

What Explains the 2007-2009 Drop In Employment? By Mian and Sufi

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- The 2007-2009 recession led to the largest decline in employment in the US since the Great Depression.
- Why did employment decline so drastically between 2007 and 2009?
- They approach this question with a particular focus on the housing net worth channel: decline in employment because of a sharp reduction in the housing net worth of households.

- The housing net worth channel predicts a differential response of nontradable versus tradable employment across US counties.
- Nontradable employment relies heavily on local demand, while tradable employment relies more broadly on national or even global demand.
- Prediction: while the change in nontradable employment should be positively correlated with the change in housing net worth in the cross-section of counties, the change in tradable employment should not be as strongly positively correlated.
- They take these predictions to the data.

- I will summarize the data used in the paper, the empirical strategy, and the main results.
- Christian will summarize how the paper is related to theoretical work that shows how demand shocks driven by a weakness in household balance sheet translate into a decline in real activity due to the presence of nominal or labor market rigidities (Eggertsson and Krugman (2012), Guerrieri and Lorenzoni (2011), etc.).

- County-level dataset that includes employment by four-digit industry, household balance sheet information including total debt and housing value, wages and other demographic and income information.
- They place each of the four-digit industries into one of four categories: non-tradable, tradable, construction and other.
- Key right hand side variable is the change in household net worth between 2006 and 2009.
- Net worth in county i at time t : $NW_t^i = S_t^i + B_t^i + H_t^i - D_t^i$
- The four terms on the right hand side represent stocks, bonds, housing, and debt owed.

- They compute the market value of stock and bond holdings in a given county using IRS Statistics of Income.
- They estimate the value of housing stock owned by households in a county using the 2000 Decennial Census data as the product of the number of home owners and the median home value. They then project the housing value into later years using the Core Logic Zip code level house price index and an estimate of the change in homeownership and population growth.
- Debt is measured by using data from Equifax Predictive Services that has information on the total borrowing by households in each county in a given year.

- Change in total net worth:

$$\Delta HNW = \frac{\Delta \log p_{06-09}^{H,i} * H_{2006}^i}{NW_{2006}^i}$$

- ΔHNW is what they refer to as *housing net worth shock*.

Data: Tradable and Non-Tradable Categories

- They classify industries following two methods. First one is the retail and world trade classification:
 - Four-digits NAICS industry as tradable if it has imports plus exports equal to at least \$10,000 per worker, or if total exports plus imports for the four-digit industry exceeds \$500M.
 - Non-tradable industries are defined as the retail sector and restaurants.
 - Construction: includes industries related to construction, real estate, or land development.
 - Any industry in the construction category is not included in either the tradable or non-tradable category.
 - The remaining industries are classified as other.

Data: Tradable and Non-Tradable Categories

- The second method is the geographical concentration based classification:
 - Idea: the production of tradable goods requires specialization and scale, so industries producing tradable goods should be more concentrated geographically.
 - Certain goods and services (such as vacation beaches and amusement parks) are concentrated geographically and rely on national demand, making them tradable for their purposes.
 - Non-tradable industries are needed everywhere and should be geographically dispersed.
- They construct a Herfindahl index for each industry based on the share of an industry's employment that falls in each county.
- They categorize the top and bottom quartile of industries by geographical concentration as tradable and non-tradable.

