U.S. Job Flows and the China Shock

Appendix — For Online Publication

Brian Asquith, Sanjana Goswami, David Neumark, and Antonio Rodriguez-Lopez

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A NETS Data Reliability

The NETS database is marketed as a powerful tool to analyze business dynamics in the U.S., and among other things, it allows for the calculation of gross job flows at different levels of aggregation. Although expensive, a NETS license does not impose any confidentiality restrictions and can be used in any computer or location. This is the main advantage of NETS over the similar Census Bureau's Longitudinal Business Database (LBD), which can only be accessed in secure Federal Statistical Research Data Center (FSRDC) locations after a lengthy process that involves the development of a proposal, evaluation and approval by Census and the Internal Revenue Service, background checks, special sworn status for researchers, strong confidentiality restrictions, and disclosure reviews. As an example, Burnes, Neumark, and White (2014) use NETS to study the impact of fiscal zoning on employment in a list of big-box retailers that includes Wal-Mart, Costco, Home Depot, and Target (such an analysis cannot be carried over with LBD due to confidentiality restrictions).

As with any other dataset, the NETS database has strengths as well as limitations. Using the NETS data for California, Neumark, Zhang, and Wall (2007) (NZW hereafter) provide a comprehensive analysis of the reliability of the NETS database along three dimensions: employment levels and correlations with other databases, tracking of establishments' relocations, and the identification of establishments' births. Here we review that assessment, compare NETS against the County Business Patterns (CBP) data used by Acemoglu, Autor, Dorn, Hanson, and Price (2016), and describe more recent NETS reviews.

A.1 NETS Employment Levels and Correlations with Other Databases

NZW and Neumark, Wall, and Zhang (2011) compare NETS against the BLS's Quarterly Census of Employment and Wages (QCEW), the BLS's Current Employment Statistics (CES), and the

Size of Business Data (SOB). NETS reports more employment than all these datasets, which NZW attribute to the inclusion in NETS of self-employed workers and proprietors, as well as to better coverage in NETS of small establishments. At the county-by-industry level the correlations between employment levels are 0.99 with CES and 0.95 with the QCEW. With SOB data, the correlation is 0.81 due mainly to discrepancies in small-establishment cells. Removing one employee from each NETS establishment (to avoid nonemployer businesses and proprietors) still causes NETS to report about 5 percent more employment than SOB.

The main problem with NETS is its extensive use of employment rounding (5, 10, 15,...) and imputations, especially for small and new establishments. As mentioned by NZW, rounding is a source of measurement error, but is unlikely to cause a large bias because rounding-up cases cancel out rounding-down cases. However, rounding generates stickiness in employment changes (it ignores small changes), and possibly underestimates expansions and contractions. As well, imputation is also a source of stickiness. NZW calculate that each year between one quarter to one third of employment data is imputed. Thus, the main consequence of rounding and imputation is substantial stickiness in year-to-year changes. For 2002, for example, only 16.3 percent of establishments report a change in employment, and the employment share of these establishments is only 14.1 percent. Stickiness is, from our point of view, the most important limitation of NETS data and makes it unsuitable for the analysis of year-to-year gross job flows.

NZW argue that longer intervals greatly reduce this problem, and suggest using three-year employment changes. Indeed, NZW show that the correlation between NETS and QCEW employment for yearly changes at the county level is only 0.53, but rises to 0.86 for three-year changes. In our case, we calculate job flows for 1992-1999 (seven-year change), 1999-2007 (eight-year change), and 1999-2011 (twelve-year change). Therefore, we are confident that the long-term horizons of our analysis minimize the impact of NETS stickiness on our results.

In a recent NETS assessment, Barnatchez, Crane, and Decker (2017) compare NETS against CBP, Nonemployer Statistics (NES), and QCEW and find correlations of employment levels of 0.99 across counties and above 0.9 across state-industry-size class cells. The CBP is constructed from the Census Bureau's Business Register (BR) data, which is the same source of the LBD data, and excludes proprietors, contractors, self-employed workers, temporary service workers, and government employees. Echoing Haltiwanger, Jarmin, and Miranda (2013), Barnatchez, Crane, and Decker (2017) show that the number of establishments in NETS is larger than the number of CBP establishments but smaller than the sum of establishments in CBP and NES, so that NETS is a combination of employer and nonemployer businesses but does not really contain the universe of U.S. establishments. As we do in this paper, and following a similar rule to NZW, Barnatchez, Crane, and Decker (2017) suggest excluding all one-person establishments from NETS to avoid nonemployer (or non-payroll) businesses as much as possible and make NETS more comparable to CBP.

Given that CBP is the source of employment data for Autor, Dorn, and Hanson (2013) and AADHP, which we also use for purposes of comparison with our net regressions results that use NETS data, the rest of this section is focused on the relationship between NETS and CBP. While CBP is based on March snapshots of employment, NETS uses January snapshots, but the D&B information is collected throughout the year (it is not the same collection time for every establishment). In their assessment, Barnatchez, Crane, and Decker (2017) compare the January NETS employment counts against the same year's March CBP employment counts. In our case, as is common for researchers using NETS, we use the January NETS data as the employment count of the previous year.

Barnatchez, Crane, and Decker (2017) show that NETS over-represents very small establishments. Comparing NETS and CBP, but excluding non-payroll NETS establishments, they find that most of the difference in employment comes from very small establishments (fewer than 10 employees, but especially fewer than 5) and very large establishments (more than 1000 employees). If we exclude these establishments, the employment difference between them is only between 2.2 and 5 percent (as opposed to between 16 and 19.5 percent without exclusions). Relatedly, the difference in number of establishments comes mostly from establishments with fewer than 10 employees—the difference is only between 1.33 and 4.61 percent if we exclude them. Therefore, they find that the match between CBP and NETS becomes very good after excluding establishments with fewer than 10 employees. Similar to NZW, they attribute the differences in small establishments' counts and employment to imputation, which is very high in establishments with 1 to 4 employees; they hypothesize that a large number of nonemployer establishments in NETS are imputed to have more than one employee.

As it is not possible to know whether excluding businesses with fewer than 10 employees will remove a large fraction of payroll establishments, we only exclude one-person establishments from the raw NETS data. After doing this, our restricted NETS database reports on average (across all years in the 1992-2011 period) 24 percent more employment than CBP. There is, however, large variation across industries. To show this, Table A.1 reports the average percentage difference in total employment between NETS and CBP for nine aggregated industries and overall. The differences across industries range from −8 percent in Construction to 42 percent in Finance, Insurance, and

Table A.1: Percentage Difference in Employment Between NETS and CBP

Industry	**1992-2011**
Agriculture, Forestry, and Fishing	34
Mining	8
Construction	-8
Manufacturing	21
Transportation and Public Utilities	18
Wholesale Trade	11
Retail Trade	3
Finance, Insurance, and Real Estate	42
Services	40
All industries	24

Notes: The numbers reported are the differences between NETS and CBP employment as a percentage of CBP employment for the average of all years between 1992-2011.

Table A.2: NETS–CBP Employment and Establishment Count Correlations, 1992-2007

Aggregation level	*Employment*	*Establishments*	*Observations*
A. Levels			
Industry	0.931	0.845	1,437
Commuting zone	0.997	0.959	2,166
Commuting zone – sector	0.997	0.958	6,498
B. Stacked differences			
Industry	0.695	0.331	958
Commuting zone	0.894	0.821	1,444
Commuting zone – sector	0.914	0.852	4,332

Notes: The NETS–CBP correlations for levels use employment and establishment counts data for years 1992, 1999, and 2007, while the correlations for stacked differences use the periods 1992-1999 and 1999-2007.

Real Estate, with Manufacturing reporting 21 percent more employment.

Table A.2 shows correlations for employment and establishment counts between NETS and CBP data used in our regressions. These correlations are calculated for levels and stacked differences under three different aggregations of the data: 479 industries, or 722 commuting zones, or 722×3 commuting zone–sectors (as in section 5, the three sectors are exposed, nonexposed tradable and nonexposed nontradable). The correlations for levels use data for 1992, 1999, and 2007, while the correlations for stacked differences use the periods 1992-1999 and 1999-2007.

Similar to previous assessment exercises, no matter the level of aggregation, the correlations for the variables in levels are very high, ranging from 0.931 to 0.997 for employment levels, and between 0.845 and 0.958 for establishment counts. On the other hand, the stacked difference correlations are very high when using any of the commuting zone aggregations (0.894 and 0.914 for employment, and 0.821 and 0.852 for establishment counts), but they are not as good for the industry-level aggregation (0.695 for employment, and only 0.331 for establishment counts). The difference in stacked-difference correlations helps explains why the commuting-zone net regressions yield very similar coefficients and predicted gross flows with NETS and CBP data, while yielding coefficients with non-negligible differences in magnitude in the industry-level regressions.

