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ABSTRACT

We investigate the impact of a large economic shock on mortality. We find that counties more exposed to a plausibly exogenous trade liberalization exhibit higher rates of suicide and related causes of death, concentrated among whites, especially white males. These trends are consistent with our finding that more-exposed counties experience relative declines in manufacturing employment, a sector in which whites and males are disproportionately employed. We also examine other causes of death that might be related to labor market disruption and find both positive and negative relationships. More-exposed counties, for example, exhibit lower rates of fatal heart attacks.

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1 Introduction

Large literatures in economics and public health investigate the effect of economic shocks on physical and mental health, and on mortality.[1] Finding exogenous sources of variation in economic conditions is an important challenge in this research agenda. Here, we explore the relationship between mortality and a plausibly exogenous change in U.S. trade policy – the October, 2000 granting of Permanent Normal Trade Relations (PNTR) to China – that differentially exposed U.S. counties to increased international competition via their industry structure. We find that counties more exposed to the change in policy exhibit higher mortality due to causes of death, particularly suicide, that have been linked to relative loss of employment and income, which we also show to be associated with the change in policy. We find that relative increases in these causes of death are concentrated among whites, which is consistent with that group's disproportionately high employment in manufacturing, the sector most directly affected by the change in trade policy, as well as recent research into rising white mortality by Case and Deaton (2015).

In principle, an increase in import competition can affect U.S. workers' health positively or negatively depending upon the sector in which they are employed and the region in which they and their dependents live. On one hand, health might improve with real income in areas where production lines up with U.S. comparative advantage, and health everywhere might improve with declines in the prices of goods and services that are important inputs to medical care. On the other hand, health might suffer in areas competing most directly with imports if workers experience sharper or longer-term declines in employment and real income. We note that while our analysis contributes to a broader understanding of the distributional implications of trade liberalization, it does not constitute an assessment of PNTR's overall effect on welfare.

PNTR was a non-traditional trade liberalization in that it eliminated the threat of tariff increases on U.S. imports from China without changing the tariff rates actually applied to Chinese goods. Specifically, PNTR eliminated the need for politically contentious annual renewals of China's Normal Trade Relations (NTR) status – and the accompanying uncertainty – that was needed to preserve China's access to the low NTR rates available to most other U.S. trading partners. Removing the possibility of these potential tariff increases made producing in China for export to the United States more attractive, effectively liberlizing trade between the two countries. We de-

[1] See, for example, the survey by Cutler, Deaton and Lleras-Muney (2006).

fine industries' exposure to PNTR as the difference between the higher, non-NTR rates to which tariffs could have risen prior to PNTR and the lower NTR rates that were locked in by the change in policy. We refer to these differences as "NTR gaps," and, importantly for our identification strategy, show both that they exhibit substantial variation across industries and that they are unrelated to employment outcomes prior to the change in policy. Indeed, nearly all of the variation in the NTR gap is accounted for by variation in non-NTR rates, which were set by the Smoot-Hawley Tariff Act of 1930. We compute counties' exposure to PNTR as the labor-share weighted average NTR gaps of the industries they produce.[2]

We use proprietary microdata from the U.S. Centers for Disease Control (CDC) to compute mortality rates by county, year, cause of death, gender and race. Our initial focus is on three causes of death – suicide, accidental poisoning (which includes drug overdoses) and alcohol-related liver disease (ARLD) – that are highlighted in Case and Deaton (2015) and that a literature described below has found to be related to labor market disruptions. We then use a difference-in-differences (DID) identification strategy to examine whether counties that are more exposted to PNTR (first difference) experience differential changes in mortality and labor market outcomes after the policy is implemented (second difference).

We find that PNTR is associated with a statistically significant relative increase in suicide, and that this result is robust to inclusion of county-level demographic and economic control variables. Coefficient estimates imply that an interquartile shift in counties' NTR gaps is associated with an increase in the annual suicide rate of 4.0 percent relative to its respective average in the year 2000, the year of the change in U.S. trade policy. Across age and racial groups, we find that the relationship between PNTR and suicide is concentrated among white males. We also find that PNTR is associated with statistically significant relative increases in mortality from accidental poisoning, though those estimates are more sensitive to the set of county attributes included in the regression and to its specification. The evidence for a link between the policy change and mortality from ARLD is mixed, perhaps due to the longer onset

[2]Pierce and Schott (2016) show that PNTR is associated with the sharp decline in U.S. manufacturing employment that began around time of its passage, as well as with increases in U.S. imports from China, the number of domestic and foreign-owned Chinese firms exporting to the United States, the number of U.S. firms importing from China and the number of trading relationships between the two countries. Handley and Limao (2016) develop a theoretical model that indicates that PNTR was equivalent to a 13 percentage point permanent decline in tariff rates. Feng, Li and Swenson (2016) document the effect of PNTR on the prices and quality of goods exported to the U.S. by Chinese firms.

associated with fatal liver diseases.

We examine the robustness of the DID results in several ways. First, we consider an alternate empirical specification that places no restrictions on the timing of the effects of the policy change and verify that the relationship between the NTR gap and mortality from suicide for white males is only present after PNTR was passed. Second, we demonstrate that the statistical and economic significance of our results are similar after accounting for the NTR gaps of other counties within the surrounding commuting zone and controlling for potential changes in state healthcare policies. Finally, we show that PNTR has no association with other causes of death plausibly unrelated to the change in policy (e.g., deaths of unknown intent), and that it is negatively associated with fatal heart attacks, perhaps due to loss of employment in industries requiring physically strenuous activity.[3]

To verify labor market disruption as a potential channel through which PNTR might affect mortality, we estimate the relationship between the NTR gap and several labor market outcomes. Results from a DID specification analogous to the one described above imply that an interquartile shift in counties' NTR gaps is associated with persistent relative increases in counties' unemployment rates and persistent relative declines in counties' manufacturing employment, overall employment, labor force participation rates and per capita personal income.[4] These findings suggest that PNTR's relationship with mortality rates may occur at least in part via the impact of import competition on local labor markets.

Finally, as a further check on the mechanism linking PNTR to mortality and to facilitate comparison of our results with those already in the literature, we perform a series of two-stage least squares estimations of county mortality rates on county unemployment rates, using counties' exposure to the change in trade policy as an instrument. The resulting coefficient estimates suggest that a 1 standard deviation increase in the unemployment rate (2.6 percentage points) is associated with a 29.1 percent increase in the suicide rate. This elasticity is approximately an order of magnitude greater than that estimated in Ruhm (2000), which finds that a 1 standard deviation increase in

[3]Ruhm (2000) reports a negative relationship between the unemployment rate and death due to heart attacks. Hummels, Munch and Xiang (2016) show that increased effort in manufacturing jobs resulting from positive export shocks is associated with a higher rates of hospitalization due to heart attacks.

[4]Complementary evidence indicating the seriousness of the labor market disruption is reported in our online appendix, where we document a relationship between PNTR and relative increases in property crime. Unlike Dix-Carneiro et al. (2015), however, we find no relationship between the change in trade policy and the murder rate, or other forms of violent crime.

the *state* unemployment rate (2.1 percentage points) is associated with a 2.7 percent increase in the suicide rate.[5]

Our analysis contributes to research in several literatures. First, the link we find between PNTR and suicide relates to a series of papers studying the health consequences of unemployment. Two seminal contributions in this literature are Ruhm (2000), which reports a positive relationship between the unemployment rate and suicide in a panel of U.S. states, and Sullivan and von Wachter (2009), which finds that high-tenure workers displaced as part of a mass layoff experience a sharp increase in their probability of death.[6] More recently, Classen and Dunn (2011) find that unemployment duration is a major force in the relationship between job loss and suicide.

Second, our analysis contributes to the substantial body of research examining the relationship between import competition and employment, particularly with respect to China.[7] Autor, Dorn and Hanson (2013), for example, find that up to half of the decline in U.S. manufacturing employment between 2000 and 2007 is associated with rising imports from China, while Pierce and Schott (2016) show that both a decline in manufacturing employment and an increase in U.S. imports from China during this period are related to PNTR. Complementary research demonstrates that U.S. labor markets subject to larger increases in Chinese import competition experience greater declines in self-reported health outcomes (McManus and Schaur 2015a,b), reduced provision of local public goods (Feler and Senses 2015), and changes in marriage and fertility patterns (Autor, Dorn and Hanson 2015). Hummels, Munch and Xiang (2016), by contrast, find that the increased job effort associated with positive export demand shocks increases rates of illness and injury for Danish workers, and Bombardini and Li (2016) find that higher pollution associated with expanded export production is associated with a substantial increase in infant mortality.

[5]The difference in magnitudes may arise from the persistence of the employment effect associated with the trade shock – as opposed to the transitory nature of a business cycle contraction – or our focus on county-level variation in mortality and unemployment rates, rather than state-level variation as in Ruhm (2000).

[6]Potential reasons for the increase in mortality discussed by Sullivan and von Wachter (2009) include reduced investments in health, increased stress, and loss of health insurance. Browning and Heinesen (2012) find that workers displaced by plant closures in Denmark exhibit elevated death rates due to mental illness, suicide and alcohol-related diseases, particularly in the short run. A number of papers in the public health literature, including Falba et al. (2005) and Deb et al. (2011), find that workers facing job loss are more likely to engage in unhealthy activities.

[7]See, for example, Freeman and Katz (1991), Revenga (1992), Sachs and Shatz (1994) and Bernard, Jensen and Schott (2006). Recent papers focused specifically on China include Bloom, Draca and Van Reenen (2015), Ebenstein et al. (2014b), Groizard, Ranjan and Rodriguez-Lopez (2012), Mion and Zhu (2013), and Utar and Torres Ruiz (2013).

Finally, our research contributes to studies that take advantage of "natural" or actual experiments to examine the impact of shocks to healthcare coverage. Two such papers focus on the random allocation of Medicaid coverage in Oregon. Baicker et al. (2013) find that coverage significantly increases use of preventative services, the probability of a positive screening for depression and diabetes and the use of diabetes medication. Finkelstein et al. (2012) find that coverage leads to better self-reported physical and mental health. To the extent that the labor market disruptions associated with PNTR affect access to healthcare, these findings are consistent with the positive links we find between the change in trade policy and mortality.

The paper proceeds as follows: Section 2 describes the data, Section 3 describes our empirical strategy and mortality results, Section 4 explores mechanisms that might explain the results, Section 5 presents the two stage least squares estimates, and Section 6 concludes. An online appendix provides additional empirical results as well as information about dataset construction and sources.

2 Data

2.1 County Level Mortality

We calculate the number of deaths by county, demographic category and cause using the proprietary "compressed all-county mortality files" available by petition from the U.S. Centers for Disease Control (CDC). These data summarize all death certificates filed in the United States from 1990 to 2013.[8] Observable demographics include the deceased's age, gender, race, county of residence and county of death. Underlying causes of death are classified according to one of several hundred "external" or "internal" categories.[9] Internal causes of death are defined as those that originate within the body (e.g., liver disease) and external causes of death are defined as those whose origins lie outside the body (e.g., suicide or accidental poisoning).

We match year by county of residence by age by gender by race death counts to cor-

[8]A public-use version of these data can be accessed at www.wonder.cdc.gov, though the extent to which mortality rates can be examined within causes of death and demographic groups over time is limited to prevent disclosure of confidential information.

[9]Causes of death are classified according to International Classification of Diseases (ICD). The CDC data use version 10 of these codes (ICD-10) from 1999 to 2013 and version 9 (ICD-9) of these codes from 1990 to 1998. We make use of a concordance between these underlying codes and major disease categories available in Anderson et al. (2001).

responding population estimates compiled by the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) Program.[10] We use these population estimates to compute both "crude" and "age-adjusted" mortality rates, conventionally expressed per 100,000 population. The crude death rate for a county-year is simply the total number of deaths in that county in that year divided by its total population in that year. The age-adjusted death rate for a county, by contrast, is a weighted average of the crude death rates across age categories within a county, where the shares of the overall U.S. population in each age category are used as weights.[11] We use the U.S. population shares in the year 2000 for constructing age-adjusted mortality rates.[12]

Figure 1 plots the (censored) distributions of age-adjusted mortality rates across counties at four-year intervals starting in 1990. This figure conveys two messages. First, the leftward movement in the distributions over time indicates that overall U.S. mortality rates decline during our sample period. Second, the relatively wide support of each distribution reveals that mortality rates vary substantially across counties. This across-county variation in mortality rates is also apparent in Table 1, which summarizes counties' population-weighted average mortality rates by gender and by race for the year 2000. As indicated in the first row of the table, the overall mortality rate across counties is 858, with an interquartile range stretching from 778 to 1002. The remaining rows show that mortality is higher for males than females (1047 versus 719), and higher for blacks than for other racial groups.[13]

Table 2 reports the year 2000 population-weighted average age-adjusted death rates per 100,000 population for major external and internal causes of death across counties. As noted in the table, internal causes account for more than 90 percent of deaths across racial groups. The three leading causes of death are cancer, circulatory disease and respiratory ailments.

[10]Eighty-one percent of deaths occur in the deceased's county of residence, the focus of our analysis. SEER population estimates are available at http://seer.cancer.gov/popdata/download.html.

[11]We use the following age categories in our baseline results: less than 1 year old, 1 to 4 years, 5 to 14 years, 15 to 19 years, 20 to 24 years..., 80 to 84 years, and greater than 85 years.

[12]The SEER population weights associated with these categories are provided in Table A.1 of the online appendix.

[13]In 2000, the U.S. population shares representing males, females, whites, blacks, American Indian and Asians or Pacific Islanders are 49, 51, 82, 13, 1 and 4 percent. Counties' weighted average death rates vary depending on whether overall county population or demographic-specific county population is used to weight each county. This sensitivity can be seen by comparing the first two columns of Table A.2 in the online appendix. The first column (like Table 1 in the main text) uses total population while the second column uses the population specific to the demographic group whose weighted average is being computed. As indicated in the table, the latter are closer to the official CDC age-adjusted death rates for the United States as a whole.

Examining overall U.S. mortality rates by cause of death and demographic categories, Case and Deaton (2015) highlight a substantial rise in deaths due to suicide, chronic liver disease and poisoning (accidental and intent undetermined) among middle-aged whites starting in 1999. Figure 2 uses the CDC microdata examined here to demonstrate these trends and extend them backwards in time to the beginning of our sample period (1990), where to faciliate concordance with data from the 1990s, we focus more specifically on suicide, alcohol-related liver disease (ARLD) and accidental poisoning. As indicated in the figure, the weighted average rates of suicide and ARLD across counties are more or less flat during the 1990s but begin increasing around the time of the change in U.S. trade policy in the year 2000. Deaths due to accidental poisoning, by contrast, rise throughout the sample period but increase at a faster rate during the 2000s.[14]

2.2 The NTR Gap

Our analysis makes use of a plausibly exogenous change in U.S. trade policy – the U.S. granting of PNTR to China in October 2000 – that effectively liberalized U.S. imports from China. This impact can be understood by considering the two sets of tariff rates that comprise the U.S. tariff schedule. The first set of tariffs, known as NTR tariffs, are generally low and applied to goods imported from other members of the World Trade Organization (WTO). The second, known as non-NTR tariffs, were set by the Smoot-Hawley Tariff Act of 1930 and are often substantially higher than the corresponding NTR rates. Imports from non-market economies such as China generally are subject to the higher non-NTR rates, but U.S. law allows the President to grant such countries access to NTR rates on a year-by-year basis subject to annual approval by Congress.

U.S. Presidents granted China such a waiver every year starting in 1980, but Congressional votes over annual renewal became politically contentious and less certain of passage following the Chinese government's crackdown on Tiananmen Square protests in 1989 and other flashpoints in U.S.-China relations during the 1990s such as China's transfer of missile technology to Pakistan in 1993 and the Taiwan Straits Missile Crisis in 1996. Uncertainty over China's access to NTR tariff rates ended with Congress passing a bill granting PNTR status to China in October 2000, which formally took

[14] One commonly cited explanation for the increase in death due to poisoning around the year 2000 is an increase in the misuse of prescription opioid painkillers. See, e.g., Rudd, Aleshire, Zibbel and Gladden (2016). We hope to explore a potential link between such prescriptions and labor market shocks in future drafts of this paper.

effect upon China's entry into the WTO in December 2001.

We follow Pierce and Schott (2016) in measuring the impact of PNTR as the rise in U.S. tariffs on Chinese goods that would have occurred in the event of a failed annual renewal of China's NTR status prior to PNTR,

$$NTR\,Gap_j = Non\;NTR\,Rate_j - NTR\,Rate_j. \tag{1}$$

We refer to this difference as the NTR gap, and compute it for each SIC industry j using *ad valorem equivalent* tariff rates provided by Feenstra et al. (2002) for 1999, the year before passage of PNTR. NTR gaps vary widely across industries, with a mean and standard deviation of 33 and 15 percentage points. As noted in Pierce and Schott (2016), 79 percent of the variation in the NTR gap across industries is due to variation in non-NTR rates, set 70 years prior to passage of PNTR, while less than 1 percent of variation is due to variation in NTR rates. This feature of non-NTR rates effectively rules out reverse causality that would arise if *non-NTR rates* were set to protect industries with declining employment or surging imports.[15]

We compute U.S. counties' exposure to PNTR as the employment-share weighted average NTR gap across the sectors in which they are active,

$$NTR\,Gap_c = \sum_j \frac{L_{jc}^{1990}}{L_c^{1990}} NTR\,Gap_j. \tag{2}$$

We use employment shares from 1990, a period well before the change in policy.[16] NTR gaps are defined only for industries whose output is subject to U.S. import tariffs, primarily in the manufacturing and agricultural sectors. For industries whose output is not subject to tariffs, such as service industries, we set NTR gaps to zero. For each county, we also calculate the population weighted average NTR gap of the *remaining* counties in its commuting zone, $NTR\,Gap_{cz}$.[17]

[15] Furthermore, to the extent that NTR rates were set to protect industries with declining employment prior to PNTR, these higher NTR rates would result in lower NTR gaps, biasing our results away from finding an effect of PNTR.

[16] Employment by county and industry are available from the U.S. Census Bureau's County Business Patterns (CBP) database, available at http://www.census.gov/econ/cbp/download/. We follow Autor et al. (2013) in imputing employment for counties where only a range of employment is reported. For more information, see David Dorn's data page, at http://www.ddorn.net/data.htm.

[17] We use the U.S. Department of Agriculture definition of commuting zones as of 1990 (Tolbert and Sizer 1996) and the concordance of counties to commuting zones provided by Autor et al. (2013). The counties in our sample are distributed across 741 commuting zones, with the number of counties per commuting zone ranging from 1 to 19 (the Washington DC area).

