.0287	0.0282	0.0283	0.0281
	(0.0088)***	(0.0088)***	(0.0089)***	(0.0088)***
FTV	0.0450	0.0444	0.0447	0.0450
	(0.0191)**	(0.0190)**	(0.0190)**	(0.0190)**
$M_{ever} \times MTV$	-0.0007			
	(0.0016)			
$M_{ever} \times FTV$	-0.0018			
	(0.0045)			
$M_{1991} \times MTV$		-0.0004		
		(0.0016)		
$M_{1991} \times FTV$		0.0003		
		(0.0045)		
$M_{5yrs} \times MTV$			-0.0012	
			(0.0020)	
$M_{5yrs} \times FTV$			0.0023	
			(0.0061)	
$M_{1yr} \times MTV$				0.0004
				(0.0036)
$M_{1yr} \times FTV$				-0.0035
				(0.0104)
Mean dep. var. (M=0)	0.362	0.384	0.393	0.391
Mean dep. var. (M=1)	0.408	0.392	0.359	0.330
Test Men	0.00160	0.00170	0.00250	0.00220
Test Women	0.0248	0.0207	0.0175	0.0505
N. districts	1066	1066	1066	1066
Adjusted R^2	0.0743	0.0739	0.0740	0.0742
N	77891	77891	77891	77891
District and Year FE	X	X	X	X
Initial conditions	X	X	X	X
Individual-level covariates	X	X	X	X
District-level covariates	X	X	X	X

Notes: Standard Errors clustered at the district level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

PIPV stands for physical intimate partner violence. MTV stands for "male tariffs vulnerability", while FTV stands for "female tariffs vulnerability". Note that we have multiplied the coefficients on MTV and FTV by minus one to facilitate the reading of our tables as we are interested in the effect of a reduction in tariffs.

The set of initial conditions includes the district's population,the share of individuals with complete primary, high school and post-secondary education, the share of female employment, the share of employment destined to agriculture and fishing, mining, manufacture and construction. Each of these variables is interacted with linear and quadratic trends. **The set of individual-level covariates** includes the age and years of education of both partners, the age of the female when first married, a dummy that captures whether the female speaks Spanish, the size of the household, the sex of the household head, and the altitude at which the household is located. **The set of district-level covariates** includes a measure of vulnerability to foreign direct investment, a measure of vulnerability to exports, and a measure of vulnerability to input tariffs. Details on the construction of these variables can be found in Appendix B.

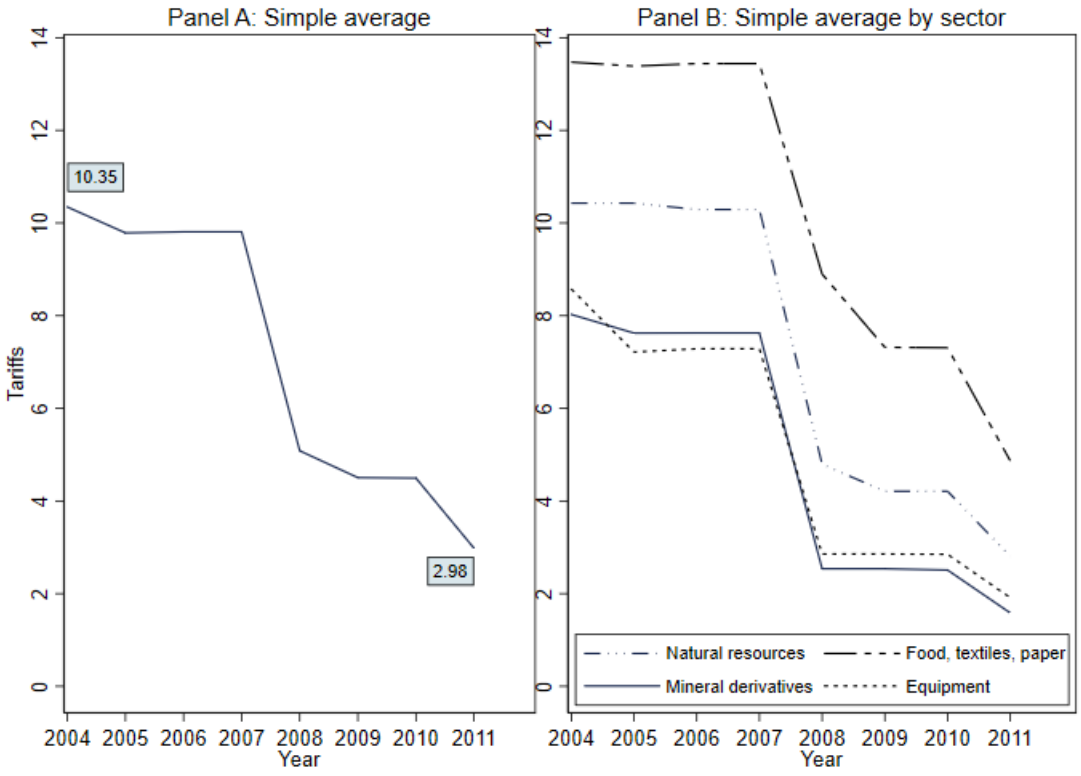
Figure 1: Correlation between initial tariffs and tariff changes



