The Role of Self-Employment in Mitigating Trade Shocks of Chinese Imports on U.S. County Labor Markets

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Abstract: *This paper embeds an analysis of self-employment into the framework of international trade and local economies, seeking to explain how entrepreneurship can shape local labor market response to trade shocks. We investigate the cross-effect of self-employment and change in Chinese imports on US county labor markets during 2000-2007. Our empirical results suggest that counties with higher self-employment experience smaller job losses and wage cuts in response to Chinese imports. That suggests self-employment or entrepreneurship activities in local economies mitigate adverse impacts of trade penetration.*

An important phenomenon in international trade during the past several decades has been the rapid rise of newly industrialized countries and growth in their exports to high income economies. While economic theory indicates that trade in free markets increases welfare, one of the main debates about the impacts of international trade concerns the distribution of benefits and costs among different regions, sectors, and labor groups. For developed countries, import competition from low-income countries can have a greater impact on the labor market than other trade shocks (Krugman, 2008). For US local labor markets, recent papers indicate that increasing exposure to imports from developing countries can result in negative shocks in the short run (e.g., Autor, Dorn, & Hanson, 2013; Leichenko & Silva, 2004). However, little attention has been paid to the role of localities' idiosyncratic features in shaping their response to import competition. Trade theory indicates that although international trade can increase a country's economic wellbeing in the aggregate, sub-regions with higher shares of industries that have a comparative disadvantage tend to be subject to short run loss in the labor market, and those regions that are more capable of adjusting their

labor markets suffer smaller losses and can better adapt to trade shocks. Therefore, it is possible that regions with certain characteristics suffer less from the same level of trade shocks than others.

Among the factors that might determine a locality's ability to mitigate adverse effects of import competition, this paper focuses especially on self-employment. Self-employment is widely used as a proxy for the level of entrepreneurship activities (e.g., Goetz & Shrestha, 2009; Rupasingha & Goetz, 2011). The connection between entrepreneurial activities and economic growth is currently being widely debated. Theories indicate that entrepreneurs can promote economic development by exploiting potential entrepreneurial opportunities or by taking advantage of technology spillovers (Acs, Braunerhjelm, Audretsch, & Carlsson, 2008). The correlation of self-employment and economic growth in US counties has been confirmed by many empirical works in recent years (e.g. Henderson & Weiler, 2009; Rupasingha & Goetz, 2011; Stephens & Partridge, 2011). However, beyond statistically significant correlations between self-employment and economic development, we have little empirical evidence about *how* self-employment can contribute to local economic well-being. In this paper we provide a new perspective in interpreting self-employment's role in regional development. Given entrepreneurs' characteristics, regions with a higher level of entrepreneurship activities usually can better exploit opportunities, adjust labor markets, and have greater market vitality. Thus we propose that in counties with higher self-employment shares, the negative impact of import shocks on labor market tends to be smaller.

In this paper we investigate how the share of self-employment can affect the impacts of increasing Chinese imports on US counties during 2000-2007. Our empirical approach mainly builds on previous works investigating the impacts of international trade on local labor markets(Autor et al., 2013; Borjas & Ramey, 1995; Chiquiar, 2008; Edmonds, Pavcnik, & Topalova, 2010; Kovak, 2010; Topalova, 2010). A key approach in these papers is to measure local exposure to trade shocks according to a region's employment structure among various industries. Particularly, in this paper the import change in a county will be measured by weighting each industry's

import change for the whole USA by this county's employment specialization, which is described in more details in section II.

For the trade data, we particularly focus on the increase of Chinese imports during the period of 2000-2007. As Autor et al. (2013) indicate, first, the increase of Chinese imports make up most of the US's import increase from developing countries during this period; and second, the increase of Chinese imports was largely due to China's higher productivity or lower trade barriers, which are exogenous to US labor markets, allowing for greater efficiency in estimation. For self-employment we use US Census' data and express it as the share of self-employed in a county's total employment. For the estimation we instrument the increase of Chinese import to the US with the increase of Chinese imports to other high-income countries. We use 2SLS to estimate the cross-effects of self-employments and change in Chinese imports on US counties.

Our empirical results show that as the share of self-employment increases, the negative effect of imports on jobs is smaller. Or, in those counties with higher shares of self-employment, the increase of Chinese imports results in fewer job losses and smaller wage reductions. These results are robust for different model specifications, and also robust when spatial clustering is considered. That suggests entrepreneurial activities help the local economy mitigate adverse shocks of import competition.

The contribution of this paper to previous literature is two-fold. First, for the stream of works on the impacts of import competition on local labor market, our results provide strong evidence that within a country, different sub-regions could have varied responses in the labor market under increasing trade exposure, and that local entrepreneurship activities, or self-employment, is one of the factors that can help the locality to better mitigate the trade shocks. Secondly, for the domain of self-employment studies, while most existing empirical works focused on the direct causal relationship between entrepreneurship level and economic proxies such as employment, wage, income, etc., our approach examines whether self-employment can help localities to mitigate negative economic impacts from outside shocks. And our findings provide a new perspective for interpreting how entrepreneurs contribute

to regional economic wellbeing. Also, for previous self-employment studies the endogeneity problem between entrepreneurship and economic performance is often an obstacle. Our empirical model provides an exogenous setting by embedding self-employment into foreign trade shocks, which may be helpful for future policy analyses and discussions.

