Trade Liberalization and Mortality: Evidence from U.S. Counties*

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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 relative increases in drug overdoses and suicide, specifically among whites. We show that these results are not driven by pre-existing trends in mortality rates, that the estimated relationships are robust to controls for state-level legislation pertaining to opioid availability and health care, and that the impact of the policy change on mortality coincides with a deterioration in labor market conditions.

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1 Introduction

Though large literatures in economics and public health investigate the effect of economic shocks on health and mortality, finding exogenous sources of variation in economic conditions remains an important challenge. In this paper 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 relative losses in employment and earnings via their industry structure. We find that counties more exposed to the change in policy exhibit relative increases in "deaths of despair," including suicide and drug overdose. Consistent with the dramatic rise in mortality among middle-aged Americans reported in Case and Deaton (2015), we that find these effects are present only for whites.

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 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 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.

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. Prior to PNTR, China's access to the low normal trade relations tariff rates available to most U.S. trading partners depended on contentious annual renewals of China's NTR status by the President and Congress. Absent these renewals, U.S. tariffs on most Chinese imports would have risen abruptly, in some cases dramatically. PNTR removed this cost uncertainty, rendering production in China for export to the United States more attractive. In earlier work (Pierce and Schott (2016a)) we find that industries with greater exposure to PNTR exhibit relative increases in U.S. imports from China and relative reductions in employment.

We define 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 mortality and employment outcomes prior to the change in policy. Moreover, 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, well before the policy change. We compute counties' exposure to PNTR as the labor-share-weighted-average NTR gaps of the industries active within their borders.

We use proprietary microdata from the U.S. Centers for Disease Control (CDC) to compute mortality rates by county, year, cause of death, gender, race and age group. Our initial focus is on "deaths of despair" – suicide, drug overdoses and alcohol-related liver disease

(ARLD) – that are highlighted in Case and Deaton (2015) and that the literature has found to be related to labor market disruptions.

We use a difference-in-differences (DID) identification strategy to examine whether counties that are more exposed to PNTR (first difference) experience differential changes in mortality and labor market outcomes after the policy is implemented (second difference). Our baseline specification includes controls for county-level demographic and economic attributes, as well as fixed effects that capture time-invariant characteristics of counties and aggregate shocks that affect all counties in a particular year.

Our results indicate that exposure to PNTR is associated with a statistically significant relative increase in deaths of despair. Coefficient estimates imply that an interquartile shift in counties' exposure to PNTR is associated with a relative increase in mortality from these causes of death equal to 10 percent of the average across counties in 2000, the year of the change in U.S. trade policy. Across racial, gender and age groups, we find that the relationship is statistically significant among white males and white females of working age, but not present for other races. Within deaths of despair, we find that PNTR has a positive and statistically significant relationship with suicide and drug overdoses. Coefficient estimates imply that an interquartile shift in counties' NTR gaps is associated with relative increases in the annual suicide and fatal drug overdose rates for the overall population equal to 4.4 and 25 percent relative to their averages in the year 2000. The relationship with ARLD is positive but statistically significant only for white males.

We examine the robustness of these baseline estimates in several ways. First, we consider the possibility that the results could be driven by pre-existing trends by employing an alternate empirical specification that places no restrictions on the timing of any potential increases in mortality, and also by explicitly allowing for separate mortality trends for counties in different geographic regions or with different initial economic conditions. Second, we include controls for changes in state-level laws pertaining to the regulation of prescription opioids and health care policy. Third, because mortality rates may be less accurate for areas with small populations and because some conditions may spill over from neighboring counties, we re-estimate results to capture effects at higher levels of geographic aggregation. Fourth, we allow for the possibility that counties with different initial shares of employment in manufacturing may have experienced other shocks to mortality that were unrelated to PNTR, or that they were on different trends in terms of mortality prior to 2000. Finally, we discuss the potential impact of migration on our results.

We find that the relationship between exposure to PNTR and relative increases in overall deaths of despair is robust to these alternate specifications. Within deaths of despair, we also find positive and statistically significant associations for drug overdose in all specifications, and most estimates also indicate positive and statistically significant relationships between exposure to PNTR and suicide. We find only limited evidence that PNTR is associated with relative increases in mortality from ARLD. Taken in their entirety, the results provide substantial evidence of a link between PNTR and deaths of despair.

In the final part of the paper we present evidence supporting labor market disruption as

a plausible mechanism for PNTR's impact on deaths of despair using a DID specification analogous to the one described above. The results indicate that higher exposure to PNTR is associated with persistent relative increases in unemployment rates and decreases in labor force participation. To further investigate this mechanism, 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. Results suggest that a 1 standard deviation increase in the unemployment rate (1.7 percentage points in 2000) is associated with increases of 25, 19 and 56 percent for overall deaths of despair, suicide and drug overdoses, respectively.

Our analysis contributes to research in several literatures. First, the link we find between PNTR and mortality relates to a series of papers studying the health and mortality 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 Wachter (2009), which finds that high-tenure workers displaced as part of a mass layoff experience a sharp increase in their probability of death.[1] More recently, Classen and Dunn (2012) find that unemployment duration is a major force in the relationship between job loss and suicide, and Hollingsworth et al. (2017) find that macroeconomic shocks at the county or state-level are associated with increases in deaths and emergency room visits due to opioid overdoses.

Our work also relates to an emerging literature on the economics of deaths of despair including Case and Deaton (2017)'s hypothesis that "cumulative disadvantage" in the labor market for less-educated workers may lie behind the increase in middle-aged whites' mortality. Indeed, while employment opportunities for lower-skilled workers have been declining for some time (Autor et al. (2003); Jaimovich and Siu (2012)), PNTR may have served as a catalyst for increasing mortality rates for at least two reasons. First, because PNTR was a change in policy, its effects were abrupt, potentially exacerbating the labor market disruption by requiring the reallocation of a large number of workers in a short amount of time. Second, unlike previous cyclical declines in manufacturing employment, the labor market effects of PNTR are persistent. Indeed, we find that counties more exposed to the policy change exhibit relatively elevated unemployment rates well into the 2000s.

In the international trade literature, our analysis contributes to the substantial body of research examining the relationship between import competition, employment and associated social outcomes.[2] Autor et al. (2013), for example, find that regions with higher initial

[1]Potential reasons for the increase in mortality discussed by Sullivan and 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. By contrast, Bockerman and Ilmakunnas (2008) find no relationship between unemployment and a self-assessment of health using survey data for Finland.

[2]Recent papers focused specifically on China include Bloom et al. (2016), Ebenstein et al. (2014), Mion

shares of employment in industries with relatively greater exposure to Chinese imports experience relatively larger declines in employment. Subsequent research has tied this labor market disruption to a range of socioeconomic indicators including relative declines in self-reported health outcomes (McManus and Schaur (2015, 2016)), reductions in the provision of local public goods (Feler and Senses (2017)), and changes in marriage and fertility patterns (Autor et al. (2017)).[3] By contrast, Hummels et al. (2016) 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) show that higher pollution associated with expanded export production is associated with a substantial increase in infant mortality in China.

Before continuing, we note that while this paper 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. Recent contributions to the literature, for example, have shown that increased imports from China have led to lower prices for consumers (Antràs et al. (2017); Amiti et al. (2017)) and an increase in product quality or variety (Feng et al. (2016); Handley and Limao (2017)).

The paper proceeds as follows: Section 2 describes the data, Section 3 describes our empirical strategy and mortality results, Section 4 discusses these results and provides robustness checks, Section 5 explores mechanisms that might explain the results, Section 6 presents the two stage least squares estimates, Section 7 examines other causes of death, and Section 8 concludes. An online appendix provides additional empirical results as well as information about dataset construction and sources.

2 Data

2.1 County-Level Mortality Rates

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's National Center for Health Statistics. These data provide information from all death certificates filed in the United States from 1990 to 2013. 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.[4] Internal causes of death are defined as those that originate within the

and Zhu (2013), and Torres-Ruiz and Utar (2013).

[3]Following Pierce and Schott (2016b), Autor et al. (2017) find that increased import competition is associated with an increase in mortality rates for men, relative to women, contributing to a scarcity of marriageable men.

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

body (e.g., liver disease) and external causes of death are defined as those whose origins lie outside the body (e.g., suicide or drug overdose).

We match year by county of residence by age by gender by race death counts to corresponding population estimates compiled by the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) Program.[5] 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 U.S. population in each age category are used as weights.[6] We use the U.S. population shares in the year 2000 for constructing age-adjusted mortality rates.[7]

Figure 1 plots the (censored) distributions of age-adjusted mortality rates across counties at four-year intervals starting in 1990.[8] 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 average mortality rate across counties is 892, with an interquartile range stretching from 797 to 982. The remaining rows show that average mortality is higher for males than females (1103 versus 736), and higher for blacks than for other racial groups.[9]

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, poisoning – which primarily consists of drug overdoses – and chronic liver disease among middle-aged whites starting in 1999. Figure 2 uses the CDC microdata examined here to demonstrate these trends and extend them backwards for mortality from suicide, drug overdoses and alcohol-related liver disease (ARLD).[10] 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

[5]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.

[6]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.

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

[8]To promote readability, the figure excludes counties with mortality rates greater than 1,500.

[9]Table A.2 of the online appendix reports the overall U.S. mortality rates for major external and internal causes of death in 2000. Internal causes account for more than 90 percent of the 2.4 million deaths in that year, with the three leading causes being cancer (neoplasm), circulatory disease and respiratory ailments. Suicide, drug overdose and ARLD account for 29,416, 14,160 and 12,126 deaths, or approximately 10, 5 and 4 per 100,000.

[10]Section A of the online appendix details the NCHS codes used to construct mortality rates for these causes of death.

increasing around the time of the change in U.S. trade policy in the year 2000, particularly for suicide. Deaths due to drug overdose, by contrast, are increasing before 2000, but exhibit an inflection point around that time.

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 and led to an economically significant labor market disruption.

The impact of PNTR on U.S. labor markets can be understood by considering the two sets of tariff rates that comprise the U.S. tariff schedule and how they relate to U.S. trade policy toward China. The first set of tariffs, known as NTR tariffs, are generally low and apply to goods imported from other members of the World Trade Organization (WTO).[11] 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, though 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 began granting China such a waiver in 1980. However, 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, Congressional votes over annual renewal became politically contentious and less certain of passage. Indeed, the U.S. House of Representatives passed resolutions to end China's NTR status in 1990, 1991 and 1992, though the Senate failed to act on the House votes, keeping China's temporary NTR status in place.

The possibility that China's NTR status would be withdrawn – and that tariffs would increase – created a disincentive for U.S. firms to invest in locating production in China for export to the United States, and for Chinese firms to make sunk investments to export to the United States, e.g., scaling up their capacity.[12] These disincentives were lifted when Congress passed a bill granting permanent NTR status to China in October 2000; this bill eliminated the need for annual NTR renewals effective upon China's entry into the WTO in

[11] Normal Trade Relations is the terminology used in the United States to refer to the familiar concept of Most Favored Nation.

[12] Following a survey of U.S. firms doing business in China, the U.S. General Accounting Office reported that respondents "cited uncertainty surrounding the annual renewal of China's most-favored-nation trade status as the single most important issue affecting U.S. trade relations to China," and a 1993 letter signed by the CEOs of 340 firms including General Motors, Boeing, and Caterpillar noted that "the persistent threat of MFN withdrawal does little more than create an unstable and excessively risky environment for U.S. companies considering trade and investment in China, and leaves China's booming economy to our competitors (Rowley (1993))." Pierce and Schott (2016a) provide an extensive list of additional anecdotal reports from firms and government agencies describing the extent and effects of the disincentives created by uncertainty regarding China's NTR status prior to PNTR.

December 2001.

Passage of PNTR is associated with economically significant changes in U.S. imports from China as well as U.S. employment. Pierce and Schott (2016a) show that industries more exposed to the change in policy exhibit relative increases in import volume as well as relative growth in both the number of U.S. firms importing from China and the number of Chinese firms exporting to the United States. With respect to the U.S. labor market, they find that greater exposure to PNTR is associated with relative declines in manufacturing employment.

We follow this earlier work and measure 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 30 and 18 percentage points. As noted in Pierce and Schott (2016a), 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.[13]

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

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

where c indexes counties, j indexes years and L represents employment. We use employment shares from 1990, a period well before the change in policy.[14] NTR gaps are defined only for industries whose output is subject to U.S. import tariffs, primarily in the manufacturing and agricultural sectors. Industries whose output is not subject to tariffs, such as service industries, have NTR gaps of zero by definition. For each county, we also calculate the population-weighted-average NTR gap of the *remaining* counties in its commuting zone, $NTR\,Gap_{cz}$.[15]

[13]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.

[14]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 county-industry observations where only a range of employment is reported.

[15]Surrounding-county NTR gaps have a similar distribution, with a mean and standard deviation of 6.6

Figure 3 reports the distribution of NTR gaps across four-digit SIC industries and U.S. counties. Relative to the distribution across industries, the distribution for counties is shifted towards the left, reflecting the fact that most workers in most counties are employed outside goods-producing sectors.[16] Own-county NTR gaps average 7.3 percent and have a standard deviation of 6.5 percent, with an interquartile range from 2.3 to 10.6 percent, or 1.3 standard deviations.

2.3 Other Control Variables

Our baseline specification 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 average 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.[17]

MFA Exposure: 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, the MFA 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 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

and 4.8 percent, and an interquartile range from 3.3 to 8.8 percent, or 1.1 standard deviations. 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.

[16]The distribution for industries in Figure 3 omits SIC industries that are not subject to import tariffs.

[17]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 (2016a) suggests this is an reasonable assumption that avoids having to make do with the smaller set of industries for which "revealed" rates are available.

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 Khandelwal et al. (2013) in measuring the extent to which MFA quotas in industry j and phase p were binding as the average fill rate of the industry's constituent import products in the year before they were phased out, $FillRate_{jp}$.[18] Specifically, for each phase, we measure an industry's exposure to MFA expiration as its average quota fill rate in the year prior to the phase's expiration. Industries with higher pre-expiration average fill rates faced more binding quotas and are therefore more exposed to the end of the MFA. Second, we compute counties' labor-share-weighted-average fill rate across industries for each phase, $FillRate_{cp}$, using a version of Equation 2. Finally, the county-year variable of interest, $MFAExposure_{ct}$, cumulates the calculated fill rates as each phase of expiration takes place. 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, this measure of exposure to the MFA rises over time, as quotas for additional products are removed, by phase.

Changes in U.S. Export Opportunities: 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 and thereby mortality including liberalization of its import tariff rates and reductions of production subsidies, which might increase export opportunities for U.S. manufacturers. Following Pierce and Schott (2016a) we use product-level data on Chinese import tariffs from 1996 to 2005 from Brandt et al. (2017) to compute the average change across those years in Chinese import tariffs across products within each U.S. industry. For production subsidies, we use data from the Annual Report of Industrial Enterprise Statistics compiled by China's National Bureau of Statistics (NBS), which reports the subsidies provided to responding firms.[19] For both changes in Chinese import tariff rates and production subsidies, we compute the labor-share-weighted average of this change across the industries active in each U.S. county as in Equation 2, and then interact these variables with an indicator for post-PNTR years. 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)

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

[18] As discussed in Brambilla et al. (2010), fill rates are defined as actual imports divided by allowable imports under the the quota. MFA products for which there were no restrictions on imports (i.e., there were no quotas), have fill rates of zero.

[19] 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 et al. (2013) spans the period 1998 to 2005. Following Girma et al. (2009) and Aghion et al. (2015) we use the variable "subsidy" in this dataset and 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).

of population that are veterans.[20] These variables allow for the possibilities, respectively, that changes in technology unrelated to the trade liberalization 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 suicide and opioid misuse might be the result of military experience associated with post-9/11 wars in Afghanistan and Iraq (Kemp and Bossarte (2012); Bauerlein and Campo-Flores (2016)). These attributes, summarized in Table 1, are obtained from the U.S. Census Bureau's 1990 Decennial Census.[21] As noted in the table, the unweighted means and standard deviations across counties are 64.7 and 11.0 percent (share of population with no college education), 31.2 and 8.6 thousand dollars (median household income), and 14.8 and 2.8 percent (percent of population that are veterans, respectively.[22]

Table A.3 in the online appendix reports the results of OLS regressions of counties' NTR gaps on the control variables discussed in this section. As indicated in the table, counties with higher NTR gaps have greater exposure to the MFA, have higher import tariffs across the goods they produce, are exposed to larger reductions in Chinese imports tariffs and subsidies, have lower household incomes in 1990, have lower share of population with a college education in 1990, and have a higher share of the population that are veterans in 1990.

3 PNTR and County Mortality Rates

This section examines the link between PNTR and deaths of despair, which consists of suicide, drug overdose and alcohol-related liver disease (ARLD). We focus on these causes of death for several reasons: they account for a substantial portion of the increase in mortality rates for middle-aged whites highlighted in Case and Deaton (2015); there is an established link between these causes of death and job loss Classen and Dunn (2012); 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 drug overdose.[23]

[20] We use initial rather than contemporaneous levels of these variables as the latter may be affected by the change in policy.

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

[22] These unweighted averages across counties can differ from national averages as they are more affected by counties with small populations. Regression results described below are population weighted.

[23] There is reason to believe that the listed cause of death on death certificates may be noisy. Schottenfeld et al. (1983), 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.