Source: World Bank TRAINS and World Bank's concordance tables

Notes: Tariffs and tariff changes were computed at the industry level using ISIC3 codes. Originally, industries were coded based on the Trade Classification Harmonized System (HS). We translated this classification into the International Standard Industrial Classification (ISIC3) using the concordance tables available online.

Figure 2: MFN tariffs, 2004-2011

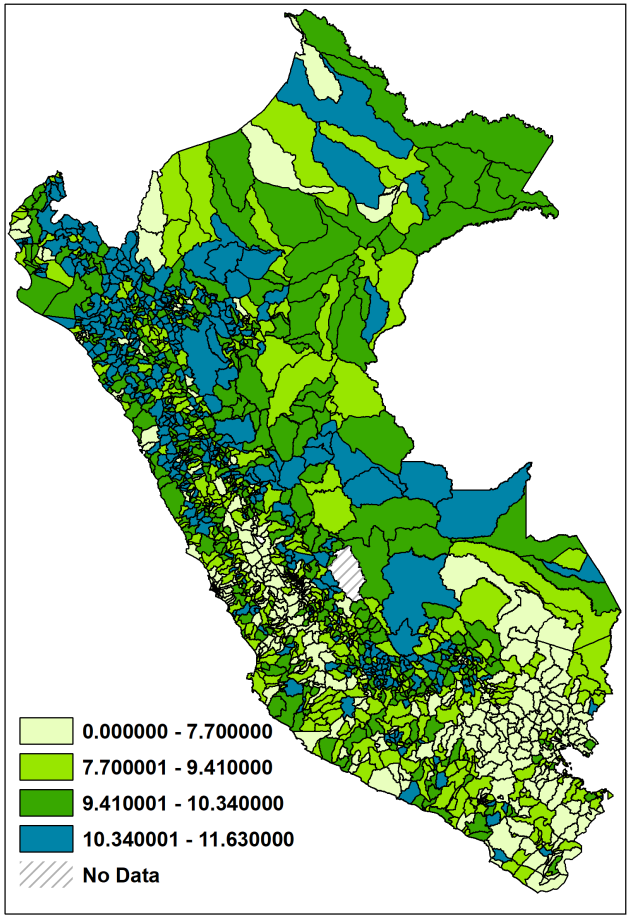


Source: World Bank TRAINS and World Bank's concordance tables

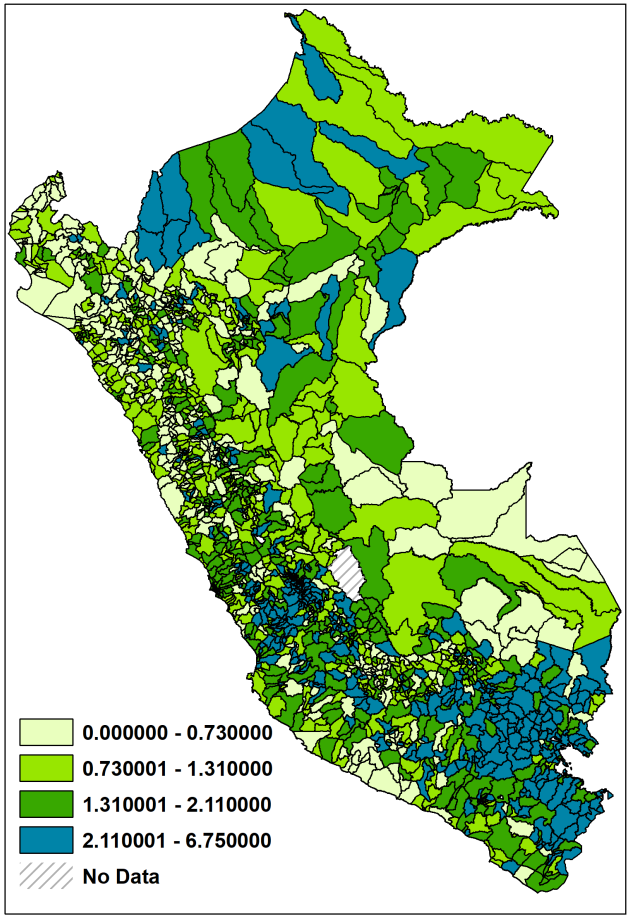