The rest of this paper is organized as following. In section I we review some background about self-employment and regional development, and discuss possible mechanisms through which self-employment can be involved in local labor market's response to trade shocks. In section II we propose our empirical methodology. Specifically, we embed self-employment shares into a reduced-form model of import change and local labor markets. The estimation results are shown in section III, which confirm our proposition that self-employment are conducive for localities to mitigate trade shocks. In Section IV we check the robustness of our empirical results for different model specifications and spatial clustering effects. Section V concludes.

I. Self-employment, local labor market, and trade shocks

Although the correlation between self-employment and regional long-term development is under debate in recent literature, very few studies address themselves with international trade. This paper, to the best of our knowledge, is the first to investigate the role of self-employment in shaping localities' capabilities of coping with exogenous shocks such as increasing trade penetration. According to recent literature on several different issues of international trade, local economy, and self-employment, we suggest that two possible mechanisms explain self-employment's role in mitigating trade shocks.

First, higher shares of self-employment can lead to greater flexibility in the local economy, which contributes to the capability of adjusting and adapting to exogenous shocks. Trade theories (like the H-O theory) imply that regions with better ability to adjust economically will suffer less severe and shorter shocks from trade competitions. Higher flexibility of labor force has significant meanings for the health of local labor

market (Fedderke, 2012). Recently Cuñat & Melitz(2012) point out that labor market flexibility can serve as an additional source of comparative advantage in international trade. Many empirical works have also confirmed that labor market flexibility can significantly influence a region's response to exogenous shocks, especially increasing import competition (Cacciatore, 2014; Kambourov, 2009; Loayza & Raddatz, 2007). Compared with wage and salary workers in large firms, the self-employed usually have greater mobility, lower redistribution cost, and more prompt responses to changing business environments. Therefore, regions with higher share of self-employed can achieve better performance in adjusting and experience less loss under trade shocks.

In addition, entrepreneurial activities can help a local economy to more effectively respond to changing market demands. Trade liberalization will reveal a country's comparative advantages in a larger market scale, and bring about fluctuations to local business. Existing market supply-demand systems of regional economies might become imbalanced. For example, when more low-skill manufacturing products are imported from developing countries at lower prices, the demand for such goods produced in USA will decline. Meanwhile, when local residents can spend less buying these imported products, their demand for some other non-tradable services or high tech products that cannot be imported may increase. It is also found that United States regional economies adapt to trade shocks mainly through structural adjustments in output(Hanson & Slaughter, 2002). In this context of *creative destruction*, entrepreneurship will play an important role (Schumpeter, 1911/1932). Entrepreneurial activities in bringing about innovations and providing more new products (Acs & Szerb, 2007) will help a region to meet new market demand and rebalance the local economy. Thus regions with higher shares of self-employment and more entrepreneurship activities will be able to more effectively deal with adverse shocks of increasing trade exposure, and exhibit better economic performances.

II. Empirical approach and data

A. Measurement of import exposure

To the best of our knowledge, statistics for import change at US county level cannot be directly obtained from any open access database. Thus our measurement of the trade exposure for counties is indirectly derived based on local industry specialization, an approach also used in other recent works (Autor et al., 2013; Edmonds et al., 2010; Kandilov, 2009; Kovak, 2010; Topalova, 2007, 2010). Specifically, we calculate the following *change in Chinese Import Per Worker* (thereafter ΔIPW) to proxy local trade exposure to China's import competition.

$$\Delta IPW_{US,i} = \frac{1}{L_i}\sum_j \frac{L_{i,j}}{L_{US,j}} \Delta M_{US,j} \quad (1)$$

In (1), $\Delta M_{US,j}$ is the import change in sector j for US total; $L_{i,j}$ is the employment of sector j in county i; $L_{US,j}$ is the employment of sector j for the entire US; and L_i is total employment of county i. Therefore, $\Delta IPW_{US,i}$ measures the import shock (in $) per worker in county i. A greater $\Delta IPW_{US,i}$ means higher pressure from import competition on local labor market. Our analysis period is 2000-2007, thus the import change $\Delta M_{US,j}$ is the difference from 2000 to 2007, and all the employment data $L_{US,j}$, L_i, and $L_{i,j}$ are taken as the initial year (2000) values.