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 versus before (second difference),

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

The sample period is 1990 to 2013.[24] The left-hand side variable represents the age-adjusted death rate for a particular cause of death for county c 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 industries active in 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 and exposure to changes in Chinese domestic production subsidies – 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 and after passage of PNTR.[25] 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 this DID identification strategy is its 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

We begin with an analysis of overall deaths of despair, as aggregating suicide, drug overdoses and ARLD helps alleviate a "small numbers" problem that can arise for uncommon causes of death in counties with small populations.[26] Results from estimation of Equation 3 are

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

[25] Our analysis includes the 3,121 counties for which all covariates are defined for every year.

[26] We report results for each constituent cause of death below, and also address the potential small numbers problem via geographic aggregation in Section 4.

reported in Table 2 with standard errors clustered at the county level, though we note that results are robust to clustering at the state 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 are positive and statistically significant at conventional levels across all four specifications, and are generally of similar magnitude. We assess the economic significance of the DID estimates by computing the change in mortality rates associated with moving a county from the 25th percentile to the 75th 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 1.28 = [0.154*(10.6-2.3)] per 100,000 in column 3 to 2.00 per 100,000 in column 4. These changes represent 6.4 to 10.0 percent of the average age-adjusted mortality rate from deaths of despair across counties in the year 2000 which, as reported in the penultimate row of the table, is 20.

Coefficient estimates for initial county attributes indicate that counties with lower initial household income, higher shares of the population that did not attend college, and higher shares of veterans in the population experience larger increases in mortality from deaths of despair in the post-PNTR period, relative to before. One standard deviation increases in these initial county attributes (1) are associated with -4.7, 4.5 and 17.6 percent relative increases in mortality rates *vis a vis* the 2000 average, respectively. Among policy variables, declines in Chinese production subsidies are associated with relatively lower mortality from deaths of despair, post-PNTR, perhaps due to increased export opportunities for U.S. firms. The coefficient estimate for Chinese production subsidies suggests that a one standard deviation decline in that variable (2.5 percent) is associated with a relative decline in mortality from deaths of despair of 2.7 percent relative to the 2000 average.

Table 3 breaks out the results for overall deaths of despair by its constituent causes using the full specification from the final column of Table 2. DID point estimates of interest are positive for all three causes of death but statistically significant at conventional levels only for suicide and drug overdose. For the latter, interquartile increases in exposure are associated with implied increases in mortality of 0.45 and 1.31 per 100,000, or 4.4 and 25.4 percent of their average mortality rates of 10 and 5, respectively.[27]

3.3 Baseline DID Estimates by Gender, Race and Age

We examine the link between PNTR and aggregate deaths of despair by race and gender in Table 4. To conserve space, analogous results for suicide, drug overdose and ARLD are reported in Tables A.4 to A.6 of the online appendix. As shown in Table 4, we find that the positive relationship between PNTR and overall deaths of despair is concentrated in one

[27]Within suicides, we find positive relationships both with respect to those which involve a firearm and those that do not.

racial group – whites – and that this link is statistically significant at conventional levels for both males and females. As indicated in the bottom panel of this table, an interquartile shift in exposure to PNTR is associated with increases in mortality of 8.1 and 11.5 percent among white males and females, respectively. By contrast, we find no relationship between PNTR and overall deaths of despair for blacks, Asians or American Indian males.[28]

Within deaths of despair, results in Tables A.4 to A.6 of the online appendix indicate that PNTR is associated with relative increases in mortality among whites due to suicide (males and females), drug overdose (males and females) and ARLD (males). The largest implied increases in relative mortality rates are found with respect to drug overdoses, where interquartile shifts in exposure to PNTR are associated with increases of 19.4 and 28.5 percent for while males and females, respectively. While DID analysis is not amenable to predicting level changes, these results nevertheless provide context for Case and Deaton (2015)'s surprising finding that mortality due to deaths of despair has been increasing among whites since 2000.

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.7 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 percent of manufacturing employment versus 82 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 the largest declines in income following job separation.[29] The negative impact on mortality of these earnings declines might be magnified by the psycho-social stress induced by an accompanying loss of status (Cutler et al. (2006)).

To further assess whether the relationship between PNTR and mortality operates through the labor market, we examine the association between crude death rates and PNTR across age groups. 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 overall deaths of despair (top row) and its constituent causes (remaining rows). (Tables A.8 to A.13 in the online appendix report the corresponding regression results for white males and females.) As indicated in

[28]We find a negative and statistically significant association with respect to American Indian females. Estimates for the American Indian and Asian populations may be noisy due to their small size and relatively uneven distribution across counties. These populations represent 1.1 and 4.2 percent of the overall U.S. 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.

[29]Ebenstein et al. (2014), for example, find that workers displaced from manufacturing on average experience wage declines in moving to another sector. As reported in Table A.7 of the online appendix, whites accounted for 90 percent of managers and professionals, 86.3 percent of technical, sales, administrative and service positions, and 83 percent of precision production positions, versus 79 percent among operators, fabricators, laborers and other occupations

the figure, an association between PNTR and suicide is evident across most of the five-year age bins between ages 20 and 54 for white males, but is not statistically significant for white females in any age category.[30] For drug overdoses, 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 present in middle-age bins for white males and not evident in any age category for females. These results indicate that the relationship between PNTR and mortality from deaths of despair is present for working age adults, including those in middle age.

4 Robustness and Discussion

This section describes a series of exercises that examine the robustness of the baseline DID results reported in the previous section. First, we use a more flexible 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 to control for exogenous shocks to the supply of opioids and changes in state health policies. Next, we consider higher levels of data aggregation, allowing for spillover effects from other counties in the same commuting zone and also considering mortality rates defined for areas with larger populations. Finally, we consider controls for counties' initial manufacturing intensity, as measured by employment share.

Overall, these exercises indicate that the positive and statistically significant relationship between exposure to PNTR and deaths of despair is robust. For overall deaths of despair and for drug overdoses specifically, we find that higher exposure to the policy change is associated with relative increases in mortality in each of the specifications we consider. We also find substantial evidence for a positive association between PNTR and suicide, though this relationship loses statistical significance in several specifications, perhaps because of collinearity with the additional regressors included in these specifications. We find less evidence that PNTR is associated with relative increases in mortality from ARLD. In sum, given the substantial flexibility associated with the specifications we consider in this section, we find these results to be persuasive evidence for a relationship between PNTR and deaths of despair.

4.1 Prior Trends and Timing

To consider whether counties with high versus low exposure were on different trends for mortality rates prior to passage of PNTR, and to further assess the timing of the estimated relationship between PNTR and mortality, we estimate a version of Equation 3 that inter-

[30] Gemmill et al. (2015) find that macroeconomic shocks appear to induce suicide among working age males, as opposed to simply moving suicides forward in time.

acts the time-invariant county-level NTR gap and other county attributes with an indicator variable for each year,

$$\begin{aligned} DeathRate_{ct} &= \sum_t \theta_t \, 1\{year = t\} \times NTRGap_c + \\ &\quad \beta \mathbf{X}_{ct} + \\ &\quad \sum_t \gamma_t \, 1\{year = t\} \times \mathbf{X}_c + \\ &\quad \delta_c + \delta_t + \varepsilon_{ct}, \end{aligned} \tag{4}$$

Figure 5 presents a matrix of graphs for reviewing the results of these estimations visually. Each panel of the figure uses the estimated DID parameters of interest (θ_t) from a separate regression to display the 95 percent confidence interval associated with an interquartile shift in counties' NTR gaps. Results for overall deaths of despair are presented in the first column; subsequent columns present estimates for suicide, drug overdose and ARLD. The top row of figures is for the overall population, while the next two rows are for white males and white females. To conserve space, we omit figures for the other racial groups, but they are available upon request.

As indicated in the upper left panel of the figure, we find that the confidence interval for overall deaths of despair for the overall population is statistically indistinguishable from zero prior to 2000, but takes a notable step up around the time of the change in policy in 2000, and remains elevated through the end of the sample period. The two panels beneath this first panel reveal a similar pattern for white males and females, though for females there is a break in the pattern at the onset of the Great Recession.

Similar patterns are also present for suicide and drug overdose. As with overall deaths of despair, the step up in mortality rates is clearer for white males than white females. Across causes of death, it is clearer for suicide and drug overdose. This specification yields little evidence in favor of a link between PNTR and ARLD, as confidence intervals include zero across the sample period for all three groups.

4.2 Trends

To account for the possibility that mortality rates may have trends unrelated to PNTR that vary by geography or initial economic conditions, we amend our baseline specification (equation 3) to include interactions of time trends with census region, state, or county initial-household-income quartile dummy variables. Results are reported in the second, third and fourth columns of Table 5. Each "block" in this table reports results from a different regression, where results are displayed in terms of economic significance, i.e., the impact of an interquartile shift in county exposure. The four blocks in each column correspond to results in which the dependent variable is one of the following mortality rates: overall deaths of despair, suicide, drug overdose or ARLD. For comparison, the first column of the table reports

the results from our baseline specification. We estimate the same relationships for white males and white females, but to conserve space these tables appear in the online appendix (Tables A.14 and A.15).

As indicated in these tables, the sign, statistical significance and magnitude of the results are similar to the baseline across these trend-inclusive specifications for the four cause of death categories, both for the overall population and for white males. For white females, estimates for overall deaths of despair and drug overdoses remain positive and statistically significant in all three trend specifications, while for suicide the relationship is statistically significant only in the specification with income trends.

4.3 Alternate Measures of Geography

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 add to our baseline specification an interaction of the $Post\,PNTR_t$ indicator variable with counties' exposure to PNTR via the remaining counties in their commuting zones, $NTR\,Gap_{cz}$, described in Section 2. Results are reported in the fifth column of Table 5 (and Tables A.14 and A.15 of the online appendix), which report the cumulative implied impact of an interquartile shift from *both* exposures. As indicated in the table, the results are nearly identical to the baseline estimates in terms of sign, statistical significance and magnitude.

One concern associated with examining deaths of despair is that their relative infrequency may lead to noisy estimates of mortality rates, especially for sparsely populated counties. We address this concern by re-constructing the dataset at the level of larger geographic units that we refer to as "super" PUMAs. Standard public use microdata areas (PUMAs) are geographic areas constructed by the U.S. Census Bureau to have a minimum population of 100,000. Here, because counties can span more than one PUMA, we construct an algorithm based on the year 2000 PUMA definitions that combines PUMAs, as needed, so that all counties map into a unique PUMA or combination of PUMAs.[31] We then re-estimate our baseline specifications on this super PUMA-level dataset.

The sixth column in Table 5 (and Tables A.14 and A.15 of the online appendix) summarize the results. For overall deaths of despair, estimates remain positive and are precisely estimated for all three groups. Results for drug overdose remain positive and statistically significant overall and for both white males and females, with the implied impacts increasing for all three groups. For suicide, results for white females and the overall population lose statistical significance, while the estimated effect for white males remains positive and is statistically significant at the ten percent level, though it declines in magnitude.

[31] Further detail on the construction of super-PUMAs and a comparison of population distributions across counties, PUMAs and super-PUMAs is contained in Section C of the online appendix. Case and Deaton (2017) use a concept similar to super-PUMAs, which they refer to as "coumas."

4.4 Medicaid Expansion, Opioid Policies and State-Year Fixed Effects

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 (Baicker et al. (2013); Finkelstein et al. (2012)). Results are reported in the seventh column of Table 5 (and Tables A.14 and A.15 of the online appendix). As indicated in the tables, including these covariates yields results that are very similar to the baseline for all groups and causes of death.

A substantial amount of attention among public health researchers, the media and policymakers has recently been paid to a surge in the abuse of opioids, including both prescription painkillers and illegal drugs (e.g., Rose A. Rudd and Gladden (2016)). If there were exogenous increases in the availability of opioids in areas that happened to experience increased import competition due to PNTR – but that were unrelated to the change in policy – we may find a spurious relationship between deaths of despair and exposure to the policy change. This seems plausible given that laws and policies on the licensing and regulation of doctors and the tracking of opioid prescriptions were largely made at the state-level, with substantial variation in the extent of opioid-related legislation across states (Meara et al. (2016)).[32]

To assess the potential effects of this variation in policy, we use data on state-level legislation pertaining to opioid regulation collected by Meara et al. (2016). These data track a variety of types of legislation covering categories such as prescription monitoring databases, prevention of "doctor-shopping" for prescriptions and regulation of pain clinics. For each state, we sum the number of categories of legislation enacted over the years covered in Meara et al. (2016), 2006 to 2012. We then interact this measure of the extent of state-level opioid legislation with the post-PNTR indicator and include this interaction in equation 3. The eighth column in Table 5 (and Tables A.14 and A.15 of the online appendix) indicates that results from this specification are nearly identical to the baseline, with the primary difference being that the estimate for ARLD is now statistically significant for the overall population.

Another approach to controlling for changes in medical and drug policies is to include a full set of state by year fixed effects. This approach captures any state-year-level factor that might exogenously affect mortality rates, including changes in medical and drug policies, economic shocks that are unrelated to exposure to PNTR, and changes in states' underlying demographic characteristics. This approach is particularly stringent as it absorbs the substantial across-state variation in the NTR gap. Moreover, it will sweep out effects of increases in the supply of opioids that might be related to PNTR and would therefore belong in estimates

[32]Morden et al. (2014) describe regional variation in the prevalence of opioid prescription among disabled medicare beneficiaries.

of its impact.[33]

Results with state-year fixed effects are reported in the ninth column of Table 5 (and Tables A.14 and A.15 of the online appendix). As shown in those columns, we continue to find a positive relationship between PNTR and both drug overdose and overall deaths of despair among white males and white females. For suicide, the relationship with PNTR remains positive and statistically significant overall and for white males, but loses statistical significance for white females. Results for ARLD become positive and statistically significant overall and remain statistically significant for white males. Given the substantial variation in the dependent variable that is captured by state-year fixed effects, we consider these findings to be persuasive evidence in favor of a role for the change in policy on mortality.

4.5 Manufacturing Intensity

As noted in Section 2.3, our baseline specification includes counties' initial share of non-college-educated population to control for the possibility that workers in such counties are more susceptible to replacement by automation or competition with lower-wage foreign workers that is unrelated to PNTR, including those employed either inside or outside of manufacturing. An alternate approach to capturing such variation is to include a control for counties' initial share of manufacturing employment, as this share may also be an indicator of counties whose workers are at risk of replacement by technology. Furthermore, if counties with high NTR gaps had spuriously high manufacturing employment in the 1990s, this control can help account for subsequent declines in manufacturing employment during the 2000s that are driven by mean reversion.

On the other hand, counties' initial shares of manufacturing employment may also capture unobserved exposure to PNTR. Pierce and Schott (2016a), for example, show that conditional on their own exposure, establishments that are more exposed to PNTR via downstream industries experience relatively greater declines in manufacturing employment. As a result, NTR gaps based solely on own-industry exposure may underestimate the impact of the change in policy on up-and-downstream-linked manufacturing industries, and this underestimation may rise in ways that are difficult to measure if these input-output linkages are stronger within counties exhibiting agglomeration of industries (Ellison et al. (2010)).

One further consideration is that, in practice, NTR gaps and manufacturing employment shares are highly correlated ($\rho = 0.87$) because manufactured goods represent the vast majority of products present in the U.S. tariff schedule. As a result, inclusion of both exposure

[33]For example Quinones (2015) describes the possibility of opioid supplies responding to economic conditions in *Dreamland*:

"The pain treatment revolution had many faces and these mostly belonged to well-meaning doctors and dedicated nurses. But in the Rust Belt, another kind of pain had emerged. Waves of people sought disability as a way to survive as jobs departed. Legions of doctors arose who were not so well-meaning, or who simply found a livelihood helping people who were looking for a monthly government disability check as a solution to unemployment. By the time the pain revolution changed U.S. medicine, the Ohio River valley had a class of these docs. They were an economic coping strategy for a lot of folks."

to PNTR and counties' manufacturing share may bias results away from finding an effect for either.

The final two columns of Table 5 (and Tables A.14 and A.15 of the online appendix) report results for two specifications that control for the initial manufacturing intensity of each county in two different ways. The first augments the baseline specification to include trend terms for each quartile of initial manufacturing employment shares. This covariate accounts for the possibility that counties with different initial manufacturing shares may be on different trends in terms of mortality rates even before PNTR. The second augments the baseline specification to include an interaction of a post-PNTR indicator with the county's initial manufacturing share. This covariate allows for the possibility that initially manufacturing-intensive counties exhibit changes in mortality after 2000 that are unrelated to PNTR.

For overall deaths of despair, we continue to find a positive and significant relationship with respect to exposure to PNTR for all three groups in both specifications. For specifications examining suicide, the relationship with PNTR loses statistical significance, while for drug overdoses, the estimated relationships remain statistically significant and increase in magnitude. The relationship between the policy change and ARLD is generally statistically insignificant, overall and among white men, but turns negative and statistically significant in the final column for the overall population. We interpret the persistence of the overall deaths of despair relationships in the presence of a term that is highly correlated with the change in policy as further evidence in favor of a link between PNTR and deaths of despair.

4.6 Migration

County-level mortality rates could, in principle, be influenced by two types of selective out-migration. The first would be migration based on age, e.g., if younger workers are more likely to move in response to a labor market shock than older workers. Examining both population changes and migration, Greenland et al. (2016), for example, find that areas with greater exposure to PNTR experience relative reductions in population and relatively larger out-migration, especially among the young, though most of the out-migration occurs with a lag of 7 to 10 years. Such movement might bias our results downwards or upwards depending on whether younger workers are more or less likely to suffer deaths of despair. On the other hand, the SEER population data we use to calculate age-adjusted mortality rates track population changes by age, race, and gender, at an annual level, and therefore can reasonably be expected to reflect changes in the population of young people that might affect the mortality rates we compute. In addition, the Census population data upon which the SEER population data are based include explicit adjustments to account for migration.[34]

[34]While Arthi et al. (2017) discuss potential errors in inter-censal population estimates, these issues are less of a concern once the estimates have been revised to reflect the information in subsequent censuses, which has occurred for the years 1990 to 2010, nearly our entire period of analysis. While data for 2011 to 2013 will not undergo this revision process until the 2020 Census is released, accuracy of inter-censal population estimates is less of a concern in the years immediately following a Census (Phipps et al. (2005).