Notes: Tariffs were computed at the industry level using ISIC3 codes. Originally, industries were coded based on the Trade Classification Harmonized System (HS). We translated this classification into the International Standard Industrial Classification (ISIC3) using the concordance tables available online.

Figure 3: Reductions in tariffs vulnerability, 2004-2011

Panel A. *MTV*



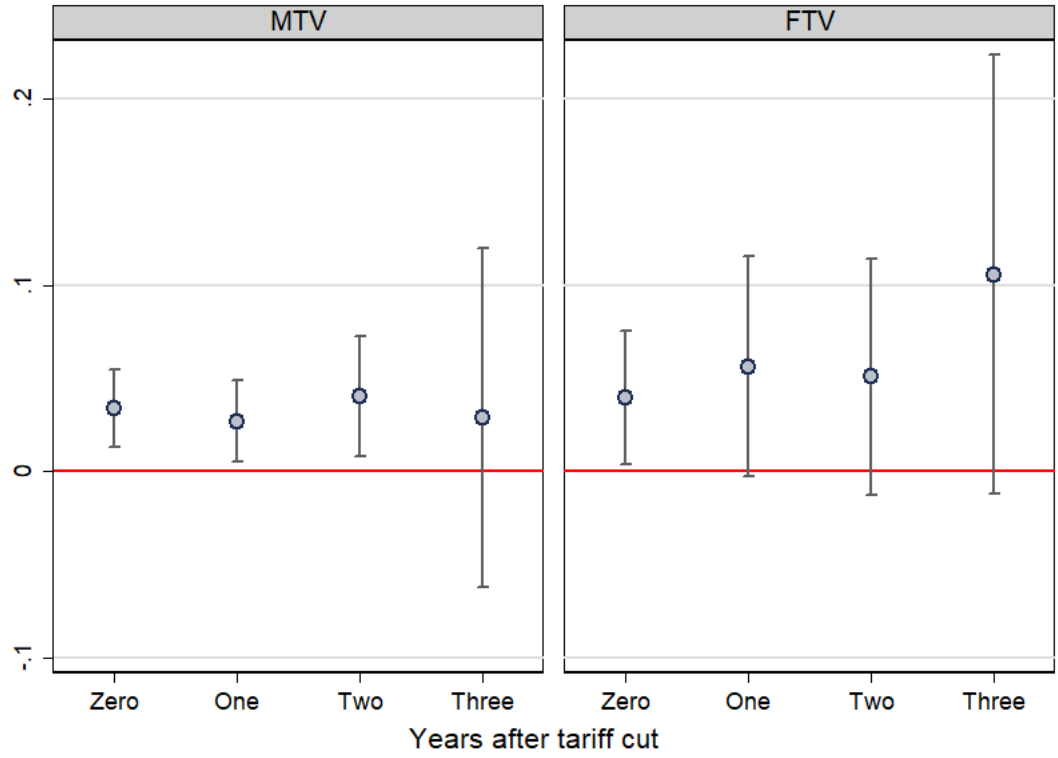
Panel B. *FTV*



Source: World Bank TRAINS, World Bank's concordance tables and the 1993 Population and Household Census. Own calculations.