The import change per worker calculated by (1) provides a dollar measure at the per-capita level which reflects the degree of shocks on local labor market from China's import competition. For the US economy the change in import from China is largely a result of improved competitiveness of Chinese manufacturers, which is driven by China's market-oriented reform, better access to updated technologies, removal of international trade barriers, etc. However, it is still possible that there exist reverse causalities, i.e., the realized changes of Chinese imports are caused by some internal US economic shocks. Therefore, in order to better identify this supply-driven increase of China's imports, we follow Autor et al. (2013)'s strategy, and we instrument the $\Delta IPW_{US,i}$ using the contemporaneous changes of Chinese imports in

other high-income countries, which could be expressed as $\Delta IPW_{o,i}$ and is calculated as:

(2) $$\Delta IPW_{o,i} = \frac{1}{L_{i,t-1}} \sum_j \frac{L_{i,j,t-1}}{L_{us,j,t-1}} \Delta M_{o,j}$$

(2) differs from (1) in two ways. First, the import changes$\Delta M_{o,j}$ are for other developed countries. In our model we chose: Japan, Australia, France, Germany, and Finland. These five high income countries as an aggregate have a comparable economic scale to the US, and they all have relatively stable macro economies during the recent decade. And they are all non-North American countries so that they can serve as good instrument in our analysis. The second difference is that, in (2) the three labor-related variables L_i, $L_{i,j}$, and $L_{us,j}$ are all taken as 10 year lag values (1990), as the subscript *t-1* indicates.

B. Empirical method

We start with the reduced form difference-in-difference model shown in (3), which, as in previous literature, can be used to investigate the impacts of import changes or other trade policies on local labor market. Δy_i is a proxy for local economic or labor market performance, such as the poverty rate, employment, or wage. Δx_i is the trade-related variable to be investigated, which could be tariff change or, as in this paper, import change ΔIPW;cv_k are other control variables and θ_k their coefficients.

(3) $$\Delta y_i = \beta_0 + \beta_1 \Delta x_i + \sum_k \theta_k cv_k$$

With models similar to (3), Kovak (2010) finds that in Brazil those regions whose workers facing greater loss of tariff protection tend to experience more wage cuts; Topalova (2010)investigates the relationship between trade liberalization and poverty in India, and indicates that poverty rates fell more slowly in rural regions where production sectors were more exposed to import penetrations. With the import

exposure proxy described in (1) and instrumental variable as in (2), Autor et al. (2013) finds that Commuting zones that had undergone higher Chinese import exposure tended to see higher unemployment, lower labor force participation, and more wage cuts during the period 1990-2007. That means for US Commuting zones in this period trade competition from China's imports resulted in negative shocks to local economies and labor markets. Given these results, here we embed self-employment into this *trade shock vs. local economy* paradigm as in (3), and propose that counties with higher self-employment shares can better mitigate the adverse shocks of import competition. Or:

Proposition. In counties with higher shares of entrepreneurs/self-employment, the impacts of increase in Chinese import per worker tend to be lower.

And we analyze the following model:

(4)

$$\Delta y_i = \beta_0 + \beta_1 \Delta IPW_{US,i} + \beta_2\left(\Delta IPW_{US,i} * self\_emp_i\right) + \beta_3 self\_emp_i + \sum_k \theta_k cv_k$$

In (4), Δy_i is a proxy for the local labor market of a county, for which we use wage employment and average wage in our estimation. Although the direct impacts of import competition are mostly on tradable goods or manufacturing sectors, here we are using the employment and wage data for the entire labor market to capture not only the direct impacts of trade shocks but also the multiplier effects. $\Delta IPW_{US,i}$ in (4) is change in imports from China per worker as defined in (1), and $self\_rate_i$ is the share of self-employment in total employment at the initial year 2000[2]. The net coefficient of change in Chinese imports $\Delta IPW_{US,i}$ is $(\beta_1 + \beta_2 self\_emp_i)$, which should be negative given that trade shocks tend to have adverse impacts on local labor

[2] In US census data 2000, total employment consists of four parts: wage and salary employment in private sectors, government employment, self-employment, and un-paid family workers.

markets. If the above proposition is true, i.e., self-employment can mitigate import shock's negative impact on local labor market, then we expect β_2>0. That means in counties with higher level of entrepreneurship activities the net effects of trade shocks $(\beta_1 + \beta_2 self\_emp_i)$ will tend to be smaller in scale.[3]

As have discussed in section 2.1, in order to identify the supply-driven increase of China's imports the import change $\Delta IPW_{US,i}$is instrumented by $\Delta IPW_{o,i}$, the contemporaneous growth of China's imports in other high-income countries. As to the share of self-employment $self\_rate_i$, to avoid reverse causality we use its initial year value in 2000, as in Rupasingha & Goetz (2011). Then for the identification of the cross-term $\Delta IPW_{US,i} * self\_emp_i$ in (4), we instrument with the cross-term $\Delta IPW_{o,i} * self\_rate_i$.

C. Variables and data

To calculate the import shock $\Delta IPW_{US,i}$ from (1), we need data for $M_{US,j}$from the US Census Bureau's US International Trade Statistics database; data for $L_{i,j}$, $L_{US,j}$, and L_i for different period all come from the US Census Bureau's County Business Patterns (CBP) database. To calculate the instrumental variable, the contemporaneous growth of China's imports in other high-income countries $\Delta IPW_{o,i}$ as in (2), we need bilateral trade data between China and the five high-income countries chosen. These international trade data are from the UN Comtrade Database. Details about the process of constructing the data of $\Delta IPW_{US,i}$ and $\Delta IPW_{o,i}$ can be found at Autor et. al. (2013). For the local economic performance proxy Δy_i in model (4), we use log change of wage employment and log change of average wage during the period of 2000-2007, both of which are from Bureau of Economic Analysis (BEA) statistics. Descriptive for the trade penetration measure $\Delta IPW_{US,i}$, change of employment, and change of average wage for US counties during 2000-2007 are shown in table 1.