An explanation for the lower stacked-difference correlations at the industry level, but very high correlations at the commuting zone level, is that there are discrepancies between NETS and CBP data regarding the identification of industries—due, for example, to the same establishment being classified into a different industry in each dataset. A sign of this is the cross-industry variation in percentage differences between NETS and CBP's employment counts, as reported in Table A.1. Importantly, in spite of the differences in coefficient magnitudes, the industry-level net regressions with NETS and CBP data always yield coefficients with similar signs and statistical significance, which bolsters our confidence in our main results. However, our results should be confirmed with the LBD to be considered validated.

A.2 NETS Tracking of Establishments' Relocations and Births

Using the national NETS data, Neumark, Wall, and Zhang (2011) show that there is a negative relationship between employment growth and firm size. Haltiwanger, Jarmin, and Miranda (2013) refine the results of Neumark, Wall, and Zhang (2011) and show, using LBD data, that startups—which most of the time are classified as small—have a crucial role in employment creation, so that once you control for firm age, there is no longer a relationship between employment growth and firm size. Haltiwanger, Jarmin, and Miranda (2013) prefer to use the LBD because they have concerns regarding how well NETS captures startups, questioning the feasibility of a firm-age analysis with NETS.[1]

The doubts about the tracking of establishments in NETS have their origin in unfavorable criticism in older studies (see, for example, Birch, 1987) using previous versions of D&B data. The dataset, however, has improved over time. For example, thanks to a federal court ruling, D&B started using Yellow Pages to identify establishments in 1992, which caused a large increase in the number of small establishments detected (because of this, researchers typically do not use NETS data before 1992). NZW's assessment on NETS identification of relocations and births shows that

[1]Importantly, in their specification without the firm-age control, they also obtain a negative relationship between employment growth and firm size. Hence, when estimating the same specification, there is no conflict between the result of Neumark, Wall, and Zhang (2011) with NETS data, and the result of Haltiwanger, Jarmin, and Miranda (2013) with the LBD.

the tracking concerns are largely unjustified.

Although our job flows analysis ignores the relocation margin because it is negligible (Neumark, Zhang, and Wall, 2006), relocation cases provide a good window to verify the reliability of NETS because they give indirect evidence on D&Bs ability to properly identify births and deaths. In the case of a relocation, for example, we have to make sure that NETS does not capture it as a death in one location and a birth in another location. NZW identify 405 possible business relocations from *Los Angeles Times* news articles between 1996 and 2000. Of these, 58.5 percent are captured by NETS, but the type of relocation matters: they confirmed 74 percent of cross-state moves, 70 percent of between-city within-state moves, but only 27 percent of within-city moves. For a commuting-zone level analysis, the small share of within-city moves captured is inconsequential. NZW argue that the true fraction of between-city and cross-state moves captured should be higher than 75 percent because they were not able to confirm as real relocations most of the non-captured cases.

NZW perform two checks on how well NETS captures birth of establishments. The first check uses a random sample of establishments from the San Francisco business White Pages, and identifies potential startups by looking for businesses that are not in the phonebook in the initial year but that appear one year later. They obtain a list of 58 establishments, of which 90 percent are captured in the NETS database. The phonebook's initial year does not necessarily correspond to the establishment's opening year, and therefore, NZW attempt to obtain through other means (directly from the establishment or their websites) the opening year for the 52 captured establishments. They are able to reach 33 of them, and find that the NETS data match the opening year much more accurately than the phonebook.

Given that phonebooks may not be very accurate regarding opening years, NZW perform a second check by looking for California startups in the BioAbility database of U.S. biotech companies. From this database they extract 161 California companies whose founding dates in the database were between 1992 and 2002, and which also reported founding dates in their websites. Of these, 89 percent of websites reported the same founding year as the BioAbility database, and for the remaining 11 percent NZW prefer to use the website founding year. Out of 161 companies, only 8 do not appear in NETS. Of the remaining 153, 75 percent report the same starting year in NETS as on their website, 88 percent are within one year, and 92 percent are within two years. The correlation between NETS start years and website start years is 0.87.

Echeverri-Carroll and Feldman (2018) do a similar exercise for startups in the Austin, Texas area, comparing start years from establishments in the Secretary of State (SOS) registry data against those reported by NETS. After matching by name 1,454 establishments that reported a start year between 1990 and 2010 in NETS, they find that 50 percent had the same start year, 75.1 percent were within two years, and 80.4 percent were within three years, for a 0.69 correlation between the start year in NETS and the start year in SOS. To conclude, NETS does a good job in detecting new establishments.

B Overview of U.S. Job Flows

This section supplements the brief description of three-year U.S. job flows from section 3. Figures 2 and 3 in the main text show that the extensive margin components (births and deaths) dominate gross job creation, gross job destruction, and the overall net effect. Table B.1 gives more detail on these job flows. Total jobs grew consistently over the 1990s, but job growth since 2000 was more anemic, with net job destruction occurring over 2001-2004 and then again in 2006-2009, 2007-2010, and 2008-2011, coinciding with the bursting of the Dot-com Bubble and the Great Recession. Prior to 2001-2004, births were far and away the single most important factor in job flows, but since then, deaths took over as the most important source of job reallocation.

Breaking out the job flows by industry groupings, Figures B.1 and B.2 show the composition and evolution of gross job creation and gross job destruction in the manufacturing and non-manufacturing sectors. For the manufacturing sector we observe a steady decline in gross job creation since the early 2000s, leading to an all-time low in 2007-2010, and then followed by a sharp increase in births of new establishments post-2010. Unlike in the overall economy, births and expansions in manufacturing had on average an almost equal share in job creation. Job destruction in manufacturing started a sharp increase in 1996-1999, reaching its peak in 2000-2003. This was followed by a sharp decline, driven mostly by decreasing contractions of establishments. In manufacturing, 59 percent of gross job destruction is accounted for by deaths of establishments. For the non-manufacturing sector, gross job creation and destruction follow similar trends to those observed for the overall economy in Figure 2.

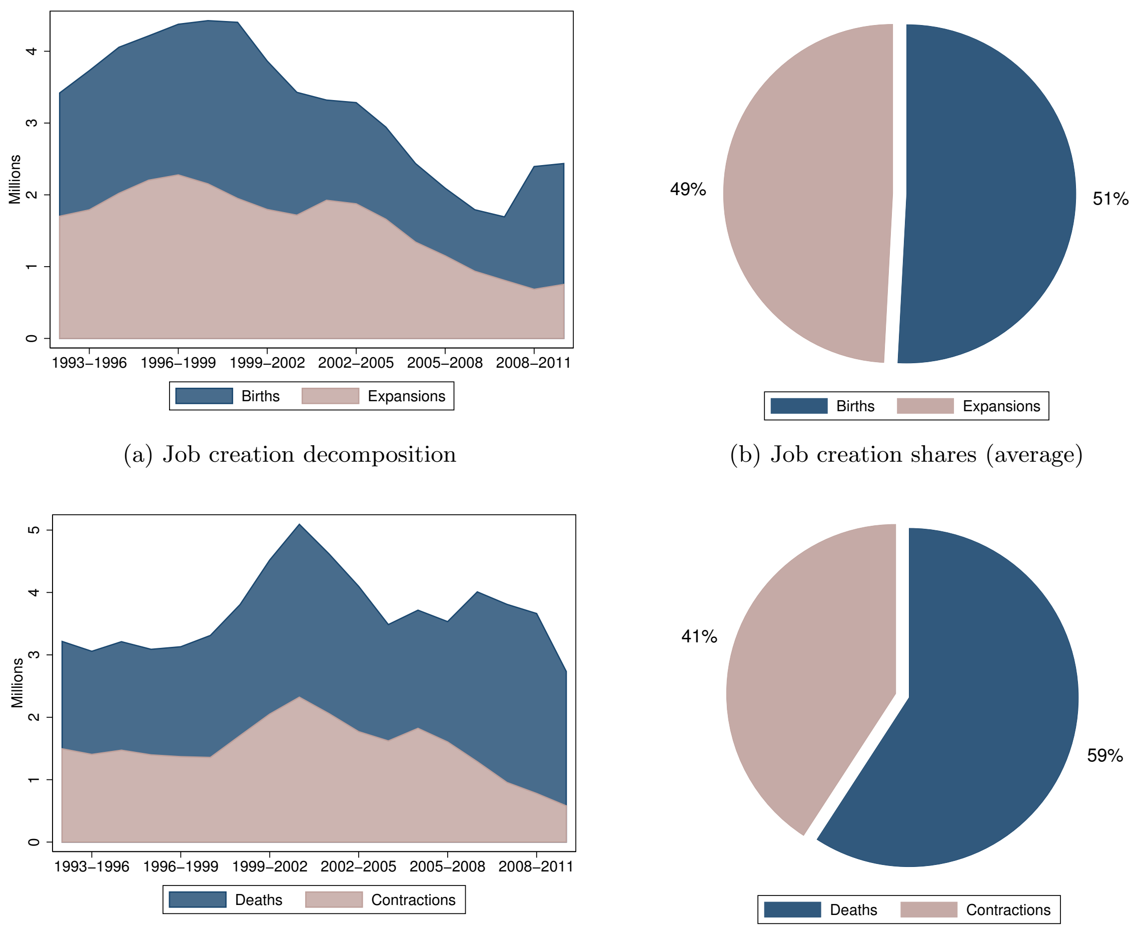
Figure B.3a shows net employment changes at the intensive margin, the extensive margin, and overall in the manufacturing sector. The net intensive margin of employment was positive until 1998-2001, and since then it was negative most of the time (the exceptions were 2002-2005, 2003-2006, and 2009-2012). The extensive margin of employment remained negative since 1999-2002, reaching an all-time low in 2007-2010. In contrast to the overall economy, and driven strongly by establishment deaths, net job creation in manufacturing never returned to being positive after the 2001 recession—manufacturing net job losses progressed steadily in the post-2000 period, reaching