Figure 3 reports the distribution of NTR gaps across four-digit SIC industries, U.S. counties and U.S. counties' surrounding commuting zones. Relative to the distribution across industries, the distributions for counties and surrounding labor market areas are shifted towards the left, reflecting the fact that most workers in most counties are employed outside the manufacturing sector.[18] Own-county NTR gaps average 7.3 percent and have a standard deviation of 6.5 percent, with an interquartile range from 2.4 to 10.6 percent, or 1.3 standard deviations. Surrounding-county NTR gaps have a similar distribution, with a mean and standard deviation of 6.5 and 4.8 percent, and an interquartile range from 3.3 to 8.8 percent, or 1.1 standard deviations.

2.3 Other Policy Variables

Our empirical analysis controls for four additional variables that capture changes in U.S. or Chinese policy: the average U.S. import NTR tariff rate associated with the goods produced by each county; the average exposure of the county to the end of quantitative restrictions on textiles and clothing imports associated with the phasing out of the global Multi-Fiber Arrangement (MFA); and changes in Chinese import tariffs and domestic production subsidies.

NTR Rates: Counties' labor-share weighted U.S. import tariff rates, NTR_{ct}, are computed as in Equation 2, except that the U.S. NTR tariff rate for industry j (in percent) is used in place of the NTR gap for industry j. The left panel of Figure A.2 in the online appendix summarizes the distribution of NTR_{ct} across our sample period; as shown in the figure, it declines during the late 1990s due to implementation of tariff reductions agreed upon during the Uruguay Round.[19]

MFA Exposure: We measure counties' exposure to the end of the MFA analogously. As discussed in greater detail in Khandelwal et al. (2013), the MFA and its successor, the Agreement on Textile and Clothing (ATC), grew out of quotas imposed by the United States on textile and clothing imports from Japan during the 1950s. Over time, it evolved into a broader institution that regulated the exports of clothing and textile products from developing countries to the United States, European Union, Canada and

[18]The distribution for industries in Figure 3 omits SIC industries that that are not imported and which therefore have NTR gaps of zero by definition.

[19]NTR tariff rates from Feenstra et al. (2002) are unavailable after 2001 and so are assumed constant after that year. Analysis of analogously computed "revealed" tariff rates from public U.S. trade data during this interval in Pierce and Schott (2016) suggests this is an reasonable assumption that avoids having to make do with the smaller set of industries for which "revealed" rates are available.

Turkey. Bargaining over these restrictions was kept separate from multilateral trade negotiations until the conclusion of the Uruguay Round in 1995, when an agreement was struck to eliminate the quotas over four phases. On January 1, 1995, 1998, 2002 and 2005, the United States was required to remove textile and clothing quotas representing 16, 17, 18 and the remaining 49 percent of their 1990 import volumes, respectively. Relaxation of quotas on Chinese imports did not occur until it became a member of the World Trade Organization in 2001; as a result, its quotas on the goods in the first three phases were relaxed in early 2002 and its quotas on the goods in the fourth phase were relaxed as scheduled in 2005. The order in which goods were placed into a particular phase was chosen by the United States.

Computation of counties' exposure to elimination of the MFA proceeds in three steps. First, we follow Brambilla et al. (2010) in measuring the extent to which MFA quotas in industry j and phase p were binding as the import-weighted average fill rate of the industry's constituent import products in the year before they were phased out, $FillRate_{jp}$.[20] Industries with higher average fill rates faced more binding quotas and are therefore more exposed to the end of the MFA. Second, for each phase, we compute counties' labor-share weighted average fill rate across industries, $FillRate_{cp}$, using a version of Equation 2. Finally, we create our county-year variable of interest, $MFAExposure_{ct}$, which, for each year t, is county c's the weighted avearge $FillRate_{cp}$ for industries whose quotas were relaxed in the most recent phase. The right panel of Figure A.2 in the online appendix summarizes the distribution of $FillRate_{cp}$ across our sample period. As shown in the figure, fill rates are zero until the second phaseout, in 1998. They then step up in 2002 and again in 2005, consistent with the hypothesis in Brambilla et al (2010) that the United States placed its more "sensitive" textile and clothing products into the latter two phases as a means of deferring politically painful import competition as long as possible.

Changes in Chinese Policy: As part of its accession to the WTO, China agreed to institute a number of policy changes that could have influenced U.S. manufacturing employment, notably liberalization of its import tariff rates and reductions of production subsidies. Following Pierce and Schott (2016) we use product-level data on Chinese import tariffs from 1996 to 2005 from Brandt et al. (2012) to compute the average change in Chinese import tariffs across products within each U.S. industry. For production subsidies, we use data from the Annual Report of Industrial Enterprise

[20]Fill rates are defined as actual imports divided by allowable imports under the the quota, and products outside the MFA have a fill rate of zero.

Statistics compiled by China's National Bureau of Statistics (NBS), which reports the subsidies provided to responding firms.[21] Following Girma et al. (2009) and Aghion et al. (2015) we use the variable "subsidy" in this dataset to compute the change in the subsidies to sales ratio for each SIC industry between 1999 and 2005 using concordances provided by Dean and Lovely (2010). For both changes in Chinese import tariff rates and production subsidies, we then compute the labor-share weighted average of this change across the industries each U.S. county produces. Figure A.3 in the online appendix summarizes the distribution of counties' exposure to reductions in Chinese import tariffs (left panel) and domestic production subsidies (right panel)

2.4 County Demographic Information

Our baseline specifications control for interactions of a post-PNTR indicator variable with three initial-year (i.e., 1990) county attributes: the percent of the population without any college education, median household income and percent of population that are veterans. These variables allow for the possibilities, respectively, that spurious changes in technology might have replaced low-skill workers with technology disproportionately during the 2000s, that high-income households gained better access to medical care after the 2000s, perhaps due to health insurance provided by their employers, and that an increase in destructive behaviors such as suicide might be the result of combat experience associated with post-9/11 wars in Afghanistan and Iraq (Kemp and Bossarte 2012). These attributes, summarized in Table 1, are obtained from the U.S. Census Bureau's 1990 Decennial Census.[22] As noted in the table, the unweighted means and standard deviations across counties are 54.4 and 11.4 percent (share of population with no college education), 40.4 and 10.6 thousand dollars (median household income), and 14.4 and 2.4 percent (percent of population that are veterans, respectively.[23]

Table 3 reports the results of OLS regressions of counties' NTR gaps on the inital (1990) county demographic attributes discussed in this section. As indicated in the table, counties with higher NTR gaps have greater exposure to the MFA, higher import tariffs across the goods they produce, are exposed to larger reductions in Chinese

[21]The NBS data encompass a census of state-owned enterprises (SOEs) and a survey of all non-SOEs with annual sales above 5 million Renminbi (~\$600,000). The version of the NBS dataset available to us from Khandelwal, Schott and Wei (2013) spans the period 1998 to 2005.

[22]These data can be downloaded from the Dexter Data Extractor at the University of Missouri, available at http://mcdc.missouri.edu/.

[23]These values differ from national averages as they are more affected by counties with small populations.

imports tariffs and subsidies, have lower household incomes in 1990, lower share of population with a college education in 1990, and a higher share of the population that are veterans in 1990. Counties with higher NTR gaps have lower median household income in 1990.

3 PNTR and County Mortality Rates

3.1 DID Identification Strategy

Our baseline difference-in-differences (DID) specification examines whether counties with higher NTR gaps (first difference) experience differential changes in mortality after the change in U.S. trade policy (second difference) versus before,

$$\begin{aligned} Death\,Rate_{ct} \;&=\; \theta Post\,PNTR_t \,\times\, NTR\,Gap_c + \\ &\quad\; \beta \mathbf{X}_{ct} + \gamma Post\,PNTR_t \times \mathbf{X}_c + \\ &\quad\; \delta_c + \delta_t + \varepsilon_{ct}, \end{aligned} \tag{3}$$

The sample period is 1990 to 2013.[24] The left-hand side variable represents an outcome in county c, for example the age-adjusted death rate for a particular cause of death and demographic group in year t. The first term on the right-hand side is the DID term of interest, an interaction of a post-PNTR (i.e., $t > 2000$) indicator with the (time-invariant) county-level NTR Gap. $\mathbf{X}_{ct}$ represents the two additional, time-varying controls for policy discussed in Section 2.3: the overall U.S. import tariff rate associated with the sectors produced by the county (NTR_{ct}) and the sensitivity of the county to the phasing out of the global Multi-Fiber Arrangement ($MFA\,Exposure_{ct}$). $\mathbf{X}_c$ represents the two Chinese policy variables, exposure to changes in Chinese tariffs between 1996 and 2005 and exposure to changes in Chinese domestic production subsidies between 2000 and 2005, and the three initial-period county attributes, 1990 median household income, 1990 share of population without a college degree and 1990 share of population that are veterans. Including interactions of these attributes with the $Post\,PNTR_t$ indicator allows their relationship with mortality rates to differ before

[24] The baseline results discussed below are robust to ending the sample period in 2007, the year before the onset of the Great Recession.

and after passage of PNTR. δ_c and δ_t represent county and year fixed effects. Inclusion of these fixed effects nets out characteristics of counties that are time-invariant, such as whether they are near the coast or inland, while also controlling for aggregate shocks that affect all counties identically in a particular year.

An attractive feature of these DID identification strategies is their ability to isolate the role of the change in U.S. trade policy. While counties with high and low NTR gaps are not identical, comparing outcomes within counties over time isolates the differential impact of China's change in NTR status.

3.2 Baseline DID Estimates for Suicide, Accidental Poisoning and ARLD

This section examines the link between PNTR and three specific causes of death – suicide, accidental poisoning and alcohol-related liver disease (ARLD). We focus on these causes of death for several reasons: they are highlighted in Case and Deaton (2015); they are found to be important in the unemployment and mass-layoff literatures (e.g., Classen and Dunn 2011 and Browning and Heinesen 2012); their concordance across the cause-of-death coding schemes used by the CDC over time is straightforward; and they may be more easily observable than other forms of death, particularly in the case of suicide and accidential poisoning.[25]

Results from estimation of Equation 3 for suicide are reported in the first four columns of Table 4, with standard errors clustered at the county level. The first column reports coefficient estimates for a specification containing just the DID term of interest and the fixed effects. The second and third columns, respectively, add controls for policy changes and demographic variables. The fourth column includes the full set of controls.

As indicated in the table, the DID point estimates of interest for suicide are positive and statistically significant at conventional levels across all four specifications, declining in magnitude as additional covariates are included in the regression. We assess the economic significance of the DID estimates of interest by computing the change in the mortality rates associated with moving a county from the 25th percentile to the 75th

[25]There is reason to believe that information on death certificates' cause of death may be noisy. Kircher et al. (1985), for example, finds that 29 percent of 272 randomly selected autopsy reports and corresponding death certificates in Connecticut in 1980 exhibit a major disagreement. The "blue form" instructions for completing the cause of death section of a death certificate are available at http://www.cdc.gov/nchs/data/dvs/blue_form.pdf.

percentile of the NTR gap distribution (i.e., from 2.3 to 10.6 percent, or 1.3 standard deviations). As indicated in the bottom panel of the table, the implied increases in mortality under this counterfactual range from 0.63 = [0.089*(10.6-2.3)] per 100,000 in column 1 to 0.42 per 100,000 in column 4. These changes represent 6.0 and 4.0 percent of the of the average age-adjusted suicide mortality rates across counties in the year 2000 which, as reported in the penultimate row of the table, is 10.51.[26] In terms of the other control variables, coefficient estimates in column 4 indicate that counties with higher shares of the population that did not attend college and higher shares of veterans in the population experience larger increases in mortality from suicide in the post-PNTR period, relative to before. Larger declines in Chinese production subsidies are associated with lower mortality from suicide, post-PNTR. In this sense, a liberalization on the part of a U.S. trading partner is associated with a decline in mortality from suicide in the U.S.

The next eight columns of Table 4 focus on accidental poisoning and ARLD. For accidental poisoning, the DID terms of interest are positive and significant in three of the four specifications, including the specification that includes the full set of control variables. We do not find a statistically significant relationship between PNTR and accidental poisoning when only demographic variables are included. In terms of economic significance, the impact of an interquartile shift in counties' exposure to PNTR implied by the DID coefficient estimate from the specification with all controls is an increase of 27.7 percent for accidental poisoning, relative to the overall mortality rate from that cause in the year 2000.[27] By contrast, we do not find a relationship between PNTR and ARLD in the full specification, possibly due to the longer onset period associated with the disease.

3.3 Baseline DID Estimates by Gender, Race and Age

We examine the link between PNTR and suicide across genders and races in Table 5. We find that the positive relationship between PNTR and suicide overall is concentrated

[26]The relationship between PNTR and suicide might spuriously relate to changes in access to firearms across counties that occurs at the same time as the change in trade policy. Re-estimation of the relationship according to whether or not the suicides involve a firearm, however, reveals a positive and statistically insignificant association at conventional levels for the former (implied impact and standard error of 0.019 and 0.013) and a positive and statistically significant association with respect to the latter (implied impact and standard error of 0.037 and 0.010).

[27]The mortality rate from accidental poisoning in 2000 was 4.59 per 100,000 and 4.39 per 100,000 for ARLD.

in one racial group – whites – and that this link is statistically significant at conventional levels only for white males (p-value for white females 0.14).[28] By contrast, we find no relationship between PNTR and suicide for blacks, Asians, or American Indians.

Results in Tables 6 and 7 indicate that PNTR also is associated with higher white mortality due to both accidental poisoning and ARLD. For accidental poisoning, this relationship is present for both white men and white women, while for ARLD it is statistically significant for white men, but not for white women.[29] There is generally no relationship between PNTR and mortality from ARLD or accidental poisoning for blacks, Asians, or American Indians, though for ARLD, we find negative and statistically significant relationships for American Indian as well as Asian or Pacific Islander females.[30] Overall, the results in Tables 5, 6 and 7 provide context for the findings of Case and Deaton (2015), who report a worsening of trends in mortality rates from suicide, poisoning and chronic liver disease rates among whites relative to other races.

One potential explanation for the link between PNTR and white mortality – particularly white male mortality – is this group's disproportionate representation among manufacturing workers, the group most directly affected by exposure to PNTR. As indicated in Table A.6 of the online appendix, males accounted for 68 percent of U.S. manufacturing employment versus 49 percent of the population in 1999, and whites represented 84.3 percent of manufacturing employment versus 81.7 percent of the population. Moreover, within manufacturing, over-representation of whites is highest among occupations likely to be earning the highest wages – such as managerial and professional occupations – that might lead to largest declines in income following job separation.[31]

To examine how the above relationships between PNTR and mortality vary by age,

[28]As indicated in the bottom panel of Table 5, the implied impact of an interquartile shift in the county-level NTR gap is an increase in deaths by suicide 4.8 percent of the year 2000 level for white males.

[29]As indicated in the bottom panels of Tables 6 and 7, the implied impacts of an interquartile shift in the county-level NTR gap is an increase in deaths rates of 59 and 14 percent for white males and females for accidental poisoning, and of 6.7 percent for white males for ARLD.

[30]Estimates for the American Indian and Asian populations may be noisy due to their small size and relatively uneven distribution across counties. The American Indian and Asian or Pacific Islander populations represent 1.1 and 4.2 percent of the overall population in the year 2000. In that year, these two groups have populations exceeding 50,000 in 48 and 158 counties, respectively, versus 2290 and 514 counties for whites and blacks. As reported in Figure A.4 of the online appendix, the American Indian and Asian populations also tend to inhabit counties with relatively low NTR gaps.

[31]Ebenstein et al. (2014a,b), for example, find that workers displaced from manufacturing on average experience wage declines in moving to another sector. As reported in Table A.6 of the online appendix, whites accounted for 90.4 percent of managers and professionals, 86.3 percent of technical, sales, administrative and service positions, and 83.0 percent of precision production positions, versus 78.9 percent among operators, fabricators, laborers and other occupations

we examine crude death rates by gender, race and age category. Results are displayed visually in Figure 4, which reports the 95 percent confidence intervals of the implied impact of an interquartile shift in counties' exposure to PNTR on white males (left panels) and white females (right panels) for each cause of death. For comparison, the first bar in each figure reproduces the 95 percent confidence interval across all ages from the bottom panel of Tables 5, 6 and 7. As indicated in the figure, an association between PNTR and suicide is evident across several five-year age bins between ages 20 and 54 for males, but is not statistically significant for white females in any age category.[32] For accidental poisoning, the association between PNTR and mortality is positive and significant for both white males and white females in most age groups through 45 to 49. Finally, PNTR-related ARLD mortality is spread across most working year age bins for middle-age white males, and not evident in any age category for females.

3.4 Robustness Exercises

This section describes three exercises that examine the robustness of the baseline DID results reported in the previous section. First, we use a more flexible DID specification to examine the timing of the post-2000 changes in mortality and test for the possibility of prior trends in mortality among counties with varying exposure to PNTR. Second, we explore the effect of the inclusion of additional covariates and fixed effects. And third, we examine the relationship between PNTR and other causes of death.

Prior Trends and Timing: For the increase in mortality to be attributable to the change in U.S. trade policy, the NTR gap should be correlated with mortality rates after PNTR but not before. To examine whether this is the case, we estimate a version of Equation 3 that interacts the time-invariant county-level NTR gap and other county attributes with an indicator variable for each year,

[32] Gemmill et al. (2016) find that macroeconomic shocks appear to induce suicide among working age males, as opposed to simply moving suicides forward in time.

$$
\begin{aligned}
Death\,Rate_{ct} \;=\; & \sum_t \theta_t \, 1\{year = t\} \times NTR\,Gap_c + \\
& \beta \mathbf{X}_{ct} + \\
& \sum_t \gamma_t \, 1\{year = t\} \times \mathbf{X}_c + \\
& \delta_c + \delta_t + \varepsilon_{ct},
\end{aligned} \tag{4}
$$

Results for suicide, accidental poisoning and ARLD among white males and females are displayed visually in Figure 5. Each panel of the figure uses the estimated DID parameters of interest (θ_t) for a particular regression to display the 95 percent confidence interval associated with an interquartile shift in counties' NTR gaps. As indicated in the figure, the implied impact of PNTR for suicide is generally statistically indistinguishable from zero prior to the change in U.S. trade policy but shifts upward after it is implemented. This upward shift is most clearly evident for suicide by white males in the top left panel, where the confidence interval for the implied impact of PNTR remains above zero after 2003.

The confidence interval for the implied impact of PNTR on mortality from accidental poisoning for white women – shown in the middle right panel – is statistically indistinguishable from zero prior to 2000 but becomes positive and significant after PNTR. The equivalent confidence interval for white males shows a similar shift up around the time of passage of PNTR, though it is negative and statistically significant through most of the 1990s. The lower two panels of Figure 5 report results for alcohol-related liver disease for white males and females. Here, too, an upward shift is discernible for white males, though it is not statistically different from zero in any year of the sample period. For white females, there is no discernible shift.