[3] For better interpretation of the results, in the estimation the share of self-employment $self\_rate_i$ is manipulated as the deviation from its mean value.

Table 1. Descriptive Statistics for US county's labor markets (2000-2007)

Variable	Mean	Std. Dev.
Change of Chinese imports per worker ($\triangle IPW_{US,i}$) / (thousand $)	4.54	2.64
Log change of the counts of wage employment / (100 × log points)	26.28	7.79
log change of average wage / (100 × log points)	2.85	13.38

Data source: US County Business Patterns 2000; UN Comtrade Database; BEA.

In order to control for other local characteristics that might also impact economic and labor market's performance, relevant control variables are included in model (4). We mainly follow Rupasingha and Goetz (2011) and Autor et al. (2013), and all control variables are listed in table 2. The first five control variables are for regional demographic and labor market characteristics, including education, woman working participation, ethnics and age of population. The next three are local government related variables, for controlling the policy intervention effects. All control variables are taken as the initial year (2000)'s value.

Table 2. Descriptive Statistics for Regional Control Variables (2000)

Variable	Mean	Std. Dev.
Percentage of college educated population	16.52	7.79
Percentage of employment among women	51.69	6.99
Percentage of white people	84.43	16.58
Percentage of population aging 20-29	11.79	3.40
Percentage of population aging 50-59	11.67	1.53

Variable	Mean	Std. Dev.
Per-capita government expenditure on education (thousand $ per-capita)	1.30	0.46
Per-capita government expenditure on highway (thousand $ per-capita)	0.19	0.18
Per-capita local tax (thousand $ per-capita)	0.91	0.87

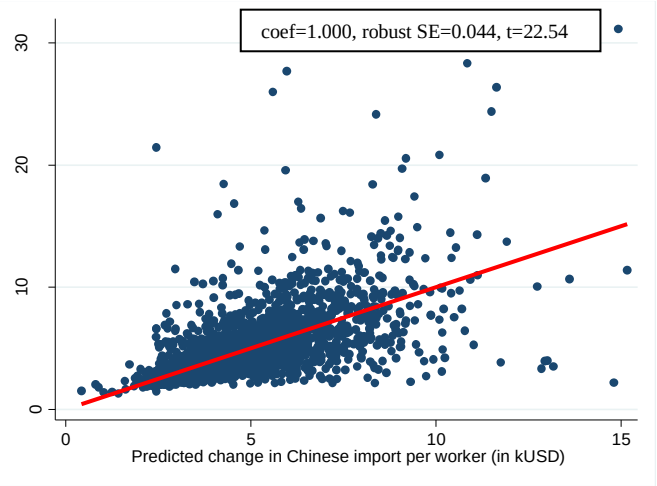
Source: US Census 2000

III. Estimation results

As outlined in section II.*A*, our instrumental variable strategy for the import exposure per worker measurement *IPW* aims at identifying the component of US import growth that is due to China's productivity improvement and trade cost reduction. The assumption underlying this strategy is that the common within industry component of rising Chinese imports to the US and other developed countries is China's rising comparative advantage and falling trade barriers (Autor, et al. 2013). Also, in order to make model (4) identifiable, we use the cross term $\left(\Delta\, IPW_{o,i} * self\_emp_i\right)$ as an instrument for $\left(\Delta\, IPW_{US,i} * self\_emp_i\right)$. With these two instrumental variables, we regress model (4) using 2SLS. Figure 1 sketches the realized values of the two endogenous variables and their predicted values obtained from their respective 1st stage regressions. The instrumental variables have strong predictive power.[4]

[4] In the regression of $\Delta\, IPW_{US,i}$ on its instrumental variable $\Delta\, IPW_{o,i}$, the *F-statistic* is 2513.87 and R^2=0.45; in the regression of the cross-term $\left(\Delta\, IPW_{US,i} * self\_emp_i\right)$ on its instrumental variable$\left(\Delta\, IPW_{o,i} * self_emp_i\right)$, the *F-statistic* is 2645.95 and R^2=0.46. Thus we can significantly reject the weak instrument hypothesis for both.