Table B.1: Job Flows Decomposition in All Industries (in Thousands)

	1992-95	**1993-96**	**1994-97**	**1995-98**	**1996-99**	**1997-00**	**1998-01**	**1999-02**	**2000-03**
Employment at initial year	102,582	104,221	109,936	111,852	116,928	121,534	124,489	129,111	135,499
Employment at final year	111,852	116,928	121,534	124,489	129,111	135,499	141,823	140,400	138,779
Change in employment									
Due to births	16,887	19,498	18,377	17,571	16,814	19,176	24,060	21,893	18,758
Due to deaths	-8,953	-9,261	-10,699	-11,067	-11,618	-12,716	-12,989	-14,223	-16,854
Due to expansions	8,331	9,366	11,658	13,472	14,404	14,688	14,610	13,565	13,151
Due to contractions	-6,995	-6,896	-7,739	-7,338	-7,417	-7,184	-8,347	-9,946	-11,775
Net changes									
Net extensive margin	7,933	10,237	7,678	6,504	5,196	6,460	11,071	7,670	1,904
Net intensive margin	1,336	2,471	3,919	6,134	6,987	7,505	6,263	3,620	1,376
Net employment change	9,270	12,708	11,598	12,638	12,183	13,965	17,334	11,289	3,280

	2001-04	**2002-05**	**2003-06**	**2004-07**	**2005-08**	**2006-09**	**2007-10**	**2008-11**	**2009-12**
Employment at initial year	141,823	140,400	138,779	139,196	142,114	143,874	145,047	148,038	140,508
Employment at final year	139,196	142,114	143,874	145,047	148,038	140,508	143,912	146,838	144,794
Change in employment									
Due to births	15,350	16,789	16,909	15,952	15,053	16,058	19,464	22,178	19,159
Due to deaths	-17,571	-17,061	-14,161	-12,987	-12,189	-21,996	-23,762	-26,870	-19,155
Due to expansions	13,126	13,028	11,906	10,925	10,183	8,190	7,418	7,416	7,544
Due to contractions	-13,532	-11,041	-9,559	-8,040	-7,124	-5,618	-4,256	-3,924	-3,262
Net changes									
Net extensive margin	-2,221	-273	2,748	2,966	2,864	-5,938	-4,298	-4,691	3
Net intensive margin	-406	1,986	2,347	2,885	3,060	2,572	3,162	3,492	4,282
Net employment change	-2,627	1,713	5,095	5,851	5,924	-3,365	-1,135	-1,199	4,285

Notes: This table reports employment levels and three-year job flows for the overall U.S. economy. It uses NETS data from the universe of U.S. establishments with two or more employees in at least one year during the 1992-2012 period.



(a) Job creation decomposition

(b) Job creation shares (average)

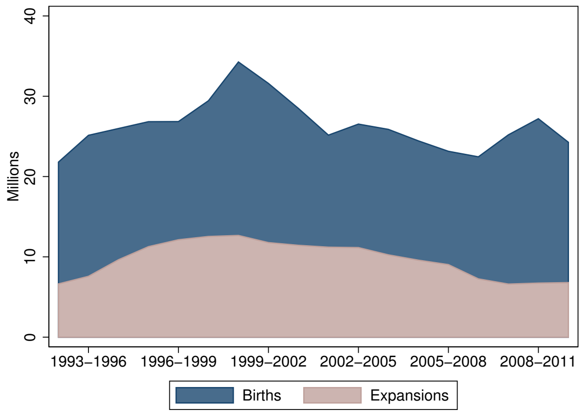
(c) Job destruction decomposition

(d) Job destruction shares (average)

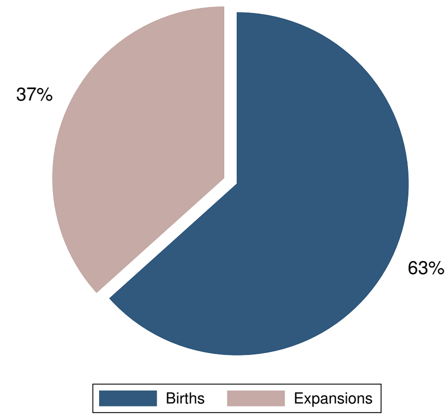
Figure B.1: Employment creation and destruction in the manufacturing industry (three-year windows)

their nadir during the Great Recession. For the non-manufacturing sector, which on average accounts for 86 percent of total employment per year, Figure B.3b is of course very similar to Figure 3.

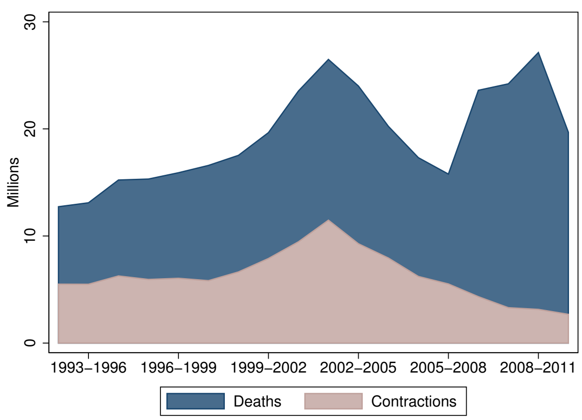
The last stylized fact we present is that the relative importance of the extensive margin processes grew sharply after the Great Recession. For both the manufacturing and non-manufacturing sectors, Figures B.4a and B.4b show a strong increase in the death share in job destruction starting from 2005-2008. As well, the birth share in job creation also experienced a steady increase starting from 2005-2008. Hence, in the post-Great Recession period, the extensive margin of employment accounted for a much larger share in total job reallocation than it did previously, speaking again to the importance of using the NETS dataset to tease out changes on the intensive and extensive margins.



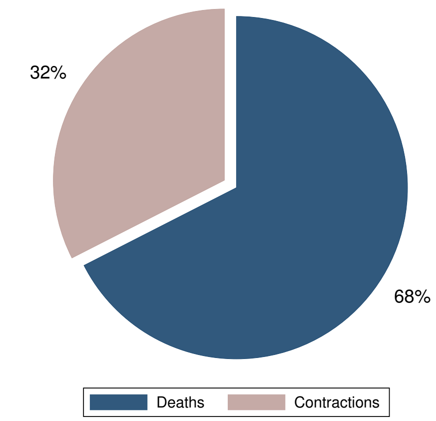
(a) Job creation decomposition



(b) Job creation shares (average)



(c) Job destruction decomposition



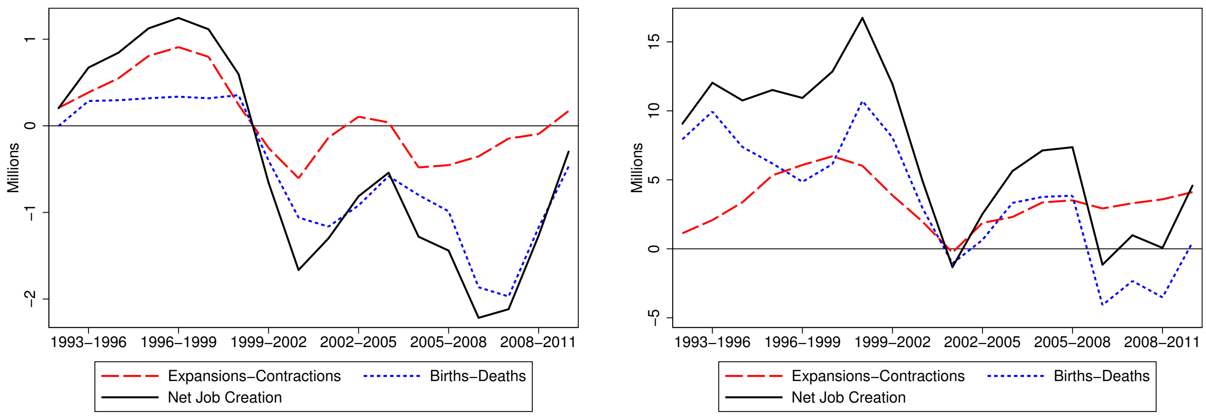
(d) Job destruction shares (average)