Notes: *MTV* stands for "male tariffs vulnerability", while *FTV* stands for "female tariffs vulnerability". To facilitate the visualization of the figure we have multiplied MTV and FTV by minus one as we are interested in the effect of a reduction in tariffs.

Figure 4: Accumulated Effect of Trade Liberalization

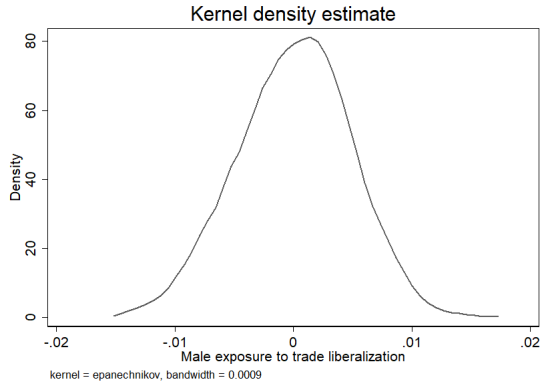


Notes: Based on coefficients from column 6 in Table 8. 95% confidence intervals. MTV stands for "male tariffs vulnerability", while FTV stands for "female tariffs vulnerability". Note that we have multiplied the coefficients on MTV and FTV by minus one to facilitate the reading of our tables as we are interested in the effect of a reduction in tariffs.

Figure 5: Empirical Distribution of Coefficients for Male and Female Vulnerability

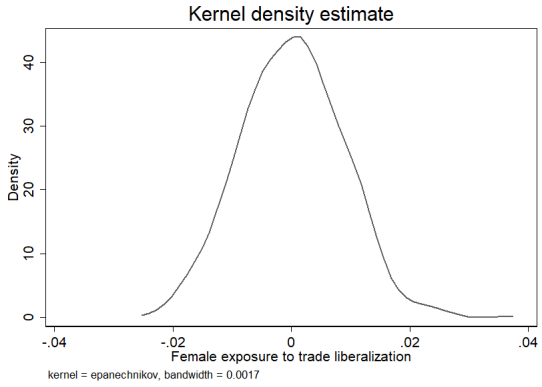
Panel A: Randomizing cross-sectional structure between districts

MTV



Empirical p-value: <0.001

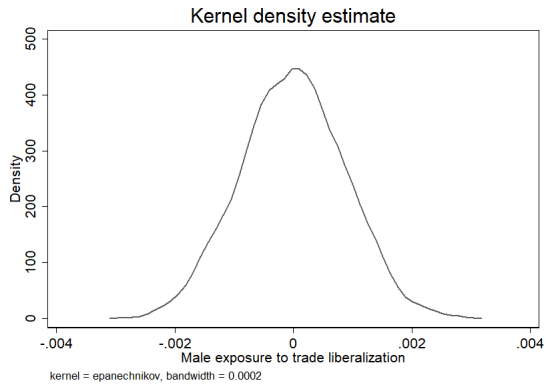
FTV



Empirical p-value: <0.001

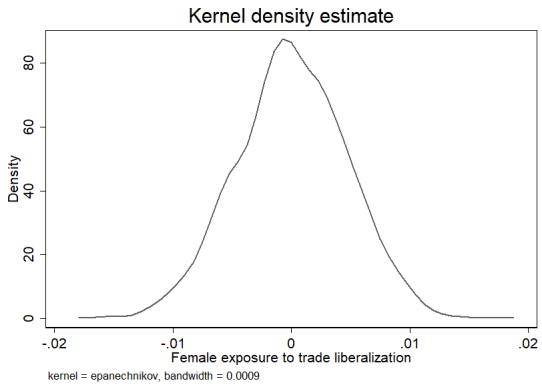
Panel B: Randomizing time structure within districts

MTV



Empirical p-value: <0.001

FTV



Empirical p-value: <0.001

Notes: MTV stands for "male tariffs vulnerability", while FTV stands for "female tariffs vulnerability". Distribution of point estimates for $MTV_{d,t}$ and $FTV_{d,t}$ based on equation 3. Note that we have multiplied the coefficients on MTV and FTV by minus one to facilitate the visualization of the figure as we are interested in the effect of a reduction in tariffs. Regressions include district and years fixed effects; initial conditions interacted with liner and quadratic trends; and the sets of individual- and district-level covariates. Each distribution is constructed by repeating the randomization and estimation procedure 2,000 times.