Panel A. Predicted and realized values of change in Chinese import per worker $\Delta\, IPW_{US,i}$ *(kUSD)*



Panel B. Predicted and realized values of the cross-term $\left(\Delta\, IPW_{US,i} * self\_emp_i\right)$

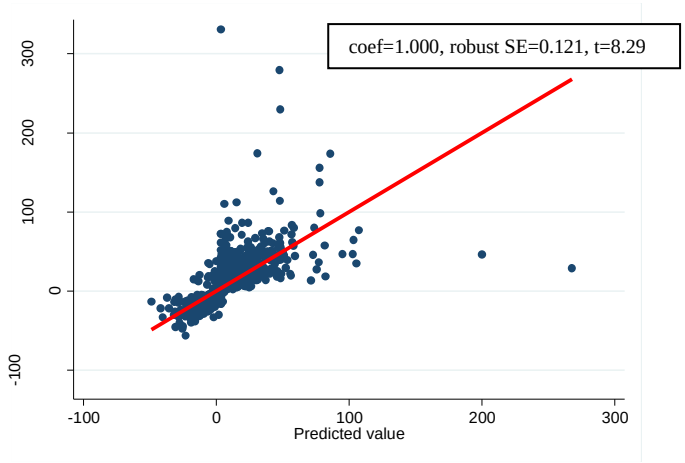


Figure 1. Results of first stage regressions of change in Chinese imports per worker $\Delta\, \boldsymbol{IPW_{US,i}}$ **and cross-term** $\left(\Delta\, \boldsymbol{IPW_{US,i}} * \boldsymbol{self\_emp_i}\right)$ **for mode (4)**

Note: N = 3074

We estimate model (4) using 2SLS as described above. Firstly we use wage employment of a county as the local labor market proxy y_i. Specifically, the dependent variable Δy_i is calculated as the log value in 2007 minus the log value in 2000, so that the coefficient provides the percentage change from the initial year. The robust estimation results are shown in Table 3. In panel (a) we fit model (4) without any control variables or spatial dummies. In panel (b) census division dummies are included for controlling spatial effects. Panel (c) adds five regional demographic and educational control variables, and panel (d) adds three policy variables that reflect the

effects of government intervention. And panel (e) is the result of estimation with the full set of control variables as in panel (c) and (d). As a comparison, panel (f) excludes the regressors of $self\_emp_i$ and the cross-term $\Delta IPW_{US,i} * self\_emp_i'$, resembling a model like (3), which only investigates the impacts of trade shock $\Delta IPW_{US,i}$ on local labor markets without incorporating the effects of self-employment.

Table 3. Cross Effects of Self-employment and Import Shock on Local Labor Market. 2SLS results (2000-2007)
Dep Vars: 100×ΔLog (Counts of Employment)

	(a)	(b)	(c)	(d)	(e)	(f)
(ΔImport from China to US)/worker, $\Delta IPW_{US,i}$	-1.801 **	-1.443 **	-1.271 **	-1.479 **	-1.354 **	-1.053 **
	(0.158)	(0.167)	(0.177)	(0.173)	(0.177)	(0.179)
Share of self-employment in total employment	-0.971**	-0.990 **	-1.074	-0.889 **	-0.964**	
	(0.182)	(0.183)	**(0.183)	(0.179)	(0.181)	
Cross-term, $(\Delta IPW_i * self\_emp_i)$	0.179 **	0.161 **	0.166 **	0.157 **	0.161 **	
	(0.047)	(0.046)	(0.045)	(0.046)	(0.045)	
Percentage of college educated population			0.316 **		0.317 **	0.304 **
			(0.058)		(0.064)	(0.059)
Percentage of employment among women			0.188 **		0.222 **	0.248 **
			(0.066)		(0.058)	(0.058)
Percentage of white people			0.180 **		0.174 **	0.153 **
			(0.021)		(0.020)	(0.020)
Percentage of population age 20-29			-0.492 **		-0.565 **	-0.339 **
			(0.116)		(0.117)	(0.116)
Percentage of population age 50-59			-1.121 **		-1.138 **	-1.028 **
			(0.377)		(0.355)	(0.357)
Per-capita government expenditure on education				-1.324	-0.507	-0.872
				(1.249)	(1.188)	(0.884)
Per-capita government expenditure on highway				-7.119 **	-7.522 **	-9.742 **
				(2.704)	(2.369)	(2.712)
Per-capita local tax				0.776	0.164	0.165
				(0.905)	(1.091)	(0.904)
Census division dummies	No	Yes	Yes	Yes	Yes	Yes

R^2	0.05	0.11	0.19	0.12	0.20	0.19

Notes: N = 3,074 counties. Robust standard errors are in parentheses. Share of self-employment in total employment are manipulated as deviation from its median value. (Δ Import from China to US)/worker are measured in 1000 dollars. ** p≤0.01, * p≤0.05, ~p≤0.10.

The coefficients of ΔIPW_i in all settings are negative and statistically significant. This means counties with higher import increases from China tend to have less employment growth compared with counties not experiencing such increases. Particularly, model (e) results indicate that an increase of one thousand dollars per worker in imports from China during 2000-2007 would reduce a county's employment growth by 1.354%. More importantly, the coefficients of the cross-term $(\Delta IPW_i * self\_emp_i)$ are statistically significant and positive in all model settings. This indicates that for counties with higher share of self-employment, the net effects of Chinese import shocks, which is expressed as $(\beta_1 + \beta_2 self\_emp_i)$, is smaller. Specifically, for 1% higher self-employment rate in a county, the marginal impacts of one thousand dollars' Chinese import increase per worker on job loss will be 0.161 percentage points smaller in scale.