A second type of selective out-migration that might influence our results involves differential movement of workers within age groups. If those least likely to suffer deaths of despair are more likely to migrate in response to the change in U.S. trade policy, our results will be overstated, and *vice versa.* While we do not have any data that allows us to address this issue directly, we do find, below, that while counties more exposed to PNTR experience relative *increases* in deaths of despair and some forms of cancer, they experience relative *decreases* in mortality from heart attacks. This variation suggests that whatever correlation may exist between migration and vulnerability to specific causes of death, it is likely complex.

In either case, our finding that age-adjusted mortality rates increase within counties more exposed to PNTR is evidence of important distributional implications of changes in trade policy. Moreover, because overall deaths of despair increase substantially over the period we examine (Figure 2; Case and Deaton (2015)), it is clear that the data do not simply reflect a reshuffling of population, and therefore mortality, across counties.

5 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, and Figure A.6 in the online appendix shows that 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.[35] In this section, we examine the relationship between PNTR and four county-level labor market indicators: total employment, the unemployment rate, the labor force participation rate and per-capita personal income.

We draw data on employment, the unemployment rate and the labor force participation rate 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.[36] We use data from the U.S. Bureau of Economic Analysis's (BEA) Local Area Personal Income (LAPI) database to track counties' per capita personal income, which is deflated using the BLS *regional* Consumer Price Index for all urban consumers (CPI-U).[37] The distributions of these labor market variables across counties 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 Table 6, with standard errors

[35] As discussed in Pierce and Schott (2016a), 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.

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

[37] 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. The LAPI data are available at http://www.bea.gov/regional/. Detailed discussions of the definitions of personal income are available on the BEA and BLS websites.

clustered at the county level.[38] As indicated in the table, we find that total employment exhibits a negative and statistically significant relationship with county exposure to PNTR, with the coefficient estimates suggesting that an interquartile shift along the NTR gap distribution is associated with a relative decline in overall employment of -0.04 log points. The next two columns of Table 6 reveal that greater exposure to PNTR is associated with a statistically significant relative increase in counties' unemployment rates and a statistically significant relative 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 1.17 percentage points, or 28.7 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 -1.4 percentage points, or -2.8 percent of the average labor force participation rate across counties in 2000.[39]

Figure 6 visually reports the results of regressing unemployment and labor force participation 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 are indistinguishable from zero until around the change in policy, and then rise and fall, respectively, thereafter.[40]

6 Two-Stage Least Squares Estimates of Mortality on the Unemployment Rate

For additional insight into labor market outcomes as a mechanism behind the relationship between PNTR and mortality rates, and to facilitate comparison of our estimates to those already in the literature (e.g., Ruhm (2000)), we estimate a series of two-stage-least squares regressions of deaths of despair 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.[41]

[38] Unfortunately, the data required to compute unemployment and labor force participation rates by race and gender are unavailable before 2005. Using publicly available data from the American Community Survey (Table B23003, downloadable at https://factfinder.census.gov/), we find that white unemployment and not-in-labor-force rates are positively associated with PNTR in 2005 across "super-pumas" (the most disaggregate level at which the data are available without substantial suppression).

[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 $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 D of the online appendix, we demonstrate a positive link between exposure to PNTR and property crime.

[41] These two-stage least squares estimates are appealing in that they demonstrate a direct mechanism through which PNTR might affect mortality. Nonetheless, it is important to note that the exclusion restriction would

Results are reported in Table 7. As indicated in columns one, three, five and seven, we find a positive relationship between the unemployment rate and overall deaths of despair and all three individual causes of death when using OLS, though the result is not statistically significant for ARLD in column seven. Two-stage least squares results, reported in columns two, four, six and eight also indicate a positive relationship between the unemployment rate and all four categories of death, though here, too, results for ARLD are statistically insignificant at conventional levels.

Point estimates for overall deaths of despair imply that a one standard deviation increase in the county unemployment rate in 2000 (1.7 percentage points) is associated with a 25 (=1.7*2.917/20) percent increase in deaths of despair relative to the average in 2000. For suicide and drug overdoses, the same increase in the county unemployment rate is associated with a 19 (=1.7*1.182/10) percent increase in suicides and a 56.3 (=1.7*1.706/5) percent increase in drug overdoses. The 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. 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), or the fact that relative increases in unemployment associated with the change in trade policy are more persistent than those associated with typical cyclical fluctuations. Differences may also be related to sample periods: whereas the analysis in Ruhm (2000) ends in 1991, our analysis considers mortality rates through 2013, a relevant distinction given that Ruhm (2016) shows that the magnitude of the positive relationship between unemployment rates and suicide nearly triples from 1976 to 2009.

7 Other Causes of Death

In Table 8, we use our baseline specification to investigate the relationship between PNTR and other causes of death. The first two columns report results for deaths due to all internal and all external causes. We find positive and statistically significant relationships in both cases, though the implied impact of PNTR relative to mortality rates in 2000 is larger for external causes. As indicated in the table, coefficient estimates for 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 807 per 100,000), versus 6.3 percent for external causes.[42]

A large body of research in the economics and public health literatures examines the potential impact of health insurance on health outcomes, hypothesizing that lack of coverage

not hold if PNTR influences mortality through channels other than the unemployment rate. Our baseline OLS estimates, by contrast, allow for the possibility that PNTR could influence mortality rates through other channels such as changes in the provision of local government services (Feler and Senses (2015)), crime (Che et al. (2016)), or other labor market outcomes.

[42]We also report results for the 16 major internal causes of death in Table A.16 of the online appendix.

might inhibit both preventative screening and treatment of known conditions. Toward that end, columns three through five of Table 8 examine links between PNTR and several internal causes of death which, ideally, involve consistent monitoring and treatment, i.e., diabetes, or are sensitive to preventative screening, i.e., cancer of the breast, bone and skin and cancer of the digestive tract, which includes colorectal cancer. As indicated in the table, we find no relationship with respect to diabetes, but we do find positive and statistically significant relationships for both types of cancer. The implied impacts of an interquartile shift in a county's exposure to PNTR for these causes of death are increases in the mortality rate of 1.4 and 1.1 percent, respectively, compared to their year-2000 levels (of 21 and 47 deaths per 100,000). These results may point to a role for the loss of employer-provided health insurance in increasing mortality from certain causes of death.[43]

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.[44] In columns six and seven of Table 8, we examine death due to AMI versus all other forms of circulatory disease.[45] 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 -4.4 percent relative to the year-2000 level (of 69 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 (2016), 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 et al. (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 columns of Table 8 reports results for accidents other than drug overdoses. We find a positive and significant association between exposure to PNTR and mortality from motor vehicle accidents. This relationship is inconsistent with Ruhm (2000) and Stevens et al. (2011), who find a negative and statistically significant relationship between this cause of death and unemployment rates. One potential explanation for the difference

[43]Robbins et al. (2015), for example, links limited insurance coverage with later-stage cancer diagnosis, especially for cancers that are detectable by screening. Similarly, 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.

[44]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.

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

may be the impact of PNTR on drinking while driving. Another might involve healthcare coverage: Doyle (2006), for example, finds that the medically uninsured receive 20 percent less care and have a substantially higher mortality rate from auto accidents.

8 Conclusion

This paper examines a link between mortality and exposure to an economic shock, a change in U.S. trade policy with China known as PNTR, which is associated with relative increases in U.S. imports from China and relative declines in employment and earnings. We calculate exposure to PNTR as the employment-weighted-average exposure of the industries active in each county and calculate mortality rates using confidential data from the CDC. We then estimate the relationship between PNTR and mortality using a 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 relative increases in mortality due to deaths of despair, particularly drug overdose and suicide. We find that this relationship is concentrated among whites, and especially among white males. Furthermore, the results are present for those in middle age, in line with Case and Deaton (2015)'s finding of a dramatic increase in mortality from deaths of despair among middle-aged whites since 1999. 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 as including controls for shocks to the supply of opioids and exposure of other counties in the surrounding labor market.

We also document a potential channel for PNTR to affect mortality rates operating through the labor market. We show that higher exposure to PNTR is associated with a relative worsening of labor market conditions, which is observed through declines in employment and labor force participation, along with an increase in the unemployment rate. In an instrumental variables analysis, we show that higher county-level unemployment rates are associated with higher mortality from suicide and drug overdoses when exposure to PNTR is used to instrument for the endogenous unemployment rate.

While the results in this paper do not provide an assessment of the overall welfare impact of PNTR, we believe that they offer a broader understanding of the distributional implications of trade liberalization by focusing on an outcome that has traditionally received relatively little attention in the trade literature. Moreover, by providing new evidence regarding the effects of major labor market disruptions, the findings may offer insights for those considering potential effects of technology shocks on employment.

References

Aghion, P., J. Cai, M. Dewatripont, L. Du, A. Harrison, and P. Legros (2015). Industrial policy and competition. *American Economic Journal: Macroeconomics 7*(4), 1–32.

Amiti, M., M. Dai, R. C. Feenstra, and J. Romalis (2017, June). How did chinas wto entry benefit u.s. consumers? Working Paper 23487, National Bureau of Economic Research.

Anderson, R. N., A. M. Minino, D. L. Hoyert, and H. M. Rosenberg (2001, May). Comparability of cause of death between icd-9 and icd-10. *National Vital Statistics Reports 59*(1).

Antràs, P., T. C. Fort, and F. Tintelnot (2017). The margins of global sourcing: Theory and evidence from u.s. firms. *American Economic Review 107*(9), 2514–64.

Arthi, V., B. Beach, and W. W. Hanlon (2017, June). Estimating the recession-mortality relationship when migration matters. Working Paper 23507, National Bureau of Economic Research.

Autor, D., D. Dorn, and G. Hanson (2017, February). When work disappears: Manufacturing decline and the falling marriage-market value of men. Working Paper 23173, National Bureau of Economic Research.

Autor, D., F. Levy, and R. Murnane (2003). The skill content of recent technological change: An empirical exploration. *The Quarterly Journal of Economics 118*(4), 1270–1333.

Autor, D. H., D. Dorn, and G. H. Hanson (2013). The china syndrome: Local labor market effects of import competition in the united states. *American Economic Review 103*(6), 2121–68.

Baicker, K., S. L. Taubman, H. L. Allen, M. Bernstein, J. H. Gruber, J. P. Newhouse, E. C. Schneider, B. J. Wright, A. M. Zaslavsky, and A. N. Finkelstein (2013). The oregon experiment â effects of medicaid on clinical outcomes. *New England Journal of Medicine 368*(18), 1713–1722. PMID: 23635051.

Bauerlein, V. and A. Campo-Flores (2016, December). The va hooked veterans on opioids, then failed them again. *Wall Street Journal*.

Bloom, N., M. Draca, and J. V. Reenen (2016). Trade induced technical change: The impact of chinese imports on innovation, diffusion, and productivity. *Review of Economic Studies 83*, 87–117.

Bockerman, P. and P. Ilmakunnas (2008). Interaction of working conditions, job satisfaction, and sickness absences: Evidence from a representative sample of employees. *Social Science & Medicine 67*(4), 520 – 528.

Bombardini, M. and B. Li (2016, November). Trade, pollution and mortality in china. Working Paper 22804, National Bureau of Economic Research.

Brambilla, I., A. K. Khandelwal, and P. K. Schott (2010). China's experience under the multi-fiber arrangement (mfa) and the agreement on textiles and clothing (atc). In *China's Growing Role in World Trade*, pp. 345–387. University of Chicago Press.

Brandt, L., J. Van Biesebroeck, L. Wang, and Y. Zhang (2017, September). Wto accession and performance of chinese manufacturing firms. *American Economic Review 107*(9), 2784–2820.

Browning, M. and E. Heinesen (2012, April). Effect of job loss due to plant closure on mortality and hospitalization. *31*, 599–616.

Case, A. and A. Deaton (2015). Rising morbidity and mortality in midlife among white non-hispanic americans in the 21st century. *Proceedings of the National Academy of Sciences 112*(49), 15078–15083.

Case, A. and A. Deaton (2017). Mortality and morbidity in the 21st century. *Brookings Papers on Economic Activity, Spring 2017*.

Che, Y., X. Xu, and Y. Zhang (2016, July). Chinese import competition, crime, and govern-

ment transfers in us.

Classen, T. J. and R. A. Dunn (2012). The effect of job loss and unemployment duration on suicide risk in the united states: a new look using mass-layoffs and unemployment duration. *Health Economics 21*(3), 338–350.

Cutler, D., A. Deaton, and A. Lleras-Muney (2006, September). The determinants of mortality. *Journal of Economic Perspectives 20*(3), 97–120.

Dean, J. M. and M. E. Lovely (2010). Trade growth, production fragmentation, and china's environment. In *China's growing role in world trade*, pp. 429–469. University of Chicago Press.

Deb, P., W. T. Gallo, P. Ayyagari, J. M. Fletcher, and J. L. Sindelar (2011). The effect of job loss on overweight and drinking. *Journal of Health Economics 30*(2), 317 – 327.

Dix-Carneiro, R. and B. K. Kovak (2015, January). Trade reform and regional dynamics: Evidence from 25 years of brazilian matched employer-employee data. Working Paper 20908, National Bureau of Economic Research.

Doyle, J. J. (2006). Health insurance, treatment and outcomes: using auto accidents as health shocks. *Health 87*(2).

Ebenstein, A., A. Harrison, M. McMillan, and S. Phillips (2014). Estimating the impact of trade and offshoring on american workers using the current population surveys. *The Review of Economics and Statistics*.

Ellison, G., E. L. Glaeser, and W. R. Kerr (2010, June). What causes industry agglomeration? evidence from coagglomeration patterns. *American Economic Review 100*(3), 1195–1213.

Falba, T., H.-M. Teng, J. L. Sindelar, and W. T. Gallo (2005). The effect of involuntary job loss on smoking intensity and relapse. *Addiction 100*(9), 1330–1339.

Feenstra, R. C., J. Romalis, and P. K. Schott (2002). Us imports, exports, and tariff data, 1989-2001. Technical report, National bureau of economic research.

Feler, L. and M. Z. Senses (2015). Trade shocks and the provision of local public goods. *Manuscript, JHU-SAIS, December*.

Feler, L. and M. Z. Senses (2017, November). Trade shocks and the provision of local public goods. *American Economic Journal: Economic Policy 9*(4), 101–43.

Feng, L., Z. Li, and D. L. Swenson (2016). The connection between imported intermediate inputs and exports: Evidence from chinese firms. *Journal of International Economics 101*(C), 86–101.

Finkelstein, A., S. Taubman, B. Wright, M. Bernstein, J. Gruber, J. P. Newhouse, H. Allen, and K. Baicker (2012). The oregon health insurance experiment: Evidence from the first year*. *The Quarterly Journal of Economics 127*(3), 1057–1106.

Gemmill, A., A. Falconi, D. Karasek, T. Hartig, E. Anderson, and R. Catalano (2015). Do macroeconomic contractions induce or ï¿œharvestï¿œsuicides? a test of competing hypotheses. *J Epidemiol Community Health*, jech–2015.

Girma, S., Y. Gong, and H. Gorg (2009). What determines innovation activity in chinese state-owned enterprises? the role of foreign direct investment. *World Development 37*(4), 866 – 873. Law, Finance and Economic Growth in China.

Greenland, A., J. Lopresti, and P. McHenry (2016). Import competition and internal migration.

Handley, K. and N. Limao (2017, September). Policy uncertainty, trade, and welfare: Theory and evidence for china and the united states. *American Economic Review 107*(9), 2731–

83.

Hollingsworth, A., C. J. Ruhm, and K. Simon (2017, February). Macroeconomic conditions and opioid abuse. Working Paper 23192, National Bureau of Economic Research.

Houseman, S., C. Kurz, P. Lengermann, and B. Mandel (2011, June). Offshoring bias in u.s. manufacturing. *Journal of Economic Perspectives 25*(2), 111–32.

Hummels, D., J. R. Munch, and C. Xiang (2016, February). Offshoring and labor markets. Working Paper 22041, National Bureau of Economic Research.

Iyer, L. and P. B. Topalova (2014). Poverty and crime: evidence from rainfall and trade shocks in india.

Jaimovich, N. and H. E. Siu (2012, August). The trend is the cycle: Job polarization and jobless recoveries. Working Paper 18334, National Bureau of Economic Research.

Kemp, J. and R. M. Bossarte (2012, March). Surveillance of suicide and suicide attempts among veterans: Addressing a national imperative.

Khandelwal, A. K., P. K. Schott, and S.-J. Wei (2013, October). Trade liberalization and embedded institutional reform: Evidence from chinese exporters. *American Economic Review 103*(6), 2169–95.

McManus, T. and G. Schaur (2015). The effects of import competition on health in the local economy. Working Paper, Midwest International Trade Economics Conference Fall.

McManus, T. C. and G. Schaur (2016). The effects of import competition on worker health. *Journal of International Economics 102*(Supplement C), 160 – 172.

Meara, E., J. R. Horwitz, W. Powell, L. McClelland, W. Zhou, A. J. O'malley, and N. E. Morden (2016). State legal restrictions and prescription-opioid use among disabled adults. *New England Journal of Medicine 375*(1), 44–53.

Mion, G. and L. Zhu (2013). Import competition from and offshoring to china: A curse or blessing for firms? *Journal of International Economics 89*(1), 202 – 215.