Surrounding Commuting Zones: Residents of a particular county may be affected by PNTR via its impact on surrounding counties that are part of the same labor market. To account for this possibility, we calculate for each county the employment-weighted average NTR gap of the other counties in its commuting zone and augment Equation 3 with the interaction of this commuting zone NTR gap ($NTR\;Gap_{cz}$) and the $Post\,PNTR_t$ indicator. The first two columns of the upper panel of Table 8 compare results from this specification to the baseline results in columns 4, 8 and 12 of Table

4. Here, too, to conserve space we focus on the implied impact of PNTR in terms of an interquartile shift of both NTR gaps. The middle and bottom panels repeat this comparison for white males and white females, respectively, where the baseline results in the first column are from Tables 5, 6 and 7. As indicated in the table, accounting for exposure via other counties in the commuting zone has little effect on the results for any of the three causes of death examined.

Medicaid Expansion: Sommers et al. (2012) find that expansion of Medicaid in New York, Maine and Arizona in 2001, 2002 and 2006 is associated with a significant reduction in age-adjusted mortality among older adults, non-whites, and residents of poorer counties. To capture the potential influence of these expansions on our results, we construct three variables that interact indicators for these states with indicators picking out the years after the expansion. To this group we add two additional variables to capture the introduction of "Romneycare" in Massachusetts in 2006 and the expansion of Medicaid in Oregon in 2008 that is discussed in the introduction (Baicker et al. 2013). Results with controls for these changes in health policy are reported in the third column of each panel of Table 8. As indicated in the table, including these covariates along with counties' exposure to PNTR via their commuting zones yields results similar to those reported in column 2.

A particularly stringent method of controlling for changes in state healthcare policies is the inclusion of the full set of state-by-year fixed effects. This approach captures any state-year level change in policy that might affect mortality rates, and also absorbs the substantial across-state variation in the NTR gap. Results including these fixed effects are reported in the fourth column of Table 8. As indicated in the table, we continue to find a positive relationship between PNTR and suicide, with the results still concentrated among white men. For accidental poisoning, the relationship with PNTR also remains positive but drops substantially in magnitude and loses statistical significance for white males and white females. Results for ARLD, by contrast, become positive and statistically significant overall once state-by-year fixed effects are added.

Other Causes of Death: Finally, we investigate the relationship between PNTR and several other causes of death. The first column of Table 9 investigates whether PNTR is associated with deaths from "events of unknown intent," which includes, for example, poisonings, discharges of firearms and falls from high places that were not ruled accidental or due to suicide. We view this regression as a check on the results for suicide reported above: to the extent that events of unknown intent were not classified as clear cases of suicide, we do not expect them to be related to economic conditions. As indicated in the table, we find no statistically significant relationship between this cause of death and PNTR.

In column two, we investigate the link between PNTR and deaths due to motor vehicle accidents, a form of mortality found to be positively related to economic activity in the literature. Ruhm (2000), for example, finds that a 1 percent increase in the unemployment rate is associated with 3 percent decline in mortality due to motor vehicle accidents, and a similar relationship is found in Stevens et al. (2011).[33] Here, however, we find no association between motor vehicle fatalities and PNTR.

A large body of research in the economics and public health literatures examines the potential impact of health insurance and health outcomes, hypothesizing that lack of coverage might inhibit both preventative screening and treatment of known conditions. Toward that end, columns three through five of Table 9 examine links between PNTR and diabetes, which, ideally, involves consistent monitoring and treatment, and two categories of cancer found to be sensitive to preventative screening: cancer of the digestive tract, which includes colorectal cancer, and cancer of the breast, bone and skin.[34] As indicated in the table, we find no relationship with respect to diabetes or the first category of cancers, but find positive and statistically significant relationships with respect to cancer of the digestive tract. The implied impact of an interquartile shift in a county's exposure to PNTR for the latter is an increase in the mortality rate of 1.1 percent compared to its year-2000 levels (of 21.4).

A number of papers study the link between economic shocks and circulatory disease in general and acute myocardial infarction (AMI, or heart attack) in particular.[35] In columns six and seven of Table 9, we examine death due to AMI versus all other

[33] The relationship between PNTR and motor vehicle accidents might be more complex if a decline in economic activity occurs as health insurance coverage decreases. Doyle (2005), for example, finds that the medically uninsured receive 20 percent less care and have a substantially higher mortality rate from auto accidents. Relationships might also be more complex depending on the elasticity of drinking while driving.

[34] Studying the Oregon health care experiment, Baiker et al. (2013) find that access to Medicaid increased the probability of being diagnosed with diabetes and increased the use of diabetes medication. Roetzheim et al. (1999), Bradley et al. (2002) and Tawk et al. (2016) find that the uninsured are diagnosed with breast, skin (melanoma), colorectal and prostate cancers at later stages than the insured, reducing the chance of survival.

[35] Ruhm (2000), for example, finds that a 1 percent increase in the unemployment rate is associated with a 0.5 percent decline in death due to circulatory disease, speculating that this relationship might be driven by a decline in stressful activity. Browning and Heinesen (2012), on the other hand, find that Danish workers displaced by plant closure are more likely to die of both heart attack and other forms of circulatory disease than workers with similar characteristics who are not laid off.

forms of circulatory disease.[36] As indicated in the table, we find a *negative* and statistically significant relationship between PNTR and AMI and no statistically significant relationship between PNTR and other forms circulatory diseases. For AMI, the implied impact of an interquartile increase in counties' exposure to PNTR is a decrease in mortality of 3.8 percent relative to the year-2000 level (of 67.7 per 100,000). One potential explanation for this link between PNTR and AMI may be the loss of physically demanding manufacturing employment due to the trade liberalization. McManus and Schaur (2015a), for example, argue that firms in import-competing industries emphasize productivity at the expense of worker safety; loss of such jobs may reduce mortality due to AMI even as adverse health effects may increase for those who remain employed in these industries. Relatedly, Hummels, Munch and Xiang (2016) find that a rise in firm exports is associated with increases in injuries, severe depression and hospitalizations due to AMI and strokes.

Finally, the last two columns of Table 9 summarize the relationship between PNTR and deaths due to all internal and all external causes. We find a positive and statistically significant relationship in both cases. Coefficient estimates for all internal causes of death suggest that the implied impact of an interquartile shift in counties' exposure to PNTR is an increase in the mortality rate of 1.7 percent versus the average mortality rate for that cause in the year 2000 (of 803 per 100,000). For external causes of death, the analogous figure is larger, at 6.1 percent.

4 PNTR and County Labor Markets

As discussed in the introduction, one of the primary ways that trade liberalization might lead to changes in mortality rates is through its effect on labor market outcomes. As illustrated in Figure 6, passage of PNTR in October 2000 is followed by a sharp decline in U.S. manufacturing employment and a pronounced increase in the U.S. unemployment rate.[37] In this section we examine the relationship between PNTR and labor market outcomes at the county level using the baseline DID specification introduced in the last section.

[36] Circulatory disease is the leading cause of death during in the year 2000, with AMI accounting for one-fifth of deaths within this category.

[37] As discussed in Pierce and Schott (2016), U.S. value added in manufacturing continued to grow at slightly lower than the average post-WWII growth rate after PNTR. Houseman et al. (2011) provide evidence that this growth may in part be inflated by mismeasurement of input price indexes driven by purchases of low-cost foreign materials.

4.1 Employment, Unemployment and Labor Force Participation

We investigate the relationship between PNTR and employment using data from the U.S. Bureau of Labor Statistics' (BLS) Local Area Unemployment (LAU) Statistics Program and the BLS' Quarterly Census of Employment and Wages (QCEW) database.[38] Via these data, we observe counties' overall and manufacturing employment as well as their unemployment and labor force participation rates. The distribution of these labor market variables in the year 2000 are summarized in Table 1.

For consistency, we make use of the same specification and covariates employed in our analysis of mortality rates (Equation 3). Results are reported in the first three columns of Table 10, with standard errors clustered at the county level. As indicated in the table, we find that both overall and manufacturing employment exhibit a negative and statistically significant relationship with county exposure to PNTR. These estimates suggest that an interquartile shift along the NTR gap distribution is associated with a relative decline in overall employment of -0.03 log points and a relative decline in manufacturing employment of -0.05 log points. We find a positive but statistically insignificant relationship between counties' exposure to PNTR and non-manufacturing employment. The negative relationship with respect to manufacturing employment combined with the lack of a relationship for non-manufacturing highlights heterogeneity in the labor market implications of trade liberalization.

The negative relationship with respect to overall and manufacturing employment carries through to broader measures of labor market activity and slack. The final two columns of Table 10 reveal that greater exposure to PNTR is associated with a statistically significant increase in counties' unemployment rates and a statistically significant decline in counties' labor force participation rates. Here, the DID point estimates suggest that an interquartile shift in a county's NTR gap is associated with a relative increase in the unemployment rate of 1.14 percentage points, or 27.9 percent of the average unemployment rate across counties in the year 2000. For the labor force participation rate, the comparable implied impact is a decline in the labor force participation rate of -1.46 percentage points, or -2.9 percent of the average labor force participation rate across counties in 2000.[39]

[38] These data are available athttp://www.bls.gov/lau/ and http://www.bls.gov/cew/cewover.htm.

[39] Autor et al. (2013) show that commuting zones experiencing greater increases in imports from China between 2000 and 2007 exhibit greater declines in manufacturing employment, larger increases in unemployment and greater declines in labor force participation. Their estimates imply that the

Figure 7 visually reports the results of regressing these labor market outcomes on interactions of the NTR gap with year dummies via Equation 4. As indicated in the figure, 95 percent confidence intervals of the estimates of θ_t for overall and manufacturing employment are indistinguishable from zero prior to the change in U.S. trade policy, and decline thereafter. For the unemployment rate and the labor force participation rate, estimates of θ_t are indistinguishable from zero until around the change in policy, and then rise and fall, respectively, thereafter.[40]

4.2 Personal Income, Average Annual Pay and Prices

In this section we examine whether the relationship between PNTR and labor market outcomes documented in the previous sub-section is also manifest in residents' income. This analysis helps to determine whether residents of affected counties experienced changes in income if PNTR led them to change firms or industries following a job loss, even if these switches were not accompanied by periods of unemployment. Income losses could occur, for example, due to the loss of accumulated firm- or industry-specific human capital.

We use data from two sources: the U.S. Bureau of Economic Analysis's (BEA) Local Area Personal Income (LAPI) database, which tracks counties' overall and per capita personal income; and the BLS' Quarterly Census of Employment and Wages (QCEW) database, which contains information on counties' average annual pay inside and outside of manufacturing.[41] In both cases, data are expressed in current dollars. Absent the availability of county-level consumer price indexes, we deflate the nominal series for each county by their corresponding BLS *regional* Consumer Price Index for

$1,840 actual increase in imports per worker from China from 2000 to 2007 decreases the labor force participation rate by 1.42 percentage points.

[40] Additional evidence regarding the severity of the shock to labor markets comes from examination of the link between PNTR and crime. In Section B of the online appendix, we demonstrate a positive link between exposure to PNTR and property crime as well as a negative but statistically insignificant association between exposure to PNTR and birth rates. Autor et al. (2015), by contrast, find a decline in natality among commuting zones most exposed to rising imports from China.

[41] Personal income is defined as income received from all domestic and international sources, including wage income, income from assets and government transfers, but excluding realized or unrealized capital gains or losses. Annual pay include bonuses, stock options, severance pay, profit distributions, cash value of meals and lodging, tips and other gratuities and, for some states, employer contributions to deferred compensation plans. The LAPI data are available at http://www.bea.gov/regional/. Detailed discussions of the definitions of personal income and wages are available on the BEA and BLS websites.

all urban consumers (CPI-U).[42] The base year for each real series is 2000.

As indicated in the first two columns of Table 11, we find negative associations between PNTR and counties' real personal income and real per capita personal income, though only the latter is statistically significant at conventional levels. Its DID point estimate implies that an interquartile shift in a county's exposure to PNTR is associated with a drop in per capita personal income of -0.021 log points. Results in columns three and four indicate a negative relationship between PNTR and average annual pay and a positive association with respect to average annual pay in manufacturing. Neither, however, is statistically significant at conventional levels.[43]

Figure 8 visually reports the results of regressing real per capita income and real average annual pay on interactions of the NTR gap with year dummies via Equation 4. In contrast to the employment results in Figure 7, the estimates of θ_t for real personal income, real per capita personal income and real average annual pay exhibit an upward trend during the 1990s before beginning pronounced declines starting in the year 2000. One potential explanation for the rising pre-trends is that the CPI deflators used here do not adequately account for differential changes in prices across counties during this period.

5 2SLS Estimates of Mortality on the Unemployment Rate

To further verify labor market outcomes as a mechanism behind the relationship between PNTR and mortality rates, and to facilitate comparison of our estimates to

[42] Results for the nominal series are similar but exhibit slightly higher magnitudes, which is intuitive given the behavior of the CPIs noted below. Results are also similar if state GDP deflators are used in lieu of the CPIs (see below). See Section A of the online appendix for a more detailed discussion of the regional CPI deflators. Table 1 reports the distribution of these series across counties for the year 2000. As indicated in the table, the population weighted average per capita personal income in the year 2000 has a mean and standard deviation of 30.5 and 9.2 thousand dollars, and ranges from 10.2 to 83.2 thousand dollars. The means and standard deviations for counties' average annual overall and manufacturing pay are 32.9 and 9.9 thousand dollars, and 41.8 and 13.4 thousand dollars, respectively.

[43] Greater import competition might push the average wage in manufacturing up by driving out the lowest skill workers and push it down by subjecting remaining workers to greater competition. The sign pattern observed here is consistent with results in Autor, Dorn, Hanson and Song (2014), which finds that increased exposure to imports from China leads to a reduction in U.S. workers' cumulative earnings, and Ebenstein et al. (2014a,b), which finds a positive relationship between import competition and U.S. wages in manufacturing. In complementary research, McLaren and Hakobyan (2010) find that blue collar workers in the U.S. industries most vulnerable to import competition from NAFTA experience wage declines.

those already in the literature (e.g., Ruhm 2000), we estimate a series of two-stage-least squares regressions of death due to suicide, ARLD and accidental poisoning on the unemployment rate, using counties' NTR gaps as an instrument for the unemployment rate. The plausible exogeneity of PNTR satisfies the standard exclusion restriction for instruments, and the relationship between PNTR and the unemployment rate, documented above, demonstrates its explanatory power.

Results are reported in Table 12. As indicated in columns one, three and five, we find a positive relationship between the unemployment rate and all three causes of death when using OLS, though the result is not statistically significant for ARLD in column five. Two-stage least squares results, reported in columns two, four and six, indicate a positive relationship between the unemployment rate and all three causes of death, though here, too, results for ARLD are statistically insignificant at conventional levels. Point estimates for suicide and accidental poisoning imply that a 1 standard deviation increase in the county unemployment rate (2.6 percentage points) is associated with a 29.1 (=2.6*1.176/10.51) percent increase in suicides and an 84.2 (=2.6*1.487/4.59) percent increase in accidental poisonings *vis a vis* their year 2000 levels. This magnitude of the effect on suicide is substantially higher than that reported by Ruhm (2000), where a 1 standard deviation increase in the state unemployment rate (2.1 percentage points) is associated with a 2.7 percent increase in the suicide rate.[44] The difference in estimates may be driven by the different levels of aggregation in the two analyses – with variation here at the county-level, compared to state-level variation in Ruhm (2000) – as well as the nature of unemployment associated with exposure to the change in trade policy, which may be more persistent than unemployment due to more typical cyclical fluctuations.

6 Conclusion

This paper examines the relationship between county-level mortality rates and exposure to an important economic shock, the trade liberalization associated with the U.S. granting of Permanent Normal Trade Relations to China. We calculate exposure to PNTR as the employment-weighted average exposure of the industries active in each county. We then estimate the relationship between PNTR and mortality using a

[44]In Ruhm (2000), the standard deviation of unemployment rates across states during the 1972 to 1991 sample period is 2.1.

differences-in-differences framework that nets out any time-invariant county characteristics, as well as annual shocks that affect counties identically.

We find that exposure to PNTR is associated with an increase in mortality due to suicide and related causes, particularly among whites. These results are consistent with that group's relatively high employment in manufacturing, the sector most affected by the change in trade policy. We find that these results are robust to various extensions, including an alternate empirical specification that places no restrictions on the timing of the effects of the policy change as well including controls for changes in state health care policy and exposure of other counties in the surrounding labor market.

While the results in this paper do not provide an assessment of the overall welfare impact of PNTR, they do offer a broader understanding of the distributional implications of trade liberalization.

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Variable	Obs	Mean	StdDev	Min	10th	25th	75th	90th	Max
Age-Adjusted Death Rate (2000)									
Overall	3135	858	112	0	726	778	922	1,002	2,864
- Male	3135	1,047	154	0	875	934	1,127	1,249	4,657
- Female	3135	719	94	0	604	658	775	835	2,296
- White	3135	841	98	0	728	776	898	964	2,641
- Black	3101	1,021	475	0	595	885	1,191	1,291	9,897
- American Indian	3130	461	563	0	0	22	670	1,130	11,233
- Asian or Pacific Islander	3112	416	381	0	0	255	516	652	8,028
Median Household Income (1990)	3133	40.4	10.6	11.2	28.3	33.2	45.6	56.6	77.3
Percent No College (1990)	3133	54.4	11.4	18.8	40.3	46.2	62.7	69.9	88.3
Percent Veteran (1990)	3133	14.4	2.7	4.2	11.0	12.8	16.1	17.4	29.0
Unemployment Rate (2000)	3133	4.1	1.4	1.4	2.7	3.2	4.8	5.6	17.5
Labor Force Participation Rate (2000)	3133	50.5	4.9	17.5	43.7	48.2	53.7	56.3	91.6
Personal income (2000)	3069	30.5	60.3	0.0	0.8	2.5	38.7	92.2	284.1
Per capital personal income (2000)	3069	30.5	9.2	10.2	21.5	24.8	34.3	41.3	83.2
Average Annual Pay (2000)	3118	32.9	9.9	12.6	22.5	25.9	38.6	43.5	79.5
Average Annual Manufacturing Pay (2000)	3118	41.8	13.4	11.8	27.9	33.3	47.5	56.8	246.7

Notes: Table summarizes distribution of noted attributes across counties. Age-adjusted death rates are computed using mortality data from the Centers for Disease Control and population estimates from the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) Program. Counties' initial median household income and percent of population with no college education and that are veterans in 1990 are from the 1990 Decennial Census. Counties' unemployment and labor force participation rates in the year 2000 are from the Bureau of Labor Statistics Local Area Unemployment Statistics (LAUS) Program. Counties' overall and per capita and personal income in the year 2000 are from the Bureau of Economic Analysis' Local Area Personal Income (LAPI) Program. Counties' average overall and manufacturing annual pay in the year 2000 are from the Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW) Program. Death rates are per 100,000; household income, per capital personal income and average annual pay are in dollars; personal income is in millions of dollars.

