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Abstract: This research assesses the impact of Chinese Trade Shock, the swift rise of import penetration from China to U.S, on local-level labor market's employer Concentration. The paper extends the work by Acemoglu et al.(2014) on the effects of Chinse import penetration on US job market. Using commuting zone-level data analysis, the study finds a significant and negative effect of Chinese trade shock on overall commuting zone employer concentration and in those industries more exposed to trade. However, the paper finds a significant and positive impact of Chinese trade shock on commuting zone employer concentration in non-exposed and tradable industries

I. Introduction

Economists have long sought to explain t why the wages in the United States have been exhibiting puzzling behavior in recent decades. Real wage growth has slowed significantly, with annual average growth in median wages new zero since 1973 (Acemoglu and Autor, 2011 on Benmelech at al. 2018). Although the productivity growth has diminished, the link between productivity growth and real increase in hourly compensation appears to have declined since the early

1980s(Mishel 2012, Bivens and Mishel 2015; and Uguccioni, 2016, all on Benmelech at al. 2018). In addition, the labor share of national income in the United States has also diminished, particularly since early 2000s (Karabarbounis and Neiman, 2014 on Benmelech at al. 2018). Many economists have sought to understand this phenomenon of slow or stagnant US wage growth during the lengthy period of economic expansion. Increased availability of data on employer for the US labor market has been sparking a rapidly growing literature which seeks to address the source of wage stagnation. As a starting point, many economists have been questioning whether US labor market is perfectly competitive. In a very competitive labor market, the assumption of allocative efficiency is to hold; this means that marginal revenue product of labor must be equal to worker's wage or simply, every dollar generated on the margin is to be paid to the worker (Hershbain at al.(2019).

There have been some explanations about the cause of stagnant wages and a declining share of labor income in GDP in recent decades. Those include outsourcing, foreign competition, automation, and the decline of unions. However, recent studies have focused on employer domination of local job market.

The study by Efraim Benmelech, Nittai Bergman and Hyunseob Kim(Benmelech, 2019) analyzes county-level census data for industrial firms for the period 1977 to 2009 to study the impact of employer concentration on wages in local labor markets. By focusing on manufacturing, the study was able to control for worker productivity. The paper found a negative relationship between employer concentration and wages. More important, the research found that substantial cross-sectional and time series variation in concentration. According to the author, average local-level employer concentration increased between 1977-1981. In addition to finding lower wages in monopsony markets, the researchers also found that, over time, firms that dominates their labor markets were likely to share productivity gains with employees.

Figure#1 and 2 shows, respectively employer concentration measured by HHI by year and by commuting zones. The period of this and other studies that find rising employer concentration coincides with the period of rising U.S. imports from China commonly known as “china shock. Acemoglu et al.(2014) investigates the contribution of the rapid increase of import competition from China on U.S employment. They apply industry and local labor market-level approach to estimate the size of employment losses in directly exposed industries, the size of employment effects in indirectly exposed upstream and downstream industries inside and outside manufacturing and the net effect of conventional labor reallocation in non-exposed sectors. The baseline used to measure the exposure is the change in the import penetration ratio for US manufacturing over the period 1991 to 2011. The author finds that increase in US import from China caused significant reduction in U.S manufacturing employment as well as significant suppression of overall US job growth (Acemoglu et al. 2014). Does the swift rise of import penetration from China to U.S account for variation on labor market concentration across the U.S?

II. Literature Review

There has been extensive research on the role of employer concentration in the local labor market. Hershbain at al.(2019) exploited rich administrative data for US manufacturing and estimated plant-level mark-down. They quantify weather the U.S labor market is characterized by employer market power and whether the degree of employer market power has increased over time. The authors find that most US manufacturing plants operate in a monopolistic environment and at least since early 2000s, the labor market in the US manufacturing has become more monopolistic. Their findings suggest an average mark-down of 1.53 which is a significant deviation from perfect