Morden, N. E., J. C. Munson, C. H. Colla, J. S. Skinner, J. P. Bynum, W. Zhou, and E. R. Meara (2014). Prescription opioid use among disabled medicare beneficiaries: Intensity, trends and regional variation. *Medical care 52*(9), 852.

Phipps, A. I., C. A. Clarke, and R. R. Ereman (2005). Impact of intercensal population projections and error of closure on breast cancer surveillance: examples from 10 california counties.

Pierce, J. R. and P. K. Schott (2016a). The Surprisingly Swift Decline of U.S. Manufacturing Employment. *American Economic Review 106*(7), 1632–1662.

Pierce, J. R. and P. K. Schott (2016b). Trade liberalization and mortality: Evidence from us counties. Working Paper 22849, NBER.

Quinones, S. (2015). *Dreamland: The True Tale of America's Opiate Epidemic*. Bloomsbury Press.

Robbins, A., X. Han, E. Ward, E. Simard, Z. Zheng, and A. Jemal (2015). Association between the affordable care act dependent coverage expansion and cervical cancer stage and treatment in young women. *JAMA 314*(20), 2189–2191.

Rose A. Rudd, Noah Aleshire, J. E. Z. and M. R. Gladden (2016, January). Increases in drug and opioid overdose deaths â united states, 2000â2014. *Morbidity and Mortality Weekly Report 64*, 50–51.

Rowley, S. H. (1993, May). China woos western businesses, snubs clinton. *Chicago Tribune*.

Ruhm, C. J. (2000). Are recessions good for your health?*. *The Quarterly Journal of*

Economics 115(2), 617–650.

Ruhm, C. J. (2016). Health effects of economic crises. *Health Economics 25*, 6–24. HEC-15-0485.R1.

Schottenfeld, D., M. Eaton, S. C Sommers, D. R Alonso, and C. Wilkinson (1983, 01). The autopsy as a measure of accuracy of the death certificate. *58*, 778–94.

Sommers, B. D., K. Baicker, and A. M. Epstein (2012). Mortality and access to care among adults after state medicaid expansions. *New England Journal of Medicine 367*(11), 1025–1034. PMID: 22830435.

Stevens, A. H., D. L. Miller, M. E. Page, and M. Filipski (2011). The best of times, the worst of times: Understanding pro-cyclical mortality. *NBER Working Paper Series-National Bureau ofEconomic Research* (17657).

Sullivan, D. and T. V. Wachter (2009). Job displacement and mortality: An analysis using administrative data. *Quarterly Journal of Economics*, 1265–1306.

Tolbert, C. M. and M. Sizer (1996). Us commuting zones and labor market areas: A 1990 update.

Torres-Ruiz, L. and H. Utar (2013). International competition and industrial evolution: Evidence from the impact of chinese competition on mexican maquiladoras. *Journal of Development Economics 105*, 267–287.

Table 1: Summary Statistics

Variable	Obs	Mean	StdDev	Min	10th	25th	50th	75th	90th	Max
Age-Adjusted Death Rate (2000)										
Overall	3121	892	158	0	718	797	886	982	1,079	2,864
- Male	3121	1,103	235	0	857	965	1,088	1,228	1,372	4,657
- Female	3121	736	149	0	573	655	736	817	895	2,296
- White	3121	876	154	0	710	786	870	964	1,054	2,641
- Black	3088	824	858	0	0	0	930	1,216	1,514	9,897
- American Indian	3117	379	794	0	0	0	0	485	1,283	11,233
- Asian or Pacific Islander	3098	274	683	0	0	0	0	342	770	8,028
Median Household Income (1990)	3121	31.2	8.6	11.2	22.3	25.7	29.6	35.1	41.3	77.3
Percent No College (1990)	3121	64.7	11.0	18.8	49.9	58.2	65.8	73.0	77.9	88.3
Percent Veteran (1990)	3121	14.8	2.8	4.2	11.4	13.1	14.7	16.3	18.1	29.0
Percent Manufacturing Employment (2000)	3121	24.1	16.4	0.0	3.7	10.9	21.8	34.8	47.7	91.0
Unemployment Rate (2000)	3121	4.4	1.7	1.4	2.6	3.2	4.1	5.2	6.5	17.5
Labor Force Participation Rate (2000)	3121	48.7	5.9	17.5	41.1	45.4	49.3	52.6	55.2	91.6
Per capita personal income (2000)	3068	24.0	5.9	10.2	18.2	20.3	23.2	26.3	30.2	83.2

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' personal income and per capita personal income in the year 2000 are from the Bureau of Economic Analysis's 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 and per capita personal income are in thousands of dollars.

VARIABLES	Deaths of Despair$_{ct}$	Deaths of Despair$_{ct}$	Deaths of Despair$_{ct}$	Deaths of Despair$_{ct}$
Post x NTR Gap$_c$	0.192***	0.180***	0.154***	0.240***
	0.050	0.056	0.051	0.052
NTR$_{ct}$		-0.666		-0.395
		0.647		0.490
MFA Exposure$_{ct}$		-0.106		-0.066
		0.153		0.101
Post x ΔChinese Tariffs$_c$		-0.169		0.185
		0.132		0.116
Post x ΔChinese Subsidy$_c$		0.555**		0.214**
		0.230		0.106
Post x Median HHI in 1990$_c$			-0.107***	-0.109***
			0.021	0.021
Post x % No College in 1990$_c$			0.083***	0.082***
			0.029	0.029
Post x % Veteran in 1990$_c$			1.267***	1.254***
			0.133	0.129
Observations	74,904	74,904	74,904	74,904
R-squared	0.557	0.559	0.594	0.595
Counties	3,120	3,120	3,120	3,120
P-Value DID Term	0.00	0.00	0.00	0.00
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	1.6***	1.5***	1.28***	2***
Std Err	0.42	0.47	0.42	0.43
Average Death Rate (2000)	20	20	20	20
Impact/Average	0.08***	0.075***	0.064***	0.1***

Notes: Table reports difference-in-differences (DID) OLS regression results for age-adjusted mortality rates per 100,000 population for "deaths of despair" (i.e., suicide, drug overdoses and alcohol-related liver disease) 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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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 2: PNTR and Deaths of Despair

VARIABLES	Suicide$_{ct}$	Drug Overdose$_{ct}$	ARLD$_{ct}$
Post x NTR Gap$_c$	0.055***	0.157***	0.028
	0.018	0.037	0.018
NTR$_{ct}$	-0.317	0.312	-0.390**
	0.209	0.304	0.171
MFA Exposure$_{ct}$	-0.012	0.102	-0.156***
	0.035	0.070	0.026
Post x ΔChinese Tariffs$_c$	-0.025	0.341***	-0.131***
	0.035	0.083	0.036
Post x ΔChinese Subsidy$_c$	0.078**	0.090	0.046*
	0.035	0.073	0.024
Post x Median HHI in 1990$_c$	-0.009	-0.071***	-0.029***
	0.007	0.015	0.006
Post x % No College in 1990$_c$	0.026***	0.092***	-0.036***
	0.008	0.019	0.009
Post x % Veteran in 1990$_c$	0.220***	0.742***	0.293***
	0.039	0.075	0.043
Observations	74,904	74,904	74,904
R-squared	0.406	0.634	0.524
Counties	3,120	3,120	3,120
P-Value DID Term	0.00	0.00	0.11
Estimation	OLS	OLS	OLS
Sample Period	1990-13	1990-13	1990-13
FE	c,t	c,t	c,t
Clustering	c	c	c
Weighting	Population	Population	Population
Implied Impact of PNTR	0.45***	1.31***	0.24
Std Err	0.15	0.31	0.15
Average Death Rate (2000)	10	5	4
Impact/Average	0.044***	0.254***	0.054

Notes: Table reports difference-in-differences (DID) OLS regression results for age-adjusted mortality rates per 100,000 population for "deaths of despair" -- suicide, drug overdoses and alcohol-related liver disease -- 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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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 3: PNTR and Suicide, Drug Overdoses and ARLD

	Aggregate Deaths of Despair$_{ct}$							
	White		Black		American Indian		Asian or Pac Is	
VARIABLES	Male	Female	Male	Female	Male	Female	Male	Female
Post x NTR Gap$_c$	0.327***	0.130***	0.105	-0.064	-0.721	-0.705*	-0.207	-0.084
	0.077	0.039	0.167	0.051	0.552	0.384	0.203	0.090
NTR$_{ct}$	-0.203	0.081	-0.602	-0.736	-13.594***	0.785	-0.721	1.731
	0.714	0.366	1.714	0.468	4.574	3.341	2.221	1.221
MFA Exposure$_{ct}$	0.095	0.298***	-0.363*	-0.213**	0.286	-0.437	-0.712	0.118
	0.155	0.084	0.205	0.098	1.343	0.719	0.540	0.225
Post x ΔChinese Tariffs$_c$	0.509***	0.186**	-0.299	-0.183*	-0.568	-1.684**	-1.238**	-0.470**
	0.175	0.080	0.257	0.109	0.996	0.755	0.549	0.194
Post x ΔChinese Subsidy$_c$	0.222	0.146*	0.226	0.080	1.085	0.380	0.478	0.002
	0.167	0.087	0.237	0.098	0.764	0.611	0.303	0.144
Post x Median HHI in 1990$_c$	-0.067**	-0.143***	-0.171***	-0.024	-0.631***	-0.354***	0.040	0.033*
	0.031	0.015	0.054	0.021	0.173	0.115	0.040	0.019
Post x % No College in 1990$_c$	0.180***	0.029*	-0.213**	-0.039	-0.027	-0.154	0.009	0.011
	0.040	0.017	0.100	0.031	0.179	0.105	0.055	0.024
Post x % Veteran in 1990$_c$	1.510***	0.777***	1.183***	0.410***	0.948**	0.929***	0.283**	0.128**
	0.217	0.091	0.271	0.099	0.379	0.297	0.124	0.054
Observations	74,904	74,904	66,888	65,208	69,888	69,936	63,792	68,136
R-squared	0.495	0.465	0.266	0.143	0.211	0.152	0.058	0.046
Counties	3,120	3,120	2,786	2,716	2,911	2,913	2,657	2,838
P-Value DID Term	0.00	0.00	0.53	0.21	0.19	0.07	0.31	0.35
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
FE	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	2.72***	1.08***	0.87	-0.54	-5.99	-5.85*	-1.72	-0.7
Std Err	0.64	0.32	1.39	0.42	4.59	3.19	1.69	0.75
Average Death Rate (2000)	33	9	28	8	47	20	11	4
Impact/Average	0.081***	0.115***	0.031	-0.063	-0.127	-0.29*	-0.16	-0.187

Notes: Table reports difference-in-differences (DID) OLS regression results for age-adjusted mortality rates per 100,000 population for noted cause of death. 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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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 Deaths of Despair by Gender and Race

Table 5: Robustness Exercises: Overall Population

		All										
		Base	Census Trend	State Trend	MHHI Trend	CZ	Super PUMA	Medicaid	Opioid	State x Year FE	Man Sh Trend	Manuf Share
Overall DOD	Implied Impact	2***	1.62***	1.62***	2.27***	2.17***	1.87***	1.89***	2.04***	1.51***	0.98**	0.96*
	Std Err	0.43	0.42	0.38	0.43	0.44	0.48	0.43	0.43	0.39	0.45	0.55
	P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.08
	Observations	74,904	74,904	74,904	74,904	74,904	22,800	74,904	74,904	74,904	74,904	74,904
	Impact / Average	0.1***	0.081***	0.081***	0.114***	0.109***	0.094***	0.095***	0.103***	0.076***	0.049**	0.048*
Suicide	Implied Impact	0.45***	0.44***	0.36***	0.54***	0.52***	0.2	0.47***	0.48***	0.38***	-0.01	-0.16
	Std Err	0.15	0.15	0.13	0.15	0.15	0.16	0.15	0.15	0.14	0.16	0.20
	P-value	0.00	0.00	0.01	0.00	0.00	0.21	0.00	0.00	0.01	0.96	0.43
	Observations	74,904	74,904	74,904	74,904	74,904	22,800	74,904	74,904	74,904	74,904	74,904
	Impact / Average	0.014***	0.013***	0.011***	0.016***	0.016***	0.006	0.014***	0.014***	0.011***	0	-0.005
Drug Overdose	Implied Impact	1.31***	0.94***	0.99***	1.43***	1.44***	1.55***	1.24***	1.3***	0.87***	1.04***	1.63***
	Std Err	0.31	0.29	0.28	0.31	0.31	0.35	0.31	0.31	0.29	0.31	0.40
	P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Observations	74,904	74,904	74,904	74,904	74,904	22,800	74,904	74,904	74,904	74,904	74,904
	Impact / Average	0.14***	0.101***	0.106***	0.153***	0.154***	0.166***	0.132***	0.14***	0.093***	0.111***	0.174***
ARLD	Implied Impact	0.24	0.24	0.26**	0.3**	0.2	0.13	0.19	0.26*	0.26**	-0.05	-0.5***
	Std Err	0.15	0.15	0.12	0.15	0.15	0.16	0.14	0.15	0.13	0.14	0.20
	P-value	0.11	0.12	0.03	0.04	0.18	0.42	0.19	0.08	0.04	0.72	0.01
	Observations	74,904	74,904	74,904	74,904	74,904	22,800	74,904	74,904	74,904	74,904	74,904
	Impact / Average	0.023	0.023	0.025**	0.029**	0.019	0.012	0.018	0.025*	0.025**	-0.005	-0.048***

Notes: Table reports implied 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 block reports results from a separate regression for a different cause of death, including implied impact, standard error, p-value, number of observations and impact divided by noted mortality rate as of 2000. First column reports results from the baseline specification in Table 5. Columns 2 to 4 add Census Division, state and median household income trends. Column 5 adds a second DID term for the avearge NTR gap for all other counties in the commuting zone. Column 6 reports results for super PUMA regions whose minimum population is at least 100,000. Column 7 adds indicators for states and years with expanding Medicaid coverage. Column 8 adds an interaction of the post-PNTR indicator with a measure of the intensity of states' opioid restrictions. Column 9 adds a full set of state by year fixed effects. Column 10 adds an interaction of the post-PNTR indicator with states' initial share of manufacturing employment. Final column adds manufacturing employment share trends. Superscripts *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

VARIABLES	Log Employment$_{ct}$	Unemployment Rate$_{ct}$	Labor Force Participation Rate$_{ct}$	Log Per Capita Personal Inc$_{ct}$
Post x NTR Gap$_c$	-0.004***	0.141***	-0.169***	-0.002***
	0.001	0.016	0.027	0.001
NTR$_{ct}$	0.015	0.329***	-0.054	-0.015*
	0.010	0.104	0.203	0.008
MFA Exposure$_{ct}$	0.004**	-0.051*	-0.097**	0.003***
	0.002	0.026	0.042	0.001
Post x ΔChinese Tariffs$_c$	-0.003	-0.038	0.097*	0.006***
	0.003	0.028	0.054	0.001
Post x ΔChinese Subsidy$_c$	0.236	-1.858	-4.720	0.015
	0.204	1.879	5.027	0.081
Post x Median HHI in 1990$_c$	-0.001	0.000	-0.019*	-0.001***
	0.001	0.005	0.011	0.000
Post x % No College in 1990$_c$	-0.002***	-0.055***	0.049***	-0.000
	0.001	0.006	0.013	0.000
Post x % Veteran in 1990$_c$	0.007***	0.127***	-0.010	-0.003***
	0.002	0.024	0.059	0.001
Observations	73,272	73,272	73,272	73,272
R-squared	0.998	0.833	0.870	0.969
Counties	3,052	3,052	3,052	3,052
P-Value DID Term	0.00	0.00	0.00	0.00
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	-0.04***	1.17***	-1.4***	-0.02***
Std Err	0.01	0.13	0.23	0.01
Average Dep Var (2000)	12.0	4.1	50.5	4.1
Impact/Average	.	0.287***	-0.028***	-0.005***

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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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. 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 of the noted dependent variable 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 Employment Outcomes (LAU and QCEW)

VARIABLES	Overall Deaths of Despair$_{ct}$	Overall Deaths of Despair$_{ct}$	Suicide$_{ct}$	Suicide$_{ct}$	Drug Overdose$_{ct}$	Drug Overdose$_{ct}$	ARLD$_{ct}$	ARLD$_{ct}$
Unemployment Rate$_{c}$	0.295***	2.917***	0.052**	1.182***	0.197***	1.706***	0.045	0.030
	0.106	0.771	0.022	0.247	0.072	0.515	0.031	0.189
Observations	74,858	74,858	74,858	74,858	74,858	74,858	74,858	74,858
R-squared	0.557	0.474	0.401	0.350	0.594	0.526	0.509	0.509
Estimation	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Sample Period	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
Clustering	c	c	c	c	c	c	c	c
Weighting	Population	Population	Population	Population	Population	Population	Population	Population
Underidentification LM Test	.	48.2	.	48.2	.	48.2	.	48.2
Weak Identification F Test	.	57.5	.	57.5	.	57.5	.	57.5
Hansen J Stat	.	0.0	.	0.0	.	0.0	.	0.0
Average Death Rate (2000)	20	20	10	10	5	5	4	4