Table 1: Summary Statistics

	Total	Mortality Rate				
	Deaths	All	White	Black	Asian or Pacific Islander	Amerian Indian
External causes of death						
Suicide	27,740	10	11	6	6	5
Poison	12,757	5	5	7	1	2
Motor Vehicle Accidents	43,354	16	16	16	10	11
Other	67,417	24	22	34	13	17
Total External	151,268	54	53	63	30	35
Internal causes of death						
Infectious or Parasitic Diseases (e.g., septicemia)	59,007	21	18	40	11	12
Neoplasms (i.e., cancer)	566,637	201	199	231	107	90
Diseases of the Blood (e.g., anemia)	9,315	3	3	7	1	1
Endocrine, Nutritional and Metabolic Diseases (e.g., diabetes)	94,345	34	31	59	18	27
Mental (e.g., dementia)	46,015	17	17	17	5	9
Diseases of the Nervous System (e.g., Alzheimers, Parkinsons)	91,140	33	34	30	12	15
Diseases of the Circulatory System (e.g., AMI, hypertension)	941,526	335	329	403	162	170
Diseases of the Respiratory System (e.g., pneumonia, influenza)	231,079	83	85	69	35	51
Diseases of the Digestive System (e.g., liver failure)	84,015	30	30	33	13	24
Diseases of the Skin	3,753	1	1	3	1	2
Diseases of the Skeletal System (e.g., arthritis)	13,764	5	5	6	3	3
Diseases of the Genitourinary System (e.g., renal failure)	54,560	20	18	32	10	14
Pregnancy and Childbirth	404	0	0	0	0	0
Conditions Arising in the Perinatal Period	14,069	5	4	9	3	2
Congenital Malformations and Abnormalities	10,578	4	4	4	2	2
Not elsewhere classified	31,876	11	11	16	4	5
Total Internal	2,252,083	803	788	958	386	426
Total	2,403,351	858	841	1,021	416	461

Notes: Table displays overall number of deaths and age-adjusted death rates by major cause of death and demographic group for the year 2000. Each rate is the population-weighted average across counties per 100,000 population using counties' total population as weights.

Table 2: Average Death Rates by Major Causes of Death

	NTR Gap_c	NTR Gap_c	NTR Gap_c	NTR Gap_c	NTR Gap_c	NTR Gap_c	NTR Gap_c	NTR Gap_c
NTR Gap_{cz}	0.788***							
	0.02							
MFA $Exposure_c$		7.112***						
		0.377						
2000 NTR_c			4.263***					
			0.068					
ΔChinese $Tariffs_c$				-1.569***				
				0.024				
ΔChinese $Subsides_c$					-38.756***			
					4.556			
1990 Median HHI_c						-0.081***		
						0.013		
1990 Percent No $College_c$							0.251***	
							0.009	
1990 Percent $Veteran_c$								-0.584***
								0.04
Observations	3,136	3,136	3,136	3,136	3,136	3,136	3,136	3,136
R-squared	0.34	0.10	0.55	0.57	0.02	0.01	0.18	0.06

Notes: Table reports the results of county-level OLS regression of the 1999 NTR gap on county attributes. First covariate is the 1999 NTR gap of remaining counties in the county's commuting zone. Second covariate is the labor-share weighted average fill rate of the MFA products produced in the county across all four phases. Third covariate is the labor-share weighted average NTR tariff rate of the goods produced in the region. Fourth and fifth covariates are the labor-share weighted average 1996 to 2005 change in Chinese import tariffs and the 1998 to 2005 change in Chinese production subsidies across the industries produced in the county. Final three covariates are counties' median household income, percent of residents without college education and percent of residents who are veterans in 1990. Results for the regression constant are suppressed. Standard errors are reported below coefficients. *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

Table 3: 1999 NTR Gap versus Other County Attributes

VARIABLES	$Suicide_{ct}$	$Suicide_{ct}$	$Suicide_{ct}$	$Suicide_{ct}$	Accidental $Poisoning_{ct}$	Accidental $Poisoning_{ct}$	Accidental $Poisoning_{ct}$	Accidental $Poisoning_{ct}$	$ARLD_{ct}$	$ARLD_{ct}$	$ARLD_{ct}$	$ARLD_{ct}$
Post x NTR Gap_c	0.076***	0.051***	0.057***	0.051***	0.094***	0.149***	0.025	0.153***	0.003	-0.028*	0.061***	0.028
	0.014	0.017	0.014	0.017	0.034	0.042	0.035	0.039	0.013	0.016	0.019	0.018
NTR_{ct}		-0.241		-0.235		0.033		-0.019		-0.552***		-0.349**
		0.194		0.184		0.298		0.237		0.186		0.146
MFA $Exposure_{ct}$		-0.017		-0.011		0.048		0.041		-0.142***		-0.108***
		0.029		0.026		0.072		0.052		0.028		0.018
Post x ΔChinese $Tariffs_c$		-0.093**		-0.027		0.107		0.381***		-0.138***		-0.135***
		0.04		0.035		0.093		0.083		0.039		0.036
Post x ΔChinese $Subsidy_c$		14.298**		8.124**		27.625**		3.781		7.583*		4.115*
		5.98		3.63		13.552		6.968		4.324		2.357
Post x Median HHI in 1990_c			-0.01	-0.01			-0.067***	-0.070***			-0.027***	-0.028***
			0.007	0.007			0.016	0.016			0.006	0.006
Post x % No College in 1990_c			0.027***	0.026***			0.084***	0.088***			-0.035***	-0.036***
			0.008	0.008			0.018	0.019			0.009	0.009
Post x % Veteran in 1990_c			0.207***	0.202***			0.693***	0.692***			0.315***	0.307***
			0.041	0.038			0.078	0.077			0.044	0.043
Observations	74,900	74,900	74,900	74,900	74,900	74,900	74,900	74,900	74,900	74,900	74,900	74,900
R-squared	0.40	0.40	0.41	0.41	0.58	0.58	0.61	0.62	0.51	0.51	0.52	0.52
P-Value DID Term	0.00	0.00	1.00	0.00	0.01	0.00	1.00	0.00	0.83	0.08	1.00	0.12
Estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample Period	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13
FE	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t
Clustering	c	c	c	c	c	c	c	c	c	c	c	c
Weighting	Population	Population	Population	Population	Population	Population	Population	Population	Population	Population	Population	Population
Implied Impact of PNTR	0.63***	0.43***	0.47***	0.42***	0.78***	1.24***	0.21	1.27***	0.02	-0.23*	0.51***	0.23
Std Err	0.11	0.14	0.11	0.14	0.28	0.35	0.29	0.32	0.11	0.13	0.16	0.15
Average Death Rate (2000)	10.51	10.51	10.51	10.51	4.59	4.59	4.59	4.59	4.63	4.63	4.63	4.63
Impact/Average	0.06***	0.041***	0.045***	0.04***	0.171***	0.269***	0.046	0.277***	0.005	-0.051*	0.11***	0.05

Notes: Table reports difference-in-differences (DID) OLS regression results for age-adjusted mortality rates per 100,000 population for noted causes of death across counties (c) and years (t). Sample period is 1990 to 2013. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate accounts for the elimination of quantitative restrictions on apparel and clothing imports from developing countries durring the sample period; higher values correspond to greater exposure. The third covariate is the weighted average U.S. import tariff of the products produced in the county; higher values indicate greater protection. Fourth and fifth covariates are the the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-period dummy variable with the county's median household income in 1990, the percent of residents who have not attended any college in 1990, and the percent of residents who are veterans in 1990. Regressions are weighted by county population in 1990 for the demographic group for which death rates are being estimated. Penultimate three rows of table report the implied impact of PNTR in terms of moving a county from the 25th to the 75th percentile of the NTR gap, the standard error of this implied impact and the population-weighted average death rate for this cause of death across counties in the year 2000. Final row of table reports the ratio of the implied impact to this average. Standard errors adjusted for clustering at the county level are reported below coefficients. *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

Table 4: PNTR and Suicide, ARLD and Accidental Poisoning

	Suicide							
	White		Black		American Indian		Asian or Pac Is	
VARIABLES	Male	Female	Male	Female	Male	Female	Male	Female
Post x NTR Gap_c	0.100***	0.02	-0.051	-0.017	-0.213	-0.164	-0.209	-0.051
	0.032	0.014	0.062	0.02	0.316	0.139	0.186	0.081
NTR_{ct}	-0.281	-0.123	0.15	-0.217	-7.223**	1.547	-2.368	1.241
	0.361	0.15	0.699	0.145	3.544	2.121	1.819	1.124
MFA $Exposure_{ct}$	0.005	0.031	0.009	-0.025	-0.188	0.142	-0.284	0.218
	0.054	0.024	0.064	0.021	0.317	0.176	0.367	0.159
Post x ΔChinese $Tariffs_c$	0.023	-0.04	0.043	-0.035	0.507	-0.024	-1.034**	-0.221
	0.066	0.028	0.125	0.043	0.576	0.258	0.511	0.178
Post x ΔChinese $Subsidy_c$	13.209*	4.02	-0.483	0.983	32.956	-31.426**	50.025*	-6.791
	6.945	2.6	9.897	2.912	46.792	15.692	28.984	12.967
Post x Median HHI in 1990_c	-0.002	-0.018***	0.015	0.014**	-0.139	-0.074	0.041	0.037**
	0.013	0.005	0.02	0.006	0.099	0.048	0.034	0.017
Post x % No College in 1990_c	0.046***	0.006	-0.014	0.001	0.093	0.03	0.026	0.018
	0.014	0.005	0.021	0.006	0.1	0.043	0.042	0.02
Post x % Veteran in 1990_c	0.265***	0.154***	0.023	0.017	-0.295	0.151	-0.009	0.091*
	0.08	0.027	0.059	0.018	0.25	0.111	0.098	0.048
Observations	74,900	74,900	67,082	65,600	70,203	70,316	64,139	68,284
R-squared	0.31	0.17	0.08	0.05	0.14	0.06	0.05	0.05
P-Value DID Term	0.00	0.14	0.41	0.37	0.50	0.24	0.26	0.53
Estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample Period	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13
Fixed Effects	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t
Clustering	c	c	c	c	c	c	c	c
Weighting	Population	Population	Population	Population	Population	Population	Population	Population
Implied Impact of PNTR	0.83***	0.17	-0.42	-0.14	-1.77	-1.36	-1.74	-0.42
Std Err	0.26	0.11	0.51	0.16	2.63	1.16	1.54	0.67
Average Death Rate (2000)	18.3	4.1	9.4	1.5	16.0	3.7	7.6	2.4
Impact/Average	0.045***	0.041	-0.045	-0.094	-0.111	-0.364	-0.228	-0.173

Notes: Table reports difference-in-differences (DID) OLS regression results for age-adjusted mortality rates per 100,000 population for noted causes of death across counties (c) and years (t). Sample period is 1990 to 2013. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate accounts for the elimination of quantitative restrictions on apparel and clothing imports from developing countries durring the sample period; higher values correspond to greater exposure. The third covariate is the weighted average U.S. import tariff of the products produced in the county; higher values indicate greater protection. Fourth and fifth covariates are the the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-period dummy variable with the county's median household income in 1990, the percent of residents who have not attended any college in 1990, and the percent of residents who are veterans in 1990. Regressions are weighted by county population in 1990 for the demographic group for which death rates are being estimated. Penultimate three rows of table report the implied impact of PNTR in terms of moving a county from the 25th to the 75th percentile of the NTR gap, the standard error of this implied impact and the population-weighted average death rate for this cause of death across counties in the year 2000. Final row of table reports the ratio of the implied impact to this average. Standard errors adjusted for clustering at the county level are reported below coefficients. *, ** and * signify statistical significance at the 10, 5 and 1 percent level.**

Table 5: PNTR and Suicide

	Accidental Poisoning							
	White		Black		American Indian		Asian or Pac Is	
VARIABLES	Male	Female	Male	Female	Male	Female	Male	Female
Post x NTR Gap$_c$	0.179***	0.112***	0.061	-0.007	-0.149	-0.078	-0.071	-0.003
	0.056	0.03	0.097	0.046	0.265	0.182	0.058	0.037
NTR$_{ct}$	0.045	0.008	0.521	-0.026	-2.32	-0.991	0.496	0.514
	0.332	0.187	0.93	0.283	1.939	2.204	0.71	0.382
MFA Exposure$_{ct}$	0.105	0.225***	-0.293***	-0.100*	-0.058	0.051	-0.239	0.045
	0.077	0.045	0.102	0.052	0.402	0.286	0.154	0.072
Post x ΔChinese Tariffs$_c$	0.668***	0.338***	-0.035	-0.017	0.563	-0.479	-0.149	-0.099
	0.12	0.063	0.212	0.099	0.541	0.34	0.14	0.077
Post x ΔChinese Subsidy$_c$	2.258	2.322	-5.627	3.22	-45.281	4.635	5.504	1.727
	10.511	6.021	17.061	6.042	34.152	30.698	7.593	4.603
Post x Median HHI in 1990$_c$	-0.032	-0.095***	-0.159***	-0.032*	-0.476***	-0.151**	-0.015	0.007
	0.023	0.011	0.051	0.018	0.082	0.061	0.011	0.008
Post x % No College in 1990$_c$	0.177***	0.043***	-0.102	-0.031	-0.06	-0.085	0.009	0.006
	0.025	0.012	0.068	0.025	0.07	0.069	0.013	0.011
Post x % Veteran in 1990$_c$	0.761***	0.450***	0.676***	0.300***	0.709***	0.757***	0.095**	0.054***
	0.121	0.052	0.193	0.075	0.221	0.143	0.038	0.02
Observations	74,900	74,900	67,082	65,600	70,203	70,316	64,139	68,284
R-squared	0.57	0.48	0.30	0.17	0.12	0.10	0.05	0.04
P-Value DID Term	0.00	0.00	0.53	0.88	0.57	0.67	0.23	0.93
Estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample Period	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13
Fixed Effects	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t
Clustering	c	c	c	c	c	c	c	c
Weighting	Population	Population	Population	Population	Population	Population	Population	Population
Implied Impact of PNTR	1.49***	0.93***	0.5	-0.06	-1.24	-0.64	-0.59	-0.03
Std Err	0.46	0.25	0.81	0.38	2.21	1.51	0.49	0.31
Average Death Rate (2000)	2.5	6.7	6.1	0.4	3.5	9.4	1.0	3.3
Impact/Average	0.586***	0.139***	0.082	-0.159	-0.351	-0.069	-0.57	-0.009

Notes: Table reports difference-in-differences (DID) OLS regression results for age-adjusted mortality rates per 100,000 population for noted causes of death across counties (c) and years (t). Sample period is 1990 to 2013. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate accounts for the elimination of quantitative restrictions on apparel and clothing imports from developing countries durring the sample period; higher values correspond to greater exposure. The third covariate is the weighted average U.S. import tariff of the products produced in the county; higher values indicate greater protection. Fourth and fifth covariates are the the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-period dummy variable with the county's median household income in 1990, the percent of residents who have not attended any college in 1990, and the percent of residents who are veterans in 1990. Regressions are weighted by county population in 1990 for the demographic group for which death rates are being estimated. Penultimate three rows of table report the implied impact of PNTR in terms of moving a county from the 25th to the 75th percentile of the NTR gap, the standard error of this implied impact and the population-weighted average death rate for this cause of death across counties in the year 2000. Final row of table reports the ratio of the implied impact to this average. Standard errors adjusted for clustering at the county level are reported below coefficients. *, ** and * signify statistical significance at the 10, 5 and 1 percent level.**

Table 6: PNTR and Accidental Poisoning

	ARLD							
	White		Black		American Indian		Asian or Pac Is	
VARIABLES	Male	Female	Male	Female	Male	Female	Male	Female
Post x NTR Gap$_c$	0.056**	0.002	-0.01	-0.017	-0.459	-0.608*	0.009	-0.046*
	0.024	0.011	0.092	0.034	0.363	0.311	0.063	0.026
NTR$_{ct}$	-0.238	-0.056	-1.515**	-0.550**	-4.427	-1.66	0.325	-0.101
	0.211	0.095	0.684	0.269	2.898	2.126	0.846	0.327
MFA Exposure$_{ct}$	-0.134***	-0.057***	-0.051	-0.048	-0.363	-0.571	-0.083	-0.024
	0.029	0.013	0.074	0.035	0.73	0.385	0.166	0.039
Post x ΔChinese Tariffs$_c$	-0.149***	-0.080***	-0.262	-0.107	-0.874	-1.151**	-0.042	-0.141**
	0.05	0.019	0.194	0.069	0.651	0.556	0.166	0.057
Post x ΔChinese Subsidy$_c$	0.649	4.413**	13.464	1.542	94.832**	61.053	1.393	3.265
	3.03	2.188	8.533	4.66	46.022	42.543	9.359	2.779
Post x Median HHI in 1990$_c$	-0.034***	-0.027***	-0.012	-0.008	-0.216*	-0.121*	0.006	-0.008
	0.008	0.004	0.027	0.012	0.112	0.073	0.015	0.005
Post x % No College in 1990$_c$	-0.055***	-0.022***	-0.05	-0.021	-0.045	-0.052	-0.018	-0.015**
	0.013	0.004	0.038	0.015	0.105	0.067	0.023	0.006
Post x % Veteran in 1990$_c$	0.394***	0.126***	0.492***	0.091**	0.098	-0.109	0.142***	0.009
	0.07	0.022	0.11	0.041	0.246	0.211	0.043	0.017
Observations	74,900	74,900	67,082	65,600	70,203	70,316	64,139	68,284
R-squared	0.47	0.27	0.15	0.08	0.18	0.15	0.06	0.05
P-Value DID Term	0.02	0.84	0.92	0.61	0.21	0.05	0.88	0.08
Estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample Period	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13
Fixed Effects	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t
Clustering	c	c	c	c	c	c	c	c
Weighting	Population	Population	Population	Population	Population	Population	Population	Population
Implied Impact of PNTR	0.47***	0.02	-0.08	-0.14	-3.81	-5.06*	0.08	-0.38*
Std Err	0.20	0.09	0.76	0.28	3.02	2.58	0.52	0.21
Average Death Rate (2000)	7.0	6.9	2.1	2.7	19.9	11.9	2.0	0.6
Impact/Average	0.067***	0.003	-0.038	-0.052	-0.191	-0.425*	0.04	-0.662*

Notes: Table reports difference-in-differences (DID) OLS regression results for age-adjusted mortality rates per 100,000 population for noted causes of death across counties (c) and years (t). Sample period is 1990 to 2013. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate accounts for the elimination of quantitative restrictions on apparel and clothing imports from developing countries durring the sample period; higher values correspond to greater exposure. The third covariate is the weighted average U.S. import tariff of the products produced in the county; higher values indicate greater protection. Fourth and fifth covariates are the the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-period dummy variable with the county's median household income in 1990, the percent of residents who have not attended any college in 1990, and the percent of residents who are veterans in 1990. Regressions are weighted by county population in 1990 for the demographic group for which death rates are being estimated. Penultimate three rows of table report the implied impact of PNTR in terms of moving a county from the 25th to the 75th percentile of the NTR gap, the standard error of this implied impact and the population-weighted average death rate for this cause of death across counties in the year 2000. Final row of table reports the ratio of the implied impact to this average. Standard errors adjusted for clustering at the county level are reported below coefficients. *, ** and * signify statistical significance at the 10, 5 and 1 percent level.**