competition of unity markdown[1]. The authors also documented the existence of significant amount of dispersion in markdown across plants and across time. They find that the aggregate markdown decreased from late 1970s up to the earlier 2000s, but ever since it has been sharply increasing afterward (Hershbbain at al. 2019). Unlike Hershbbain who used markdown as a proxy for employment concentration, Azar at al.(2019) used data on the near universe of online US job vacancies collected by Burning Class Technologies in 2016 to calculate labor market concentration using the Herfindahl-Hirschman index(HHI) for each commuting zone by 6-digit SOC occupation. The authors found that the average market has an HHI of 4,378 and following the Department of Justice guideline, 60% of labor markets are highly concentrated, or have HHI above 2,500, corresponding to 20% of total employment. When down to manufacturing industries, the authors found that the labor market concentration is distinct from product concentration and is negatively correlated with wages in each industry's top occupation (Azar at al. 2019). Elizabeth Weber Handwerker and Matthew Dey used the detailed microdata of occupational Employment Statistics(OES) to estimate employer labor market power by occupation for nearly all workers in the United States, in all sectors, all occupations and all geography areas, from 2015 to 2017. The authors documented a wide variation in the extent and wage impact of explicit oligopsony by occupation and how much of that variation can be explained by various occupational characteristics (Dey and Handwerker, 2019). Qiu and Sojourner (2019) estimate the effect of labor-market concentration on labor compensation across the US private sector since 2000. They distinguish between concentration in local labor market and local product market. Their analysis includes wages and rate of employment -based health insurance coverage. Likewise, their estimate

[1] This means that a worker employed at the average manufacturing plant earns 65 cents on each dollar generated on the margin.

suggests negative effects of labor-market concentration on labor compensation. According to the authors, effects is a result reduction in the level of human capital of those in the market as well as reduction in pay conditional on human-capital level. Higher product-market concentration exacerbates this effect while a higher unionization rates mitigates these effects (Qiu and Sojourner, 2019). Benmelech at al.(2019) analyze the effect of local-level labor market concentration on wages. Using census data over the period 1977-2009, they find that; first, local-level employer concentration exhibits substantial cross-section and time-series variation and increase over time. Second, there is a negative relation between local-level employer concentration and wages which is more pronounced at high levels of concentration and increases over time. Third, the negative relation between labor market concentration and wages becomes stronger when unionization rate is low. Fourth, when labor markets are less concentrated, the link between productivity growth and wage growth is stronger. Last, exposure to great import competition from China also known as "the China Shock", is associated with more concentrated labor markets. Another important paper by Schubert at al.(2020) studies the effect of employer concentration on wages in the United States but makes new contributions by developing an instrument for employer concentration, based on differential local exposure to national firm-level trends. They used the instrument to estimate the effect of plausibly exogenous variation in employer concentration on wages across the large majority of U.S. occupations and metropolitan areas and adopted a flexible probabilistic approach to labor market definition. They find that moving from the median to the 95^{th} percentile of employer concentration reduces wages by 3.5%.

While the empirical literature on the effect of employer concentration on compensation has been growing remarkably, there has been little research on the linkage between international trade and employer concentration. Acemoglu et al.(2014) explore how much of the sluggish US

employment growth can be explained by the quick rise of import competition from China. Using employment data from County Business Patterns, the authors use two empirical approaches. The "direct industry level-employment approach or "national industry level estimates" which compares employment across four-digit manufacturing industries from 1991 to 2011. The second approach focuses on local labor markets and seeks to capture the reallocation and aggregated demand effects (Freenstra, 2003 and Acemoglu et al, 2014). The approach measures the impact of trade shocks within US commuting zones (CZs). Last but not least, Benmelech at al(2018), investigates the role of local-level labor market monopsonies in influencing firm-wage setting behavior. They hypothesize that exposure to greater import competition from China[2] can be associated with more concentration labor market.

This paper will fill out the gap in the literature by closely examining the impact of China Trade shock on Commuting Zone employer concentration. Using 2SLS, this paper will study the effects of "the china trade shock" on overall Commuting zone employer concentration in years 1991, 1999, 2007 and 2011. Second, the paper studies the impact of china shock on sectorial commuting zone employer concentration considering exposed and non-exposed sectors.

III. Data and Methodology

3.1 Data

This research utilizes the Quarterly Work Force Indicator dataset which provides employment data by zip code and various types of firms. The QWI comprises 32 indicators detailing a variety of firm's characteristics and workers demographics at several levels of geographic aggregation. The current research uses data on all private firms, at the county level, with aggregation at the 2-digit

[2] The Chinese shock, see Acemolgu at al.(2014)

North American Industry Classification System (NAICS) sector level. Further, the data were disaggregated by firm type[3]. QWI county-level stable employment data were pulled for all 50 states and District of Columbia to create accurate estimates on employment share by commuting zone, by industry and by firm size.