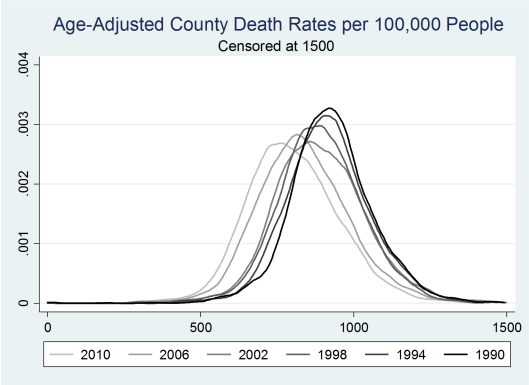
Notes: Table reports OLS and two-stage least squares (2SLS) regression results for age-adjusted mortality rates per 100,000 population for overall deaths of despair and for its consituent parts -- suicide, drug overdoses and alcohol-related liver disease -- across counties (c) and years (t) on the unemployment rate. Sample period is 1990 to 2013. First, third, fifth and seventh columns report OLS results. The remaining columns present 2SLS results where counties' exposure to PNTR is used as an instrument for the unemployment rate. Regressions are weighted by county population in 1990 for the demographic group for which death rates are being estimated. *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

Table 7: Mortality and Unemployment (2SLS)

Table 8: PNTR and Other Causes of Death

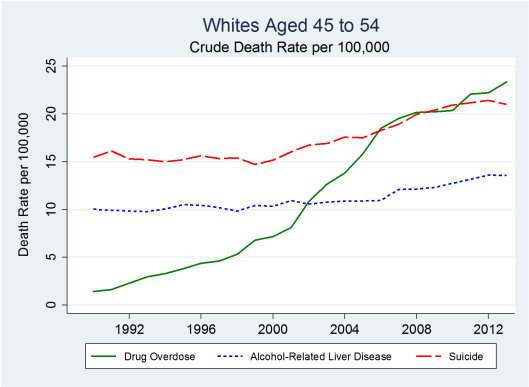
VARIABLES	All Internal Causes	All External Causes	Diabetes	Breast, Bone, and Skin	Cancer of Digestive Tract	Acute Myocardial Infarction	Other Circulatory Diseases	Accidental Falls	Motor Vehicle Accidents	Firearm Accidents	All Other Accidents
Post x NTR Gap$_c$	1.615***	0.412***	0.049	0.036*	0.063**	-0.363***	-0.118	0.043**	0.040*	0.003	0.019
	0.368	0.079	0.048	0.020	0.032	0.131	0.174	0.021	0.024	0.003	0.016
NTR$_{ct}$	-11.940***	-0.701	-0.299	-0.112	-0.681**	0.958	-2.814	0.108	0.230	-0.009	-0.125
	4.165	0.982	0.469	0.210	0.345	1.294	2.121	0.176	0.250	0.042	0.192
MFA Exposure$_{ct}$	2.320***	-0.566***	0.139	0.014	0.288***	-0.052	0.551*	-0.116***	-0.201***	-0.030***	-0.132***
	0.757	0.158	0.085	0.036	0.059	0.229	0.308	0.036	0.048	0.008	0.031
Post x ΔChinese Tariffs$_c$	-2.110***	0.475***	-0.180*	-0.088**	-0.163***	0.003	-0.799**	-0.020	0.242***	0.026***	0.056*
	0.793	0.178	0.093	0.038	0.061	0.303	0.391	0.041	0.048	0.007	0.033
Post x ΔChinese Subsidy$_c$	0.225	0.268	-0.163	0.037	-0.121**	-0.193	0.447	-0.019	-0.087**	-0.009**	0.004
	0.640	0.180	0.100	0.028	0.061	0.237	0.398	0.031	0.036	0.004	0.033
Post x Median HHI in 1990$_c$	-1.992***	-0.050	-0.135***	-0.054***	-0.166***	-0.186***	-0.409***	-0.044***	-0.002	0.007***	0.038***
	0.183	0.036	0.020	0.010	0.015	0.056	0.084	0.011	0.007	0.001	0.007
Post x % No College in 1990$_c$	-0.098	0.106**	-0.041**	-0.013	-0.068***	-0.525***	0.194**	-0.060***	0.020***	-0.002	-0.036***
	0.259	0.044	0.020	0.008	0.015	0.050	0.084	0.010	0.007	0.001	0.007
Post x % Veteran in 1990$_c$	7.830***	1.840***	0.155	0.186***	0.200***	0.341	1.207***	0.222***	0.023	-0.004	0.031
	1.356	0.222	0.098	0.029	0.062	0.265	0.426	0.027	0.028	0.004	0.031
Observations	74,904	74,904	74,904	74,904	74,904	74,904	74,904	74,904	74,904	74,904	74,904
R-squared	0.886	0.678	0.553	0.251	0.409	0.823	0.848	0.393	0.611	0.146	0.370
Counties	3,120	3,120	3,120	3,120	3,120	3,120	3,120	3,120	3,120	3,120	3,120
P-Value DID Term	0.00	0.00	0.31	0.07	0.05	0.01	0.50	0.04	0.09	0.44	0.25
Estimation	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
FE	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
Weighting	Population	Population	Population	Population	Population	Population	Population	Population	Population	Population	Population
Implied Impact of PNTR	13.41***	3.42***	0.41	0.3*	0.52**	-3.02***	-0.98	0.35**	0.33*	0.02	0.16
Std Err	3.06	0.65	0.40	0.16	0.27	1.09	1.45	0.17	0.20	0.03	0.14
Average Death Rate (2000)	807	54	25	21	47	69	269	5	16	0	5
Impact/Average	0.017***	0.063***	0.016	0.014*	0.011**	-0.044***	-0.004	0.075**	0.021*	0.078	0.03

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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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.



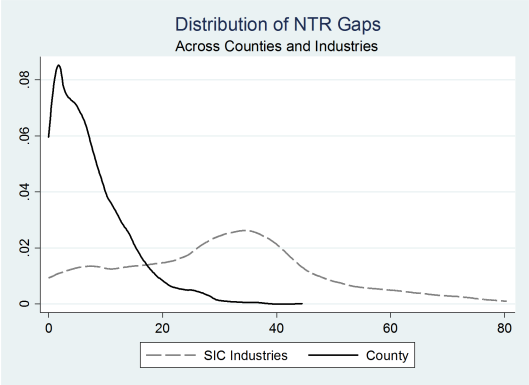
Notes: Figure displays the distribution of age-adjusted death rates per 100,000 population across counties. Counties with death rates exceeding 1500 are excluded to promote readability. The number of counties with non-missing death rates for 1990, 1994, 1998, 2002, 2006 and 2010 are 3118, 3116, 3119, 3135, 3136 and 3138. Source: U.S. Centers for Disease Control (CDC).

Figure 1: Distribution of Overall Mortality Rates



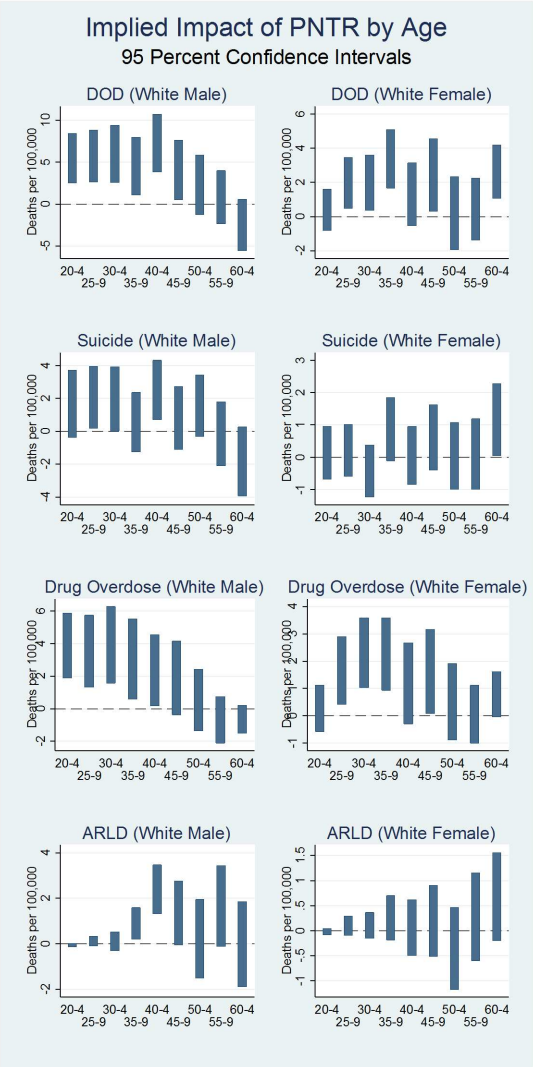
Notes: Figure displays the crude death rate for three causes of death across all U.S. counties for whites aged 45 to 54. Source: U.S. Centers for Disease Control (CDC).

Figure 2: Death Rates for Whites Aged 45-54



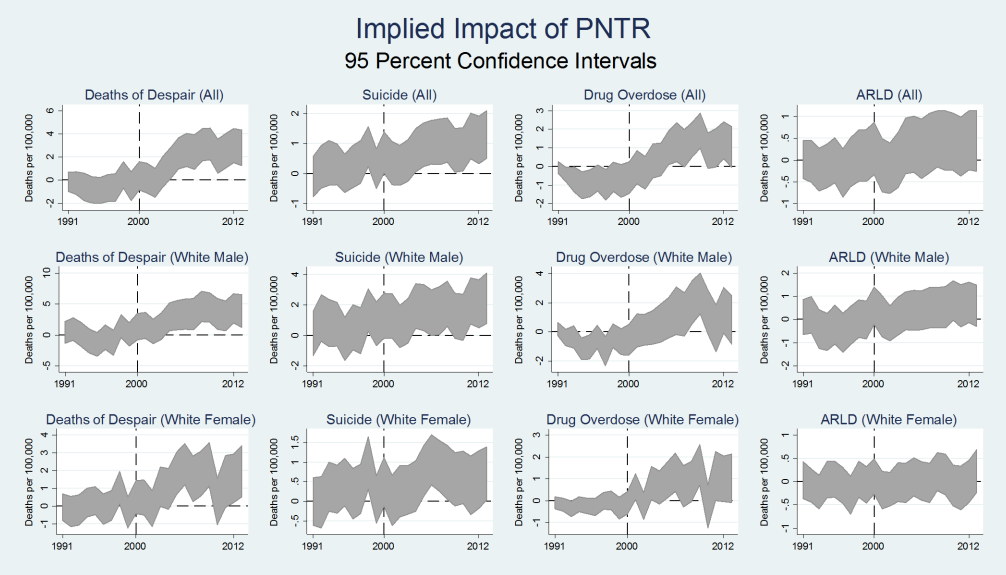
Notes: Figure displays kernel densities of the distributions of NTR gaps across industries and counties. Source: Authors' estimates based on data from Feenstra, Romalis and Schott (2002) and the U.S. Census Bureau's 1990 County Business Patterns.

Figure 3: Distribution of 1999 NTR Gaps Across Counties



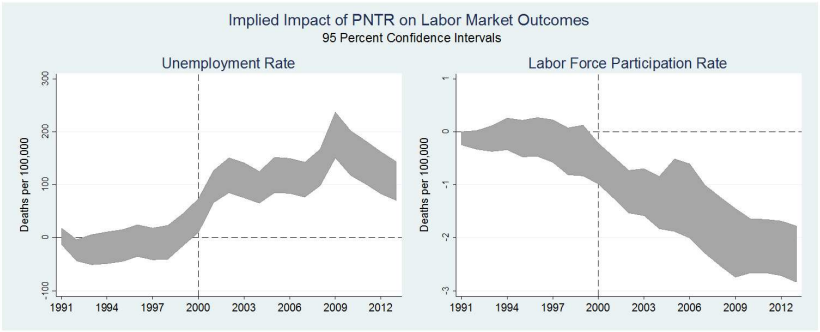
Notes: Figure displays impact of an interquartile shift in county exposure to PNTR on death rates for overall deaths of despair (DOD) and constituent causes for noted age groups and populations. Each bar represents the 95 percent confidence interval associated with this shift. These estimates are derived from the difference-in-differences coefficients estimated in equation 3. Confidence intervals are based on robust standard errors adjusted for clustering at the county level. Source: Authors' calculations based on U.S. Centers for Disease Control (CDC) data.

Figure 4: Implied Impact of PNTR, by Age Category



Notes: Figure displays the 95 percent confidence interval of the implied impact of an interquartile shift in a county's exposure to PNTR on noted death rates using estimates from equation 4. Each row reports the results for a different population: all, white males and white females. Confidence intervals are based on robust standard errors adjusted for clustering at the county level. Note that scales vary across panels. Source: Authors' calculations based on U.S. Centers for Disease Control (CDC) data.

Figure 5: Implied Impact of PNTR (Equation 4)



Notes: Figure displays impact of an interquartile shift in county exposure to PNTR on noted labor market outcomes, by year. Each figure represents the 95 percent confidence interval associated with this shift. These estimates are derived from the difference-in-differences coefficients estimated in equation 4. Confidence intervals are based on robust standard errors adjusted for clustering at the county level. Source: Authors' calculations based on data from the U.S. Bureaus of Labor Statistics and Economic Analysis.

Figure 6: Implied Impact of PNTR on Employment Outcomes Using Annual DID Specification (Equation 4)

Appendix for Online Publication

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

A Cause of Death Codes

Causes of death are classified by the NCHS based on codes listed in the International Classification of Diseases (ICD), where version 10 of the ICD codes (ICD-10) is used for years 1999 to 2013 and version 9 (ICD-9) of the ICD codes is used for years 1990 to 1998. NCHS recodes the ICD causes of death into classification systems of varying levels of aggregation. We use the NCHS 282 cause recodes for the years 1990 to 1998 and the NCHS 358 cause recodes for the years 1999 to 2013. The following codes are used to define the three categories of deaths of despair considered in this paper:

- Suicide:
  - NCHS 282 Cause Recodes (1990-1998): 33700-34400
  - NCHS 358 Cause Recodes (1999-2013): 424-431
- Drug Overdoses
  - NCHS 282 Cause Recodes (1990-1998): 31700, 35300
  - NCHS 358 Cause Recodes (1999-2013): 420, 443
- Alcohol-Related Liver Disease
  - NCHS 282 Cause Recodes (1990-1998): 24200
  - NCHS 358 Cause Recodes (1999-2013): 298

B 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). We use the CPI for urban consumers for these regions to deflate the income measures analyzed in the main text.

C Super-PUMAs

We develop an algorithm to assign counties to what we refer to as "super-PUMAs." We start with the U.S. Census Bureau's concordance of counties to PUMAs for the 2000 decennial census. Census defines PUMAs to be geographic areas nested within states that contain populations of at least 100,000 and cover the entirety of the United States. These areas are built upon their definitions of census tracts, and are designed to be geographically contiguous. As a county might be assigned to more than one PUMA, we develop an algorithm that combines PUMAs as needed into what we refer to as "super-PUMAs" to ensure that each county maps to at most one PUMA or super-PUMA.[46] After this mapping we have 955 super-PUMAs versus 2071 PUMAs and 3135 counties. Figure A.5 compares the population distributions for counties, PUMAs and super-PUMAs.

D 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 and Kovak (2015).[47]

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.[48] 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.[49]

Table A.17 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 a county's NTR gap is associated with an increase in the rate of property crime per 100,000 residents of 128.42, or 3.8 percent of the average property crime rate across counties in the year 2000 (3365 per 100,000). These results are consistent with Feler and Senses (2017) who note that counties

[46] We are unable to split counties across PUMAs because we observe mortality rates at the county level.

[47] Che et al. (2016) and Feler and Senses (2017) examine the link between Chinese imports and U.S. crime across commuting zones.

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

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

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.17 illustrate positive and statistically significant relationships between counties' exposure to PNTR and several sub-categories of property crime, including robbery, larceny and motor vehicle theft. Coefficient estimates suggest interquartile shifts in counties' exposure to PNTR are associated with increases in the rates of these crimes of 12.9, 3.4 and 8.2 percent compared to their year-2000 levels.

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

	Total Deaths	Crude Rate
External causes of death		
Suicide	29,416	10
Drug Overdose	14,160	5
Other (e.g., motor vehicle accidents, falls, crime)	108,560	39
Total External	152,136	54
Internal causes of death		
Infectious or Parasitic Diseases (e.g., septicemia)	59,122	21
Neoplasms (i.e., cancer)	567,242	202
Diseases of the Blood (e.g., anemia)	9,337	3
Endocrine, Nutritional and Metabolic Diseases (e.g., diabetes)	94,456	34
Mental (e.g., dementia)	46,040	16
Diseases of the Nervous System (e.g., Alzheimers, Parkinsons)	91,182	32
Diseases of the Circulatory System (e.g., AMI, hypertension)	943,068	336
Diseases of the Respiratory System (e.g., pneumonia, influenza)	231,253	82
Diseases of the Digestive System (e.g., liver failure)	84,136	30
Diseases of the Skin	3,756	1
Diseases of the Skeletal System (e.g., arthritis)	13,775	5
Diseases of the Genitourinary System (e.g., renal failure)	54,604	19
Pregnancy and Childbirth	404	0
Conditions Arising in the Perinatal Period	14,097	5
Congenital Malformations and Abnormalities	10,631	4
Not elsewhere classified	31,954	11
Total Internal	2,255,057	803
Total	2,407,193	857

Notes: Table displays overall number of deaths by noted cause for the year 2000. Crude rate is the number of deaths divided by total population in 2000 multiplied by 100,000.