A Appendix: Tables and Figures

Table A.1: Top 10 Traded Industries by...:

Panel A: ...the share of male workers

Industry (ISIC3 Group)	Share of male workers
Manufacture of furniture (361)	0.962
Quarrying of stone, sand and clay (141)	0.958
Manufacture of structural metal products, tanks, reservoirs and steam generators (281)	0.953
Mining of uranium and thorium ores (120)	0.952
Manufacture of products of wood, cork, straw and plaiting materials (202)	0.950
Fishing, aquaculture and service activities incidental to fishing (050)	0.949
Mining of non-ferrous metal ores, except uranium and thorium ores (132)	0.946
Manufacture of aircraft and spacecraft (353)	0.945
Mining and quarrying n.e.c. (142)	0.938
Manufacture of other fabricated metal products; metal working service activities (289)	0.936

Panel B: ...the share of female workers

Industry (ISIC3 Group)	Share of female workers
Manufacture of knitted and crocheted fabrics and articles (173)	0.679
Other service activities (930)	0.614
Manufacture of wearing apparel, except fur apparel (181)	0.567
Extraction and agglomeration of peat (103)	0.500
Farming of animals (012)	0.426
Manufacture of coke oven products (231)	0.375
Manufacture of optical instruments and photographic equipment (332)	0.372
Manufacture of other textiles (172)	0.337
Manufacture of other chemical products (242)	0.311
Spinning, weaving and finishing of textiles (171)	0.283

Source: 1993 Population and Household Census

Table A.2: The Effect of Trade Liberalization on Emotional Violence

	EIPV			Controlling behavior		
	Dummy	Intensity	PC	Dummy	Intensity	PC
	(1)	(2)	(3)	(4)	(5)	(6)
MTV	0.0091	0.0266	0.0154	0.0167	0.0889	0.0359
	(0.0074)	(0.0146)*	(0.0084)*	(0.0106)	(0.0343)***	(0.0135)***
FTV	-0.0027	-0.0038	-0.0022	-0.0002	0.0212	0.0081
	(0.0176)	(0.0331)	(0.0191)	(0.0204)	(0.0662)	(0.0264)
Mean dep. var.	0.302	0.503	0.290	0.677	1.502	0.578
N. districts	1066	1066	1066	1066	1066	1066
Adjusted R^2	0.0644	0.0696	0.0694	0.0489	0.0582	0.0577
N	77935	77935	77935	77117	77117	77117
District and year FE	X	X	X	X	X	X
Initial conditions	X	X	X	X	X	X
Individual-level covariates	X	X	X	X	X	X
District-level covariates	X	X	X	X	X	X

Notes: Standard Errors clustered at the district level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

EIPV stands for emotional intimate partner violence. *MTV* stands for "male tariffs vulnerability", while *FTV* stands for "female tariffs vulnerability". EIPV stands for emotional intimate partner violence. Note that we have multiplied *MTV* and *FTV* by minus one to facilitate the reading of our tables as we are interested in the effect of a reduction in tariffs.

The set of initial conditions includes the district's population,the share of individuals with complete primary, high school and post-secondary education, the share of female employment, the share of employment destined to agriculture and fishing, mining, manufacture and construction. Each of these variables is interacted with linear and quadratic trends. **The set of individual-level covariates** includes the age and years of education of both partners, the age of the female when first married, a dummy that captures whether the female speaks Spanish, the size of the household, the sex of the household head, and the altitude at which the household is located. **The set of district-level covariates** includes a measure of vulnerability to foreign direct investment, a measure of vulnerability to exports, and a measure of vulnerability to input tariffs. Details on the construction of these variables can be found in Appendix B.