The research utilizes Acemoglu et al.(2014) international trade data, which they sourced from the United Nations Comtrade Database. Last, this research uses the same strategy by adjusting Acemoglu et al.(2014) upstream/downstream demand linkage data, originally sourced from the US Bureau of Economic Analysis, in order to link the data to our NAICS industry data. The empirical methodology and use of data are explained in the following section.

3.2 Methodology

This study follow Acemoglu et al.(2014) to estimate Stacked first-difference models to estimate the change in Commuting Zones employer concentration. To measure the effects of china trade shock on overall employer concentration, this research uses the following form:

$$\Delta E_{i\tau} = \alpha_\tau + \beta \Delta IP_{i\tau}^{CZ} + \gamma X_{i0} + \epsilon_{i\tau} \qquad (1)$$

Where the dependent variable $\Delta E_{i\tau}$ is equal to 100 times the annual change in the HHI in CZi over time period τ; the main independent variable, $\Delta IP_{i\tau}^{CZ}$ measure a CZs annual change in

[3] Firm size considers 5 different firm types. The smallest 0-19 employees and the largest above 500 employees. See QWI.

exposure to Chinese imports over time τ; a set of CZ by sector start period controls is represented by X_{i0}; α_τ is a time effect; and $\epsilon_{i\tau}$ is the error term. Start of period industry employment is used to weight regression estimates. Standard errors are clustered at the CZ level to allow for error correlation within those geographic areas. This study also adopt Acemoglu at al.(2014) instrument for growth in import from China to the US using the synchronous growth of Chinese imports in eight other developed countries(Acemoglu at al. 2014).

In order to access the differential impact of import exposure on the various types of industries within local labor markets, the study categorizes changes in employer concentration into three sectoral grouping; exposed industries, non-exposed tradable industries, and non-exposed non-tradable industries following Acemoglu et al.(2014) and interact the CZs change in import exposure with indicator variables for indicated grouping:

$$\begin{aligned}\Delta E_{ik\tau} = \alpha_{k\tau} + \beta_1 \Delta IP_{i\tau}^{CZ} \times 1\left[\text{Exposed}_k\right] + \beta_2 \Delta IP_{i\tau}^{CZ} \times 1\left[\text{Non-Exposed Tradable}_k\right] + \\ \beta_3 \Delta IP_{i\tau}^{CZ} \times \left(1 - 1\left[\text{Exposed}_k\right] - 1\left[\text{Non-Exposed Tradable}_k\right]\right) + \gamma X_{ik0} + \epsilon_{ik\tau}\end{aligned} \tag{2}$$

where $\Delta E_{ik\tau}$ is employer concentration (HHI) change of sector k in CZ I, expressed as percentage. It is in fact a weighting average of employer concentration by industry and by commuting zone in each sector. The research matches the original QWI stable employer concentration data to Acemoglu et al. (2014) country-to-CZ crosswalk.

Like in Acemoglu at al.(2014) $\Delta E_{ik\tau}$ is therefore computed by assigning each industry to one of tree mutually exclusive sectors: exposed, non-exposed tradable industries, and the three other non-exposed industries. Acemoglu at al.(2014) define the exposed sector to comprise all manufacturing industries for which predicted import exposure rose by at least 2 percentage point between 1991 to 2011, as well as all industries, including those within or outside manufacturing for which predicted full downstream import exposure increased by at least 4 percentage points from 1991 to 2011. The remaining industries, the non-exposed industries, are categorized as tradable and non-tradable. Non exposed-tradable industries refer to those industries that produce tradable goods or commodities, but which do not fall within the exposed category. All other sectors not previously categorized, including services, fall into non-exposed non-tradable class or sector. Accordingly, this research also uses the crosswalk from SIC codes to NAICS codes in order to calculate the values for sector dummy variables.

Finally, the employer concentration is calculated using Herfindahl-Hirschman Index (HHI). HHI is a commonly accepted measure of market concentration. HHI is calculating by squaring the market employment share of each firm competing in the market and then summing the resulting numbers. QWI considers five firm size: 0-19 employees; 20-49 Employees; 50-249 Employees; 250-499 Employees; 500+ Employees.