Table 4 presents the results for average wages as the dependent variable. Similarly, we can see that the coefficients of ΔIPW_i in all panels are negative and significant. That means counties with greater import penetration would have less wage growth during 2000-2007. The result of panel (e) in table 3 indicates that an increase of one thousand dollars per worker in import from China during 2000-2007 would reduce a county's wage growth by 0.904%. And also, the coefficients of the cross-term $(\Delta IPW_i * self\_emp_i)$ are significantly positive in all model settings. Thus for countries with higher shares of self-employment the net effects of Chinese import increase are smaller in scale. The results of panel (e) in table 3 suggest that for a 1 percentage point higher self-employment rate in a county, the marginal impacts of one thousand dollars' worth of Chinese import increase per worker on job losses will be 0.047 percentage points smaller.

Table 4. Cross Effects of Self-employment and Import Shock on Local Labor Market. 2SLS results (2000-2007)
Dep Vars: 100×ΔLog (Average Wage)

	(a)	(b)	(c)	(d)	(e)	(f)
(ΔImport from China to US)/worker ΔIPW_i,	-1.002 **	-0.953 **	-0.914 **	-0.946 **	-0.904 **	-0.962 **
	(0.081)	(0.086)	(0.091)	(0.088)	(0.092)	(0.090)
Share of self-employment in total employment	0.215 *	0.218*	0.237 **	0.206*	0.224*	
	(0.090)	(0.088)	(0.089)	(0.088)	(0.088)	
Cross-term($\Delta IPW_i * self\_emp_i$),	0.051 *	0.039 ~	0.046 *	0.040~	0.047 *	
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	
Percentage of college educated population			-0.002		-0.003	-0.008
			(0.025)		(0.026)	(0.026)
Percentage of employment among women			-0.035		-0.040	-0.074 **
			(0.028)		(0.028)	(0.028)
Percentage of white people			0.001		0.000	0.024 *
			(0.010)		(0.010)	(0.010)
Percentage of population age 20-29			-0.067		-0.060	-0.252 **
			(0.062)		(0.063)	(0.061)
Percentage of population age 50-59			-0.619 **		-0.623 **	-0.638 **
			(0.129)		(0.130)	(0.131)
Per-capita government expenditure on education				0.301	-0.027	-0.427
				(0.371)	(0.380)	(0.375)
Per-capita government expenditure on highway				0.566	0.730	3.115 **
				(0.910)	(0.907)	(0.890)
Per-capita local tax				-0.069	0.090	0.216
				(0.1887)	(0.195)	(0.191)
Census division dummies	No	Yes	Yes	Yes	Yes	Yes
$\mathbf{R^2}$	0.09	0.15	0.17	0.15	0.17	0.14

Notes: N = 3,074 counties. Share of self-employment in total employment are manipulated as deviation from its median value. (Δ Import from China to US)/worker are measured in 1000 dollars. ** p≤0.01, * p≤0.05, ~p≤0.10.

IV. Self-employment's role in mitigating trade shocks

Table 3 and Table 4 show that the cross-term of self-employment share and trade

shock proxy in model (4) is significant for employment and wage changes in US counties during 2000-2007, which means import increases in counties with different self-employment shares would have varied marginal impacts. We can see this effect more clearly by retrieving the point estimations of the impacts of Chinese import increase over the spectrum of self-employment rates. Figure 2 sketches the distribution of US counties' self-employment rates.

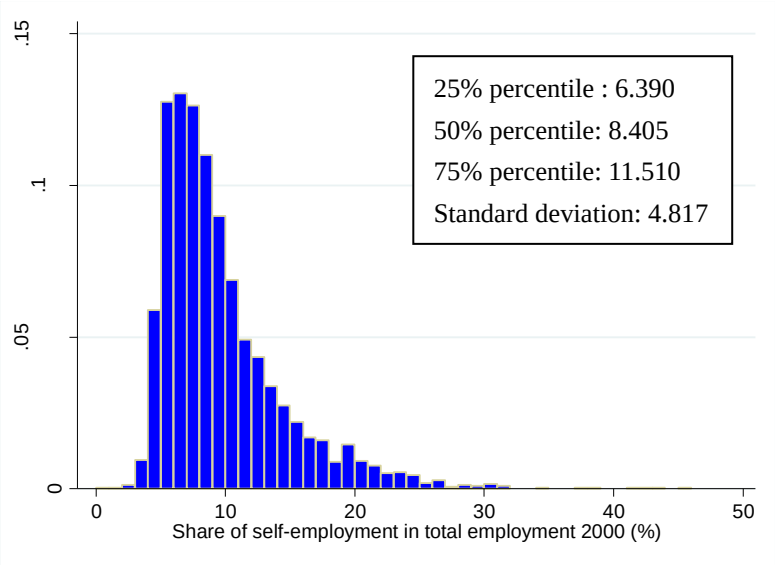


Figure 2. Distribution of US counties' self-employment rates 2000

Source: US Census 2000

In model (4) the actual impact coefficient of change in Chinese import per worker ($\Delta IPW_{US,i}$) on the labor market performance proxy Δy_i is ($\beta_1 + \beta_2 self\_emp_i$). Therefore, according to the fitted results in table 2(e) and table 3(e) and the distribution statistics of self-employment rates, we can retrieve the point estimation of the real marginal impact of Chinese import increase per worker on labor market for different self-employments rates. The results are shown in table 4[5].