Table 7: PNTR and Alcohol-Related Liver Disease

		Overall			
		Baseline	+CZ	+Medicaid	+State-Year FE
Suicide	Implied Impact	0.42	0.48	0.49	0.39
	Std Err	0.14	0.15	0.15	0.14
	P-value	0.00	0.00	0.00	0.01
	Observations	74,900	74,900	74,900	74,900
	Impact / Average	0.043***	0.049***	0.05***	0.039***
Acc Poisoning	Implied Impact	1.27	1.40	1.31	0.59
	Std Err	0.32	0.37	0.35	0.34
	P-value	0.00	0.00	0.00	0.08
	Observations	74,900	74,900	74,900	74,900
	Impact / Average	0.277***	0.305***	0.285***	0.129*
ARLD	Implied Impact	0.23	0.20	0.16	0.28
	Std Err	0.15	0.17	0.15	0.14
	P-value	0.12	0.22	0.29	0.04
	Observations	74,900	74,900	74,900	74,900
	Impact / Average	0.053	0.046	0.036	0.065**
		White Males			
		Baseline	Own+CZ	Medicaid	State-Year FE
Suicide	Implied Impact	0.83	0.98	0.99	0.75
	Std Err	0.26	0.28	0.28	0.29
	P-value	0.00	0.00	0.00	0.01
	Observations	74,900	74,900	74,900	74,900
	Impact / Average	0.045***	0.054***	0.054***	0.041***
Acc Poisoning	Implied Impact	1.49	1.73	1.66	0.16
	Std Err	0.46	0.56	0.54	0.50
	P-value	0.00	0.00	0.00	0.75
	Observations	74,900	74,900	74,900	74,900
	Impact / Average	0.586***	0.679***	0.653***	0.062
ARLD	Implied Impact	0.47	0.48	0.43	0.49
	Std Err	0.20	0.24	0.19	0.19
	P-value	0.02	0.04	0.03	0.01
	Observations	74,900	74,900	74,900	74,900
	Impact / Average	0.067***	0.069**	0.061**	0.069***
		White Females			
		Baseline	Own+CZ	Medicaid	State-Year FE
Suicide	Implied Impact	0.17	0.21	0.20	0.04
	Std Err	0.11	0.12	0.12	0.12
	P-value	0.14	0.08	0.09	0.75
	Observations	74,900	74,900	74,900	74,900
	Impact / Average	0.041	0.05*	0.049*	0.009
Acc Poisoning	Implied Impact	0.93	1.05	0.99	0.30
	Std Err	0.25	0.31	0.31	0.30
	P-value	0.00	0.00	0.00	0.31
	Observations	74,900	74,900	74,900	74,900
	Impact / Average	0.139***	0.157***	0.148***	0.045
ARLD	Implied Impact	0.02	0.02	0.00	0.01
	Std Err	0.09	0.09	0.09	0.09
	P-value	0.84	0.85	1.00	0.90
	Observations	74,900	74,900	74,900	74,900
	Impact / Average	0.003	0.002	0	0.002

Notes: Table reports impact of PNTR in terms of incremental death rate per 100,000 implied by an interquartile shift in counties' exposure to PNTR across various specifications. Each row reports results for a different cause of death and demographic group. First column reports results from the baseline specification in Table 4. Second column adds an additional covariate defined as the interaction of a post-PNTR indicator and the avearge NTR gap for all other counties in the county's commuting zone. Third column adds a series of state by "post" year interactions which are equal to one in state-years observations after an expansion of Medicaid coverage. Final column adds full set of state by year fixed effects. Superscripts *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

Table 8: Robustness Exercises

VARIABLES	Events of Unknown Intent	Motor Vehicle Accidents	Diabetes	Breast, Bone, and Skin	Cancer of Digestive Tract	Acute Myocardial Infarction	Other Circulatory Diseases	All Internal Causes	All External Causes
Post x NTR Gap$_c$	-0.001	0.032	0.054	0.031	0.060*	-0.324**	-0.121	1.662***	0.398***
	0.013	0.024	0.048	0.020	0.032	0.129	0.175	0.372	0.079
NTR$_{ct}$	0.003	0.123	-0.040	-0.202	-0.773**	0.704	-2.301	-11.043***	-0.639
	0.117	0.229	0.412	0.185	0.314	1.153	1.858	3.542	0.814
MFA Exposure$_{ct}$	-0.022	-0.134***	0.107*	0.012	0.193***	-0.008	0.437*	1.499***	-0.421***
	0.018	0.038	0.059	0.026	0.043	0.161	0.225	0.540	0.118
Post x ΔChinese Tariffs$_c$	-0.037	0.245***	-0.174*	-0.090**	-0.163***	0.023	-0.812**	-2.126***	0.470***
	0.028	0.048	0.093	0.038	0.061	0.301	0.392	0.797	0.178
Post x ΔChinese Subsidy$_c$	6.965***	-8.237**	-16.979*	3.817	-12.078**	-22.861	42.522	14.784	27.678
	2.615	3.618	10.045	2.772	6.044	23.989	40.049	64.263	18.288
Post x Median HHI in 1990$_c$	-0.004	-0.001	-0.134***	-0.055***	-0.167***	-0.179***	-0.409***	-1.994***	-0.050
	0.007	0.007	0.020	0.010	0.015	0.055	0.084	0.184	0.036
Post x % No College in 1990$_c$	0.007	0.021***	-0.041**	-0.012	-0.067***	-0.531***	0.195**	-0.094	0.107**
	0.007	0.007	0.020	0.009	0.015	0.049	0.084	0.261	0.044
Post x % Veteran in 1990$_c$	0.046**	0.016	0.153	0.177***	0.184***	0.479*	1.184***	7.796***	1.806***
	0.019	0.029	0.104	0.030	0.064	0.249	0.454	1.450	0.236
Observations	74,900	74,900	74,900	74,900	74,900	74,900	74,900	74,900	74,900
R-squared	0.591	0.611	0.553	0.247	0.407	0.824	0.847	0.886	0.678
P-Value DID Term	0.90	0.25	0.43	0.27	0.10	0.00	0.19	0.00	0.00
Estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample Period	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13
FE	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t
Clustering	c	c	c	c	c	c	c	c	c
Weighting	Population	Population	Population	Population	Population	Population	Population	Population	Population
Implied Impact of PNTR	0	0.27	0.45	0.26	0.5*	-2.69***	-1	13.82***	3.31***
Std Err	0.11	0.20	0.40	0.16	0.26	1.07	1.46	3.09	0.66
Average Death Rate (2000)	1.38	15.66	24.98	21.39	46.53	67.70	267.55	803.41	54.23
Impact/Average	-0.003	0.017	0.018	0.012	0.011*	-0.04***	-0.004	0.017***	0.061***

Notes: Table reports difference-in-differences (DID) OLS regression results for age-adjusted mortality rates per 100,000 population for noted causes of death across counties (c) and years (t). Sample period is 1990 to 2013. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate accounts for the elimination of quantitative restrictions on apparel and clothing imports from developing countries durring the sample period; higher values correspond to greater exposure. The third covariate is the weighted average U.S. import tariff of the products produced in the county; higher values indicate greater protection. Fourth and fifth covariates are the the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-period dummy variable with the county's median household income in 1990, the percent of residents who have not attended any college in 1990, and the percent of residents who are veterans in 1990. Regressions are weighted by county population in 1990 for the demographic group for which death rates are being estimated. Penultimate three rows of table report the implied impact of PNTR in terms of moving a county from the 25th to the 75th percentile of the NTR gap, the standard error of this implied impact and the population-weighted average death rate for this cause of death across counties in the year 2000. Final row of table reports the ratio of the implied impact to this average. Standard errors adjusted for clustering at the county level are reported below coefficients. *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

Table 9: PNTR and Other Causes of Death

VARIABLES	Log Employment$_{ct}$	Log Manufacturing Employment$_{ct}$	Log Non-Manufacturing Employment$_{ct}$	Unem-ployment Rate$_{ct}$	Labor Force Participation Rate$_{ct}$
Post x NTR Gap$_c$	-0.004**	-0.006**	0.0020	0.136***	-0.168***
	0.0020	0.0030	0.0020	0.0170	0.0440
NTR$_{ct}$	0.0060	0.0030	-0.0040	0.188**	0.3600
	0.0090	0.0180	0.0100	0.0850	0.2740
MFA Exposure$_{ct}$	0.002*	-0.022***	0.005***	-0.051***	-0.0170
	0.0010	0.0040	0.0020	0.0190	0.0460
Post x ΔChinese Tariffs$_c$	-0.0040	-0.0070	-0.0050	-0.0460	0.163*
	0.0030	0.0070	0.0040	0.0300	0.0860
Post x ΔChinese Subsidy$_c$	0.2260	0.3550	0.594**	-1.1550	-9.8290
	0.2360	0.4100	0.2370	2.1900	7.3580
Post x Median HHI in 1990$_c$	-0.0010	-0.0010	0.0010	-0.0030	0.062***
	0.0010	0.0010	0.0010	0.0050	0.0170
Post x % No College in 1990$_c$	-0.002***	-0.003**	-0.003***	-0.055***	0.065***
	0.0010	0.0010	0.0010	0.0060	0.0190
Post x % Veteran in 1990$_c$	0.009***	0.032***	0.012***	0.111***	0.0430
	0.0030	0.0050	0.0030	0.0270	0.0940
Observations	60,184	60,184	60,184	60,184	60,184
R-squared	0.998	0.991	0.998	0.836	0.853
P-Value DID Term	0.01	0.01	0.20	0.00	0.00
Estimation	OLS	OLS	OLS	OLS	OLS
Sample Period	1990-13	1990-13	1990-13	1990-13	1990-13
FE	c,t	c,t	c,t	c,t	c,t
Clustering	c	c	c	c	c
Weighting	Population	Population	Population	Population	Population
Implied Impact of PNTR	-0.03***	-0.05***	0.0169	1.14***	-1.46***
Std Err	0.01	0.02	0.0131	0.14	0.35
Average Dep Var (2000)	12.0	9.8	11.8	4.1	50.5
Impact/Average	.	.	.	0.279***	-0.029***

Notes: Table reports difference-in-differences (DID) OLS regression results of county c by year t labor market attributes on noted covariates. Sample period is 1990 to 2013. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate accounts for the elimination of quantitative restrictions on apparel and clothing imports from developing countries durring the sample period; higher values correspond to greater exposure. The third covariate is the weighted average U.S. import tariff of the products produced in the county; higher values indicate greater protection. Fourth and fifth covariates are the the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-period dummy variable with the county's median household income in 1990, the percent of residents who have not attended any college in 1990, and the percent of residents who are veterans in 1990. Regressions are weighted by county population in 1990 for the demographic group for which death rates are being estimated. Penultimate three rows of table report the implied impact of PNTR in terms of moving a county from the 25th to the 75th percentile of the NTR gap, the standard error of this implied impact and the population-weighted average depdendent varable across counties in the year 2000. Final row of table reports the ratio of the implied impact to this average. Standard errors adjusted for clustering at the county level are reported below coefficients. *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

Table 10: PNTR and Employment Outcomes (LAU and QCEW)

VARIABLES	ln(Personal Income)	ln(Per Capita Personal Income)	ln(Average Annual Pay)	ln(Average Annual Manufacturing Pay)
Post x NTR Gap$_c$	-0.0012	-0.0024***	-0.0010	0.0014
	0.0016	0.0007	0.0008	0.0012
NTR$_{ct}$	-0.0032	-0.0120*	-0.0068	-0.0154
	0.0114	0.0071	0.0102	0.0141
MFA Exposure$_{ct}$	0.0067***	0.0027***	0.0017*	0.0068***
	0.0015	0.0007	0.0009	0.0014
Post x ΔChinese Tariffs$_c$	0.0002	0.0063***	0.0045**	0.0037
	0.0038	0.0016	0.0019	0.0024
Post x ΔChinese Subsidy$_c$	0.3329	0.0106	0.0264	0.2032
	0.2504	0.0934	0.1286	0.1909
Post x Median HHI in 1990$_c$	-0.0015***	-0.0012***	-0.0010***	0.0000
	0.0006	0.0003	0.0003	0.0007
Post x % No College in 1990$_c$	-0.0042***	-0.0002	-0.0024***	-0.0024***
	0.0006	0.0003	0.0003	0.0005
Post x % Veteran in 1990$_c$	0.0077***	-0.0029***	-0.0029*	-0.0044**
	0.0022	0.0009	0.0016	0.0019
Observations	63,812	63,812	63,812	63,812
R-squared	0.998	0.9703	0.9672	0.9336
P-Value DID Term	0.40	0.00	0.15	0.24
Estimation	OLS	OLS	OLS	OLS
Sample Period	1990-13	1990-13	1990-13	1990-13
FE	c,t	c,t	c,t	c,t
Clustering	c	c	c	c
Weighting	Population	Population	Population	Population
Implied Impact of PNTR	-0.01	-0.021***	-0.009	0.011
Std Err	0.012	0.005	0.006	0.009
Average Dep Var (2000)	23.0	10.3	9.8	10.5
Impact/Average	.	.	.	.

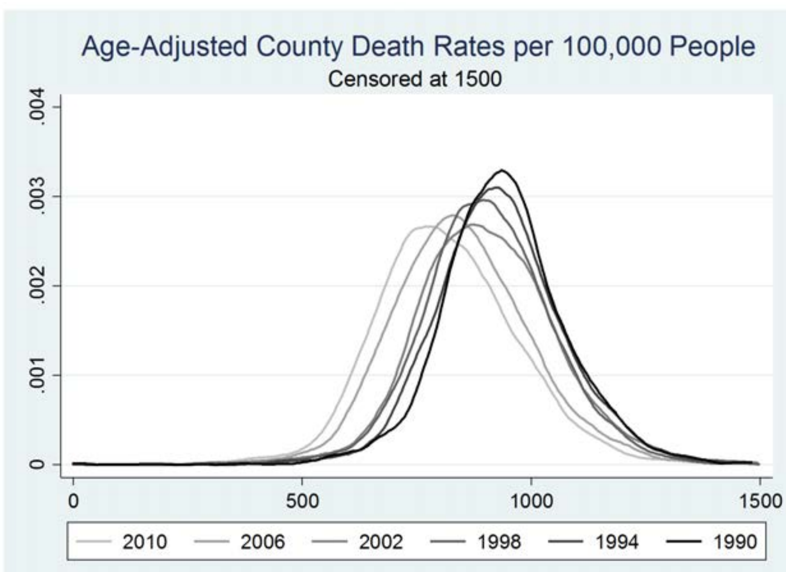
Notes: Table reports difference-in-differences (DID) OLS regression results for county-year aggregate and per capita personal income as well as average annual overall and manufacturing pay. Incomes and wages are deflated using regional CPIs available from the Bureau of Labor Statistics (base year 2000). Sample period is 1990 to 2013. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate accounts for the elimination of quantitative restrictions on apparel and clothing imports from developing countries durring the sample period; higher values correspond to greater exposure. The third covariate is the weighted average U.S. import tariff of the products produced in the county; higher values indicate greater protection. Fourth and fifth covariates are the the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-period dummy variable with the county's median household income in 1990, the percent of residents who have not attended any college in 1990, and the percent of residents who are veterans in 1990. Regressions are weighted by county population in 1990 for the demographic group for which death rates are being estimated. Penultimate three rows of table report the implied impact of PNTR in terms of moving a county from the 25th to the 75th percentile of the NTR gap, the standard error of this implied impact and the population-weighted average depdendent varable across counties in the year 2000. Final row of table reports the ratio of the implied impact to this average. Standard errors adjusted for clustering at the county level are reported below coefficients. *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

Table 11: PNTR and County Per Capita Personal Income (LAPI and QCEW)

VARIABLES	$Suicide_{ct}$	$Suicide_{ct}$	Accidental $Poisoning_{ct}$	Accidental $Poisoning_{ct}$	$ARLD_{ct}$	$ARLD_{ct}$
$U\text{-}Rate_{ct}$	0.042**	1.176***	0.190***	1.487***	0.045	0.038
	0.021	0.255	0.072	0.529	0.031	0.197
Observations	74,810	74,810	74,810	74,810	74,810	74,810
R-squared	0.40	0.35	0.58	0.53	0.50	0.50
Estimation	OLS	2SLS	OLS	2SLS	OLS	2SLS
Instruments	.	NTR Gap	.	NTR Gap	.	NTR Gap
Sample Period	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13
FE	c,t	c,t	c,t	c,t	c,t	c,t
Clustering	c	c	c	c	c	c
Weighting	Population	Population	Population	Population	Population	Population
Underidentification LM Tes	.	63.8	.	63.8	.	63.8
Weak Identification F Test	.	72.2	.	72.2	.	72.2
Hansen J Stat	.	0.0	.	0.0	.	0.0
Average Death Rate (2000)	10.51	10.51	4.59	4.59	4.63	4.63

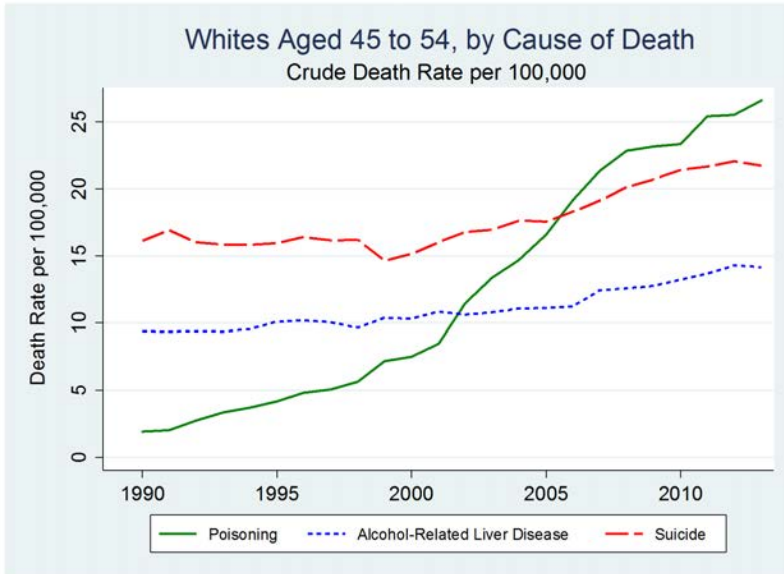
Notes: Table reports difference-in-differences (DID) OLS regression results for age-adjusted mortality rates per 100,000 population for noted causes of death across counties (c) and years (t). Sample period is 1990 to 2013. U-Rate is the county's unemployment rate in year t. Regressions are weighted by county population in 1990. Final row of table reports the population-weighted average death rate for the noted cause of death across counties in the year 2000. *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

Table 12: Mortality and Unemployment (2SLS)



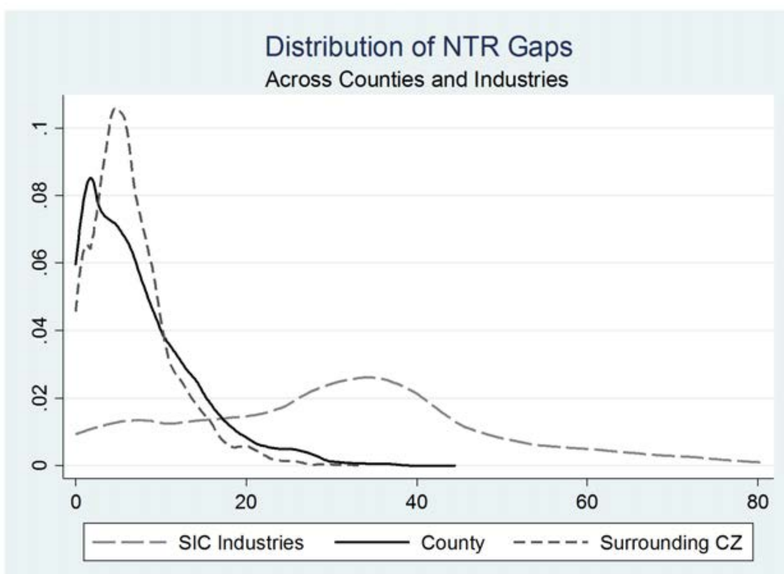
Notes: Figure displays the distribution of age-adjusted death rates per 100,000 population across counties. Counties with death rates exceeding 1500 per 100,000 population are excluded to promote readability. The number of counties with non-missing death rates for 1998, 2000 and 2002-2006 are 3131, 3136, and 3141. Source: CDC.