Therefore, the dependent variable was computed as:

HHI = 10,000(S1∧2 + S2∧2 + S3∧2 + S4∧2 + S5∧2) where:

Si = Employment Share by Firm size i,, i= 1,..5. The index takes into account the relative zise distribution of the firms in a market. It approaches zero when a market is occupied by a large number of firms of relatively equal size and reaches its maximum 10000 points when a market is

controlled by a single firm. HHI increases both as the number of firms in the market decreases and as the disparity in size between those firms increases. The Department of Justice agencies generally consider markets in which the HHI is between 1500 and 2500 points to be moderately concentrated while markets in which HHI is in excess of 2,500 points are considered highly concentrated.

3.3 Summary Statistics

Table#1 reports the summary statistics on employment for each type of firm size and the total employment by commuting zone. The variable emptotal is the total stable employment by year, by commuting zone, by industry and by firm size. It has a mean of 665 and a big dispersion with standard deviation of 2,044. Emp1 to emp5 reports the total employments by each firm size[4]. Firms of size 5 have the bigger number of employments with the mean of 319 and maximum of 96,076. Firms of size 1 follow with an average of 115 and a maximum of 49,536. Firms of size 4 have the lowest average, 50 with a maximum of 16,673.

Table#2 is the summary statistics of HHI by commuting zone and sector. The HHI or emp_share has an average of 0.43 with a large dispersion, standard deviation of 0.21. The minimum HHI is 0.252 while the maximum is 1.

[4] By year, commuting zone by industry and by firm size. It considers zero employment for firms not under consideration. For instance, if calculating for firm size 1, all other firms get zero employment. This method facilitates the calculation of HHI.

Table#1, Summary Statistics of employment by commuting zone and firm types

Variables	N	mean	sd	min	max	p25	p50	p75
czone	105,653	21,083	11,448	100	39,400	11,101	22,500	30,903
industry	105,653	50	17	11	92	42	52	62
firmsize	105,653	3	1	1	5	1	3	4
emptotal	105,653	665	2,044	2	96,076	89	208	531
emp5	105,653	319	1,872	0	96,076	0	0	0
emp4	105,653	50	271	0	16,673	0	0	0
emp3	105,653	111	584	0	44,540	0	0	0
emp2	105,653	70	351	0	22,519	0	0	0
emp1	105,653	115	668	0	49,536	0	0	37

Table#2, Summary Statistics of HHI by commuting zone and sectors

summarize emp_share					
Variable	Obs	Mean	Std. Dev.	Min	Max
emp_share(HHI)	5,702	.437003	.2168842	.2052668	1

4. Results & Interpretation

4.1 Results

Table#2 presents 2SLS results from regressing employer concentration (HHI) on china import penetration from 1991 to 2011.[5] Column 1 reports a negative but not statistically effect of china shock on employer penetration. Columns 2 and 3 shows a negative and statistically significant effect of china shock on employer concentration at 5% significant level.

[5] Column 1 only consider an interaction of sector and Time effects. Column 2 adds an interaction of Sector and Mft at Emp. Share at Baseline. Column 3 adds an interaction of sector and census division dummies.

Column 4, 5 and 6, report results on sectorial employer concentration[6]. Column 4 reports the negative and statistically significant effects of import penetration on employer penetration in exposed sectors and positive and statistically significant effects of china trade shock on non-exposed tradable and non-exposed and non-tradable sectors. The result is statistically significant at 1% significant level. Likewise, column 5 reports the negative and statistically significant effect of china trade shock on employer penetration on exposed sectors and positive and statistically significant effect on non-exposed tradable sector but negative and not statistically significant effect on non-exposed non-tradable sector. Column 6 reports negative and statistically significant effect of china trade shock on employer penetration on exposed sectors, The coefficient amplifies (in absolute terms) when an interaction sector and but it is still statistically significant at 1% significant level. When an interaction between sector and census division dummies is added. Column 6 reports the negative and statistically significant effect of china import penetration on employer concentration in exposed sector, a positive and statistically significant effect of china trade shock on non-exposed tradable sector and positive but not-statistically effects of trade shock on non-exposed and non-tradable sector.