Table A.2: Average Death Rates by Major Causes of Death

Table A.3: 1999 NTR Gap versus Other County Attributes

	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$_c$
MFA Exposure$_c$	3.725***								
	0.155								
2000 NTR$_c$		4.401***							
		0.068							
ΔChinese Tariffs$_c$			-1.572***						
			0.024						
ΔChinese Subsides$_c$				-39.117***					
				4.566					
1990 Median HHI$_c$					-0.078***				
					0.013				
1990 Percent No College$_c$						0.252***			
						0.009			
1990 Percent Veteran$_c$							-0.586***		
							0.041		
NTR Gap$_{cz}$								0.346***	
								0.003	
1990 Percent Manufacturing Employment$_c$									0.790***
									0.020
Observations	3,121	3,121	3,121	3,121	3,121	3,121	3,121	3,121	3,121
R-squared	0.156	0.575	0.572	0.023	0.011	0.184	0.063	0.769	0.343

Notes: Table reports the results of county-level OLS regression of the 1999 NTR gap (in percent) on county attributes. First covariate is the labor share-weighted average fill rate of the MFA products produced in the county. Second covariate is the labor share-weighted average NTR tariff rate of the goods produced in the county. Third and fourth 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 active in the county. Fifth through seventh covariates are counties' median household income, percent of residents without college education and percent of residents who are veterans in 1990. Penultimate covariate is the 1999 NTR gap of remaining counties in the county's commuting zone. Final covariate is the percent of employment in manufacturing. 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.

	Suicide$_{ct}$							
	White		Black		American Indian		Asian or Pac Is	
VARIABLES	Male	Female	Male	Female	Male	Female	Male	Female
Post x NTR Gap$_c$	0.100***	0.024*	-0.050	-0.016	-0.226	-0.156	-0.197	-0.044
	0.033	0.014	0.063	0.020	0.316	0.139	0.186	0.081
NTR$_{ct}$	-0.512	-0.097	0.037	-0.193	-8.038**	1.736	-2.110	1.362
	0.390	0.174	0.758	0.161	3.878	2.402	1.864	1.181
MFA Exposure$_{ct}$	0.046	0.038	-0.003	-0.033	-0.157	0.120	-0.346	0.216
	0.073	0.032	0.091	0.030	0.429	0.224	0.497	0.210
Post x ΔChinese Tariffs$_c$	0.025	-0.040	0.030	-0.038	0.492	-0.035	-1.046**	-0.219
	0.066	0.028	0.125	0.043	0.577	0.259	0.515	0.178
Post x ΔChinese Subsidy$_c$	0.126*	0.039	-0.005	0.010	0.326	-0.316**	0.500*	-0.074
	0.068	0.026	0.099	0.029	0.469	0.158	0.292	0.131
Post x Median HHI in 1990$_c$	-0.000	-0.017***	0.015	0.014**	-0.151	-0.079	0.042	0.037**
	0.013	0.005	0.020	0.006	0.100	0.048	0.034	0.017
Post x % No College in 1990$_c$	0.045***	0.006	-0.015	0.001	0.087	0.029	0.024	0.018
	0.014	0.005	0.021	0.006	0.100	0.043	0.042	0.020
Post x % Veteran in 1990$_c$	0.301***	0.164***	0.034	0.020	-0.276	0.151	0.006	0.089*
	0.081	0.027	0.057	0.017	0.250	0.110	0.096	0.047
Observations	74,904	74,904	66,888	65,208	69,888	69,936	63,792	68,136
R-squared	0.314	0.174	0.082	0.051	0.136	0.063	0.050	0.046
Counties	3,120	3,120	2,786	2,716	2,911	2,913	2,657	2,838
P-Value DID Term	0.00	0.08	0.42	0.43	0.47	0.26	0.29	0.59
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
FE	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***	0.2*	-0.42	-0.13	-1.88	-1.3	-1.64	-0.37
Std Err	0.27	0.11	0.52	0.16	2.62	1.16	1.55	0.68
Average Death Rate (2000)	19.1	4.3	10.3	1.7	19.0	4.6	8.0	2.7
Impact/Average	0.043***	0.046*	-0.04	-0.075	-0.099	-0.286	-0.205	-0.134

Notes: Table reports difference-in-differences (DID) OLS regression results for age-adjusted mortality rates per 100,000 population for noted cause of death. 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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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 Gender and Race

	Drug Overdose$_{ct}$							
	White		Black		American Indian		Asian or Pac Is	
VARIABLES	Male	Female	Male	Female	Male	Female	Male	Female
Post x NTR Gap$_c$	0.172***	0.101***	0.169	-0.032	0.041	0.041	-0.026	0.005
	0.052	0.031	0.127	0.045	0.184	0.162	0.057	0.034
NTR$_{ct}$	0.565	0.219	0.880	0.099	-0.269	0.623	1.063	0.462
	0.416	0.232	0.981	0.362	1.150	1.180	0.724	0.379
MFA Exposure$_{ct}$	0.238**	0.341***	-0.265*	-0.107	0.580	0.274	-0.275	-0.068
	0.103	0.065	0.140	0.069	0.422	0.374	0.171	0.077
Post x ΔChinese Tariffs$_c$	0.629***	0.303***	-0.061	-0.038	-0.142	-0.498	-0.153	-0.114
	0.120	0.066	0.198	0.088	0.382	0.334	0.142	0.074
Post x ΔChinese Subsidy$_c$	0.084	0.063	0.076	0.050	-0.194	0.096	-0.028	0.044
	0.109	0.063	0.177	0.059	0.274	0.289	0.079	0.042
Post x Median HHI in 1990$_c$	-0.032	-0.099***	-0.172***	-0.030*	-0.263***	-0.154***	-0.009	0.005
	0.021	0.012	0.045	0.016	0.055	0.053	0.010	0.007
Post x % No College in 1990$_c$	0.189***	0.045***	-0.150**	-0.019	-0.065	-0.132**	0.004	0.008
	0.026	0.014	0.076	0.025	0.063	0.063	0.013	0.010
Post x % Veteran in 1990$_c$	0.837***	0.489***	0.708***	0.302***	1.120***	0.885***	0.122***	0.031*
	0.120	0.056	0.174	0.070	0.137	0.146	0.034	0.017
Observations	74,904	74,904	66,888	65,208	69,888	69,936	63,792	68,136
R-squared	0.583	0.485	0.404	0.193	0.102	0.085	0.055	0.044
Counties	3,120	3,120	2,786	2,716	2,911	2,913	2,657	2,838
P-Value DID Term	0.00	0.00	0.18	0.47	0.82	0.80	0.66	0.89
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
FE	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	1.43***	0.84***	1.41	-0.27	0.34	0.34	-0.21	0.04
Std Err	0.44	0.26	1.05	0.37	1.52	1.34	0.48	0.28
Average Death Rate (2000)	7.4	2.9	10.9	3.9	6.2	2.8	0.9	0.3
Impact/Average	0.194***	0.285***	0.129	-0.069	0.054	0.121	-0.248	0.111

Notes: Table reports difference-in-differences (DID) OLS regression results for age-adjusted mortality rates per 100,000 population for noted cause of death. 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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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 Drug Overdoses, By Gender and Race

	$ARLD_{ct}$							
	White		Black		American Indian		Asian or Pac Is	
VARIABLES	Male	Female	Male	Female	Male	Female	Male	Female
Post x NTR Gap_c	0.056**	0.004	-0.014	-0.017	-0.535	-0.590**	0.016	-0.045*
	0.024	0.011	0.092	0.034	0.349	0.288	0.062	0.025
NTR_{ct}	-0.256	-0.040	-1.518**	-0.642**	-5.288*	-1.574	0.326	-0.093
	0.249	0.112	0.744	0.283	3.159	2.327	0.873	0.337
MFA $Exposure_{ct}$	-0.188***	-0.081***	-0.095	-0.073	-0.136	-0.831*	-0.091	-0.029
	0.041	0.018	0.101	0.049	0.837	0.452	0.213	0.051
Post x ΔChinese $Tariffs_c$	-0.144***	-0.077***	-0.268	-0.107	-0.919	-1.151**	-0.039	-0.137**
	0.051	0.019	0.194	0.069	0.655	0.557	0.167	0.056
Post x ΔChinese $Subsidy_c$	0.012	0.044**	0.155*	0.020	0.952**	0.600	0.006	0.032
	0.031	0.022	0.087	0.046	0.458	0.425	0.094	0.028
Post x Median HHI in 1990_c	-0.036***	-0.027***	-0.013	-0.008	-0.217*	-0.122*	0.007	-0.008
	0.008	0.003	0.027	0.012	0.112	0.072	0.015	0.005
Post x % No College in 1990_c	-0.054***	-0.022***	-0.049	-0.021	-0.048	-0.051	-0.019	-0.015**
	0.013	0.004	0.038	0.015	0.105	0.067	0.023	0.006
Post x % Veteran in 1990_c	0.373***	0.124***	0.442***	0.087**	0.104	-0.107	0.156***	0.008
	0.070	0.022	0.118	0.039	0.244	0.210	0.044	0.017
Observations	74,904	74,904	66,888	65,208	69,888	69,936	63,792	68,136
R-squared	0.469	0.273	0.153	0.084	0.183	0.147	0.058	0.045
Counties	3,120	3,120	2,786	2,716	2,911	2,913	2,657	2,838
P-Value DID Term	0.02	0.69	0.88	0.63	0.13	0.04	0.79	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
FE	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	0.46***	0.04	-0.12	-0.14	-4.45	-4.9**	0.13	-0.37*
Std Err	0.20	0.09	0.77	0.28	2.90	2.39	0.52	0.21
Average Death Rate (2000)	7.0	2.0	7.1	2.8	21.9	12.8	1.9	0.7
Impact/Average	0.066***	0.018	-0.016	-0.049	-0.203	-0.383**	0.071	-0.56*

Notes: Table reports difference-in-differences (DID) OLS regression results for age-adjusted mortality rates per 100,000 population for noted cause of death. 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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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.6: PNTR and Alcohol-Related Liver Disease, By Gender and Race

Occupation	Male	White	Male	Total
Managerial, Professional	70.8	90.4	.	100
Technical, Sales, Admin, Service	49.6	86.3	.	100
Precision Production	83.0	85.5	.	100
Operators, Fabricators, Laborers, Other	67.0	78.9	.	100
Total	68.0	84.3	58.4	100
Total in Population	49.0	81.9	40.3	100

Notes: Table displays the share of manufacturing workers in 1999 that are male or white, by occupation within manufacturing. "." represents unavailable data.
Source: U.S. Bureau of Labor Statistics.

Table A.7: Share of Whites and Males Among Occupations in Manufacturing, 1999

	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$_c$	0.199	0.250**	0.237**	0.068	0.302***	0.098	0.188	-0.019	-0.221*
	0.126	0.115	0.120	0.111	0.111	0.117	0.115	0.120	0.129
NTR$_{ct}$	-1.875	-0.328	0.106	0.739	-1.540	0.437	2.275	-0.556	-1.690
	1.472	1.455	1.178	1.219	1.410	1.317	1.431	1.709	1.541
MFA Exposure$_{ct}$	0.391	0.104	0.292	-0.276	-0.360	0.157	0.101	-0.169	0.185
	0.286	0.258	0.289	0.271	0.252	0.260	0.277	0.246	0.318
Post x ΔChinese Tariffs$_c$	0.045	0.414*	0.285	-0.293	-0.095	-0.366	-0.155	-0.355	-0.330
	0.246	0.227	0.235	0.227	0.229	0.239	0.235	0.216	0.251
Post x ΔChinese Subsidy$_c$	0.327	0.121	0.147	0.283*	0.273	0.234	-0.001	0.046	0.168
	0.232	0.181	0.163	0.152	0.223	0.190	0.206	0.192	0.203
Post x Median HHI in 1990$_c$	0.067*	-0.029	0.006	-0.015	-0.026	-0.085**	-0.171***	-0.059	-0.068*
	0.036	0.035	0.032	0.034	0.038	0.035	0.036	0.039	0.040
Post x % No College in 1990$_c$	0.008	0.053	0.078**	0.107***	0.107**	0.078*	-0.081*	-0.082**	-0.026
	0.037	0.039	0.037	0.036	0.043	0.041	0.042	0.041	0.044
Post x % Veteran in 1990$_c$	0.143	0.372***	0.365***	0.366***	0.565***	0.805***	0.834***	0.908***	0.301**
	0.107	0.127	0.119	0.130	0.196	0.174	0.188	0.129	0.150
Observations	74,892	74,904	74,902	74,898	74,903	74,904	74,904	74,904	74,904
R-squared	0.078	0.082	0.078	0.082	0.087	0.092	0.088	0.079	0.067
Counties	3,120	3,120	3,120	3,120	3,120	3,120	3,120	3,120	3,120
P-Value DID Term	0.11	0.03	0.05	0.54	0.01	0.40	0.10	0.87	0.09
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	1.66	2.07**	1.97**	0.56	2.51***	0.81	1.56	-0.16	-1.84*
Std Err	1.05	0.96	1.00	0.92	0.92	0.97	0.96	0.99	1.07
Average Death Rate (2000)	23	22	21	24	26	25	23	21	20
Impact/Average	0.071	0.096**	0.092**	0.023	0.096***	0.032	0.069	-0.008	-0.092*

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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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.8: PNTR and Suicide by White Males, By Age Group

	Suicide, White Female								
VARIABLES	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Post x NTR Gap$_c$	0.017	0.027	-0.051	0.105*	0.006	0.075	0.005	0.012	0.141**
	0.050	0.049	0.049	0.060	0.055	0.062	0.064	0.067	0.068
NTR$_{ct}$	-1.455**	-0.472	-0.439	0.574	0.028	-0.332	-0.247	0.454	0.115
	0.567	0.637	0.624	0.586	0.772	0.644	0.710	0.717	0.717
MFA Exposure$_{ct}$	0.174	-0.074	0.102	-0.018	0.189	0.229	0.212*	-0.065	-0.110
	0.112	0.115	0.142	0.143	0.151	0.154	0.125	0.126	0.127
Post x ΔChinese Tariffs$_c$	0.163	-0.025	-0.149	-0.045	-0.279***	-0.140	-0.095	-0.094	0.215*
	0.099	0.098	0.102	0.112	0.104	0.126	0.121	0.146	0.128
Post x ΔChinese Subsidy$_c$	-0.066	0.172***	-0.057	0.198**	0.158*	0.133	-0.004	-0.024	0.055
	0.081	0.066	0.072	0.086	0.087	0.096	0.091	0.112	0.099
Post x Median HHI in 1990$_c$	0.013	0.010	-0.025*	-0.030*	-0.039**	-0.086***	-0.073***	-0.054**	-0.026
	0.014	0.014	0.014	0.017	0.018	0.019	0.019	0.021	0.019
Post x % No College in 1990$_c$	0.015	0.022	0.020	0.025	0.020	-0.025	-0.039*	-0.050**	-0.016
	0.013	0.015	0.016	0.018	0.018	0.020	0.020	0.024	0.021
Post x % Veteran in 1990$_c$	0.018	0.128***	0.167***	0.233***	0.425***	0.463***	0.329***	0.288***	0.229***
	0.045	0.045	0.051	0.054	0.066	0.065	0.062	0.077	0.072
Observations	74,894	74,889	74,899	74,904	74,904	74,904	74,903	74,904	74,904
R-squared	0.048	0.050	0.054	0.065	0.067	0.071	0.066	0.063	0.055
Counties	3,120								
P-Value DID Term	0.74	0.59	0.31	0.08	0.91	0.23	0.93	0.86	0.04
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	0.22	-0.42	0.87*	0.05	0.62	0.04	0.1	1.17**
Std Err	0.42	0.41	0.41	0.50	0.46	0.52	0.53	0.56	0.57
Average Death Rate (2000)	3	4	5	7	8	7	7	6	5
Impact/Average	0.041	0.053	-0.082	0.13*	0.007	0.084	0.006	0.016	0.216**

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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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.9: PNTR and Suicide by White Females, By Age Group

	Drug Overdose, 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$_c$	0.467***	0.424***	0.471***	0.367**	0.285**	0.228	0.062	-0.083	-0.078
	0.123	0.136	0.145	0.152	0.135	0.139	0.117	0.088	0.053
NTR$_{ct}$	0.554	0.352	-1.775	1.195	2.396**	2.439**	2.047**	0.684	-0.766
	0.909	1.078	1.119	1.113	1.168	1.103	0.839	0.596	0.623
MFA Exposure$_{ct}$	0.369	0.246	0.438	-0.066	0.314	0.860***	0.715***	0.158	0.009
	0.282	0.297	0.360	0.300	0.300	0.268	0.232	0.179	0.104
Post x ΔChinese Tariffs$_c$	1.258***	1.023***	1.261***	0.758***	0.873***	1.540***	1.178***	0.548***	0.329***
	0.244	0.299	0.317	0.279	0.284	0.282	0.232	0.174	0.101
Post x ΔChinese Subsidy$_c$	-0.189	0.287	0.395	0.216	0.292	0.227	-0.189	-0.004	0.028
	0.190	0.235	0.246	0.276	0.262	0.269	0.198	0.149	0.069
Post x Median HHI in 1990$_c$	0.256***	0.225***	-0.012	-0.108**	-0.174***	-0.196***	-0.222***	-0.141***	-0.063***
	0.048	0.052	0.054	0.052	0.052	0.050	0.044	0.034	0.020
Post x % No College in 1990$_c$	0.410***	0.588***	0.476***	0.416***	0.417***	0.296***	0.031	-0.059	-0.039
	0.046	0.061	0.077	0.086	0.070	0.066	0.057	0.044	0.024
Post x % Veteran in 1990$_c$	1.686***	2.146***	2.005***	1.706***	1.588***	1.048***	0.720***	0.273*	-0.028
	0.174	0.245	0.298	0.335	0.313	0.256	0.177	0.146	0.077
Observations	74,892	74,904	74,902	74,898	74,903	74,904	74,904	74,904	74,904
R-squared	0.214	0.234	0.234	0.234	0.275	0.324	0.318	0.272	0.172
Counties	3,120								
P-Value DID Term	0.00	0.00	0.00	0.02	0.03	0.10	0.59	0.35	0.14
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	3.88***	3.53***	3.92***	3.05***	2.37**	1.89	0.52	-0.69	-0.65
Std Err	1.02	1.13	1.20	1.26	1.12	1.16	0.97	0.73	0.44
Average Death Rate (2000)	9	9	9	9	9	9	9	9	9
Impact/Average	0.425***	0.387***	0.43***	0.335***	0.26**	0.207	0.057	-0.075	-0.071