Figure 1: Distribution of Overall Mortality Rates



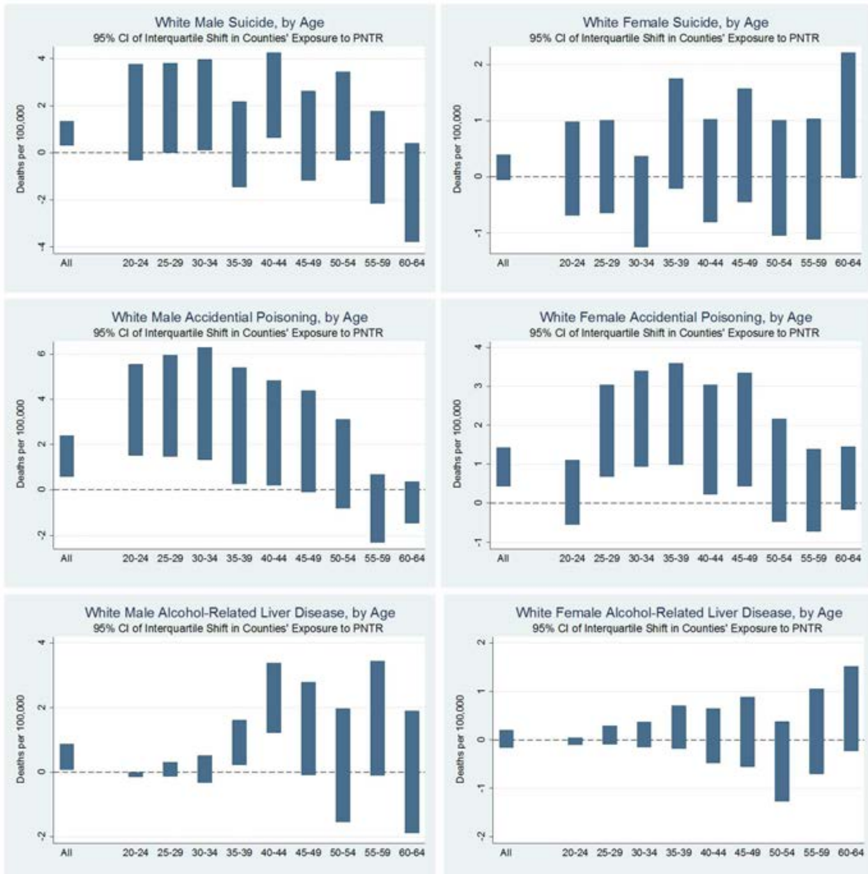
Notes: Figure displays the crude death rate for three causes of death across all U.S. counties for whites aged 45 to 54.

Figure 2: Death Rates for Non-Hispanic Whites



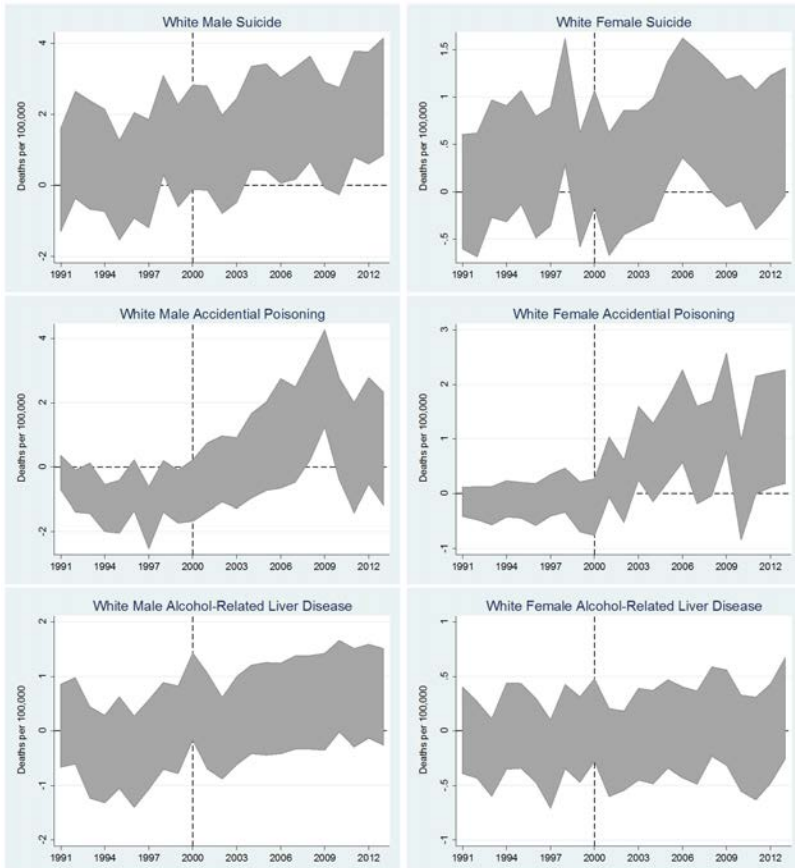
Notes: The first two kernel densities display the distribution of NTR gaps across counties and four-digit SIC industries. The third kernel density displays the distribution, for each county, of the average NTR gap.

Figure 3: Distribution of 1999 NTR Gaps Across Counties



Notes: Figure displays the 95 percent confidence interval for the estimated impact of moving a county from the 25th to the 75th percentiles of its own and surrounding commuting zone NTR gaps. This impact is derived from the difference-in-differences coefficients estimated using equation 3. Confidence intervals are based on robust standard errors adjusted for clustering at the county level.

Figure 4: Implied Impact of PNTR on Death by Suicide and Alcohol-Related Liver Disease, by Age Category



Notes: Figure displays the 95 percent confidence interval for the estimated impact of an interquartile shift in counties' NTR gap. This impact is derived from the difference-in-differences coefficients for interactions of year dummies with the NTR gap in equation 4. Confidence intervals are based on robust standard errors adjusted for clustering at the county level.

Figure 5: Implied Impact of PNTR on Death Rates Using Annual DID Specification (Equation 4)

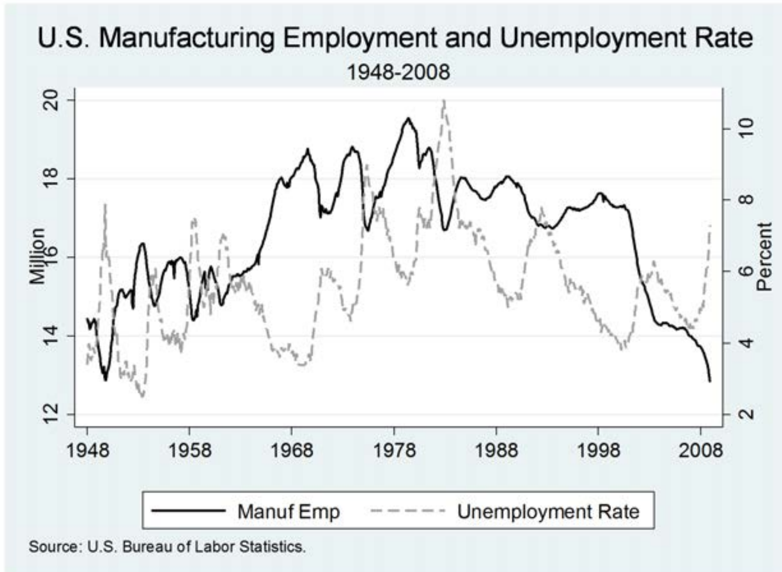
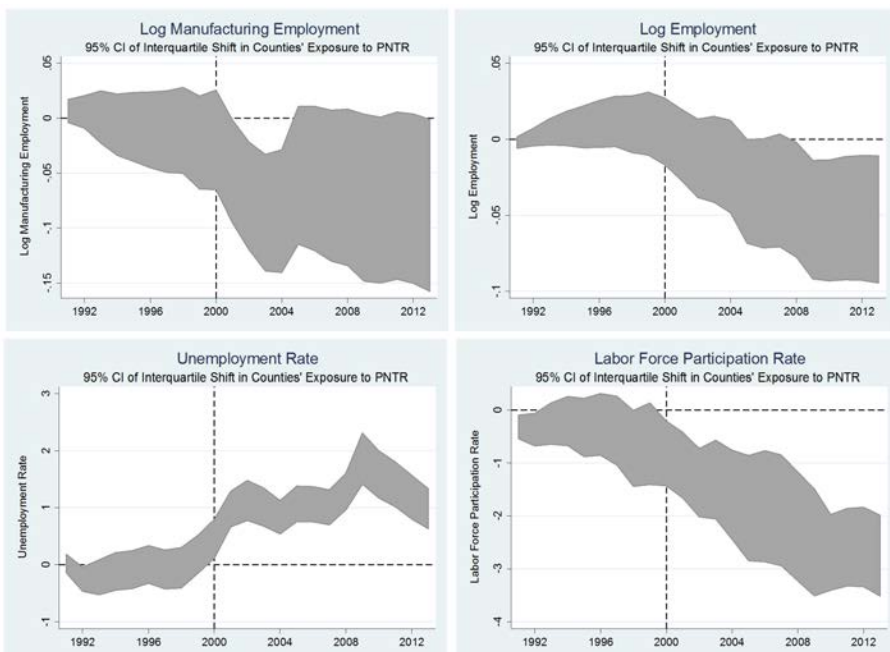
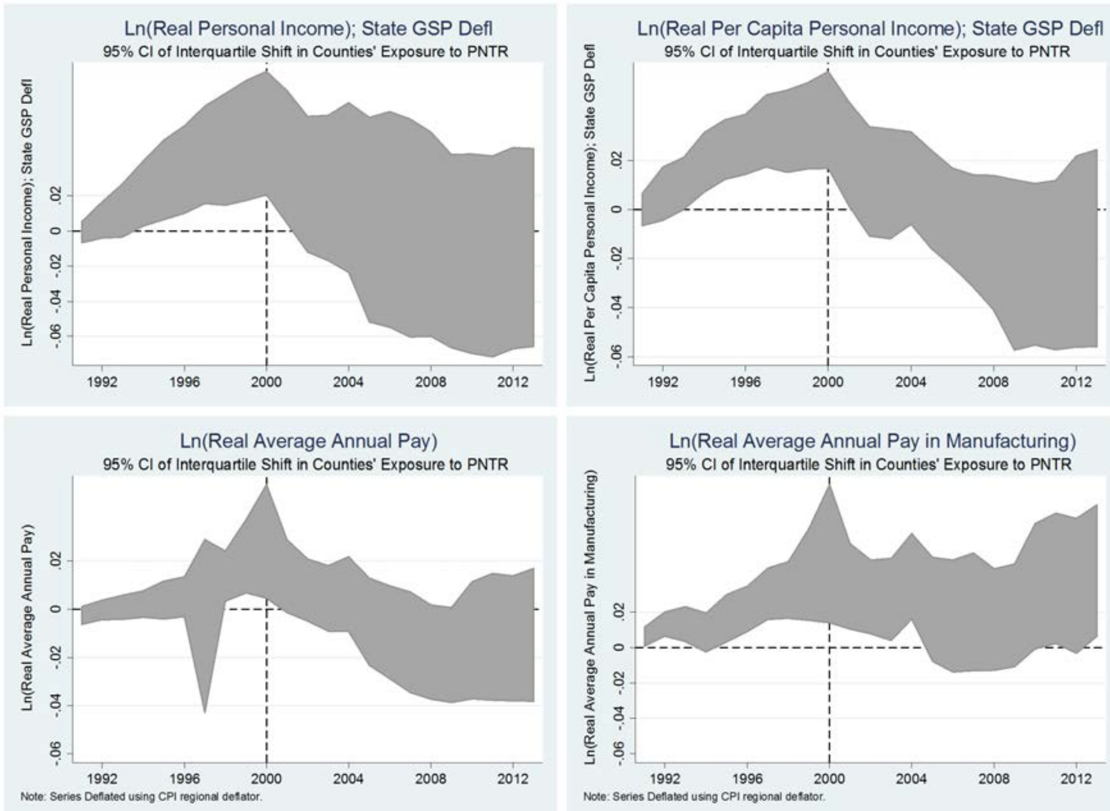


Figure 6: Post-War U.S. Manufacturing Employment



Notes: Figure displays the 95 percent confidence interval for the estimated impact of an interquartile shift in counties' NTR gap. This impact is derived from the difference-in-differences coefficients for interactions of year dummies with the NTR gap in equation 4. Confidence intervals are based on robust standard errors adjusted for clustering at the county level.

Figure 7: Implied Impact of PNTR on Employment Outcomes Using Annual DID Specification (Equation 4)



Notes: Figure displays the 95 percent confidence interval for the estimated impact of an interquartile shift in counties' NTR gap. This impact is derived from the difference-in-differences coefficients for interactions of year dummies with the NTR gap in equation 4. Confidence intervals are based on robust standard errors adjusted for clustering at the county level.

Figure 8: Implied Impact of PNTR on Income Using Annual DID Specification (Equation 4)

Online Appendix

This online appendix contains additional empirical results and information on data creation referenced in the main text.

A Regional Price Indexes

The BLS produces CPIs for four regions: the northeast (Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont), the midwest (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin), the south (Alabama, Arkansas, Delaware, District of Columbia, Florida, Geogia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia) and the west (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming).

For each region, the BLS produces indexes for three sets of cities: the overall CPI for urban consumers (CPI-U), the CPI for metropolitan urban areas with population above 1.5 million (class A) and the CPI for metropolitan urban areas fewer than 1.5 million (class B/C). These indexes are compared in Figure A.5 of this online appendix.

B Complementary Evidence

In this section we make use of the same difference-in-difference specification used to study mortality to demonstrate that counties more exposed to PNTR experience higher rates of property crime and lower birth rates.

B.1 Crime

We examine the relationship between PNTR and crime rates for three reasons. First, an increase in crime could affect mortality directly, e.g. via homicides, though it turns out that we do not find evidence for that channel. Second, an increase in crime contributes to a lower quality of life and thereby might contribute to depression or other conditions consistent with the increases in mortality noted above. Finally, a link between PNTR and crime rates provides additional evidence of the seriousness of the labor market disruptions documented in the main text (Iyer and Topalova 2014, Dix-Carneiro et al. 2015).[45]

Our analysis makes use of county-level crime rate statistics per 100,000 residents available from the Federal Bureau of Investigation (FBI) via the Uniform Crime Reporting (UCR) database.[46] These data, available from 1990 to 2006, break overall crime rates into two main categories, violent and property crime, and eight sub-categories: murder, rape, robbery, assault, burglary, larceny, auto theft and arson.[47]

Table A.7 reports the results. As indicated in the first and second columns of the table, counties' exposure to the change in U.S. trade policy has a positive relationship with both overall violent crime and overall property crime, but this relationship is only statistically significant at conventional levels for overall property crime. The DID point estimate for the property crime regression implies that an interquartile shift in counties NTR gap is associated with an increase in the rate of property crime per 100,000 residents of 144.2, or 5.6 percent of the average property crime rate across counties in the year 2000 (2592 per 100,000). These results are consistent with Feler and Senses (2015) who note that counties more exposed to imports from China experienced small increases in property crime, while the least exposed counties experienced a substantial reduction in crime.

The remaining columns of Table A.7 illustrate positive and statistically significant relationships between counties' exposure to PNTR and several sub-categories of property crime, including robbery, larceny, motor vehicle theft and arson. Coefficient estimates suggest interquartile shifts in counties' exposure to PNTR are associated with increases in the rates of these crimes of 15.8, 5.1, 11.6 and 21.9 percent compared to their year-2000 levels.

B.2 Birth Rates

In principle, the association between PNTR and local labor market conditions discussed above might affect birth rates in at least two ways. On one hand, to the extent that workers the declines in income and employment as temporary, they might perceive a drop in the opportunity cost of having children and the birth rate might rise. On the

[45]Che et al. (2015) examine the link between Chinese imports and U.S. crime across commuting zones.

[46]These data are available at https://www.fbi.gov/about-us/cjis/ucr/ucr.

[47]Burglary is defined as theft (i.e., larceny) combined with unlawful entry. Robbery is defined as forcible theft from a person.

other hand, to the extent that PNTR results in long-term reductions in income and employment, birth rates might decline.[48]

We make use of county-level data on births available from CDC.[49] Using these data and population estimates from SEER, we compute both the birth rate for each county, defined as births per population. We caution that the county-level birth data are often suppressed, and that they are available to us for years 1992 to 2006 only. The number of counties included in the regression results (i.e., those with observations both before and after 2000) rises from an average of 457 between 1995 and 2000 to 501 between 2001 and 2006. These counties are among the largest, representing an average of 76 percent of the total U.S. population across the sample period.