Finally, columns 7 and 8 consider the expansion period and the period before the great depression, 1991 to 2007[7]. Column 7 considers the overall effect of Chinese import shock while column 8 considers the sectorial effect. Column 7 reports an overall negative and statistically significant effect of china import shock on employer penetration. Column 8 reports a negative and statistically significant effect of China import shock on employer concentration in exposed sectors, a positive

[6] Exposed, non-exposed tradable and non-exposed non-tradable

[7] Both columns consider an interaction of sector and Time effects, an interaction of Sector and Mft at Emp. Share at Baseline and an interaction of sector and census division dummies.

and statistically significant effect of china trade shock on non-exposed tradable sector and negative but not statistically significant effect on non-exposed and non-tradable sector.

4.2 Interpretation

The results in column 1 suggests that without consideration of sector, after controlling for interaction of sector and Time effects, as well as other variables including those included in the error term, the effects of china import shock on employer penetration during the period of expansion is negative but negligible. In column 2, after controlling for interaction of sector and Time effects, an interaction of Sector and Mft at Emp. Share at Baseline as well as other variables including those included in the error term, a percentage point increase in import penetration from China is, on average, estimated to reduce the employer penetration by 1.3%. The coefficient is significant at 5% significant level.

In column 3, after controlling for interaction of sector and Time effects, an interaction of Sector and Mft at Emp. Share at Baseline, an interaction of sector and census division dummies as well as other variables including those included in the error term a one percentage increase in import penetration from china is on average estimated to decrease the employer penetration by 1.28%. the coefficient is significant at 5% significant level.

Column 4, after controlling for interaction of sector and Time effects as well as other variables including those included in the error term, one percentage point increase in china import shock is on average estimated to employer concentration by 2.88% in directly exposed sectors, increase employer concentration in non-exposed tradable sectors by 5.09%. Both coefficients are statistically significant at 1% significant level.

In column 5, after controlling for interaction of sector and Time effects, an interaction of Sector and Mft at Emp. Share at Baseline, as well as other variables including those included in the error term, an increase of one percentage point in import penetration from china is, on average, estimated to decrease employer concentration in directly exposed sectors by 4.16%, increase employer penetration in non-exposed but tradable sectors by 4.46%. The coefficient on exposed sector is statistically significant at 1% significant level while the one on non-exposed sectors is at 5% significant level.

In column 6, after controlling for interaction of sector and Time effects, an interaction of Sector and Mft at Emp. Share at Baseline, an interaction of sector and census division dummies as well as other variables including those included in the error term, one percentage point increase in china import penetration, is on average estimated to decrease the employer concentration by 3.54% in exposed sectors and increase employer penetration by 7.06% in non-exposed tradable sector. Both coefficients are statistically significant at 1% significant level.

In column 7, after controlling for interaction of sector and Time effects, an interaction of Sector and Mft at Emp. Share at Baseline, an interaction of sector and census division dummies as well as other variables including those included in the error term, one percentage point increase in china import exposure is, on average, expected to reduce the overall employer concentration by 1.17%, at 10% significant level.

Finally, after controlling for interaction of sector and Time effects, an interaction of Sector and Mft at Emp. Share at Baseline, an interaction of sector and census division dummies as well as other variables including those included in the error term, an increase of one percentage point on china import penetration is, on average expected to decrease employer concentration by 3.41% in

exposed sectors at 1% significant level and increase employer concentration by 4,54% in non-exposed tradable sector at 5% significant level.

Table 3: 2SLS Estimates of Import Effects on Commuting Zone Employer Concentration (HHI).

	Overall Employer concentration			Sectoral Employer concentration			Overall	Sectoral
	1991-2011			1991-2011			1991-2007	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Commuting Zone Import Exposure	-0.31	-1.31**	-1.28**				-1.17*	
	(0.44)	(0.57)	(0.56)				(0.62)	
Commuting Zone Import Exposure x 1{Exposed Sector}				-2.88***	-4.16***	-3.54***		-3.41***
				(0.80)	(1.18)	(1.20)		(1.27)
Commuting Zone Import Exposure x 1{Non-Exposed Tradable Sector}				5.09***	4.46*	7.06***		4.54**
				(1.53)	(2.32)	(2.44)		(1.91)
Commuting Zone Import Exposure x 1{Non-Exposed Non-Tradable Sector}				0.50	-0.40	-0.49		-0.49
				(0.41)	(0.49)	(0.54)		(0.59)
Sector x Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector x Mfg Emp Share at Baseline	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Sector x Census Division Dummies	No	No	Yes	No	No	Yes	Yes	Yes
N	565	565	565	1560	1560	1560	565	1576