Table A.3: Autocorrelation of ΔMTV

Years	11-10	10-09	09-08	08-07	07-06	06-05	05-04	04-03	03-02	02-01	01-00	00-99	99-98
2011-2010	1.00												
2010-2009	-0.47	1.00											
2009-2008	0.28	-0.57	1.00										
2008-2007	0.40	0.57	0.09	1.00									
2007-2006	.	.	.	.	.								
2006-2005	-0.24	-0.32	-0.06	0.02	.	1.00							
2005-2004	0.52	0.51	-0.73	0.31	.	-0.16	1.00						
2004-2003	-0.70	-0.71	0.72	-0.32	.	0.27	-0.93	1.00					
2003-2002	0.70	0.71	-0.72	0.32	.	-0.26	0.93	-1.00	1.00				
2002-2001	-0.55	0.60	-0.65	0.34	.	-0.21	0.75	-0.82	0.83	1.00			
2001-2000	0.45	-0.56	0.86	0.20	.	0.20	-0.71	0.71	-0.71	-0.62	1.00		
2000-1999	0.50	0.58	-0.93	-0.04	.	0.06	0.71	-0.72	0.72	0.63	-0.93	1.00	
1999-1998	-0.56	-0.63	0.39	-0.19	.	0.29	-0.48	0.66	-0.67	-0.52	0.37	-0.39	1.00

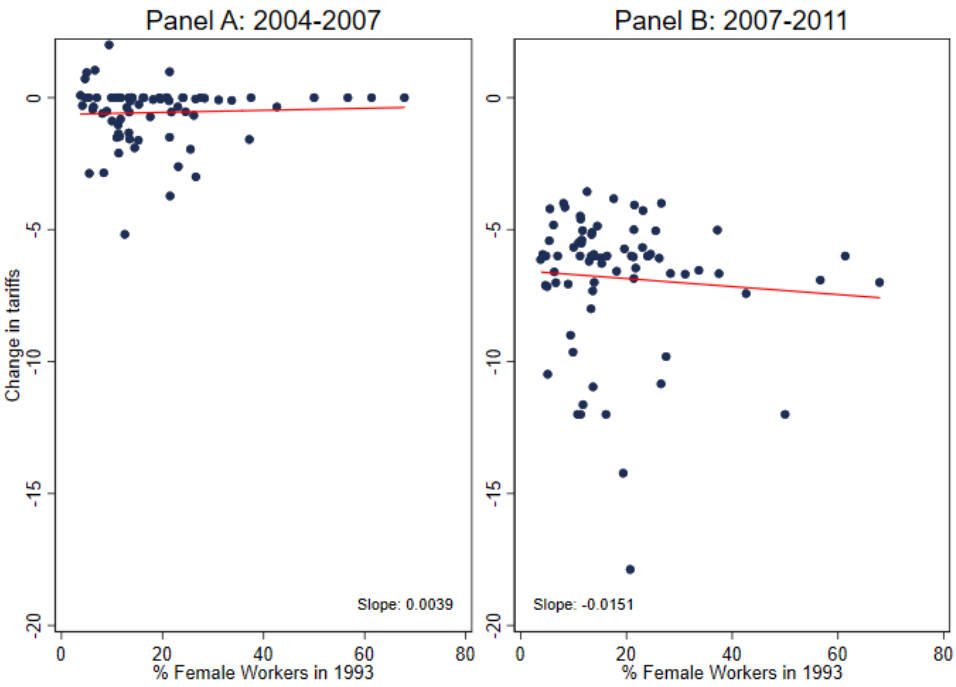
Source: World Bank TRAINS, 1993 Population and Household Census, World Bank's Concordance Table

Table A.4: Autocorrelation of ΔFTV

Years	11-10	10-09	09-08	08-07	07-06	06-05	05-04	04-03	03-02	02-01	01-00	00-99	99-98
2011-2010	1.00												
2010-2009	0.16	1.00											
2009-2008	0.69	-0.08	1.00										
2008-2007	0.93	0.18	0.56	1.00									
2007-2006	.	.	.	.	.								
2006-2005	0.08	-0.22	-0.04	0.11	.	1.00							
2005-2004	0.47	0.10	0.06	0.75	.	0.06	1.00						
2004-2003	-0.51	-0.27	-0.02	-0.77	.	-0.07	-0.97	1.00					
2003-2002	0.51	0.28	0.02	0.77	.	0.07	0.97	-1.00	1.00				
2002-2001	0.38	0.20	-0.04	0.63	.	0.19	0.82	-0.85	0.85	1.00			
2001-2000	0.75	-0.02	0.99	-0.64	.	-0.01	0.15	0.13	0.13	0.05	1.00		
2000-1999	-0.69	0.09	-0.99	0.56	.	0.04	-0.06	0.02	-0.02	0.04	-0.99	1.00	
1999-1998	-0.11	-0.54	0.11	-0.13	.	0.11	-0.07	0.21	-0.21	-0.15	0.06	-0.12	1.00