Figure B.2: Employment creation and destruction in the non-manufacturing industry (three-year windows)

C Estimation Supplement

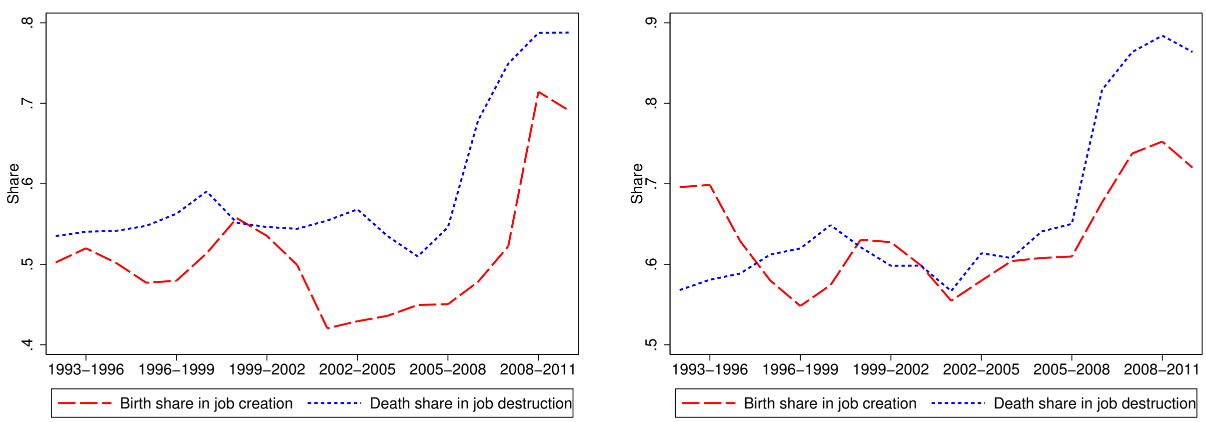
C.1 Robustness of Industry-Level Estimation for Manufacturing

Complementing the analysis of manufacturing employment in section 4.2, Table C.1 presents the robustness checks for the industry-level specifications in columns 2, 5, 6, and 7 from Table 1. We include the following industry-level time-invariant controls proposed by AADHP: *(i)* ten one-digit manufacturing sector dummies (*manufacturing sector controls*), *(ii)* 1991 levels of the share of production workers in total industry employment, the log average wage, and the ratio of capital to value-added, as well as 1990 levels of the share of computer investment in total investment, and the share of high-tech equipment in total investment (*production controls*), *(iii)* 1976-91 changes in the log average wage and in the share of the industry's employment in total U.S. employment



(a) Manufacturing industry (b) Non-manufacturing industry

Figure B.3: Net employment changes by industry



(a) Manufacturing industry (b) Non-manufacturing industry

Figure B.4: Share of births and deaths in job creation and destruction

(*pretrend controls*), and *(iv)* industry fixed effects.

Columns 1, 2, 4, and 5 indicate that when adding manufacturing sector, production, and pretrend controls, the coefficients for the net growth regressions remain statistically significant. The Chinese-import-exposure results on job flows in columns 1 and 2 tell the same story as before: in the manufacturing sector, job destruction by deaths is the main driver of the net employment decline associated with Chinese import exposure during the 1992-2007 and 1992-2011 periods (the corresponding values of $\hat{\delta}$—the share of deaths in total Chinese-induced job reallocation—are 0.56 and 0.57). As well, the PNTR results on job flows in columns 4 and 5 continue to show deaths as the main driver of Chinese-induced job reallocation (with $\hat{\delta}$ values of 0.46 during 1992-2007 and 0.64 during 1992-2011), but also report statistically significant declines in births and expansions.

Table C.1: Estimation of the Effects of the China Shock on Manufacturing Employment with Industry-Level Controls

	Chinese Import Exposure			**PNTR Status**		
	(1)	(2)	(3)	(4)	(5)	(6)
Net employment growth	-0.39**	-0.35**	-0.16	-0.22***	-0.24**	-0.18*
	(0.17)	(0.16)	(0.16)	(0.08)	(0.10)	(0.10)
Job flows						
Births	-0.03	-0.05	-0.09	-0.06*	-0.05	-0.09**
	(0.03)	(0.05)	(0.06)	(0.03)	(0.06)	(0.04)
Deaths	0.22**	0.20**	0.03	0.10**	0.16**	0.04
	(0.09)	(0.08)	(0.07)	(0.04)	(0.07)	(0.04)
Expansions	-0.02	-0.00	0.01	-0.05**	-0.05*	-0.06
	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.04)
Contractions	0.12*	0.09	0.06	0.00	-0.01	-0.01
	(0.07)	(0.07)	(0.06)	(0.04)	(0.04)	(0.03)
Net extensive margin	-0.25**	-0.25**	-0.12	-0.16***	-0.21**	-0.13**
	(0.10)	(0.10)	(0.12)	(0.05)	(0.08)	(0.06)
Net intensive margin	-0.14	-0.10	-0.05	-0.05	-0.03	-0.05
	(0.09)	(0.08)	(0.08)	(0.05)	(0.05)	(0.06)
Job creation	-0.05	-0.05	-0.08	-0.11***	-0.10*	-0.15**
	(0.04)	(0.06)	(0.08)	(0.04)	(0.06)	(0.06)
Job destruction	0.34**	0.30**	0.09	0.11	0.15	0.02
	(0.14)	(0.12)	(0.11)	(0.07)	(0.09)	(0.06)
CBP data:						
Net employment growth	-0.84***	-0.76***	-0.87**	-0.55***	-0.70***	-0.70***
	(0.26)	(0.23)	(0.36)	(0.14)	(0.20)	(0.15)
Estimation method	IV	IV	IV	OLS	OLS	OLS
Manf. sector controls	Yes	Yes	No	Yes	Yes	No
Production controls	Yes	Yes	No	Yes	Yes	No
Pretrend controls	Yes	Yes	No	Yes	Yes	No
Industry fixed effects	No	No	Yes	No	No	Yes
Include 2008-2011	No	Yes	No	No	Yes	No
Observations	784	784	784	784	784	784

Notes: This table reports $\hat{\beta}$ and $\hat{\beta}^F$ from the estimation of specifications (3) and (4) for the manufacturing sector (392 industries) including industry-level time invariant controls. All regressions include two subperiods, 1992-1999 and either 1999-2007 (in columns 1, 3, 4 and 6) or 1999-2011 (in columns 2 and 5). All regressions include subperiod fixed effects (not reported) and are weighted by 1992 employment. The net growth regression with CBP data is weighted by 1992 CBP employment, and is reported for the purpose of comparison with the net growth regression with NETS data. Standard errors (in parentheses) are clustered at the three-digit industry level. The coefficients are statistically significant at the *10%, **5%, or ***1% level.

In comparison, columns 1, 2, 4, and 5 show that the coefficients in the net-growth regressions using CBP data become closer to the NETS net coefficients when industry-level controls are added. An important caveat is the outcome of the industry fixed-effects regressions with NETS data in column 3 and 6, which show the coefficients on deaths losing their statistical significance, along with the Chinese-import-exposure coefficient in the net-employment-growth regression. In the end of section 4.2 we mention several reasons why we think the latter result does not undermine our conclusions.

C.2 Upstream and Downstream Sectoral Linkages

Following AAHDP, this section considers upstream and downstream linkages across industries. Upstream linkages refer to effects that flow from buying industries to a selling industry, and downstream linkages refer to effects that flow from a selling industry to a purchasing industry.[2]

Most non-manufacturing firms are non-importing industries, and therefore they do not have an associated direct import penetration measure as defined in section 4.1.1, nor an associated NTR gap as defined in section 4.1.2. However, these non-importing non-manufacturing industries purchase inputs from and sell goods to importing industries with associated NTR gaps. Hence, a benefit of the input-output approach is that we are able to obtain measures of indirect Chinese exposure—resulting from both changes in Chinese import penetration for directly exposed industries and changes in China's PNTR status—for non-importing non-manufacturing industries. A limitation, however, is that it is difficult to assess how measurement error in NETS at the industry level (as discussed in the end of section A.1) affects the input-output linkages estimation.