Data: Tradable and Non-Tradable Categories

INDUSTRY CATEGORIZATION*

Non-Tradable Industries			Tradable Industries		
NAICS	Industry Name	NT?	NAICS	Industry Name	T?
<i>Panel A: Industry classification based on retail, restaurants, and US—world trade</i>					
7221	Full-service restaurants	1	3261	Plastics product manufacturing	0
7222	Limited-service eating places	1	3231	Printing and related support activities	0
4451	Grocery stores	1	3363	Motor vehicle parts manufacturing	0
4521	Department stores	1	3116	Animal slaughtering and processing	0
4529	Other general merchandise stores	1	3364	Aerospace product & parts manufacturing	1
4481	Clothing stores	0	3327	Machine shops; screw nut & bolt manuf.	0
4461	Health and personal care stores	1	3345	Navigational & control instruments manuf.	0
4471	Gasoline stations	1	3344	Semiconductor and other electronic manuf.	1
7223	Special food services	0	3399	Other miscellaneous manufacturing	0
4511	Sporting goods hobby and music stores	1	5112	Software publishers	1
7224	Drinking places (alcoholic beverages)	0	3391	Medical equipment and supplies manuf.	0
4532	Office supplies stationery and gift stores	1	3222	Converted paper product manufacturing	0
4539	Other miscellaneous store retailers	1	3118	Bakeries and tortilla manufacturing	0
4482	Shoe stores	0	3339	Other general purpose machinery manuf.	0
4512	Book, periodical, and music stores	0	3329	Other fabricated metal product manuf.	0
4452	Specialty food stores	0	3254	Pharmaceutical and medicine manuf.	0
4483	Jewelry luggage and leather goods stores	1	3331	Agriculture and mining machinery manuf.	0
4453	Beer wine and liquor stores	1	3361	Motor vehicle manufacturing	1
4533	Used merchandise stores	1	3251	Basic chemical manufacturing	1
4531	Florists	1	3114	Fruit & vegetable preserving & manuf.	0

(Continues)

Data: Tradable and Non-Tradable Categories

Non-Tradable Industries			Tradable Industries		
NAICS	Industry Name	NT?	NAICS	Industry Name	T?
<i>Panel B: Industry classification based on geographical concentration of industries</i>					
4442	Lawn and garden equipment stores	0	5232	Securities and commodity exchanges	0
4245	Farm product raw material wholesalers	0	4861	Pipeline transportation of crude oil	0
4471	Gasoline stations	1	3152	Cut and sew apparel manufacturing	1
2123	Nonmetallic mineral mining & quarrying	0	5121	Motion picture and video industries	0
4529	Other general merchandise stores	1	7114	Agents for artists, entertainers, etc.	0
7212	RV parks and recreational camps	0	4831	Deep sea / great lakes water transportation	0
3211	Sawmills and wood preservation	0	5152	Cable and other subscription programming	0
4531	Florists	1	5122	Sound recording industries	0
8122	Death care services	0	3122	Tobacco manufacturing	1
5323	General rental centers	0	7115	Independent artists, writers and performers	0
4543	Direct selling establishments	0	3365	Railroad rolling stock manufacturing	1
4441	Building material and supplies dealers	0	4879	Scenic and sightseeing transportation other	0
4412	Other motor vehicle dealers	1	7131	Amusement parks and arcades	0
6231	Nursing care facilities	0	4872	Sightseeing transportation water	0
4413	Automotive accessories and tire stores	1	5231	Securities and commodity intermediation	0
1133	Logging	0	5181	Internet Sservice Pproviders	0
4842	Specialized freight trucking	0	2122	Metal ore mining	1
3273	Cement and concrete manufacturing	0	4883	Support activities for water transportation	0
3219	Other wood product manufacturing	0	4243	Apparel piece goods and wholesalers	0
6232	Mental health & substance abuse facilities	0	4889	Other support activities for transportation	0