Source: World Bank TRAINS, 1993 Population and Household Census, World Bank's Concordance Table

Figure A.1: Correlation between the share of female workers per industry in 1993 and tariff changes



Source: World Bank TRAINS, World Bank's concordance tables, and 1993 Population and Household Census

Notes: Tariff changes were computed at the industry level using ISIC3 codes. Originally, industries were coded based on the Trade Classification Harmonized System (HS). We translated this classification into the International Standard Industrial Classification (ISIC3) using the concordance tables available online.

B Data Appendix

B.1 Individual-level Outcomes

Physical Intimate Partner Violence

Dummy: Takes the value of one for women that have ever been (i) pushed, shook or thrown something at, (ii) slapped or arm twisted, (iii) punched with fist or something harmful, (iv) kicked or dragged, (v) strangled or burnt, (vi) threatened with a knife/gun or other weapon, (vii) attacked with knife/gun or other weapon, (viii) forced to have sex when not wanted, and (ix) forced to make other sexual acts when not wanted, by her spouse. This variable is defined at the individual level and comes from the DHS surveys. We only consider women that were in a relationship when they were surveyed.

Intensity: Using each of the categories described above we compute dummies and a measure of intensity by adding them together. Hence, this measure goes from 0 to 9 and its average value is of 1.12 with a standard deviation of 1.76.

Principal component: Using the dummy variables described above we compute the first component from a principal component analysis, which accounts 41% of the total variance. Its average value is of 0.42 and has a standard deviation of 0.65.

Emotional Intimate Partner Violence:

Dummy: Takes the value of one for women that have ever been (i) humiliated, (ii) threatened with harm, and (iii) threatened of going away from home or taking away the children by her spouse. This variable is defined at the individual level and comes from the DHS surveys. We only consider women that were in a relationship when they were surveyed.

Intensity: Using each of the categories described above we compute dummies and a measure of intensity by adding them together. Hence, this measure goes from 0 to 3 and its average value is of 0.50 with a standard deviation of 0.88.

Principal component: Using the dummy variables described above we compute the first component from a principal component analysis, which accounts 63% of the total variance. Its average value is of 0.29 and has a standard deviation of 0.51.

Controlling behavior:

Dummy: Takes the value of one for woman reporting that her husband have ever (i) felt jealous when she talked with other men, (ii) accused her of unfaithfulness, (iii) prohibited her to meet her girl friends, (iv) tried to limit her contact with family, (v) insisted on knowing where she is, and (vi) withheld money from her because of lack of trust. This variable is defined at the individual level and comes from the DHS surveys. We only consider women that were in a relationship when they were surveyed.

Intensity: Using each of the categories described above we compute dummies and a measure of intensity by adding them together. Hence, this measure goes from 0 to 6 and its average value is of 1.50 with a standard deviation of 1.55.

Principal component: Using the dummy variables described above we compute the first component from a principal component analysis, which accounts 43% of the total variance. Its average value is of 0.58 and has a standard deviation of 0.62.

B.2 Individual-level controls

Summary statistics are shown in Table 1. "Age at marriage" is the age in years of first marriage. "Age" is the age in years. "Partner's age" is the age in years of each woman's partner. "Years of educ. (YoE)" is the education in years. "Partner's YoE" is the education in years of each woman's partner. "HH. head is women" is a dummy indicating if the household head is female. "Non-spanish" is a dummy that indicates whether a particular woman speaks Quechua, Aymara or any other language different from Spanish. "HH. size" is the number of individuals living in

each woman's household. "Altitude" is the meters over the sea level at which the household is located. Source: DHS.