Table 5 presents the marginal impacts of a one thousand dollars change in Chinese import per worker on labor markets for counties at the 25%, 50%, and 75%

[5] Since the dependent variables in table (2) and table (3) are all manipulated as log change times 100, the coefficients can be interpreted as percentage impacts.

self-employment rate percentiles. The negative values in all cells suggest import shocks would lower counties' employment growth and wage increase during 2000-2007. Particularly, for a county with self-employment rate about the median value of all counties in USA (8.405%)[6], one thousand dollars' Chinese import increase per worker reduces the employment growth by 1.4%[7]. And this impact for counties at the 25% percentile[8] and at the 75% percentile[9] of self-employment rates is -1.7% and -0.9% respectively. Note that the former is almost twice the latter. Similarly, the marginal impact of one thousand dollars' worth of Chinese imports increase per worker on the wage growth for counties at the 25% percentile and at the 75% percentile of self-employment rates is -1.0% and -0.8% respectively. And the former is 1.25 times the later. That suggests the role of self-employment is stronger in mitigating adverse impacts of trade shocks on employment than that on wage.

Table 5. Actual marginal impacts of one thousand dollars' change in Chinese import per worker on labor market for counties with different self-employment rates (2000-2007)

	For employment	**For average wage**
At 25% percentile of self-employment rate	-1.68%	-1.00%
At 50% percentile of self-employment rate	-1.35%	-0.90%
At 75% percentile of self-employment rate	-0.85%	-0.76%

[6] Such as Cumberland, ME or Brown, OH

[7] Note that in table (2) and table (3), the share of self-employment is calculated as deviation from its mean value. Thus the coefficient of $(\Delta IPW_{US,i})$ is its actual point estimate for a county with median self-employment rate.

[8] Such as Elmore, AL or Todd, SD.

[9] Such as Union, IA or Vernon, MD.

V. Robustness checks

A. Model specification

In this section we test alternative specifications of model (4) and check the robustness of the empirical results obtained above. In model (4) we assume that counties with different self-employment rates receive varied impacts from trade shocks. However, it is possible that not only the self-employment rate but also some other factors could influence this trade impact.

Our first concern is the higher order impacts of import exposure. In model (4) only the linear form of import change per worker $\Delta IPW_{US,i}$ is included, but the higher order terms have not been held constant. In addition, we noticed that for counties the self-employment rates has a weak but significant correlation with the change of Chinese imports per worker[10]; thus it is possible that the cross-term of $(\triangle IPW_i * self_emp_i)$merely picks up the explanatory power of the squared term of $\triangle IPW_i$. Another potential problem is that other characteristics of counties, such as the variables listed in table 1, might also impact the actual impact coefficient of import exposure on the local labor market. Then the actual coefficient of $\Delta IPW_{US,i}$would be:

$$\beta_{actual} = (\beta_1 + \beta_2 self\_emp_i + \gamma \Delta IPW_{US,i} + \sum_k \alpha_k cv_k)$$

Thus model (4) becomes:

$$\Delta y_i = \beta_0 + \beta_{actual} \triangle IPW_{US,i} + \beta_3 self\_emp_i + \textstyle\sum_k \theta_k cv_k \quad (5)$$

And the testable form of (5) is:

[10] Regression of $\Delta IPW_{US,i}$ on self-employment rate yields: *coeff=-0.077, t=-7.9, R^2=0.02*. Note that in US self-employment usually concentrates in service sectors. Thus counties with higher self-employment rates tend to have lower share of manufacturing sectors and less import competition.

(6)

$$\Delta y_i = \beta_0 + \beta_1 \Delta IPW_{US,i} + \beta_2(\Delta IPW_{US,i} * self\_emp_i) + \gamma \Delta IPW_{US,i}^2 + \sum_k \alpha_k(cv_k * \Delta IPW_{US,i}) + \beta_3 self\_emp_i + \sum_k \theta_k cv_k$$

The estimate results of β_1, β_2, and $\beta_3$in model (6) are shown in Table 6(a) for both the dependent variables of employment and average wage. Even after controlling for the squared term of import change and other variables that may also influence the trade exposure's impacts on labor markets, the coefficient of the cross-term $(\Delta IPW_{US,i} * self\_emp_i)$ is still positive and with comparative magnitudes, consistent with our previous empirical results in table 3 and table 4. However it is significant in the regression for employment but not significant for wages. That again suggests that the role of self-employment in mitigating adverse impact of trade shocks is stronger for employment than for wage.