Summary Statistics

SUMMARY STATISTICS^a

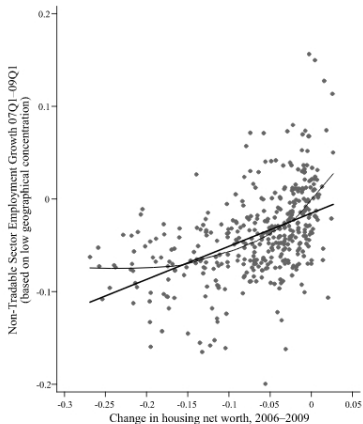
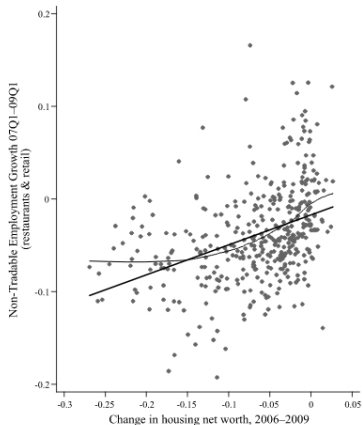
	N	Mean	SD	10th	90th	Weighted Mean	Weighted SD
Housing net worth shock, 2006 to 2009	944	-0.065	0.085	-0.172	0.003	-0.095	0.100
Number of households, 2000	944	98,197	187,506	12,841	237,783	455,860	666,240
Labor force growth, 2007 to 2009	944	0.014	0.030	-0.018	0.050	0.014	0.025
Total employment, 2007	944	110,725	235,669	9,652	267,278	543,470	809,861
Employment growth, 2007 to 2009	944	-0.052	0.066	-0.123	0.021	-0.053	0.047
Average wage, 2007	944	7.338	2.414	5.234	9.985	9.727	3.790
Average wage growth, 2007 to 2009	944	0.028	0.071	-0.044	0.100	0.026	0.056
Housing supply elasticity (Saiz) 2007 to 2009	540	2.204	1.117	0.943	3.589	1.718	0.990
Non-tradable employment growth, 2007 to 2009	944	-0.029	0.086	-0.110	0.063	-0.040	0.061
Food industry employment growth, 2007 to 2009	944	-0.012	0.090	-0.093	0.089	-0.021	0.063
Tradable employment growth, 2007 to 2009	944	-0.115	0.192	-0.337	0.062	-0.116	0.136
Construction employment growth, 2007 to 2009	944	-0.163	0.164	-0.368	0.023	-0.161	0.136
Other employment growth, 2007 to 2009	944	-0.021	0.082	-0.103	0.070	-0.026	0.052
Industry geographical Herfindahl, 2007	294	0.016	0.023	0.0034	0.0338	0.0083	0.011
Hourly wage, 2007	944	18.978	3.447	15.484	23.354	21.086	3.692
Hourly wage, 10th percentile, 2007	944	5.801	0.830	4.834	7.000	6.241	0.774
Hourly wage, 25th percentile, 2007	944	9.052	1.450	7.500	10.955	9.808	1.464
Hourly wage, median, 2007	944	22.975	4.697	18.269	29.101	25.683	5.109
Hourly wage, 75th percentile, 2007	944	34.714	7.487	27.404	44.535	39.478	8.658
Hourly wage, 90th percentile, 2007	944	14.494	2.710	11.731	18.229	15.984	2.880
Wage growth, 2007 to 2009	943	0.012	0.089	-0.099	0.124	0.011	0.066
Wage growth, 10th percentile, 2007 to 2009	943	0.053	0.064	-0.022	0.137	0.048	0.049
Wage growth, 25th percentile, 2007 to 2009	943	0.058	0.055	-0.006	0.134	0.051	0.041
Wage growth, median, 2007 to 2009	943	0.050	0.068	-0.030	0.136	0.040	0.048
Wage growth, 75th percentile, 2007 to 2009	943	0.066	0.057	-0.001	0.137	0.056	0.042
Wage growth, 90th percentile, 2007 to 2009	943	0.039	0.057	-0.031	0.107	0.032	0.039

- Housing net worth shocks can have important consequences for spending and employment, especially in the presence of nominal and real rigidities.
- What are the employment consequences for each percentage decline in housing net worth?
- Problem: difficult to estimate the parameter because spending reductions as a result of net worth decline in an area impacts employment everywhere through the trade channel.
- Their solution: isolate the impact of change in net worth on employment in the non-tradable sector.

$$\Delta \log E_i^N = \alpha + \eta \Delta HNW_i + \epsilon_i$$

- $\log E_i^N$ is the log change in non-tradable employment in county i between 2007-2009.