C.2.1 Upstream and Downstream Import Exposure

To calculate upstream and downstream import exposure measures, which are weighted averages of the industries' direct import exposure measures, AADHP use the 1992 input-output table from the Bureau of Economic Analysis (BEA) as follows. If μ_{gj} denotes industry g's purchases from industry j, the share of industry g in total sales of industry j is given by $\omega^U_{gj} = \mu_{gj}/\sum_{g'}\mu_{g'j}$. Thus, the upstream Chinese import exposure measure for industry j during subperiod τ is calculated as

$$\Delta UIP_{j\tau} = \sum_g \omega^U_{gj}\Delta IP_{g\tau}, \tag{C-1}$$

where $\Delta IP_{g\tau}$ is the direct Chinese import exposure in industry g during subperiod τ as defined in (1). Similarly, the share of industry g in total purchases of industry j is $\omega^D_{jg} = \mu_{jg}/\sum_{g'}\mu_{jg'}$, so that the downstream Chinese import exposure measure for industry j during subperiod τ is

$$\Delta DIP_{j\tau} = \sum_g \omega^D_{jg}\Delta IP_{g\tau}. \tag{C-2}$$

[2] PS and AADHP use opposite terminologies in the definition of upstream and downstream linkages. Here we use the terminology of AADHP.

The main analysis on input-output linkages of AADHP separately includes $\Delta IP_{j\tau}$, $\Delta UIP_{j\tau}$, and $\Delta DIP_{j\tau}$ as regressors in their net-employment-growth IV regressions, using $\Delta IP^*_{j\tau}$, $\Delta UIP^*_{j\tau}$, and $\Delta DIP^*_{j\tau}$ as instruments.[3] Given that their estimated coefficient on $\Delta DIP_{j\tau}$ is not statistically significant in any of their specifications, they focus their discussion on predicted employment losses from specifications that only include $\Delta IP_{j\tau}$ and $\Delta UIP_{j\tau}$. As well, they estimate a specification that combines $\Delta IP_{j\tau}$ and $\Delta UIP_{j\tau}$ in a single measure, $\Delta IP_{j\tau} + \Delta UIP_{j\tau}$, which yields similar results to the specification that includes them separately.

To simplify our job flows analysis, here we follow the latter approach and focus on combined measures of Chinese import exposure. The first combined measure adds the direct and upstream measures, $\Delta IP_{j\tau} + \Delta UIP_{j\tau}$, while the second combined measure adds all three, $\Delta IP_{j\tau} + \Delta UIP_{j\tau} + \Delta DIP_{j\tau}$. As in AADHP, instruments are included separately, using $\Delta IP^*_{j\tau}$ and $\Delta UIP^*_{j\tau}$ as instruments for the first measure, and adding $\Delta DIP^*_{j\tau}$ for the second measure. We also tried using as instruments $\Delta IP^*_{j\tau} + \Delta UIP^*_{j\tau}$ for the first measure, and $\Delta IP^*_{j\tau} + \Delta UIP^*_{j\tau} + \Delta DIP^*_{j\tau}$ for the second measure, with the results barely changing in magnitude and significance.

Pooling all manufacturing and non-manufacturing industries (a total of 479 industries), Table C.2 presents our IV estimation results for the impact of combined measures of Chinese import exposure on net employment growth (measured as the log-employment annual change), and on each of its job-flow components. Columns 1-3 use the first measure (*direct+upstream*) and columns 4-6 use the second measure (*direct+upstream+downstream*). All regressions are weighted by 1992 employment and include two subperiods (1992-1999 and either 1999-2007 or 1999-2011), with separate subperiod fixed effects for manufacturing industries and non-manufacturing industries. As before, standard errors are clustered at the three-digit SIC level.

Across all specifications, the first row in Table C.2 shows that an increase in any of the combined measures of Chinese import exposure is associated with net job destruction. The following four rows for the separate job flows indicate, as before, that job destruction by deaths of establishments is the main driver of this result: the import-exposure coefficient on deaths is the largest in magnitude in all specifications. The last column of Table C.3, which reports the values of the estimated death share ($\hat{\delta}$) for our preferred specifications, shows that deaths explain 71 or 80 percent of direct and upstream Chinese-induced job reallocation, depending on the sample period (from Table C.2's columns 2-3), and explain 63 or 71 percent if we consider all linkages (from Table C.2's columns 5-6). Each column in Table C.2 also shows statistically significant job destruction due to establishment contractions, but the contractions coefficient is much smaller than the coefficient on deaths.

[3]To construct $\Delta UIP^*_{j\tau}$ and $\Delta DIP^*_{j\tau}$, we simply have to replace $\Delta IP_{g\tau}$ with $\Delta IP^*_{g\tau}$ in (C-1) and (C-2).

Table C.2: IV Estimation of the Effects of Chinese Import Exposure on U.S. Employment — with Upstream and Downstream Linkages Across Industries

	Combined measure I *(direct+upstream)*			**Combined measure II** *(direct+upstream+downstream)*		
	(1)	(2)	(3)	(4)	(5)	(6)
Net employment growth	-0.38**	-0.44***	-0.47***	-0.33**	-0.38***	-0.39***
	(0.15)	(0.15)	(0.16)	(0.14)	(0.13)	(0.11)
Job flows						
Births	0.02	0.03	0.00	0.05	0.06	0.04
	(0.06)	(0.04)	(0.07)	(0.06)	(0.05)	(0.07)
Deaths	0.28***	0.37***	0.43***	0.30***	0.36***	0.41***
	(0.09)	(0.10)	(0.11)	(0.09)	(0.09)	(0.10)
Expansions	0.01	0.01	0.03	0.03	0.03	0.05
	(0.02)	(0.02)	(0.02)	(0.04)	(0.03)	(0.04)
Contractions	0.11*	0.11*	0.08*	0.11*	0.12**	0.08**
	(0.06)	(0.06)	(0.05)	(0.06)	(0.06)	(0.04)
Net extensive margin	-0.27***	-0.34***	-0.43***	-0.25***	-0.30***	-0.37***
	(0.10)	(0.11)	(0.15)	(0.09)	(0.09)	(0.11)
Net intensive margin	-0.11	-0.10	-0.05	-0.08	-0.08	-0.02
	(0.07)	(0.08)	(0.05)	(0.08)	(0.07)	(0.05)
Job creation	0.02	0.04	0.03	0.08	0.10	0.09
	(0.06)	(0.05)	(0.07)	(0.08)	(0.06)	(0.07)
Job destruction	0.40***	0.48***	0.50***	0.41***	0.48***	0.49***
	(0.13)	(0.14)	(0.13)	(0.13)	(0.12)	(0.11)
CBP data:						
Net employment growth	-0.93***	-1.32***	-1.37***	-0.86***	-1.17***	-1.26***
	(0.26)	(0.37)	(0.41)	(0.23)	(0.32)	(0.37)
Sector × period controls	Yes	Yes	Yes	Yes	Yes	Yes
Manf. sector controls	Yes	No	No	Yes	No	No
Include 2008-2011	No	No	Yes	No	No	Yes
Observations	958	958	958	958	958	958

Notes: This table reports results for the effects of *direct + upstream*, and *direct + upstream + downstream* Chinese import exposure on annualized log-employment changes and job flows. All regressions include 479 industries, two subperiods (1992-1999 and either 1999-2007 or 1999-2011), and are weighted by 1992 employment. The net growth regression with CBP data is weighted by 1992 CBP employment, and is reported for the purpose of comparison with the net growth regression with NETS data. Standard errors (in parentheses) are clustered at the three-digit industry level. The coefficients are statistically significant at the *10%, **5%, or ***1% level.