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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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.10: PNTR and Drug Overdose for White Males, By Age Group

	Drug Overdose, White Female								
VARIABLES	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Post x NTR Gap$_c$	0.032	0.199***	0.277***	0.272***	0.143	0.195**	0.062	0.007	0.094*
	0.052	0.076	0.079	0.081	0.091	0.095	0.086	0.065	0.051
NTR$_{ct}$	-0.187	0.028	-0.062	0.719	0.306	0.160	1.083*	0.455	0.105
	0.472	0.530	0.550	0.576	0.679	0.775	0.597	0.515	0.372
MFA Exposure$_{ct}$	0.394***	0.188	0.431**	0.573***	0.684***	1.280***	0.830***	0.336**	0.130
	0.153	0.161	0.194	0.208	0.223	0.239	0.216	0.160	0.114
Post x ΔChinese Tariffs$_c$	0.409***	0.502***	0.704***	0.501***	0.670***	0.678***	0.298*	0.208	0.112
	0.129	0.145	0.152	0.166	0.180	0.187	0.163	0.137	0.103
Post x ΔChinese Subsidy$_c$	0.008	0.264**	0.065	0.202	0.050	0.058	0.193	0.088	0.036
	0.088	0.130	0.106	0.156	0.170	0.165	0.134	0.129	0.098
Post x Median HHI in 1990$_c$	0.088***	-0.002	-0.137***	-0.199***	-0.278***	-0.304***	-0.282***	-0.175***	-0.098***
	0.018	0.021	0.024	0.027	0.029	0.031	0.031	0.024	0.017
Post x % No College in 1990$_c$	0.161***	0.207***	0.144***	0.129***	0.138***	0.044	-0.073*	-0.082***	-0.096***
	0.021	0.026	0.032	0.035	0.036	0.040	0.037	0.027	0.017
Post x % Veteran in 1990$_c$	0.602***	0.785***	0.873***	0.953***	0.976***	1.106***	0.761***	0.500***	0.216***
	0.068	0.096	0.118	0.148	0.152	0.123	0.115	0.077	0.047
Observations	74,894	74,889	74,899	74,904	74,904	74,904	74,903	74,904	74,904
R-squared	0.110	0.120	0.141	0.145	0.183	0.231	0.224	0.172	0.103
Counties	3,120								
P-Value DID Term	0.53	0.01	0.00	0.00	0.12	0.04	0.47	0.91	0.06
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	0.27	1.65***	2.3***	2.26***	1.19	1.62**	0.52	0.06	0.78*
Std Err	0.43	0.63	0.65	0.68	0.76	0.79	0.71	0.54	0.42
Average Death Rate (2000)	2	3	4	7	7	6	4	3	2
Impact/Average	0.112	0.562***	0.521***	0.34***	0.162	0.267**	0.144	0.021	0.45*

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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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.11: PNTR and Drug Overdose for White Females, By Age Group

	ARLD, 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$_c$	-0.007*	0.014	0.013	0.108**	0.289***	0.163*	0.026	0.200*	-0.002
	0.004	0.013	0.025	0.042	0.066	0.086	0.106	0.109	0.115
NTR$_{ct}$	-0.032	-0.154	-0.110	0.705	0.575	-0.123	-2.423**	-0.332	-2.255*
	0.056	0.139	0.259	0.520	0.709	0.873	1.147	1.193	1.343
MFA Exposure$_{ct}$	-0.001	-0.054*	-0.052	-0.173**	-0.587***	-0.624***	-0.565***	-0.501**	-0.466**
	0.009	0.028	0.052	0.078	0.127	0.161	0.194	0.246	0.205
Post x ΔChinese Tariffs$_c$	-0.006	-0.035	-0.031	-0.100	-0.106	-0.416**	-0.570***	-0.303	-0.455*
	0.006	0.026	0.050	0.086	0.139	0.194	0.215	0.213	0.239
Post x ΔChinese Subsidy$_c$	-0.009	0.035	0.021	0.080	0.179	-0.049	0.011	-0.009	0.061
	0.009	0.022	0.037	0.057	0.145	0.123	0.135	0.155	0.190
Post x Median HHI in 1990$_c$	-0.001	-0.007	-0.011	0.001	-0.028	-0.078***	-0.097***	-0.167***	-0.111***
	0.002	0.004	0.007	0.013	0.021	0.026	0.034	0.037	0.038
Post x % No College in 1990$_c$	-0.001	-0.011***	-0.022***	-0.038**	-0.062**	-0.132***	-0.153***	-0.170***	-0.121***
	0.002	0.004	0.008	0.017	0.032	0.042	0.047	0.046	0.045
Post x % Veteran in 1990$_c$	0.009*	0.038***	0.105***	0.342***	0.645***	0.932***	1.053***	1.288***	0.844***
	0.005	0.012	0.029	0.086	0.215	0.226	0.232	0.206	0.167
Observations	74,892	74,904	74,902	74,898	74,903	74,904	74,904	74,904	74,904
R-squared	0.042	0.044	0.061	0.087	0.118	0.148	0.164	0.169	0.153
Counties	3,120								
P-Value DID Term	0.09	0.30	0.61	0.01	0.00	0.06	0.81	0.07	0.99
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	-0.06*	0.11	0.11	0.9***	2.4***	1.35*	0.21	1.66*	-0.02
Std Err	0.03	0.11	0.21	0.35	0.55	0.71	0.88	0.90	0.95
Average Death Rate (2000)	0.05	0.5	2	4	9	16	17	18	21
Impact/Average	-1.225*	0.253	0.068	0.208***	0.253***	0.085*	0.013	0.09*	-0.001

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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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.12: PNTR and ARLD for White Males, By Age Group

	ARLD, White Female								
VARIABLES	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Post x NTR Gap$_c$	-0.002	0.012	0.013	0.031	0.007	0.023	-0.043	0.034	0.082
	0.004	0.012	0.016	0.027	0.034	0.044	0.050	0.054	0.054
NTR$_{ct}$	-0.011	0.080	-0.280*	-0.161	0.214	-0.397	-0.559	1.181**	0.952*
	0.021	0.120	0.151	0.275	0.372	0.443	0.591	0.566	0.574
MFA Exposure$_{ct}$	-0.008	-0.006	-0.003	-0.161***	-0.051	-0.167**	-0.239***	-0.436***	-0.216**
	0.006	0.020	0.030	0.059	0.080	0.081	0.091	0.098	0.102
Post x ΔChinese Tariffs$_c$	-0.005	-0.002	0.016	-0.147***	-0.169**	-0.127	-0.237***	-0.312***	-0.112
	0.005	0.021	0.032	0.052	0.075	0.082	0.091	0.106	0.099
Post x ΔChinese Subsidy$_c$	-0.006	0.009	0.049*	0.029	0.093	0.177***	0.047	0.109	0.080
	0.005	0.010	0.027	0.045	0.059	0.068	0.081	0.094	0.124
Post x Median HHI in 1990$_c$	-0.002**	-0.005	-0.013**	-0.008	-0.044***	-0.077***	-0.093***	-0.081***	-0.051***
	0.001	0.003	0.006	0.009	0.011	0.014	0.017	0.018	0.020
Post x % No College in 1990$_c$	-0.002**	-0.004	-0.008	0.001	-0.038***	-0.079***	-0.098***	-0.075***	-0.018
	0.001	0.003	0.006	0.009	0.012	0.016	0.018	0.019	0.023
Post x % Veteran in 1990$_c$	0.003	0.019*	0.039**	0.103***	0.318***	0.419***	0.325***	0.308***	0.275**
	0.005	0.011	0.017	0.034	0.059	0.062	0.055	0.058	0.117
Observations	74,894	74,889	74,899	74,904	74,904	74,904	74,903	74,904	74,904
R-squared	0.043	0.047	0.048	0.053	0.068	0.091	0.100	0.089	0.095
Counties	3,120								
P-Value DID Term	0.52	0.32	0.41	0.25	0.83	0.60	0.39	0.53	0.13
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	-0.02	0.1	0.11	0.26	0.06	0.19	-0.35	0.28	0.68
Std Err	0.03	0.10	0.13	0.23	0.29	0.36	0.42	0.45	0.45
Average Death Rate (2000)	0.03	0.09	0.6	2	4	4	5	5	6
Impact/Average	-0.754	1.129	0.193	0.116	0.016	0.045	-0.079	0.054	0.111

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 is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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.13: PNTR and ARLD for White Females, By Age Group

Table A.14: Robustness Exercises: White Males

		White Males										
		Base	Census Trend	State Trend	MHHI Trend	CZ	Super PUMA	Medicaid	Opioid	State x Year FE	Man Sh Trend	Manuf Share
Overall DOD	Implied Impact	2.89***	2.22***	2.19***	3.13***	3.36***	2.7***	2.74***	2.94***	1.94***	1.72***	1.74**
	Std Err	0.65	0.63	0.57	0.65	0.67	0.70	0.64	0.66	0.59	0.68	0.86
	P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04
	Observations	74,904	74,904	74,904	74,904	74,904	22,800	74,904	74,904	74,904	74,904	74,904
	Impact / Average	0.152***	0.116***	0.115***	0.164***	0.176***	0.141***	0.144***	0.154***	0.101***	0.09***	0.091**
Suicide	Implied Impact	0.88***	0.84***	0.72***	1***	1.05***	0.46*	0.9***	0.93***	0.72***	0.15	-0.14
	Std Err	0.15	0.15	0.13	0.15	0.15	0.16	0.15	0.15	0.14	0.16	0.20
	P-value	0.00	0.00	0.01	0.00	0.00	0.21	0.00	0.00	0.01	0.96	0.43
	Observations	74,904	74,904	74,904	74,904	74,904	22,800	74,904	74,904	74,904	74,904	74,904
	Impact / Average	0.014***	0.013***	0.011***	0.016***	0.016***	0.006	0.014***	0.014***	0.011***	0	-0.005
Drug Overdose	Implied Impact	1.41***	0.82**	0.92***	1.5***	1.69***	1.94***	1.33***	1.38***	0.7*	1.35***	2.31***
	Std Err	0.44	0.41	0.39	0.44	0.45	0.50	0.44	0.45	0.40	0.46	0.59
	P-value	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00
	Observations	74,904	74,904	74,904	74,904	74,904	22,800	74,904	74,904	74,904	74,904	74,904
	Impact / Average	0.275***	0.159**	0.178***	0.29***	0.328***	0.376***	0.259***	0.269***	0.137*	0.263***	0.449***
ARLD	Implied Impact	0.6***	0.56***	0.55***	0.64***	0.62***	0.3	0.52***	0.63***	0.51***	0.22	-0.43
	Std Err	0.23	0.22	0.19	0.23	0.24	0.21	0.21	0.23	0.20	0.20	0.29
	P-value	0.01	0.01	0.00	0.00	0.01	0.16	0.01	0.01	0.01	0.27	0.14
	Observations	74,904	74,904	74,904	74,904	74,904	22,800	74,904	74,904	74,904	74,904	74,904
	Impact / Average	0.081***	0.076***	0.075***	0.087***	0.084***	0.041	0.07***	0.086***	0.07***	0.03	-0.058

Notes: Table reports implied 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 block reports results from a separate regression for a different cause of death, including implied impact, standard error, p-value, number of observations and impact divided by noted mortality rate as of 2000. First column reports results from the baseline specification in Table 5. Columns 2 to 4 add Census Division, state and median household income trends. Column 5 adds a second DID term for the avearge NTR gap for all other counties in the commuting zone. Column 6 reports results for super PUMA regions whose minimum population is at least 100,000. Column 7 adds indicators for states and years with expanding Medicaid coverage. Column 8 adds an interaction of the post-PNTR indicator with a measure of the intensity of states' opioid restrictions. Column 9 adds a full set of state by year fixed effects. Column 10 adds an interaction of the post-PNTR indicator with states' initial share of manufacturing employment. Final column adds manufacturing employment share trends. Superscripts *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

Table A.15: Robustness Exercises: White Females

		White Females										
		Base	Census Trend	State Trend	MHHI Trend	CZ	Super PUMA	Medicaid	Opioid	State x Year FE	Man Sh Trend	Manuf Share
Overall DOD	Implied Impact	1.03***	0.66**	0.61**	1.27***	1.18***	0.78**	0.92***	1.06***	0.57*	0.49	0.64
	Std Err	0.33	0.33	0.30	0.33	0.34	0.37	0.32	0.33	0.32	0.35	0.43
	P-value	0.00	0.05	0.04	0.00	0.00	0.03	0.00	0.00	0.08	0.17	0.13
	Observations	74,904	74,904	74,904	74,904	74,904	22,800	74,904	74,904	74,904	74,904	74,904
	Impact / Average	0.349***	0.223**	0.207**	0.432***	0.4***	0.264**	0.312***	0.36***	0.192*	0.165	0.216
Suicide	Implied Impact	0.2*	0.15	0.09	0.27**	0.24**	-0.06	0.2	0.21*	0.12	0	-0.15
	Std Err	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.18
	P-value	0.09	0.21	0.44	0.02	0.04	0.63	0.10	0.07	0.34	0.98	0.40
	Observations	74,904	74,904	74,904	74,904	74,904	22,800	74,904	74,904	74,904	74,904	74,904
	Impact / Average	0.046*	0.035	0.021	0.061**	0.055**	-0.013	0.045	0.049*	0.027	0.001	-0.034
Drug Overdose	Implied Impact	0.75***	0.44*	0.46*	0.9***	0.86***	0.78***	0.67***	0.76***	0.39	0.52*	0.98***
	Std Err	0.27	0.26	0.24	0.27	0.27	0.30	0.26	0.27	0.25	0.27	0.36
	P-value	0.00	0.09	0.06	0.00	0.00	0.01	0.01	0.00	0.12	0.06	0.01
	Observations	74,904	74,904	74,904	74,904	74,904	22,800	74,904	74,904	74,904	74,904	74,904
	Impact / Average	0.108***	0.064*	0.066*	0.129***	0.124***	0.112***	0.096***	0.109***	0.056	0.074*	0.141***
ARLD	Implied Impact	0.08	0.06	0.06	0.11	0.07	0.06	0.05	0.09	0.05	-0.03	-0.2
	Std Err	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.12
	P-value	0.44	0.52	0.54	0.27	0.45	0.56	0.59	0.38	0.59	0.75	0.11
	Observations	74,904	74,904	74,904	74,904	74,904	22,800	74,904	74,904	74,904	74,904	74,904
	Impact / Average	0.037	0.031	0.029	0.053	0.035	0.028	0.026	0.042	0.027	-0.016	-0.097

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 from a separate regression for a different cause of death. First column reports results from the baseline specification in Table 5. Remaining columns consider changes vis a vis the baseline specification. Columns 2 to 4 add Census Division, state and median household income trends. Column 5 adds a second DID term for the avearge NTR gap for all other counties in the county's commuting zone. Column 6 reports results for super PUMA regions, whose minimum population is at least 100,000. Column 7 adds state by "post" year interactions for states with expanding Medicaid coverage. Column 8 adds an interaction of "post" with measures of the intensity of states' opioid restrictions. Column 9 adds a full set of state by year fixed effects. Column 10 adds an interaction of "post" with states initial share of manufacturing employment. Final column adds manufacturing employment share trends. Superscripts *, ** and *** signify statistical significance at the 10, 5 and 1 percent level.