Results: Non-Tradable Employment



Results: Non-Tradable Employment

NON-TRADABLE EMPLOYMENT GROWTH AND THE HOUSING NET WORTH SHOCK^a

Non-Tradable Definition Used:	Employment Growth, Non-Tradable Industries, 2007–2009									
	Rest. & Retail (1)	Geog. Concen. (2)	Rest. & Retail (3)	Geog. Concen. (4)	Rest. & Retail (5)	Geog. Concen. (6)	Rest. & Retail (7)	Rest. & Retail (8)	Geog. Concen. (9)	Rest. & Retail (10)
Δ Housing Net Worth, 2006–2009	0.190** (0.042) [0.022]	0.199** (0.049) [0.017]	0.174** (0.043) [0.021]	0.166** (0.046) [0.016]	0.374** (0.132) [0.081]	0.208* (0.086) [0.067]	0.489** (0.127) [0.118]	0.440** (0.140) [0.072]	0.212* (0.091) [0.057]	0.133** (0.036) [0.022]
ΔHNW * (Construction Share 07)								–1.99* (0.856)	–0.325 (0.561)	
Construction Share 07								–0.082 (0.158)	–0.183 (0.126)	
Δ Construction Employment, 2007–2009										0.079** (0.027)
Constant	–0.022** (0.007)	–0.021** (0.007)	0.176 (0.443)	0.070 (0.286)	0.445 (0.536)	1.233** (0.438)	–0.102 (0.57)	0.254 (0.428)	0.072 (0.290)	0.162 (0.430)
Specification	OLS	OLS	OLS	OLS	IV	IV	IV	OLS	OLS	OLS
Industry controls?			YES	YES	YES	YES	YES	YES	YES	YES
Other controls?							YES			
<i>N</i>	944	944	944	944	540	540	540	944	944	944
<i>R</i> ²	0.096	0.156	0.175	0.236	0.158	0.275	0.144	0.188	0.239	0.194

Empirical Strategy: Supply-Side Shocks?

- Is the correlation spurious? Certain industries may be hit harder during the recession, and counties with greater exposure to these industries may naturally experience both a larger decline in housing net worth and larger fall in employment.
- Include share of a county's employment in 2006 in each of the 23 two-digit industries.

Results: Non-Tradable Employment

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Other controls?							YES			
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<i>R</i> ²	0.096	0.156	0.175	0.236	0.158	0.275	0.144	0.188	0.239	0.194

Empirical Strategy: Supply-Side Shocks?

- One might worry that places where house prices and hence housing net worth fell the most also had greater exposure to the construction sector.
- IV strategy using the Saiz (2010) housing supply elasticity as an instrument for the change in housing net worth.
- The Saiz instrument is strongly correlated with ΔHNW_i , but is not correlated with either the share of employment in construction sector in a county, or the growth in construction sector employment prior to 2007.
- It could be that the instrument is correlated with other county-level demographic characteristics. They will add controls in other specifications.

Results: Non-Tradable Employment

NON-TRADABLE EMPLOYMENT GROWTH AND THE HOUSING NET WORTH SHOCK^a

Non-Tradable Definition Used:	Employment Growth, Non-Tradable Industries, 2007–2009									
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Construction Share 07								–0.082 (0.158)	–0.183 (0.126)	
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Specification	OLS	OLS	OLS	OLS	IV	IV	IV	OLS	OLS	OLS
Industry controls?			YES	YES	YES	YES	YES	YES	YES	YES
Other controls?							YES			
<i>N</i>	944	944	944	944	540	540	540	944	944	944
<i>R</i> ²	0.096	0.156	0.175	0.236	0.158	0.275	0.144	0.188	0.239	0.194

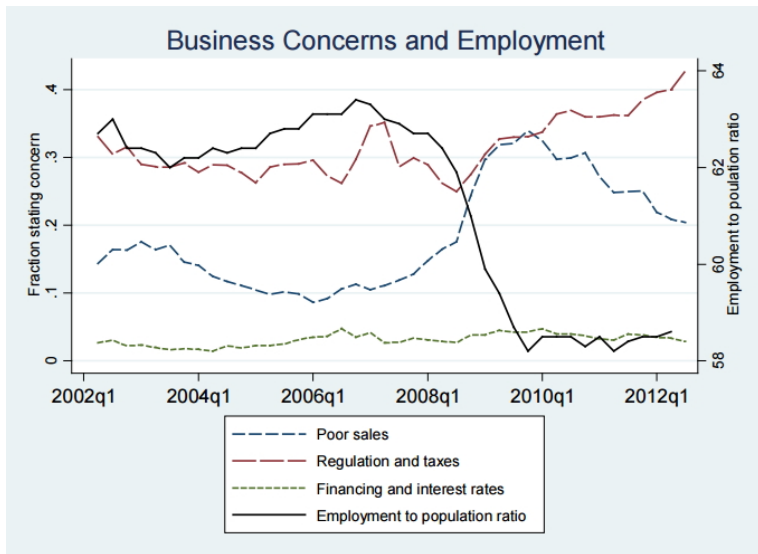
Empirical Strategy: Uncertainty?

- The effect of the housing net worth shock on non-tradable employment can be explained by the business uncertainty hypothesis.
- Uncertainty causes firms to temporarily pause their investment and hiring.
- An increase in business uncertainty at the aggregate level does not explain the cross-sectional patterns in non-tradable employment losses documented above.