Comparing the magnitude of the net coefficients in the first row, note that their size is smaller when using the second combined measure of import exposure. This, however, does not mean that predicted employment losses are smaller when we consider downstream exposure, as changes in the second measure of import exposure are likely to be larger than changes in the first measure. To know whether there are larger or smaller predicted losses with the second measure, we use a

Table C.3: Predicted U.S. Employment Changes due to the China Shock and the Estimated Death Share — with Upstream and Downstream Linkages Across Industries

Specification	*Exposure type—Sector*	*Net change*	*Births*	*Deaths*	*Expan.*	*Contr.*	$\hat{\delta}$
	A. Chinese import exposure (in thousands of jobs)						
1992-2007:							
Table 1, col. 2	Direct—*Manufacturing*	**-477**	11	**-371**	11	**-127**	0.71
Table C.2, col. 2	Combined I—*Total*	**-759**	52	**-638**	17	**-190**	0.71
Table C.2, col. 5	Combined II—*Total*	**-888**	137	**-820**	68	**-273**	0.63
1992-2011:							
Table 1, col. 5	Direct—*Manufacturing*	**-491**	-11	**-406**	21	**-96**	0.76
Table C.2, col. 3	Combined I—*Total*	**-880**	0	**-788**	55	**-147**	0.80
Table C.2, col. 6	Combined II—*Total*	**-999**	100	**-1,024**	125	**-200**	0.71
	B. PNTR status (relative change for interquartile shift in the NTR gap)						
1992-2007:							
Table 1, col. 6	Direct—*Manufacturing*	**-0.049**	-0.004	**-0.037**	-0.005	-0.004	0.76
Table C.5, col. 2	Combined I—*Total*	**-0.078**	0.005	**-0.076**	-0.004	-0.003	0.87
Table C.5, col. 5	Combined II—*Total*	**-0.073**	0.009	**-0.076**	-0.003	-0.003	0.81
1992-2011:							
Table 1, col. 7	Direct—*Manufacturing*	**-0.061**	-0.001	**-0.059**	-0.002	0.001	0.95
Table C.5, col. 3	Combined I—*Total*	**-0.121**	-0.001	**-0.123**	0.001	0.002	0.98
Table C.5, col. 6	Combined II—*Total*	**-0.139**	-0.012	**-0.136**	0.004	0.005	0.89

Notes: Panel A reports the change in employment attributed to changes in Chinese import exposure for the specifications described in the first column. Negative values indicate that import exposure reduces employment. Equation (6) shows a general formula to calculate predicted employment changes from import-exposure specifications in Tables 1 and C.2. For the PNTR-status specifications described in the first column, Panel B reports the relative log change in employment (for Tables 1 and C.5) for an interquartile shift in the NTR gap. The numbers in bold denote predicted changes corresponding to statistically significant coefficients in the corresponding tables. For each specification, the last column shows the estimated share of deaths in total Chinese-induced job reallocation, $\hat{\delta}$, as defined in (5).

formula similar to equation (6). Following AADHP (and our earlier discussion), we focus on the specifications that do not include the one-digit manufacturing sector dummies (columns 2, 3, 5, and 6), and report in Table C.3 their predicted employment changes—the net effect as well as the contribution of each job-flow type.

For the 1992-2007 period, Chinese-induced net destruction is 0.76 million U.S. jobs when considering direct and upstream import exposures, and 0.89 million jobs if we also consider downstream import exposure. If we include the Great Recession period, losses are slightly larger at 0.88 million jobs under the first measure, and 1 million jobs under the second measure. Hence, Chinese downstream import exposure is also a source of net job destruction for U.S. establishments. Although not reported in Table C.3, we also find that for the 1992-2007 period, 21 percent of net predicted losses occur in non-manufacturing industries when we consider upstream exposure, and this share rises to 33 percent if we also consider downstream exposure (these shares are 24 and 37 percent for the 1992-2011 period).

Equations (C-1) and (C-2) show *first-order* upstream and downstream import penetration measures. Following Acemoglu, Carvalho, Ozdaglar, and Tahbaz-Salehi (2012), AADHP also consider *higher-order* (HO) upstream and downstream linkages—*e.g.*, an industry is also affected by shocks to one of its buyers' buyers or sellers, or by shocks to one of its sellers' buyers or sellers, and so on. Along these lines, Table C.4 presents our estimation of the effects of the HO-combined measures of Chinese import exposure on U.S. net employment and job flows. When compared to Table C.2, the results barely change in terms of signs, magnitudes, and statistical significance.

For the net growth regressions using the CBP data in Tables C.2 and C.4, the import exposure coefficients are again similar in sign and statistical significance to those obtained with NETS in the first row, but they are between 2.4 and 3.2 times larger in magnitude. In terms of net employment changes, Table C.7 shows that the CBP data predicts losses about twice as large as the NETS data. In spite of these differences, CBP and NETS data never yield conflicting estimates for net employment responses.

C.2.2 Upstream and Downstream Exposure to China's PNTR Status

We next look at the upstream and downstream effects of China's PNTR status on U.S. net employment changes and each job-flow component. To calculate the upstream and downstream measures of China's PNTR status for industry j during subperiod τ, $UPNTR_{j\tau}$ and $DPNTR_{j\tau}$, we simply replace $\Delta IP_{g\tau}$ in equations (C-1) and (C-2) with $PNTR_{g\tau}$, which was defined in equation (2). As in the previous section, we simplify our analysis by using combined measures of exposure to China's PNTR status: the first measure is $PNTR_{j\tau} + UPNTR_{j\tau}$, and the second measure is $PNTR_{j\tau} + UPNTR_{j\tau} + DPNTR_{j\tau}$.

Table C.5, which exactly mirrors Table C.2, presents our PNTR estimation results. Similar to our previous findings, both combined measures of exposure to China's PNTR status are associated with net job destruction in the United States. Note that only the increase in job destruction by deaths significantly matters in explaining the result on net employment growth. On the other hand, the coefficients on births, expansions, and contractions are all very close to zero. As reported in panel B of Table C.3, for our preferred specifications (columns 2, 3, 5, and 6), the estimated share of deaths in total PNTR-induced job reallocation, $\hat{\delta}$, ranges between 81 and 98 percent.[4] In terms of economic significance, Table C.3 reports the log point difference in net employment—as well as the contribution of each gross margin—between industries in the 25th and 75th percentiles of the NTR-gap distribution. Up to 2007, an interquartile shift is associated with further net employment

[4]Considering higher-order upstream and downstream linkages, Table C.6 shows similar results to those in Table C.5.

Table C.4: IV Estimation of the Effects of Chinese Import Exposure on U.S. Employment — with Higher-Order Upstream and Downstream Linkages Across Industries

	Combined measure I *(direct+upstream)*			**Combined measure II** *(direct+upstream+downstream)*		
	(1)	(2)	(3)	(4)	(5)	(6)
Net employment growth	-0.35**	-0.42***	-0.47***	-0.31**	-0.36***	-0.38***
	(0.15)	(0.15)	(0.16)	(0.14)	(0.13)	(0.11)
Job flows						
Births	0.07	0.07	0.04	0.09	0.09	0.06
	(0.09)	(0.07)	(0.09)	(0.08)	(0.06)	(0.07)
Deaths	0.33***	0.40***	0.47***	0.33***	0.38***	0.42***
	(0.10)	(0.10)	(0.12)	(0.09)	(0.09)	(0.10)
Expansions	0.02	0.02	0.04	0.04	0.04	0.06
	(0.03)	(0.02)	(0.02)	(0.05)	(0.03)	(0.04)
Contractions	0.12**	0.11*	0.08*	0.11**	0.12**	0.08**
	(0.06)	(0.06)	(0.05)	(0.06)	(0.06)	(0.04)
Net extensive margin	-0.25**	-0.33***	-0.43***	-0.24***	-0.29***	-0.36***
	(0.12)	(0.11)	(0.15)	(0.09)	(0.08)	(0.10)
Net intensive margin	-0.10	-0.09	-0.04	-0.07	-0.07	-0.02
	(0.07)	(0.08)	(0.05)	(0.08)	(0.07)	(0.05)
Job creation	0.09	0.10	0.08	0.13	0.13*	0.12
	(0.10)	(0.07)	(0.09)	(0.10)	(0.07)	(0.08)
Job destruction	0.44***	0.52***	0.55***	0.44***	0.50***	0.50***
	(0.14)	(0.14)	(0.13)	(0.13)	(0.12)	(0.10)
CBP data:						
Net employment growth	-0.94***	-1.31***	-1.34***	-0.85***	-1.14***	-1.21***
	(0.25)	(0.35)	(0.39)	(0.22)	(0.30)	(0.36)
Sector × period controls	Yes	Yes	Yes	Yes	Yes	Yes
Manf. sector controls	Yes	No	No	Yes	No	No
Include 2008-2011	No	No	Yes	No	No	Yes
Observations	958	958	958	958	958	958

Notes: This table reports results for the effects of *direct + upstream*, and *direct + upstream + downstream* higher-order Chinese import exposure on annualized log-employment changes and job flows. All regressions include 479 industries, two subperiods (1992-1999 and either 1999-2007 or 1999-2011), and are weighted by 1992 employment. The net growth regression with CBP data is weighted by 1992 CBP employment, and is reported for the purpose of comparison with the net growth regression with NETS data. Standard errors (in parentheses) are clustered at the three-digit industry level. The coefficients are statistically significant at the *10%, **5%, or ***1% level.

losses of -0.078 log points for the first combined import-exposure measure, and of -0.073 log points when we also consider downstream exposure. Up to 2011, these log-point differences become -0.121 and -0.139.