Table A.8 reports the results of baseline DID specifications similar to those used above. The first column report results for the birth rate per 100,000 population, while the second column reports results for the log number of births. As indicated in the table, the DID coefficients of interest are negative but statistically insignificant in both columns.[50]

C PNTR and Import Prices

To the extent that imports are an important input into the production of healthcare, trade liberalization with China might improve workers' health via lower prices for health-related goods. Moreover, a general reduction in prices associated with trade liberalization may lead to welfare improvements for U.S. consumers. We investigate this link using customs data from the U.S. Census provided by Schott (2008).[51]

We employ a generalized triple differences specification that compares products with varying NTR gaps (first difference) before and after PNTR (second difference)

[48] These trade-offs and the potential cyclicality of birth rates are discussed in Ben-Porath (1973), Becker (1960, 1965), Galbraith and Thomas (1941), Mincer (1963) and Silver (1965). Dettling and Kearney (2014) provide a concise discussion of this literature. Anukriti and Kumler (2012) find that an increase in import competition in India associated with the end of the License Raj in 1991 raised birth rates among women with low socioeconomic status but had the opposite affect among women of high socioeconomic status.

[49] These data can be downloaded from http://wonder.cdc.gov/wonder/help/natality.html.

[50] Autor et al. (2015), by contrast, find a decline in natality among commuting zones most exposed to rising imports from China.

[51] These data are available for download at http://faculty.som.yale.edu/peterschott/sub_international.htm.

and across source countries (third difference) for the years 1992 to 2007:

$$\begin{aligned} ln(Unit\,Value)_{hst} &= \theta 1\{c = China\}_s \times PostPNTR_t \times NTR\,Gap_h + \\ &+ \lambda Tariff_{hst} + \delta_{st} + \delta_{sh} + \delta_{ht} + \alpha + \varepsilon_{hst}. \end{aligned} \tag{A.1}$$

The left-hand side variable represents the log of the average unit value observed for ten-digit HS product h from source country s in year t.[52] The first term on the right-hand side is the term of interest: a triple interaction of an indicator for China, an indicator for the post-PNTR period, and the NTR gap for product h that captures the impact of the change in U.S. policy. $Tariff_{hct}$ represents the U.S. revealed import tariff for product h from country c in year t, computed as the ratio of duties collected to dutiable value using publicly available U.S. trade data. δ_{ct}, δ_{ch} and δ_{ht} represent country×year, country×product and product×year fixed effects. α is the regression constant.

Results are reported in Table A.9. As indicated in the table, the NTR gap has a negative and statistically significant relationship with import unit values. The point estimate in the first row of the table implies that Chinese imports after PNTR are 0.18 log points lower *vis a vis* imports of products from other source countries.

We use the following back-of-the-envelope procedure to gauge the potential impact of the decline in Chinese import unit values on health-related versus other goods within the United States. First, we use the results in Table A.9 to compute the predicted relative impact of PNTR for each HS import product. Second, we take the average of these impacts across HS products within NAICS industries. Third, we merge these NAICS-level mean log changes into the 2007 U.S. total requirements input-output matrix, whose coefficients indicate the amount of the "input" NAICS industry needed to produce one dollar of the "using" industry. Fourth, we compute the weighted average implied relative log unit value changes across the input industries for each using industry, using the IO coefficients as weights. Finally, we examine the changes associated with healthcare-related NAICS industries. These industries are identified by having one of the following key words in their description: health, care, pharmaceutical, drug, hospital, medical, surgical, medicine, and imaging.

[52]The trade data report both value and quantity for each transaction and we use the ratio of these two variables as a proxy for the price. We omit products whose units change over time, and make use of concordances provided by Pierce and Schott (2016) to ensure product codes are consistent over the sample period. Further details on data construction are provided in the online appendix.

The distribution of log unit value declines across using industries is displayed in Figure A.6; the mean and standard deviation across industries is -0.069 and 0.095. The declines associated with the health industries identified in the last paragraph are reported in Table A.10, along with the average for those industries versus all others. As indicated in the table, four healthcare-related industries have sizable weighted-average changes: surgical instruments (-0.080), surgical appliances (-0.066), electromedical manufacturing (-0.060) and pharmaceutical preparation manufacturing (-.054). Weighted-average changes for the remaining industries in the table are far lower. Intuitively, this is due to their relatively high share of labor versus other goods.

Appendix Tables and Figures

Age	Population	Share
Under 1 year	3,855,956	0.0137
1-4 years	15,322,337	0.0543
5-14 years	41,101,548	0.1457
15-19 years	20,294,955	0.0719
20-24 years	19,116,667	0.0678
25-29 years	19,280,263	0.0683
30-34 years	20,524,234	0.0727
35-39 years	22,650,852	0.0803
40-44 years	22,517,991	0.0798
45-49 years	20,219,527	0.0717
50-54 years	17,779,447	0.0630
55-59 years	13,565,937	0.0481
60-64 years	10,863,129	0.0385
65-69 years	9,523,909	0.0338
70-74 years	8,860,028	0.0314
75-79 years	7,438,619	0.0264
80-84 years	4,984,540	0.0177
85 and over	4,262,472	0.0151
Total	282,162,411	1.0000

Notes: Table reports the overall U.S. population weights associated with the age categories used in our baseline results. Data are for the year 2000.

Table A.1: Distribution of U.S. Population Across Age Categories in 2000

	Weighted Average Across Counties		Aggregate U.S.
		Demographic-	
	Overall	Specific	Official
Variable	Population	Population	CDC Rate
Overall	858	858	872
- Males	1,047	1,046	1,043
- Females	719	720	739
Whites	841	839	852
- Males	1,026	1,022	1,018
- Females	705	704	722
Blacks	1,021	1,106	1,130
- Males	1,244	1,386	1,378
- Females	828	915	948
American Indian	461	716	697
- Males	484	840	829
- Females	388	610	586
Asian	416	476	507
- Males	461	580	629
- Females	350	393	415

Notes: Table reports age-adjusted death rates by demographic group. First column represents weighted average across counties using counties' total populations as weights. Second column represents weighted average across counties using counties' populations in the relevant demographic group as weights. Final column represents the official estimate reported by the CDC.

Table A.2: Sensitivity of Weighted Average Death Rates Across Counties to Population Weights

	Suicide, White Male								
VARIABLES	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Post x NTR Gap$_c$	0.207*	0.231**	0.245**	0.044	0.294***	0.086	0.188	-0.023	-0.202
	0.126	0.116	0.118	0.111	0.111	0.117	0.116	0.12	0.128
NTR$_{ct}$	-1.529	-0.944	0.508	0.514	-1.374	0.223	1.679	-0.002	-0.712
	1.466	1.279	1.019	1.067	1.236	1.149	1.314	1.53	1.482
MFA Exposure$_{ct}$	0.248	0.041	0.19	-0.193	-0.364*	0.067	-0.006	-0.06	0.069
	0.211	0.192	0.209	0.196	0.188	0.188	0.194	0.18	0.23
Post x ΔChinese Tariffs$_c$	0.05	0.421*	0.254	-0.302	-0.123	-0.378	-0.144	-0.378*	-0.315
	0.246	0.226	0.233	0.227	0.228	0.239	0.235	0.215	0.25
Post x ΔChinese Subsidy$_c$	31.189	13.073	15.493	30.165**	28.984	25.335	3.017	3.829	17.035
	23.182	18.11	16.352	15.273	22.441	19.248	21.027	19.156	20.402
Post x Median HHI in 1990$_c$	0.069*	-0.03	0.004	-0.018	-0.03	-0.088**	-0.177***	-0.056	-0.072*
	0.036	0.035	0.032	0.034	0.038	0.035	0.036	0.039	0.04
Post x % No College in 1990$_c$	0.01	0.056	0.076**	0.108***	0.109**	0.080*	-0.080*	-0.084**	-0.024
	0.037	0.039	0.038	0.036	0.043	0.041	0.042	0.041	0.044
Post x % Veteran in 1990$_c$	0.155	0.339**	0.337***	0.311**	0.510**	0.750***	0.758***	0.931***	0.229
	0.11	0.132	0.122	0.13	0.204	0.18	0.191	0.135	0.144
Observations	74,888	74,900	74,898	74,894	74,899	74,900	74,900	74,900	74,900
R-squared	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.08	0.07
P-Value DID Term	0.10	0.05	0.04	0.69	0.01	0.46	0.10	0.85	0.12
Estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample Period	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13
Fixed Effects	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t
Clustering	c	c	c	c	c	c	c	c	c
Weighting	Population	Population	Population	Population	Population	Population	Population	Population	Population
Implied Impact of PNTR	1.72*	1.92**	2.03**	0.37	2.45***	0.72	1.56	-0.19	-1.68
Std Err	1.05	0.97	0.98	0.92	0.92	0.97	0.96	1.00	1.07
Average Death Rate (2000)	23.56	21.67	21.49	24.23	26.43	25.45	22.73	21.41	20.09
Impact/Average	0.073*	0.088**	0.095**	0.015	0.093***	0.028	0.069	-0.009	-0.083

Notes: Table reports difference-in-differences (DID) OLS regression results for crude mortality rates per 100,000 population for noted causes of death across counties (c) and years (t). Sample period is 1990 to 2013. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate accounts for the elimination of quantitative restrictions on apparel and clothing imports from developing countries durring the sample period; higher values correspond to greater exposure. The third covariate is the weighted average U.S. import tariff of the products produced in the county; higher values indicate greater protection. Fourth and fifth covariates are the the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-period dummy variable with the county's median household income in 1990 and the percent of residents who have not attended any college. Regressions are weighted by county population in 1990 for the demographic group for which death rates are being estimated. Penultimate three rows of table report the implied impact of PNTR in terms of moving a county from the 25th to the 75th percentile of the NTR gap, the standard error of this implied impact and the population-weighted average death rate for this cause of death across counties in the year 2000. Final row of table reports the ratio of the implied impact to this average. Standard errors adjusted for clustering at the county level are reported below coefficients. *, ** and * signify statistical significance at the 10, 5 and 1 percent level.**

Table A.3: PNTR and Suicide by White Males, By Age Group

VARIABLES	Suicide, White Female 20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Post x NTR Gap$_c$	0.017	0.022	-0.053	0.093	0.013	0.067	-0.003	-0.005	0.103
	0.051	0.051	0.05	0.06	0.056	0.062	0.063	0.066	0.066
NTR$_{ct}$	-1.353***	-0.337	-0.326	0.422	-0.024	-0.746	-0.233	0.281	0.222
	0.494	0.569	0.552	0.516	0.661	0.597	0.621	0.628	0.697
MFA Exposure$_{ct}$	0.115	-0.055	0.124	0.043	0.085	0.119	0.200**	-0.024	-0.034
	0.082	0.087	0.103	0.102	0.114	0.116	0.097	0.103	0.089
Post x ΔChinese Tariffs$_c$	0.170*	-0.035	-0.147	-0.041	-0.279***	-0.138	-0.087	-0.097	0.184
	0.099	0.098	0.101	0.111	0.104	0.126	0.12	0.145	0.125
Post x ΔChinese Subsidy$_c$	-6.912	17.331***	-6.379	20.202**	15.781*	14.2	-0.716	-1.187	4.199
	8.084	6.566	7.225	8.622	8.735	9.63	9.114	11.214	9.746
Post x Median HHI in 1990$_c$	0.012	0.01	-0.023*	-0.030*	-0.041**	-0.087***	-0.073***	-0.055***	-0.026
	0.014	0.014	0.014	0.017	0.018	0.019	0.019	0.021	0.018
Post x % No College in 1990$_c$	0.016	0.022	0.02	0.025	0.02	-0.023	-0.038*	-0.049**	-0.01
	0.013	0.015	0.016	0.018	0.018	0.02	0.02	0.024	0.02
Post x % Veteran in 1990$_c$	0.002	0.116**	0.178***	0.222***	0.412***	0.440***	0.313***	0.257***	0.217***
	0.045	0.046	0.053	0.056	0.07	0.067	0.064	0.077	0.072
Observations	74,890	74,885	74,895	74,900	74,900	74,900	74,899	74,900	74,900
R-squared	0.05	0.05	0.05	0.07	0.07	0.07	0.07	0.06	0.06
P-Value DID Term	0.74	0.67	0.28	0.12	0.81	0.28	0.96	0.94	0.05
Estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample Period	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13
Fixed Effects	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t
Clustering	c	c	c	c	c	c	c	c	c
Weighting	Population	Population	Population	Population	Population	Population	Population	Population	Population
Implied Impact of PNTR	0.14	0.18	-0.44	0.77	0.11	0.56	-0.02	-0.04	1.1*
Std Err	0.42	0.42	0.41	0.50	0.46	0.51	0.52	0.55	0.57
Average Death Rate (2000)	3.49	4.26	5.20	6.71	7.94	7.53	7.47	6.20	5.52
Impact/Average	0.041	0.042	-0.085	0.115	0.014	0.075	-0.003	-0.007	0.198*

Notes: Table reports difference-in-differences (DID) OLS regression results for crude mortality rates per 100,000 population for noted causes of death across counties (c) and years (t). Sample period is 1990 to 2013. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate accounts for the elimination of quantitative restrictions on apparel and clothing imports from developing countries durring the sample period; higher values correspond to greater exposure. The third covariate is the weighted average U.S. import tariff of the products produced in the county; higher values indicate greater protection. Fourth and fifth covariates are the the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-period dummy variable with the county's median household income in 1990 and the percent of residents who have not attended any college. Regressions are weighted by county population in 1990 for the demographic group for which death rates are being estimated. Penultimate three rows of table report the implied impact of PNTR in terms of moving a county from the 25th to the 75th percentile of the NTR gap, the standard error of this implied impact and the population-weighted average death rate for this cause of death across counties in the year 2000. Final row of table reports the ratio of the implied impact to this average. Standard errors adjusted for clustering at the county level are reported below coefficients. *, ** and * signify statistical significance at the 10, 5 and 1 percent level.**

Table A.4: PNTR and Suicide by White Females, By Age Group

	Alcohol-Related Liver Disease, White Male								
VARIABLES	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Post x NTR Gap$_c$	-0.008**	0.011	0.012	0.111***	0.283***	0.165*	0.033	0.205*	0.007
	0.004	0.013	0.025	0.041	0.066	0.087	0.106	0.107	0.114
NTR$_{ct}$	-0.041	-0.165	-0.093	0.61	0.509	-0.269	-2.297**	-0.522	-1.21
	0.051	0.122	0.227	0.471	0.606	0.772	0.998	1.072	1.248
MFA Exposure$_{ct}$	0.001	-0.033	-0.035	-0.116**	-0.366***	-0.415***	-0.391***	-0.412**	-0.296**
	0.007	0.02	0.037	0.054	0.09	0.113	0.138	0.172	0.146
Post x ΔChinese Tariffs$_c$	-0.006	-0.036	-0.034	-0.103	-0.104	-0.405**	-0.552***	-0.33	-0.482**
	0.006	0.026	0.049	0.084	0.136	0.189	0.209	0.209	0.234
Post x ΔChinese Subsidy$_c$	-0.009	0.035	0.02	0.066	0.166	-0.066	-0.029	-0.02	0.016
	0.009	0.022	0.038	0.056	0.144	0.122	0.135	0.154	0.19
Post x Median HHI in 1990$_c$	-0.001	-0.006	-0.011	0.002	-0.026	-0.075***	-0.093***	-0.164***	-0.108***
	0.002	0.004	0.007	0.013	0.021	0.026	0.034	0.036	0.038
Post x % No College in 1990$_c$	-0.001	-0.012***	-0.022***	-0.039**	-0.064**	-0.135***	-0.154***	-0.173***	-0.124***
	0.002	0.004	0.008	0.017	0.032	0.042	0.047	0.046	0.045
Post x % Veteran in 1990$_c$	0.007	0.039***	0.108***	0.366***	0.686***	0.982***	1.122***	1.352***	0.892***
	0.005	0.012	0.03	0.086	0.222	0.234	0.236	0.204	0.17
Observations	74,888	74,900	74,898	74,894	74,899	74,900	74,900	74,900	74,900
R-squared	0.04	0.04	0.06	0.09	0.12	0.15	0.16	0.17	0.15
P-Value DID Term	0.05	0.37	0.63	0.01	0.00	0.06	0.75	0.06	0.95
Estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample Period	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13	1990-13
Fixed Effects	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t
Clustering	c	c	c	c	c	c	c	c	c
Weighting	Population	Population	Population	Population	Population	Population	Population	Population	Population
Implied Impact of PNTR	-0.07**	0.1	0.1	0.92***	2.36***	1.38*	0.28	1.71*	0.06
Std Err	0.04	0.11	0.21	0.35	0.55	0.72	0.88	0.89	0.94
Average Death Rate (2000)	0.04	0.45	1.57	4.34	9.50	15.87	17.08	18.47	21.32
Impact/Average	-1.847**	0.214	0.064	0.212***	0.248***	0.087*	0.016	0.092*	0.003

Notes: Table reports difference-in-differences (DID) OLS regression results for crude mortality rates per 100,000 population for noted causes of death across counties (c) and years (t). Sample period is 1990 to 2013. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate accounts for the elimination of quantitative restrictions on apparel and clothing imports from developing countries durring the sample period; higher values correspond to greater exposure. The third covariate is the weighted average U.S. import tariff of the products produced in the county; higher values indicate greater protection. Fourth and fifth covariates are the the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-period dummy variable with the county's median household income in 1990 and the percent of residents who have not attended any college. Regressions are weighted by county population in 1990 for the demographic group for which death rates are being estimated. Penultimate three rows of table report the implied impact of PNTR in terms of moving a county from the 25th to the 75th percentile of the NTR gap, the standard error of this implied impact and the population-weighted average death rate for this cause of death across counties in the year 2000. Final row of table reports the ratio of the implied impact to this average. Standard errors adjusted for clustering at the county level are reported below coefficients. *, ** and * signify statistical significance at the 10, 5 and 1 percent level.**

Table A.5: PNTR and Alcohol-Related Liver Disease for White Males, By Age Group

Occupation	Male	White	White-Male	Total
Managerial, Professional	0.708	0.904	.	1.000
Technical, Sales, Admin, Service	0.496	0.863	.	1.000
Precision Production	0.830	0.855	.	1.000
Operators, Fabricators, Laborers, Other	0.670	0.789	.	1.000
Total	0.680	0.843	0.584	1.000

Notes: Table displays the share of manufacturing workers in 1999 that are male or white, by occupation within manufacturing. In 1999, the shares of the U.S. population that was male, white and white-male were 49.0, 81.9 and 40.3 percent. "." represents unavailable data. Soure: www.bls.gov.