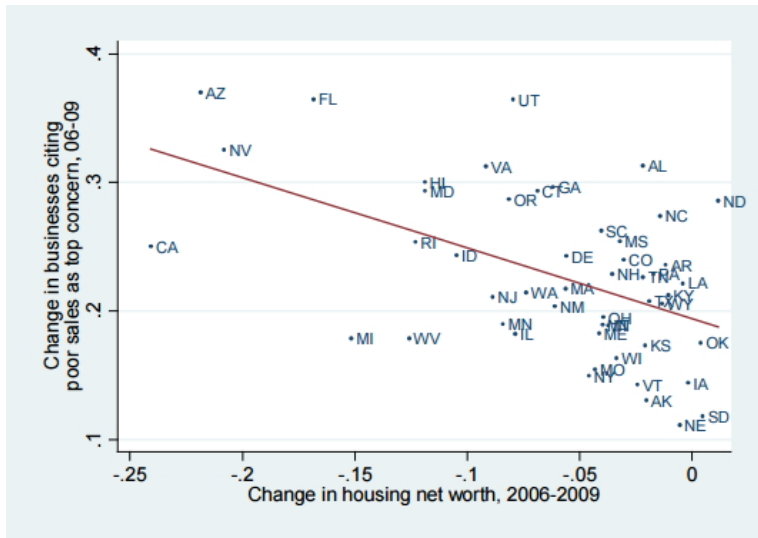
Empirical Strategy: Uncertainty?

- For the uncertainty hypothesis to qualify as an explanation for the results, it would have to be the case that the increase in business uncertainty was larger in counties that experienced a large decline in housing net worth.
- If the higher uncertainty is a consequence of a large decline in local demand in some areas, it is a manifestation of the housing net worth channel.
- The alternative explanation must involve greater uncertainty in areas with large housing net worth decline for reasons other than the decline in local demand itself. Perhaps, there is more uncertainty regarding state government policies in states with severe housing problems.

Results: Uncertainty?



Results: Uncertainty?



Results: Uncertainty?



Empirical Strategy: Credit Supply?

- Firms in counties with a larger decline in housing net worth face a larger decline in credit supply, forcing them to lay off workers?
- Evidence in previous figure: financing not seen as a problem.
- Does the reduction in credit supply make firms fire workers both in tradable and non-tradable sectors? Next slide.
- Credit supply shock might affect only non-tradable industries. They will split the sample depending on firm size to test for that.

Results: Credit Supply?

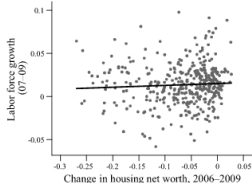
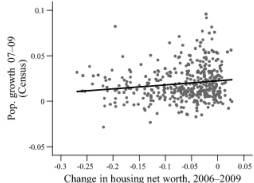
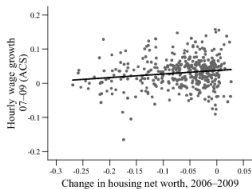
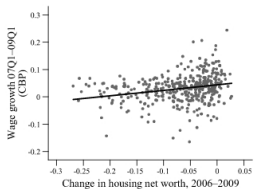
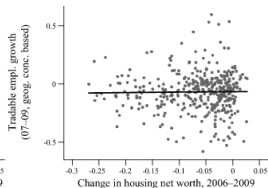
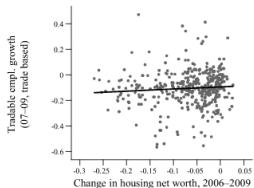
IS NON-TRADABLE EMPLOYMENT GROWTH DRIVEN BY CREDIT SUPPLY TIGHTENING?²