The CBP net growth coefficients from the last row of Table C.5 are negative, highly significant, and follow the same pattern as the respective NETS coefficients, but they are much larger in

Table C.5: OLS Estimation of the Effects of China's PNTR Status on U.S. Employment — with Upstream and Downstream Linkages Across Industries

	Combined measure I *(direct+upstream)*			**Combined measure II** *(direct+upstream+downstream)*		
	(1)	(2)	(3)	(4)	(5)	(6)
Net employment growth	-0.19	-0.28***	-0.43***	-0.10	-0.21**	-0.41***
	(0.11)	(0.10)	(0.15)	(0.11)	(0.10)	(0.13)
Job flows						
Births	0.02	0.02	-0.00	0.03	0.03	-0.03
	(0.11)	(0.09)	(0.12)	(0.10)	(0.08)	(0.10)
Deaths	0.19***	0.27***	0.44***	0.14**	0.22***	0.40***
	(0.05)	(0.05)	(0.10)	(0.06)	(0.06)	(0.10)
Expansions	-0.01	-0.01	0.00	-0.00	-0.01	0.01
	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)
Contractions	0.00	0.01	-0.01	-0.01	0.01	-0.01
	(0.04)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)
Net extensive margin	-0.17	-0.25**	-0.44***	-0.11	-0.20**	-0.43***
	(0.11)	(0.10)	(0.16)	(0.10)	(0.09)	(0.13)
Net intensive margin	-0.01	-0.03	0.01	0.01	-0.02	0.03
	(0.05)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)
Job creation	0.01	0.01	-0.00	0.03	0.02	-0.02
	(0.10)	(0.09)	(0.11)	(0.10)	(0.09)	(0.10)
Job destruction	0.19***	0.28***	0.43***	0.13	0.23***	0.39***
	(0.07)	(0.06)	(0.10)	(0.08)	(0.07)	(0.10)
CBP data:						
Net employment growth	-0.66***	-0.95***	-1.20***	-0.54***	-0.86***	-1.22***
	(0.12)	(0.14)	(0.20)	(0.11)	(0.13)	(0.19)
Sector × period controls	Yes	Yes	Yes	Yes	Yes	Yes
Manf. sector controls	Yes	No	No	Yes	No	No
Include 2008-2011	No	No	Yes	No	No	Yes
Observations	958	958	958	958	958	958

Notes: This table reports results for the effects of *direct + upstream*, and *direct + upstream + downstream* exposure to China's PNTR status on annualized log-employment changes and job flows. All regressions include 479 industries, two subperiods (1992-1999 and either 1999-2007 or 1999-2011), and are weighted by 1992 employment. The net growth regression with CBP data is weighted by 1992 CBP employment, and is reported for the purpose of comparison with the net growth regression with NETS data. Standard errors (in parentheses) are clustered at the three-digit industry level. The coefficients are statistically significant at the *10%, **5%, or ***1% level.

magnitude. As reported in the last column of Table C.7, this translates to very large consequences from an interquartile shift in the NTR gap distribution, ranging from further employment declines of -0.266 log points for up to 2007 and -0.415 log points for up to 2011.

Table C.6: OLS Estimation of the Effects of China's PNTR Status on U.S. Employment — with Higher-Order Upstream and Downstream Linkages Across Industries

	Combined measure I *(direct+upstream)*			**Combined measure II** *(direct+upstream+downstream)*		
	(1)	(2)	(3)	(4)	(5)	(6)
Net employment growth	-0.13	-0.20	-0.36**	-0.07	-0.16	-0.35**
	(0.14)	(0.12)	(0.17)	(0.12)	(0.10)	(0.14)
Job flows						
Births	0.11	0.09	0.07	0.09	0.07	0.02
	(0.14)	(0.12)	(0.16)	(0.11)	(0.10)	(0.12)
Deaths	0.24***	0.28***	0.44***	0.17***	0.22***	0.39***
	(0.05)	(0.05)	(0.10)	(0.06)	(0.05)	(0.09)
Expansions	0.02	0.01	0.02	0.02	0.01	0.02
	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)
Contractions	0.02	0.02	0.01	0.01	0.02	-0.00
	(0.04)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)
Net extensive margin	-0.13	-0.19	-0.37**	-0.08	-0.15	-0.38***
	(0.14)	(0.12)	(0.18)	(0.11)	(0.10)	(0.14)
Net intensive margin	-0.00	-0.01	0.01	0.01	-0.01	0.02
	(0.05)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)
Job creation	0.13	0.11	0.09	0.10	0.08	0.04
	(0.14)	(0.12)	(0.15)	(0.11)	(0.10)	(0.11)
Job destruction	0.26***	0.30***	0.45***	0.18**	0.24***	0.39***
	(0.07)	(0.06)	(0.10)	(0.07)	(0.06)	(0.09)
CBP data:						
Net employment growth	-0.52***	-0.70***	-0.90***	-0.43***	-0.66***	-0.97***
	(0.11)	(0.11)	(0.16)	(0.10)	(0.11)	(0.16)
Sector × period controls	Yes	Yes	Yes	Yes	Yes	Yes
Manf. sector controls	Yes	No	No	Yes	No	No
Include 2008-2011	No	No	Yes	No	No	Yes
Observations	958	958	958	958	958	958

Notes: This table reports results for the effects of *direct + upstream*, and *direct + upstream + downstream* higher-order exposure to China's PNTR status on annualized log-employment changes and job flows. All regressions include 479 industries, two subperiods (1992-1999 and either 1999-2007 or 1999-2011), and are weighted by 1992 employment. The net growth regression with CBP data is weighted by 1992 CBP employment, and is reported for the purpose of comparison with the net growth regression with NETS data. Standard errors (in parentheses) are clustered at the three-digit industry level. The coefficients are statistically significant at the *10%, **5%, or ***1% level.

C.3 Local Labor Market Effects of the China Shock in the Nonexposed Tradable Sector

This section describes the local labor market effects of the China shock on the nonexposed tradable sector, which accounts on average for 5 percent of U.S. employment per year.

For the first measure of the China shock, column 2 of Table 4 shows that in spite of a nonstatistically significant net effect coefficient from local exposure to Chinese imports, there are statistically significant job-flow responses for births, expansions, and contractions (total job reallocation is 5.8 times larger than net job reallocation). Even more interesting, this sector shows declines in the rates of job creation by births and expansions, which point toward negative aggregate demand effects, but also features an even larger decline in the rates of job destruction by contraction. With nonexposed tradable firms hiring and being born at a lower pace, but dying and contracting at an even lower rate, the net result (though not significant) is a small increase in the sector's employment-to-population ratio.[5]

In terms of the predicted employment changes in the sector, Table 2 shows that the Chinese-induced job losses due to the reductions in the rates of births and expansions (about 0.47 million jobs) are exactly matched by an increase in employment due to the decline in the rate of contractions.

Column 5 of Table 4 shows that the net impact of a positive Bartik shock on the employment-to-population ratio in the nonexposed tradable sector is close to zero. However, the job flows regressions show statistically significant job creation by both births and expansions, and statistically significant job destruction by deaths and contractions. Analogously, an adverse Bartik shock reduces the rate of job creation along its two margins (births and expansions), but also reduces the rate of job destruction along its two margins (deaths and contractions), rendering an almost zero net effect. Thus, for employment in the nonexposed tradable sector, an adverse Bartik shock and a local increase in Chinese import exposure have very similar effects. Given that this sector is not an evident reallocation destination of released workers from the exposed sector, it makes sense that the China shock is seen as a general Bartik shock from the perspective of nonexposed-tradable establishments.

For the second measure of the China shock, column 2 of Table 5 shows deaths-driven net job destruction due to local exposure to China's PNTR status. This is the only sector for which we obtain different qualitative results to those obtained in Table 4, which indicated reductions in both the rates of job creation and destruction due to Chinese import exposure. We do not have a precise explanation for this difference, other than our three-sector classification is the same as AADHP, which is based on the import exposure measure (see footnote 22 in the main text). Thus, even though a sector may be classified as "nonexposed tradable" under the import-exposure criteria, it

[5] An interesting interpretation of this result, pointed out by Penny Goldberg, is whether the China shock is causing U.S. establishments—even if located in nonexposed sectors—to engage in a "race to the bottom" by which workers are willing to accept worse employment conditions due to the fear of losing their jobs in an adverse labor market with few hires and births. Facing less resistance from workers, establishments also have less incentives to fire them; *e.g.*, instead of firing expensive workers to hire cheaper ones, establishments simply cut wages or benefits.

may well be classified as "exposed" under a PNTR-classification criteria. Given that the nonexposed tradable sector is very small, we do not further explore this issue.