B.3 District-level variables

Vulnerability to Tariff Changes: For district "d" at year "t" we construct the following measure of vulnerability:

$$TV_{d,t} = \sum_{i}^{I} \frac{L_{1993,i,d}}{L_{1993,d}} \times tariff_{i,t} \tag{7}$$

where $L_{1993,i,d}$ is the number of workers in sector "i" in district "d" in 1993, $L_{1993,d}$ is the district "d"'s total number of workers in 1993, and $tariff_{i,t}$ is the Most-Favored-Nation (MFN) tariff of industry "i" at year "t". To compute this variable we exclude the services sector altogether, as this has become standard practice in the literature. Finally, since the Census industry codes use the International Standard Industrial classification (ISIC 3) aggregated at the 3-digit level, whereas tariff data use the Trade Classification Harmonized System (HS), we convert HS codes into ISIC3 codes using the concordance tables available at the World Bank's website. This means that we are able to distinguish between $I = 76$ different industries.

Vulnerability to Tariff Changes by Sex: Refer to Section 3.2. In addition, since the Census industry codes use the International Standard Industrial classification (ISIC 3) aggregated at the 3-digit level, whereas tariff data use the Trade Classification Harmonized System (HS), we convert HS codes into ISIC3 codes using the concordance tables available at the World Bank's website. This means that we are able to distinguish between 76 different industries.

Input Tariffs: We follow Edmonds, et al., (2010) and use the 1993 Peruvian national input-output table, the 1993 national census, and MFN tariffs to construct this variable. For each industry i, we create an input tariff for that industry as the weighted average of tariffs on goods used for production in industry i (which is between paren-

thesis in equation 8). Such weights were constructed using industry j's share of industry i's total input cost, which we call $sc_{j,i,1993}$. Then, the district input tariff is computed by weighting industry i's input tariff by i's employment share in the district in 1993:

$$ITV_{d,t} = \sum_{i}^{I} \frac{L_{i,d,1993}}{L_{d,1993}} (\sum_{j}^{J} sc_{j,i,1993} \times tariff_{j,t}) \tag{8}$$

We do not exclude the services sector when computing the input tariff of industry i, $(\sum_j^J sc_{j,i,1993} \times tariff_{j,t})$ to reflect the fact that some services may be used in the production of output goods. However, we do not consider them for the set of output industries I. Once we account for the industries considered in I and in J, we are able to distinguish between 32 different industries. This is because the Peruvian input-output table features 45 sectors, hence we had to work at that level of aggregation.

Input Tariffs by sex: We compute the following measures of vulnerability:

$$(G)ITV_{d,t} = \sum_{i}^{I} \frac{L^{G}_{i,d,1993}}{L_{d,1993}} (\sum_{j}^{J} sc_{j,i,1993} \times tariff_{j,t}) \tag{9}$$

where $G = \{M, F\}$, M stands for male, and F stands for female. To construct (9) we apply the same considerations as in the computation of (8) above.

Foreign Direct Investments: $FDI_{d,t} = \sum_i^I w_{i,d} \times FDI_{i,t}$, where the employment in production sector i in district d as a share of total employment in the district is defined as $w_{i,J(i),d} \equiv L_{i,d,1993}/L_{d,1993}$. $FDI_{i,t}$ is the total foreign direct investments destined to sector i (sector codes aggregated to 2-digits). This data was compiled from the Private Investment Promotion Agency (Pro Inversión) and it distinguishes between 14 different sectors. We drop the services sector when computing $w_{i,d}$.

Exports: $Exports_{d,t} = \sum_i w_{i,d} \times Exports_{i,t}$, where $w_{i,d} \equiv L_{i,d,1993}/L_{d,1993}$ is the employment in production sector i in district d as a share of total employment in the district. $Exports_{i,t}$ is the total value of exports made by firms in sector i. This data

was compiled from the Worlbank's TRAINS Data. We drop the services sector when computing $w_{i,d}$. Since the Census industry codes use the International Standard Industrial classification (ISIC 3) aggregated at the 3-digit level, whereas exports data use the Trade Classification Harmonized System (HS), we convert HS codes into ISIC3 codes using the concordance tables available at the World Bank's website. This means that we can distinguish between $I = 76$ different industries.