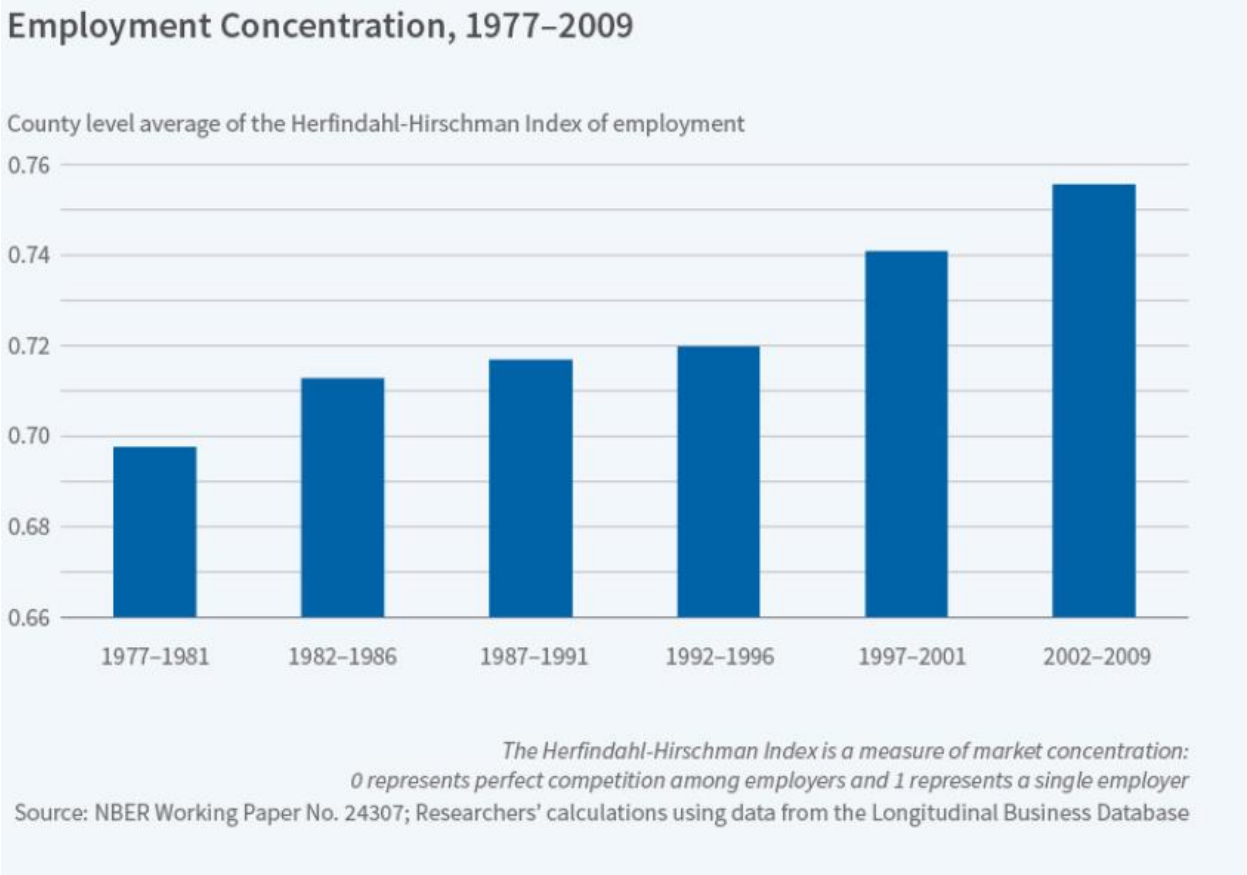
5. Conclusion and future research

The research assesses the impact of china import penetration to the U.S. on employer commuting zone's concentration from 1991 to 2011. It assesses overall impact of the "china trade shock" on employer concentration, the impact on sectors directly exposed to trade shock, sectors that are not directly exposed but are tradable and finally sector that are exposed and are not tradable. The paper finds that the China trade shock overall reduces employer concentration in the U.S during any period of study. The paper also finds that china import penetration reduces employment