Table A.6: Share of Whites and Males Among Occupations in Manufacturing, 1999

VARIABLES	Overall Violent	Overall Property	Murder	Rape	Robbery	Assault	Burglary	Larceny	Motor Vehicle Theft	Arson
Post x NTR Gap_c	1.917	16.979**	0.012	0.143	2.222***	-0.459	2.157	10.688**	4.134*	0.521
	1.679	7.991	0.027	0.104	0.746	1.205	2.119	5.133	2.330	0.320
NTR_{ct}	-0.898	-85.314	-0.219	-1.639	-7.168	8.128	-27.504	-58.908	1.098	4.843**
	25.341	90.100	0.380	1.034	12.575	14.024	25.657	52.701	26.196	2.301
MFA $Exposure_{ct}$	-0.498	21.773*	-0.053	0.046	-0.262	-0.229	-2.135	19.295**	4.613*	0.366*
	4.071	12.023	0.051	0.109	1.666	2.478	2.952	7.643	2.759	0.210
Post x ΔChinese $Tariffs_c$	-7.839*	-37.714**	-0.095	-0.301	-3.299*	-4.144	-17.722***	-6.225	-13.767***	-0.854*
	4.302	17.287	0.061	0.219	1.772	2.915	4.649	11.471	4.774	0.507
Post x ΔChinese $Subsidy_c$	1144.169	979.426	13.396**	43.298*	541.720*	545.755	747.508	-409.392	641.310	36.920
	705.740	1760.976	6.690	22.462	308.438	409.148	537.040	1008.882	581.282	43.444
Post x Median HHI in 1990_c	2.130**	0.284	0.060***	0.107**	0.446	1.517**	0.478	2.035	-2.229**	-0.053
	1.005	3.843	0.012	0.045	0.451	0.616	1.131	2.413	1.102	0.107
Post x % No College in 1990_c	4.021***	23.492***	0.043***	0.243***	0.840*	2.896***	4.531***	20.317***	-1.356	-0.061
	1.099	4.362	0.013	0.057	0.484	0.730	1.158	2.859	1.320	0.218
Post x % Veteran in 1990_c	20.098**	30.082	0.213**	0.159	10.571**	9.155*	2.668	5.368	22.045***	1.154**
	10.117	22.363	0.092	0.190	4.528	5.505	6.359	11.347	6.287	0.550
Observations	53,023	53,023	53,023	53,023	53,023	53,023	53,023	53,023	53,023	53,023
R-squared	0.858	0.851	0.799	0.733	0.893	0.795	0.83	0.829	0.874	0.692
P-Value DID Term	0.25	0.03	0.65	0.17	0.00	0.70	0.31	0.04	0.08	0.10
Estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Sample Period	1990-06	1990-06	1990-06	1990-06	1990-06	1990-06	1990-06	1990-06	1990-06	1990-06
FE	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t	c,t
Clustering	c	c	c	c	c	c	c	c	c	c
Weighting	Population	Population	Population	Population	Population	Population	Population	Population	Population	Population
Implied Impact of PNTR	15.95	141.19**	0.1	1.19	18.47***	-3.82	17.94	88.88**	34.38*	4.33
Std Err	13.96	66.45	0.23	0.86	6.20	10.02	17.62	42.69	19.38	2.66
Average Dep Var (2000)	365.6	2592.0	4.4	21.5	113.7	225.9	569.6	1709.4	312.9	20.0
Impact/Average	0.044	0.054**	0.023	0.055	0.163***	-0.017	0.031	0.052**	0.11*	0.216

Notes: Table reports difference-in-differences (DID) OLS regression results for county-year crime rates per 100,000 population. Burglary is defined as theft (i.e., larceny) combined with unlawful entry. Robbery is defined as forcible theft from a person. Sample period is 1990 to 2006. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate accounts for the elimination of quantitative restrictions on apparel and clothing imports from developing countries durring the sample period; higher values correspond to greater exposure. The third covariate is the weighted average U.S. import tariff of the products produced in the county; higher values indicate greater protection. Fourth and fifth covariates are the the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-period dummy variable with the county's median household income in 1990, the percent of residents who have not attended any college in 1990, and the percent of residents who are veterans in 1990. Regressions are weighted by county population in 1990 for the demographic group for which death rates are being estimated. Penultimate three rows of table report the implied impact of PNTR in terms of moving a county from the 25th to the 75th percentile of the NTR gap, the standard error of this implied impact and the population-weighted average depdendent varable across counties in the year 2000. Final row of table reports the ratio of the implied impact to this average. Standard errors adjusted for clustering at the county level are reported below coefficients. *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

Table A.7: PNTR and Crime Rates per 100,000 Population (UCR)

VARIABLES	Birth Rate$_{ct}$	ln(Births$_{ct}$)
Post x NTR Gap$_c$	-3.967	-0.002
	4.081	0.003
NTR$_{ct}$	14.613	0.004
	93.903	0.042
MFA Exposure$_{ct}$	0.849	0.008
	12.836	0.006
Post x ΔChinese Tariffs$_c$	-8.617	-0.005
	8.538	0.007
Post x ΔChinese Subsidy$_c$	1143.769	0.665*
	888.601	0.403
Post x Median HHI in 1990$_c$	-2.912***	-0.002***
	0.859	0.001
Post x % No College in 1990$_c$	-4.225***	-0.004***
	0.973	0.001
Post x % Veteran in 1990$_c$	12.623**	0.010***
	6.349	0.002
Observations	5,389	5,389
R-squared	0.959	0.998
P-Value DID Term	0.33	0.45
Estimation	OLS	OLS
Sample Period	1990-06	1990-06
FE	c,t	c,t
Clustering	c	c
Weighting	Population	Population
Implied Impact of PNTR	-32.99	-0.018
Std Err	33.94	0.024
Average Dep Var (2000)	1457.9	9.3
Impact/Average	-0.023	.

Notes: Table reports difference-in-differences (DID) OLS regression results for county-year birth rate per 100,000 population and log number of births Sample period is 1990 to 2006. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate accounts for the elimination of quantitative restrictions on apparel and clothing imports from developing countries durring the sample period; higher values correspond to greater exposure. The third covariate is the weighted average U.S. import tariff of the products produced in the county; higher values indicate greater protection. Fourth and fifth covariates are the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-period dummy variable with the county's median household income in 1990 and the percent of residents who have not attended any college. Regressions are weighted by county population in 1990 for the demographic group for which death rates are being estimated. Penultimate three rows of table report the implied impact of PNTR in terms of moving a county from the 25th to the 75th percentile of the NTR gap, the standard error of this implied impact and the population-weighted average depdendent varable across counties in the year 2000. Final row of table reports the ratio of the implied impact to this average. Standard errors adjusted for clustering at the county level are reported below coefficients. *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

Table A.8: PNTR and Birth Rates per 100,000 Population

VARIABLES	Ln(Unit Value)
Post x NTR Gap	-0.184***
	0.033
NTR Tariff Rate	-1.391***
	0.053
Observations	1,888,815
R-squared	0.90
Estimation	OLS
Period	1992-2007
FE	sh,ht,st
Clustering	sh

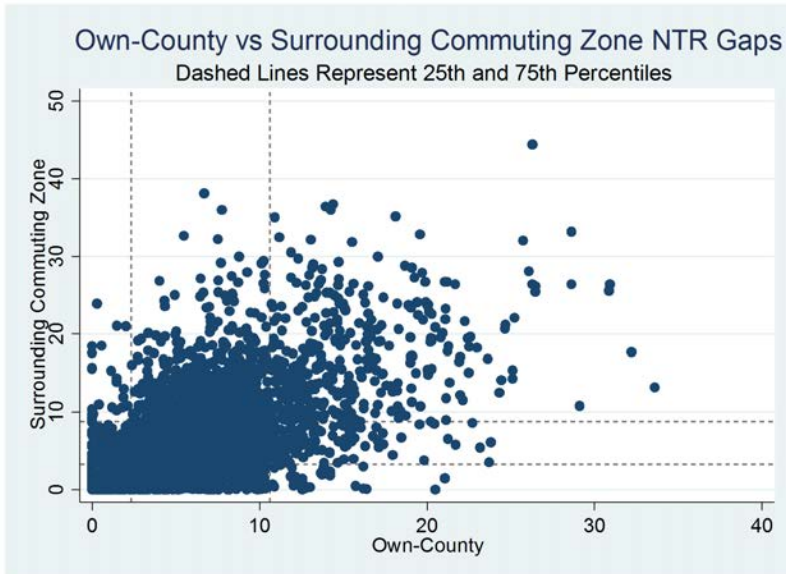
Notes: Table reports difference-in-differences (DID) OLS regression results of country (s) by product (p) by year (y) log unit values county-year on a triple-interaction DID term and tariff rates. Sample period is 1992 to 2006. Standard errors adjusted for clustering at the county level are reported below coefficients. *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

Table A.9: PNTR and U.S. Import Prices

NAICS "Using" Industry		Log Change
339112	Surgical and medical instrument manufacturing	-0.08000
339113	Surgical appliance and supplies manufacturing	-0.06608
334510	Electromedical and electrotherapeutic apparatus manufacturing	-0.05992
325412	Pharmaceutical preparation manufacturing	-0.05406
621900	Other ambulatory health care services	-0.00006
624400	Child day care services	-0.00003
621300	Offices of other health practitioners	-0.00002
621400	Outpatient care centers	-0.00002
621500	Medical and diagnostic laboratories	-0.00001
623A00	Nursing and community care facilities	-0.00001
623B00	Residential mental retardation, mental health, substance abuse and other facilities	0
812100	Personal care services	0
812200	Death care services	0
233210	Health care structures	0
622000	Hospitals	0
621600	Home health care services	0
Mean		-0.016
All other "using" industries		-0.072

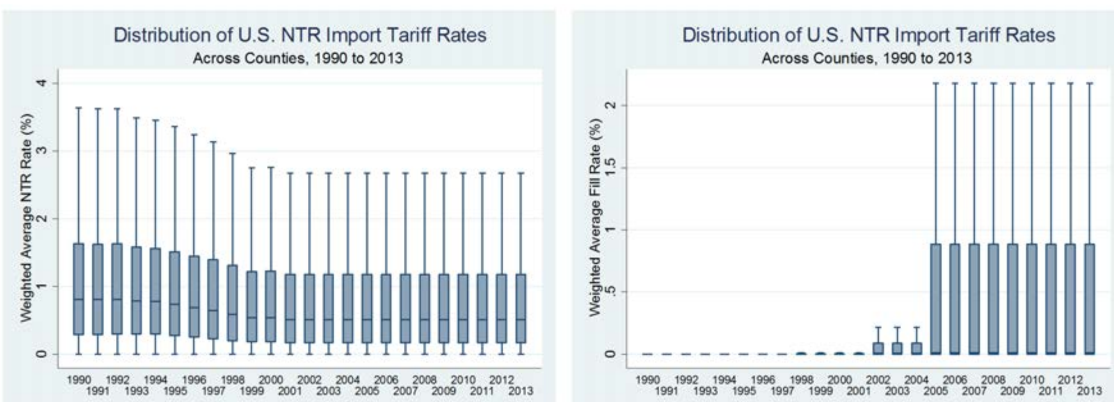
Notes: Table highlights "using" industries containing the key words health, care, pharmaceutical, drug, hospital, medical, surgical, medicine, and imaging in their desription. Second column reports the input-output coeficient weighted average decline in relative import prices from China associated with these industries, using the results reported in Table 8.

Table A.10: Unit Value Declines Weighted by Health-Industry IO Coefficients



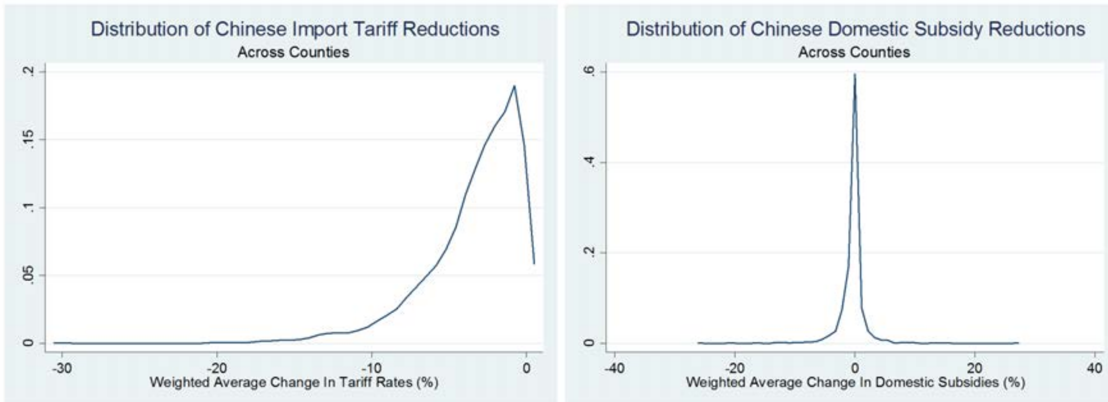
Notes: Figure compares counties' own NTR gaps to the average NTR gap of their surrounding counties. Dashed lines indicate the 25th and 75th percentiles of each distribution (2.2 and 10.5 for own county and 3.2 and 8.7 for surrounding counties). The commuting zone for each county is defined by the U.S. Census Bureau. The correlation of the two gaps is 0.58.

Figure A.1: Counties' Own versus Surrounding Commuting Zone NTR Gaps



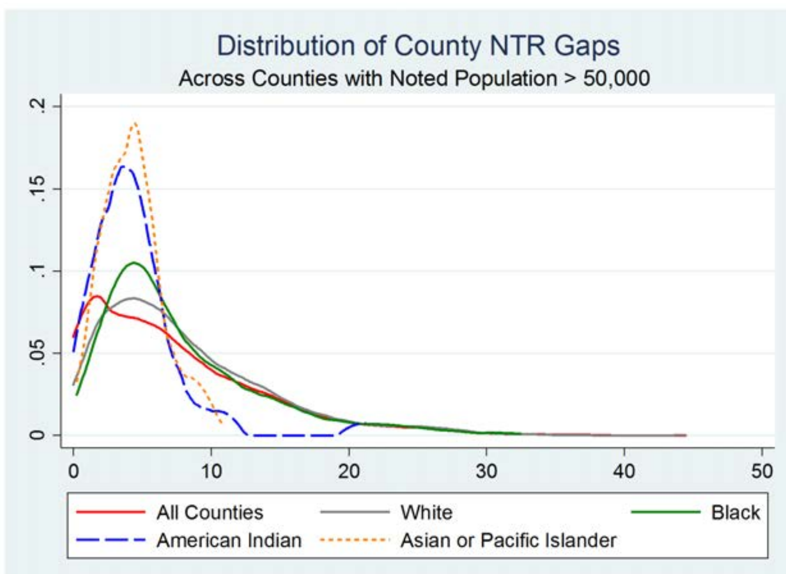
Notes: Left panel displays distribution of counties' labor-share weighted average NTR import tariff rate. Right panel displays distribution of counties' labor-share weighted average fill rates. MFA quotas were relaxed in four phases on January 1 of 1995, 1998, 2002, and 2005.

Figure A.2: Distribution of Counties' Exposure to MFA Phase-Outs ($MFA\,Exposure_{ct}$) and Counties' NTR Tariffs (NTR_{ct})



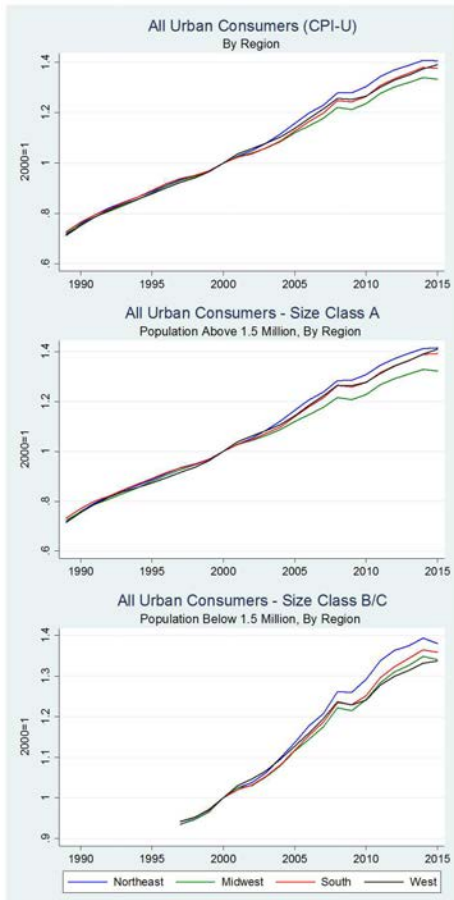
Notes: Left panel displays distribution of counties' labor-share weighted average 1996-2005 change in Chinese import tariffs. Right panel displays distribution of counties' labor-share weighted average change in Chinese domestic production subsidies as a percent of domestic sales.

Figure A.3: Distribution of Counties' Exposure to Reductions in Chinese Tariffs and Domestic Production Subsidies



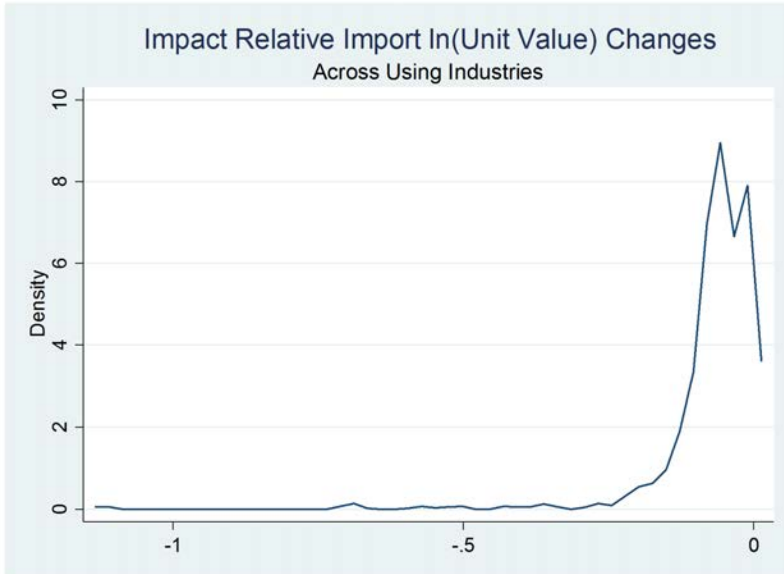
Notes: Figure displays distribution of NTR gaps across counties where population of noted racial group is 50,000 or higher.

Figure A.4: County NTR Gaps by Racial Group



Notes: Figure displays the noted consumer price indexes discussed in the main text. Top panel contains series CUUS0100SA0, CUUS0200SA0, CUUS0300SA0 and CUUS0400SA0; middle panel contain series CUUSA100SA0, CUUSA200SA0, CUUSA300SA0 and CUUSA400SA0; and bottom panel contains series CUUSX100SA0, CUUSX200SA0, CUUSX300SA0 and CUUSX400SA0.

Figure A.5: Consumer Price Indexes by Region and Size Class



Notes: Figure displays the distribution of weighted-average change in relative import unit value changes associated with PNTR on "using" industries, using input-output table total use requirement coefficients as weights. This distribution is constructed as follows. First, use the specification in Equation 5 to predict the change in relative unit values associated with PNTR. Second, take the average of these predictions a the ten-digit HS level across their associated NAICS industries. Third, merge these changes into the 2007 U.S. total requirements input-output matrix, where the coefficients indicate the amount of the input NAICS industry needed to produce one dollar of the "using" industry. Finally, take the weighted average implied change in relative log unit values, using the IO coefficients as weights.

Figure A.6: Weighted Average ln(Unit Value) Declines by "Using" NAICS Industries