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A (OLS): Effect of change in housing net worth on non-tradable employment growth by establishment size (N = 944 counties)</i>						
	Establishment Size in Terms of Number of Employees:					
	1 to 4	5 to 9	10 to 19	20 to 49	50 to 99	100+
Δ Housing Net Worth, 2006–2009	0.070** (0.025)	0.032 (0.036)	0.022 (0.044)	0.134** (0.032)	0.152 (0.097)	0.434** (0.061)
<i>Panel B (IV): Effect of change in housing net worth on non-tradable employment growth by establishment size (N = 540 counties)</i>						
	Establishment Size in Terms of Number of Employees:					
	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4
Δ Housing Net Worth, 2006–2009	-0.134 (0.147)	0.000 (0.125)	-0.022 (0.109)	0.193* (0.086)	0.335 (0.191)	0.770** (0.208)
<i>Panel C: Effect of change in housing net worth on non-tradable employment growth by banking type</i>						
	Banking Type:					
	National (OLS, N = 472)	Local (OLS, N = 304)	National (IV, N = 472)	Local (IV, N = 236)		
Δ Housing Net Worth, 2006–2009	0.186** (0.041)	0.306 (0.178)	0.233** (0.068)	0.308** (0.107)		

Empirical Strategy: Mechanisms

- With flexible prices, the negative impact of the housing net worth shock on non-tradable employment is reversed by a gain in employment in the tradable sector.
- They will look for evidence of adjustment happening in employment, wages and mobility.

Results: Mechanisms



Results: Mechanisms

TRADABLE EMPLOYMENT GROWTH AND THE HOUSING NET WORTH SHOCK^a

Tradable Definition Used:	Employment Growth, 2007-2009 (County-Four Digit Industry Level)							
	Employment Growth, Tradable Industries, 2007-2009				All Industries		Tradable Industries	
	Global Trade (1)	Geog. Conc. (2)	Global Trade (3)	Geog. Conc. (4)	Geog. Conc. (5)	Geog. Conc. (6)	Global Trade (7)	Global Trade (8)
Δ Housing Net Worth, 2006-2009	0.018 (0.099)	-0.085 (0.063)	0.064 (0.098)	-0.063 (0.074)	0.198** (0.058)	—	-0.096 (0.137)	—
Industry Geographical Herfindahl Index					-2.936** (0.606)	—		
ΔHNW^* (Geographical Herfindahl)					-11.733** (3.254)	-7.328** (1.367)		
Trade per worker (Mil. \$)							-0.262 (0.238)	—
ΔHNW^* (Trade per worker)							-1.274 (1.386)	-1.409 (0.980)
Constant	-0.114** (0.012)	-0.091** (0.012)	-0.286 (0.950)	0.542 (1.144)	-0.077** (0.010)	—	-0.233** (0.015)	—
Two-digit 2006 employment share controls?			Yes	Yes				
Four-digit Industry Fixed Effects						Yes		Yes
County Fixed Effects						Yes		Yes
<i>N</i>	944	944	944	944	180,756	180,756	31,970	31,970
<i>R</i> ²	0.000	0.002	0.079	0.064	0.004	0.18	0.0014	0.19

Results: Mechanisms

WAGES, MOBILITY, AND THE HOUSING NET WORTH SHOCK^a

	Total Wage Growth, 2007 to 2009, CBP		Average Hourly Wage Growth, 2007 to 2009, ACS		Population Growth, 2007-2009		In-Migration Growth, 2007-2009		Labor Force Growth, 2007-2009	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Δ Housing Net Worth, 2006-2009	0.061 (0.041)	0.078* (0.037)	0.054 (0.039)	0.056 (0.035)	0.019 (0.021)	0.057** (0.021)	-0.042 (0.11)	-0.128 (0.127)	-0.0094 (0.020)	0.0032 (0.024)
Constant	0.031** (0.007)	-0.325 (0.250)	0.037** (0.003)	0.078 (0.20)	0.021** (0.004)	-0.103 (0.137)	-0.010** (0.015)	-0.530 (1.778)	0.0136 (0.004)	0.030 (0.24)
Two-digit 2006 employment share controls?		Yes		Yes		Yes		Yes		Yes
<i>N</i>	944	944	943	943	939	939	943	943	944	944
<i>R</i> ²	0.012	0.16	0.018	0.076	0.009	0.25	0	0.027	0.001	0.12

- Paper shows the importance of the housing net worth shock to explain non-tradable sector job losses.
- They find support for demand channel and relevance of rigidities.

- Further questions?
 - There are behavioral responses and heterogenous effects that are masked by the level of aggregation of the data.
 - Heterogeneity of responses depending on firm's leverage?
 - Out-migration depends on age?
 - What were the effects of the housing boom on employment? i.e. what if the housing boom had affected employment patterns during the recession and the job losses that they document represent the return to “normal” housing conditions?