C.4 Supporting Figures and Tables

Table C.7: Predicted U.S. Net Employment Changes due to the China Shock with NETS Data and CBP Data (in Thousands)

		Import exposure		PNTR Status	
Specification	*Exposure type—Sector*	*NETS*	*CBP*	*NETS*	*CBP*
1992-2007:					
Table 1, cols. 2 and 6	Direct—*Manufacturing*	**-477**	**-862**	**-0.049**	**-0.160**
Tables C.2 and C.5, col. 2	Combined I—*Total*	**-759**	**-1,567**	**-0.078**	**-0.266**
Tables C.2 and C.5, col. 5	Combined II—*Total*	**-888**	**-1,918**	**-0.073**	**-0.292**
Tables 4 and 5, col. 1	Local—*Exposed*	**-2,128**	**-2,078**	**-0.017**	**-0.016**
Tables 4 and 5, col. 2	*Nonexposed tradable*	198	-169	**-0.003**	**-0.006**
Tables 4 and 5, col. 3	*Nonexposed nontradable*	**2,225**	**2,331**	**0.012**	0.010
1992-2011:					
Table 1, cols. 5 and 7	Direct—*Manufacturing*	**-491**	**-789**	**-0.061**	**-0.215**
Tables C.2 and C.5, col. 3	Combined I—*Total*	**-880**	**-1,549**	**-0.121**	**-0.336**
Tables C.2 and C.5, col. 6	Combined II—*Total*	**-999**	**-2,009**	**-0.139**	**-0.415**
Tables C.8 and C.9, col. 1	Local—*Exposed*	**-2,515**	**-2,758**	**-0.028**	**-0.026**
Tables C.8 and C.9, col. 2	*Nonexposed tradable*	114	-216	**-0.005**	**-0.009**
Tables C.8 and C.9, col. 3	*Nonexposed nontradable*	**2,222**	**2,684**	**0.020**	**0.021**

Notes: For the specifications described in the first column, this table compares predicted change in employment attributed to changes in Chinese import exposure with NETS data versus CBP data, and also compares the relative changes in employment for an interquartile shift in the NTR gap with NETS vs. CBP data. Negative values indicate that the China-shock variable reduces employment. Equations (6) and (14) show general formulas to calculate predicted employment changes from Tables 1, C.2, 4, and C.8, and equation (7) shows the general formula to calculate relative log employment changes from Tables 1 and C.5, and the change in the employment-to-population ratio from Tables 5 and C.9 for an interquartile shift in the NTR gap. The numbers in bold denote predicted changes corresponding to statistically significant coefficients in the corresponding tables.

Table C.8: IV Estimation of the Effects of Chinese Import Exposure on U.S. Commuting Zones by Sectoral Employment (1992-2011)

	Chinese Import Exposure			**Bartik Shock**		
	Exposed	*Nonexposed tradable*	*Nonexposed nontradable*	*Exposed*	*Nonexposed tradable*	*Nonexposed nontradable*
Δ(Employment/Population)	-1.12***	0.05	0.99*	0.19***	-0.04**	0.73***
	(0.22)	(0.09)	(0.51)	(0.04)	(0.02)	(0.11)
Job flows						
Births	0.19	-0.13*	1.89***	0.22***	0.03***	1.36***
	(0.12)	(0.07)	(0.55)	(0.03)	(0.01)	(0.11)
Deaths	1.05***	-0.17*	1.16**	0.17***	0.05***	0.84***
	(0.18)	(0.09)	(0.51)	(0.03)	(0.01)	(0.07)
Expansions	0.00	-0.14**	0.46*	0.15***	0.02**	0.37***
	(0.08)	(0.06)	(0.27)	(0.02)	(0.01)	(0.05)
Contractions	0.26***	-0.15*	0.21	0.01	0.03***	0.15***
	(0.06)	(0.08)	(0.18)	(0.01)	(0.01)	(0.04)
Net extensive margin	-0.86***	0.04	0.73	0.05**	-0.02**	0.52***
	(0.20)	(0.06)	(0.46)	(0.03)	(0.01)	(0.09)
Net intensive margin	-0.25***	0.01	0.26	0.14***	-0.01	0.21***
	(0.08)	(0.05)	(0.19)	(0.02)	(0.01)	(0.04)
Job creation	0.19	-0.27**	2.35***	0.37***	0.05***	1.72***
	(0.18)	(0.12)	(0.69)	(0.05)	(0.02)	(0.14)
Job destruction	1.31***	-0.32**	1.37**	0.18***	0.09***	0.99***
	(0.18)	(0.15)	(0.64)	(0.03)	(0.02)	(0.10)
CBP data:						
Δ(Employment/Population)	-1.42***	-0.11	1.38*	0.15***	0.02	0.52***
	(0.23)	(0.11)	(0.74)	(0.02)	(0.01)	(0.09)

Notes: Using subperiods 1992-1999, 1999-2011, and import exposure as the China shock, this table reports $\hat{\beta}_k$, $\hat{\gamma}_k$, $\hat{\beta}_k^F$, and $\hat{\gamma}_k^F$, for $k \in \{1(\text{exposed}), 2(\text{nonexposed tradable}), 3(\text{nonexposed nontradable})\}$, from the estimation of equations (12) and (13). All regressions include 4,332 observations (722 commuting zones, three sectors, and two subperiods) and the following controls: sector-time fixed effects, the commuting zone's manufacturing share (at the beginning of each period) interacted with sector dummies, and regional Census division dummies interacted with sector dummies. Regressions are weighted by 1992 commuting-zone population. The net regression with CBP data is reported for the purpose of comparison with the net regression with NETS data. Standard errors (in parentheses) are clustered at the commuting-zone level. The coefficients are statistically significant at the *10%, **5%, or ***1% level.

Table C.9: OLS Estimation of the Effects of China's PNTR Status on U.S. Commuting Zones by Sectoral Employment (1992-2011)

	PNTR Status			**Bartik Shock**		
	Exposed	*Nonexposed tradable*	*Nonexposed nontradable*	*Exposed*	*Nonexposed tradable*	*Nonexposed nontradable*
Δ(Employment/Population)	-0.73***	-0.14***	0.52**	0.14***	-0.04**	0.77***
	(0.08)	(0.05)	(0.21)	(0.04)	(0.02)	(0.11)
Job flows						
Births	-0.13***	-0.01	0.62***	0.21***	0.03***	1.40***
	(0.04)	(0.02)	(0.16)	(0.03)	(0.01)	(0.12)
Deaths	0.47***	0.10***	0.40**	0.21***	0.06***	0.87***
	(0.06)	(0.02)	(0.16)	(0.03)	(0.01)	(0.08)
Expansions	-0.13***	-0.02	0.39***	0.14***	0.02*	0.39***
	(0.03)	(0.02)	(0.12)	(0.02)	(0.01)	(0.05)
Contractions	-0.00	0.02	0.09*	0.01	0.03***	0.16***
	(0.03)	(0.02)	(0.05)	(0.01)	(0.01)	(0.05)
Net extensive margin	-0.60***	-0.11***	0.22	0.01	-0.03***	0.53***
	(0.06)	(0.03)	(0.16)	(0.02)	(0.01)	(0.09)
Net intensive margin	-0.13***	-0.03	0.29**	0.13***	-0.01	0.23***
	(0.04)	(0.03)	(0.11)	(0.02)	(0.02)	(0.04)
Job creation	-0.25***	-0.02	1.01***	0.36***	0.05***	1.80***
	(0.07)	(0.03)	(0.22)	(0.05)	(0.02)	(0.14)
Job destruction	0.47***	0.11***	0.49***	0.22***	0.09***	1.03***
	(0.07)	(0.03)	(0.18)	(0.04)	(0.02)	(0.11)
CBP data:						
Δ(Employment/Population)	-0.56***	-0.18***	0.44*	0.15***	0.01	0.51***
	(0.06)	(0.03)	(0.26)	(0.02)	(0.01)	(0.09)

Notes: Using subperiods 1992-1999, 1999-2011, and PNTR status as the China shock, this table reports $\hat{\beta}_k$, $\hat{\gamma}_k$, $\hat{\beta}_k^F$, and $\hat{\gamma}_k^F$, for $k \in \{1(\text{exposed}), 2(\text{nonexposed tradable}), 3(\text{nonexposed nontradable})\}$, from the estimation of equations (12) and (13). All regressions include 4,332 observations (722 commuting zones, three sectors, and two subperiods) and the following controls: sector-time fixed effects, the commuting zone's manufacturing share (at the beginning of each period) interacted with sector dummies, and regional Census division dummies interacted with sector dummies. Regressions are weighted by 1992 commuting-zone population. The net regression with CBP data is reported for the purpose of comparison with the net regression with NETS data. Standard errors (in parentheses) are clustered at the commuting-zone level. The coefficients are statistically significant at the *10%, **5%, or ***1% level.

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