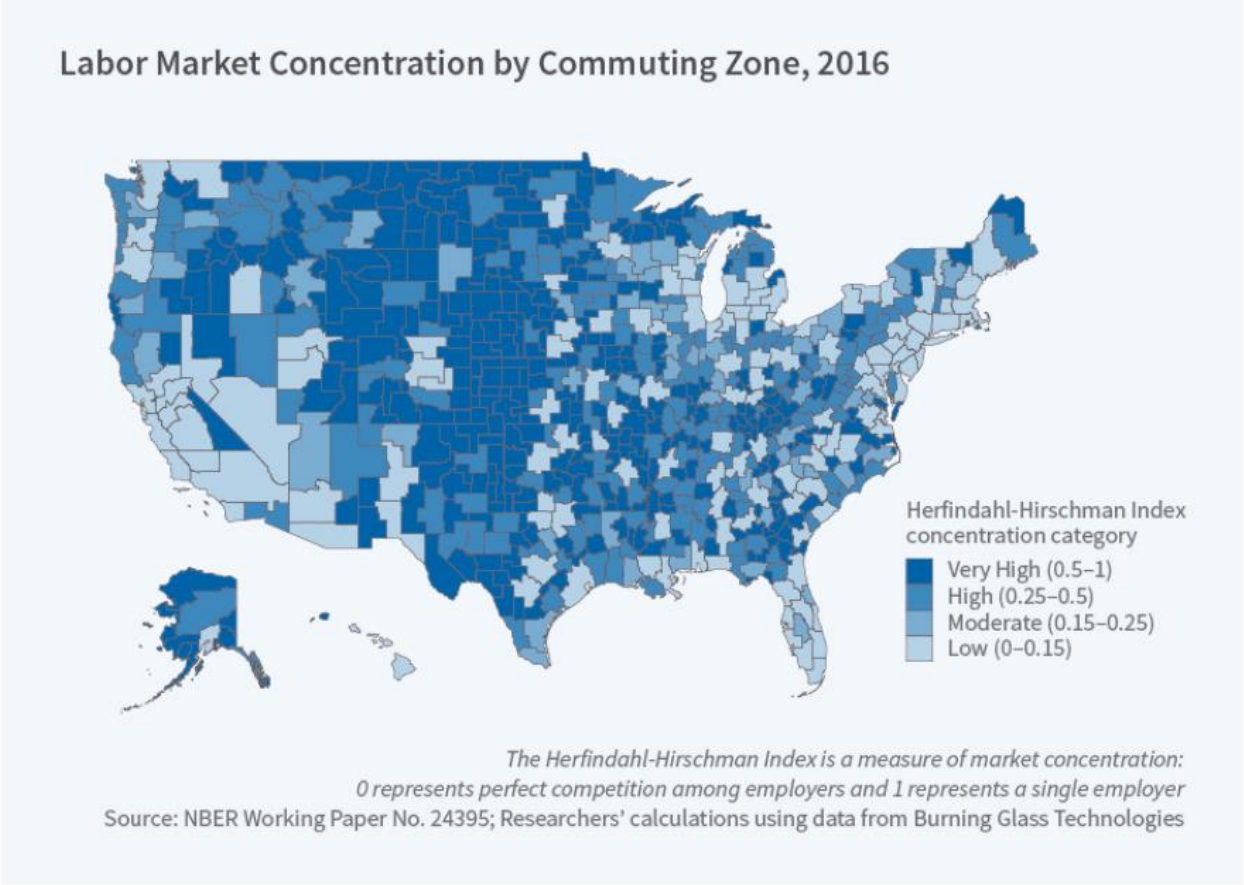
concentration in those sectors more directly exposed to trade. However, the paper finds that the surge in imports from china to the US does increase employer concentration in sectors that although are not directly exposed to trade, are tradable.

The paper, thus, finds a differentiated impact of china import penetration on U.S. employer concentration reducing the power of those companies that compete in exposed sectors. As for the next step, the research will seek to deepen on explaining the causes of a differed effect of china impact on employer's concentration. The research will also look to include unions as control variable.

Figure#1, Employment concentration, 1977-2009



Figure#2, Labor market concentration by commuting zone, 2016



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