VARIABLES	Infectious Parasitic Diseases	Cancers	Diseases of Blood, Immune	Endocrine, Metabolic Diseases	Behavioral and Mental	Eye, Ear, Nervous Diseases	Circulatory System Diseases	Respiratory System Diseases	Digestive System Diseases	Skin Diseases	Musculo-skeletal Diseases	Genital, Urinary Diseases	Pregnancy, Childbirth	Perinatal Conditions	Congenital Diseases	Not Elsewhere Specified
Post x NTR Gap$_c$	0.421***	0.487***	0.027***	0.121**	0.170*	0.399***	-0.503***	0.217**	0.094**	0.006	0.009	0.057	-0.009***	0.020	0.020***	0.075
	0.086	0.098	0.009	0.058	0.101	0.085	0.191	0.100	0.038	0.006	0.010	0.039	0.002	0.013	0.008	0.069
NTR$_{ct}$	-3.007*	-2.888***	0.075	-0.575	-0.452	-1.228**	-1.891	-0.604	-1.035***	-0.093*	0.029	-0.157	0.003	-0.320**	0.063	0.120
	1.542	0.876	0.096	0.565	0.806	0.615	1.882	0.981	0.372	0.054	0.093	0.328	0.017	0.141	0.086	0.480
MFA Exposure$_{ct}$	-0.663**	0.331*	0.036*	0.141	0.348*	0.556***	0.727*	0.739***	-0.035	-0.042***	0.013	0.017	-0.005	-0.112***	-0.019	0.552***
	0.277	0.187	0.021	0.121	0.189	0.171	0.419	0.199	0.076	0.014	0.021	0.080	0.005	0.033	0.019	0.177
Post x ΔChinese Tariffs$_c$	-0.713***	-0.534***	0.050***	-0.194*	0.325*	-0.242*	-0.794**	-0.037	-0.182***	-0.030***	-0.018	-0.034	-0.008**	-0.063**	-0.009	0.365**
	0.195	0.190	0.017	0.112	0.185	0.147	0.398	0.188	0.069	0.011	0.021	0.070	0.004	0.028	0.016	0.149
Post x ΔChinese Subsidy$_c$	7.780	-11.733	-1.640	-15.809	19.915	-7.890	24.595	17.024	-1.071	-0.729	-0.232	-2.591	0.109	-0.043	1.659	-7.974
	12.153	15.125	1.124	11.690	21.817	12.576	34.404	17.543	4.160	0.884	1.375	6.202	0.261	1.929	1.202	10.634
Post x Median HHI in 1990$_c$	-0.018	-0.434***	-0.008***	-0.170***	-0.002	-0.324***	-0.593***	-0.190***	-0.103***	-0.005**	-0.019***	-0.073***	-0.001*	-0.004	-0.002	-0.047
	0.059	0.042	0.003	0.025	0.041	0.034	0.080	0.040	0.014	0.002	0.003	0.016	0.001	0.006	0.002	0.032
Post x % No College in 1990$_c$	0.099	-0.024	0.007**	-0.032	0.025	-0.236***	-0.331***	0.339***	0.014	-0.000	0.001	0.048**	0.002***	-0.015**	0.000	0.005
	0.092	0.046	0.003	0.025	0.052	0.040	0.084	0.046	0.018	0.003	0.003	0.019	0.001	0.006	0.003	0.037
Post x % Veteran in 1990$_c$	2.113***	1.005***	0.013	0.278**	0.417**	0.718***	1.555***	0.533***	0.542***	0.036***	0.054***	0.154**	0.001	0.140***	0.044***	0.230**
	0.448	0.150	0.009	0.117	0.188	0.164	0.442	0.188	0.075	0.011	0.010	0.065	0.003	0.029	0.009	0.104
Observations	74,904	74,904	74,904	74,904	74,904	74,904	74,904	74,904	74,904	74,904	74,904	74,904	74,904	74,904	74,904	74,904
R-squared	0.704	0.723	0.215	0.580	0.724	0.726	0.909	0.622	0.463	0.218	0.239	0.555	0.094	0.347	0.138	0.527
P-Value DID Term	0.90	0.25	0.43	0.27	0.10	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Estimation	OLS	OLS	OLS	OLS	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	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	c,t	c,t	c,t	c,t
Clustering	c	c	c	c	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	Population	Population	Population	Population
Implied Impact of PNTR	3.5***	4.05***	0.23***	1**	1.41*	3.32***	-4.18***	1.81**	0.78***	0.05	0.08	0.47	-0.07***	0.16	0.16***	0.62
Std Err	0.71	0.81	0.07	0.48	0.84	0.70	1.59	0.83	0.32	0.05	0.08	0.32	0.01	0.11	0.06	0.58
Average Death Rate (2000)	22	202	3	34	17	33	337	83	30	1	5	20	0	5	4	11
Impact/Average	0.162***	0.02***	0.068***	0.029**	0.085*	0.101***	-0.012***	0.022**	0.026***	0.036	0.016	0.024	-0.488***	0.032	0.043***	0.056

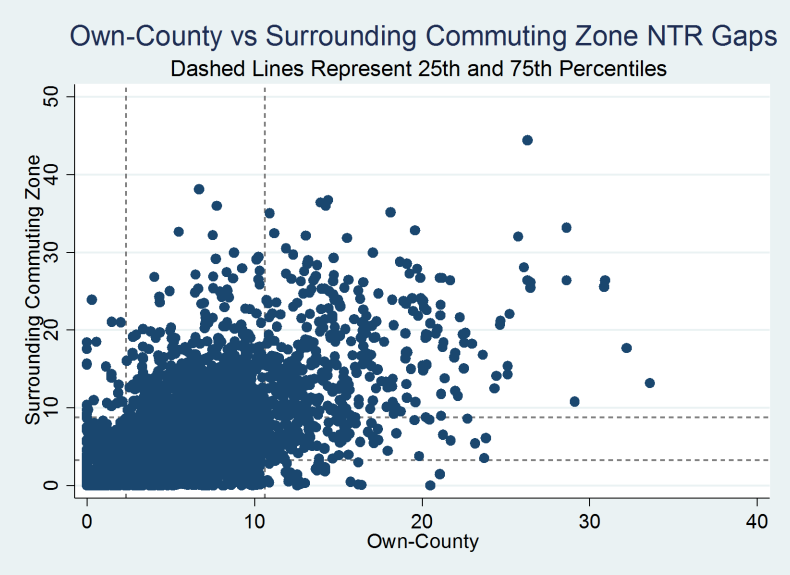
Notes: Table reports difference-in-differences (DID) OLS regression results for age-adjusted mortality rates per 100,000 population for noted causes of death across counties (c) and years (t). Sample period is 1990 to 2013. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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 of the demographic group for which mortality 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.16: PNTR and Internal Causes of Death (CDC)

VARIABLES	Overall Violent	Overall Property	Murder	Rape	Robbery	Assault	Burglary	Larceny	Motor Vehicle Theft	Arson
Post x NTR Gap$_c$	2.662	22.397***	0.017	0.166	2.564***	-0.085	3.841*	13.395**	5.161**	0.470
	1.748	8.629	0.026	0.103	0.798	1.206	2.301	5.399	2.367	0.312
NTR$_{ct}$	9.594	-24.673	-0.225	-1.371	-7.501	18.691	-21.448	-13.178	9.953	5.681**
	30.585	100.520	0.440	1.176	15.527	16.450	29.463	55.810	30.695	2.719
MFA Exposure$_{ct}$	-0.268	27.280	-0.095	0.026	-0.218	0.019	-3.948	24.893**	6.336*	0.568*
	5.356	17.213	0.071	0.158	2.195	3.295	4.248	11.122	3.730	0.308
Post x ΔChinese Tariffs$_c$	-8.397**	-42.063**	-0.095	-0.313	-3.520**	-4.469	-18.202***	-9.864	-13.997***	-0.820*
	4.237	17.050	0.059	0.216	1.756	2.864	4.600	11.286	4.597	0.487
Post x ΔChinese Subsidy$_c$	9.748	3.493	0.122*	0.372*	4.609*	4.645	5.787	-7.213	4.920	0.347
	6.426	16.688	0.062	0.217	2.797	3.779	5.017	9.882	5.287	0.424
Post x Median HHI in 1990$_c$	2.157**	0.913	0.060***	0.104**	0.488	1.505**	0.612	2.396	-2.095*	-0.070
	1.035	3.963	0.012	0.045	0.471	0.624	1.162	2.469	1.099	0.106
Post x % No College in 1990$_c$	3.975***	22.764***	0.043***	0.240***	0.822*	2.870***	4.402***	19.741***	-1.379	-0.046
	1.110	4.411	0.013	0.056	0.489	0.729	1.182	2.875	1.299	0.214
Post x % Veteran in 1990$_c$	23.755**	52.700*	0.237***	0.266	12.597***	10.655**	8.571	17.700	26.429***	1.044**
	9.939	29.707	0.087	0.200	4.627	5.237	8.039	15.547	7.265	0.509
Observations	53,074	53,074	53,074	53,074	53,074	53,074	53,074	53,074	53,074	53,074
R-squared	0.858	0.851	0.793	0.728	0.889	0.797	0.827	0.829	0.873	0.689
P-Value DID Term	0.30	0.05	0.62	0.19	0.00	0.62	0.28	0.07	0.09	0.13
Estimation	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
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	13.88	128.42**	0.11	1.13	17.51***	-4.87	18.92	77.76*	31.74*	4.08
Std Err	13.51	65.39	0.22	0.85	6.00	9.80	17.44	42.23	18.80	2.70
Average Dep Var (2000)	472	3365	5	29	135	303	679	2299	387	25
Impact/Average	0.029	0.038**	0.02	0.039	0.129***	-0.016	0.028	0.034*	0.082*	0.161

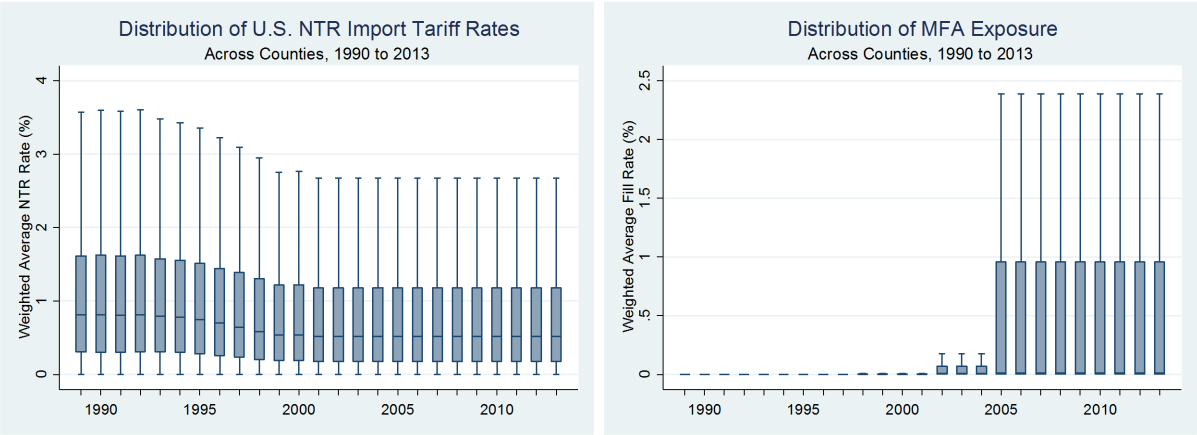
Notes: Table reports difference-in-differences (DID) OLS regression results for county-year crime rates per 100,000 population. Burglary is defined as theft (i.e., larceny) combined with unlawful entry. Robbery is defined as forcible theft from a person. Sample period is 1990 to 2006. The first covariate is an interaction of the county's NTR gap with an indicator for the post-PNTR period (years after 2000). The second covariate is the cumulative average quota fill rate for apparel and clothing imports from developing countries during 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. The fourth and fifth covariates are interactions of the post-PNTR indicator with the weighted average exposure to changes in Chinese import tariffs and changes in Chinese production subsidies. Remaining variables are interactions of the post-PNTR indicator 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. 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.17: PNTR and Crime Rates per 100,000 Population (UCR)



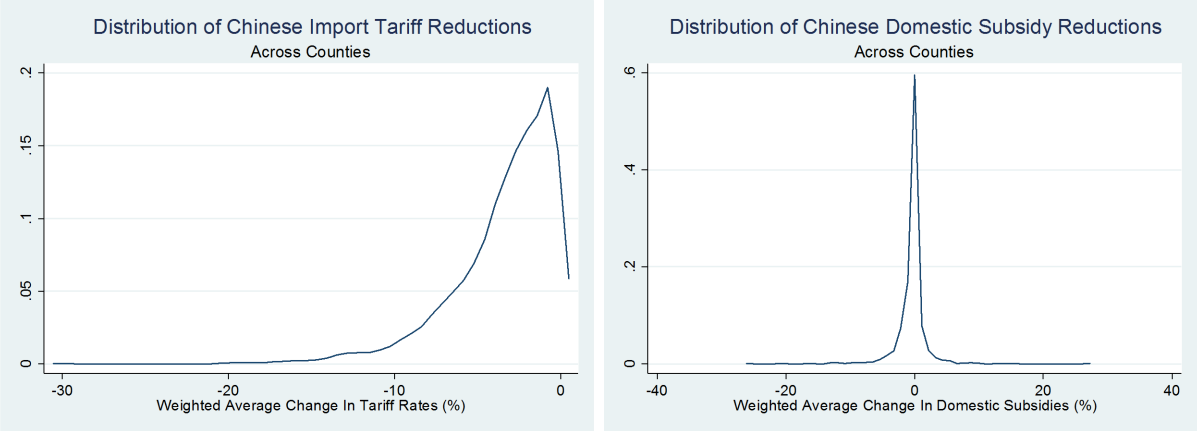
Notes: Figure compares counties' own NTR gaps to the average NTR gap of their surrounding counties. Dashed lines indicate the 25th and 75th percentiles of each distribution (2.2 and 10.5 for own county and 3.2 and 8.7 for surrounding counties). The commuting zone for each county is defined by Tolbert and Sizer (1996). The correlation of the two gaps is 0.58.

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



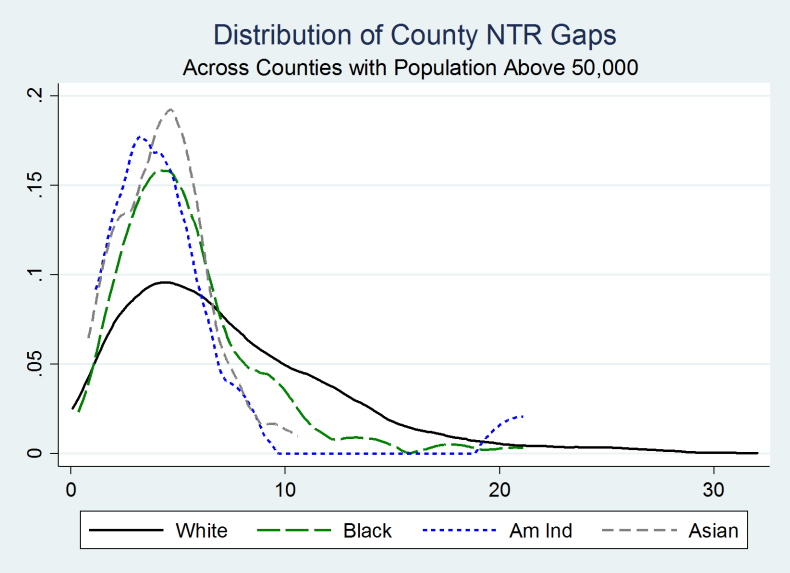
Notes: Left panel displays distribution of counties' labor-share weighted average NTR import tariff rate. Right panel displays distribution of counties' labor-share weighted average fill rates. Bars represent the interquartile range, while whiskers represent the range of the data, excluding outliers. 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})



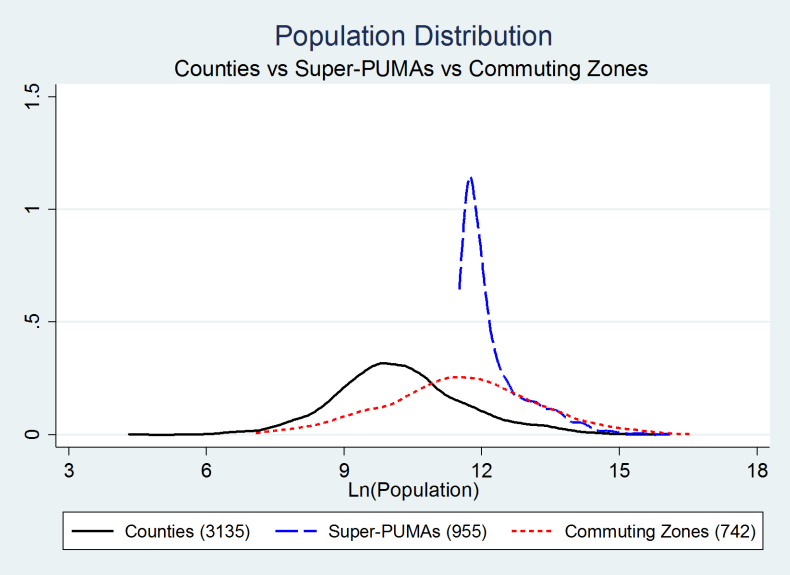
Notes: Left panel displays distribution of counties' labor-share weighted average 1996-2005 change in Chinese import tariffs. Right panel displays distribution of counties' labor-share weighted average change in Chinese domestic production subsidies as a percent of domestic sales.

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



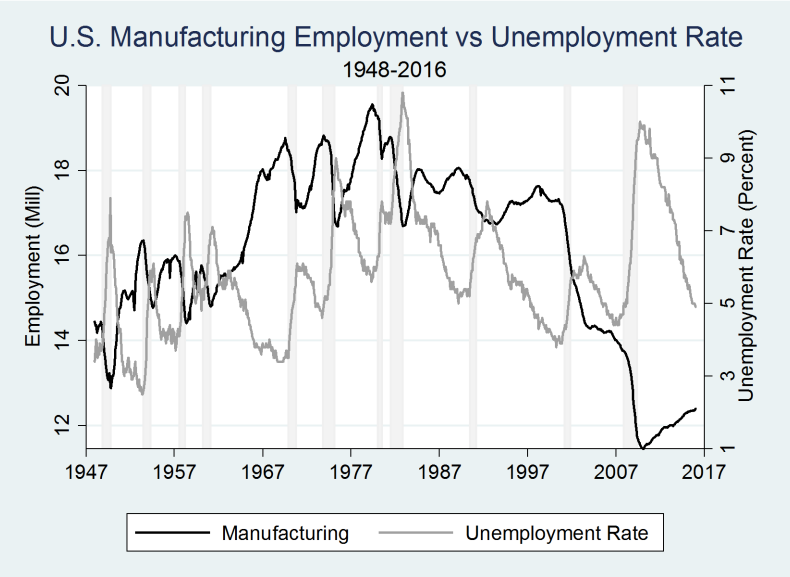
Notes: Figure displays distribution of NTR gaps across counties where population of noted racial group is 50,000 or higher.

Figure A.4: County NTR Gaps by Racial Group



Notes: Figure displays distribution of employment across noted geographic units. Figures in parentheses refer to the number of units in each geography, e.g., 3135 counties. Source: authors' calculations based on data from the U.S. Census Bureau and SEER.

Figure A.5: Distribution of Population Across Various Geographic Units



Source: Authors' calculations based on U.S. Bureau of Labor Statistics data.

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