B. Spatial clustering effects

Another important robustness issue relates to spatial correlation effects. In recent regional economic development literature there in growing consensus that local economic performance proxies can exhibit spatial correlation effects (Lesage & Fischer, 2008). This paper is based on county level analysis. However, County boundaries do not always represent the scope of economic activities. And economic or labor market performances of nearby counties can have correlations due to strong connections and spillovers of geographic adjacency. To control for these spatial effects, we will test two spatial clustering effects in our county-based estimations for robustness check: one is for US states and the other is for Commuting Zones (CZs)[11].

Table 6(b) shows the results of fitting model (4) clustered by states. In column 1, the dependent variable is log change in employment, and all results remain consistent. In column 2, the dependent variable is log change of average wage, but the fitted

[11] Our definition of CZs is based on the *2000 commuting zones* of US Department of Agriculture, Economic Research Service. See: http://www.ers.usda.gov/data-products/commuting-zones-and-labor-market-areas.aspx#.UwzvRJJRTz0

significance of the cross-term($\Delta IPW_i * self\_emp_i$) drops to 0.20. Table 6(c) shows the results of model (4) clustered by CZs. The results are quite similar to those in table 6(b). In column 1 the fitted coefficients are still significant, but in column 2 the significance of the cross-term($\Delta IPW_i * self\_emp_i$) drops to 0.15. These results again suggest that the role of self-employment in mitigating adverse impacts of trade shocks is stronger for employment than for average wage.

Table 6. Cross Effects of Self-employment and Import Shock on Local Labor Market. 2SLS results (2000-2007)

Panel (a). 2SLS results of full control variables model (6)

	Dep Vars: 100×ΔLog of	
	Employment	**Average wage**
(ΔImport from China to US)/worker ΔIPW_i,	-5.332 （4.091）	-1.152 (1.700)
Share of self-employment in total employment	-1.017 ** (0.282)	0.422** (0.117)
Cross-term($\Delta IPW_i * self\_emp_i$),	0.161 * (0.072)	0.027 (0.030)

Panel (b). 2SLS results of model (4) with spatial clustering effects by 50 states

	Dep Vars: 100×ΔLog of	
	Employment	**Average wage**
(ΔImport from China to US)/worker ΔIPW_i,	-1.354 ** （0.212）	-0.904** (0.152)
Share of self-employment in total employment	-0.964 ** (0.241)	0.224 (0.166)
Cross-term($\Delta IPW_i * self\_emp_i$),	0.161** (0.052)	0.047 (0.031)

Panel (a). 2SLS results of model (4) with spatial clustering effects by 706 CZs

	Dep Vars: 100×ΔLog of	
	Employment	**Average wage**
(ΔImport from China to US)/worker ΔIPW_i,	-1.354 ** （0.190）	-0.904** (0.113)
Share of self-employment in total employment	-0.964 ** (0.198)	0.224 (0.142)
Cross-term($\Delta IPW_i * self\_emp_i$),	0.161** (0.047)	0.047 (0.032)

*Notes: N = 3,074 counties. Panel (a) is fit by model (6), and the control variables (cv_k) include all variables in table 1. Census division dummies are also included. Panel (b) and panel (c) are estimated according to model (4). All control variables of table 1 as well as census division dummies are included.(Δ Import from China to US)/worker is measured in 1,000 dollars.** p≤0.01, * p≤0.05, ~p≤0.10.*

VI. Conclusion

We exploit an instrumented proxy of change in Chinese imports per worker to measure the level of trade shocks on US counties, which is based on different industries' trade changes and counties' employment concentration structure. The 2SLS regression results of the cross-term of share of self-employment and change in Chinese imports per worker reveal that the share of self-employment in a county has a significant role in mitigating the negative impacts of import shocks on labor market. And, this effect is stronger and more significant for employment than for average wage. The empirical results of our model are robust when controlling for different model specifications and spatial clustering effects.

The findings in this paper again confirm the conducive role of entrepreneurs or the self-employed in promoting local economic development. And our approach provides a new perspective that self-employment can help a region to better mitigate the adverse shocks of import competition. In section I we discussed possible

mechanisms that can explain why self-employment can bring about such effects: counties with higher share of self-employment may have greater flexibility in the economy, and achieve a more effective response to the changing market. More detailed work in terms of theoretical derivation or empirical proof for these specific mechanisms is beyond the scope of this paper, and we hope future studies can provide more contributions.

Our findings also have important implications for policy makers and local economic development practitioners in coordinating local development strategies and trade-related labor market policies. In the US, in order to promote local economic prosperity, governments have provided various incentives like subsidies or tax breaks et.al. to support local self-employment (Goetz et. al. 2009, 2011). Also, as a result of extensive labor market shocks resulted from increasing imports from developing countries, many policies, such as the Trade Adjustment Assistant (TAA) program, have been enacted to cope with trade-related job loss. The empirical results of our work suggests that local entrepreneurship activities or self-employment can also play an significant role in mitigating the adverse impacts of trade shocks, and it would be possible to better coordinate these two kind of policies for achieving a better policy efficiency.

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