# Import Competition and Household Debt[†]

Jean-Noël Barrot, MIT
Erik Loualiche, MIT
Matthew Plosser, New York Fed
Julien Sauvagnat, Bocconi

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**Abstract**

We analyze the effect of import competition on household balance sheets from 2000 to 2007 using individual-level data on leverage and defaults. We exploit cross-regional variation in exposure to foreign import competition using industry level shipping costs and initial differences in regions' industry specialization. We confirm the adverse effect of import competition on local labor markets during this period (Autor et al., 2013). We then show that household debt increased significantly in regions where manufacturing industries are more exposed to import competition. A one standard deviation increase in exposure to import competition explains 30% of the cross-regional variation in the growth in household leverage over the period. Our results highlight the distributive effects of globalization and their implications for household debt.

[†]Jean-Noël Barrot is with MIT Sloan School of Management. Contact: jnbarrot@mit.edu. Erik Loualiche is with MIT Sloan School of Management. Contact: erikl@mit.edu. Matthew Plosser is with Federal Reserve Bank of New York. Contact: matthew.plosser@ny.frb.org. Julien Sauvagnat is with Bocconi University. Contact: julien.sauvagnat@unibocconi.it. We thank David Autor, Nittai Bergman, Douglas Diamond, Luigi Guiso, Jonathan Parker, Fabiano Schivardi, Antoinette Schoar, David Thesmar, and participants at the MIT Finance Retreat, MIT Finance Lunch, Bocconi, NYU Stern, UCLA, and the MIT/Harvard finance workshop, INSEAD, HEC Paris, Yale, Berkeley for their valuable suggestions. We thank Jacob Conway for outstanding research assistance. The views expressed in this paper are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System.

# 1 Introduction

Two phenomena impacted the U.S. economy in the years preceding the Great Recession. The first is the dramatic rise in household debt from 2000 to 2007.[1] The second is an unprecedented increase in import competition, triggered by the expansion of China and other low-wage countries in global markets, with substantial labor market consequences.[2] The coincidence of these two phenomena is illustrated in Figure 1 which displays a dramatic acceleration in both aggregate U.S. household leverage and net Chinese imports to the U.S. in the decade prior to the crisis.

We hypothesize that these two phenomena are intimately linked, and that the impact of import competition on labor markets affected household debt expansion from 2000 to 2007. More precisely, we argue that the displacement of domestic production by imports fueled demand for credit in impacted areas. We examine our hypothesis using a large, nationally representative panel dataset of anonymous consumer credit records, the Federal Reserve Bank of New York's Consumer Credit Panel/Equifax Data (CCP). We exploit cross-regional variation in exposure to import competition to study the impact of import penetration on household liabilities.

Figure 2 illustrates our main finding. We present total debt growth across regions with high and low exposure to import competition from 2000 to 2007, relative to their 2000 level. As evidenced in Panel A, while debt increases by more than 100% in both groups, it grows by an additional 20 percentage points for exposed areas over the sample period. Panel B replicates this exercise with debt-to-income ratios, obtained after scaling total debt by income. The same pattern arises: leverage increases significantly more in exposed areas in the run up to the crisis. These aggregate correlations suggest a link between exposure to import penetration and the boom, and subsequent bust, of household credit.

To properly identify the causal link between import penetration and household balance

[1] See Mian and Sufi (2009), Mian and Sufi (2014) among others.

[2] See Pierce and Schott (2012), Autor et al. (2013), Acemoglu et al. (2016), Autor et al. (2014) among others.

sheets, we use variation in exposure to international trade driven by historical industry composition at the commuting zone (CZ) level. To capture exposure to import competition, we build on prior work (Bernard et al., 2006b; Barrot et al., 2016) and use industry-level shipping costs (SC) obtained from import data and computed as the mark up of Cost-Insurance-Freight over the price paid by the importer. We find SC to be strong predictors of the increase in import penetration and its consequences for U.S. output and employment. A one standard deviation in SC leads to a 1 percentage point increase in net import penetration from China between 2000 and 2007 (the average is 4% over the same period), to a drop in domestic output by 12% and to a drop in domestic employment by 6% over the same period.

To capture regional exposure to import penetration, we compute a weighted average measure of SC for each CZ based on its 1998 distribution of employment across sectors. We then confirm the adverse effect of international trade competition on local labor markets (Autor et al., 2013): exposed CZs experience higher unemployment growth from 2000 to 2007 than CZs with high SC industries. Quantitatively, a one standard deviation increase in SC explains 20% of the cross-sectional standard deviation in unemployment growth in this period. Similar economic magnitudes are obtained when we consider the effects of a one standard deviation increase in SC on total income growth.

We next test whether CZ exposure to low shipping cost industries causes an increase in household leverage. We find that a one standard deviation in SC is associated with a 5.7% increase in aggregate household debt and debt-to-income, which amounts to 30% of the cross-CZ variation in household debt growth from 2000 to 2007. We compare these magnitudes with the correlation of house price appreciation on household debt, another determinant of household leverage identified in the literature (Mian and Sufi, 2011) and find them to be of comparable magnitude. Finally, we study how the effects vary across types of debt. Most of the effect is driven by mortgage debt, the largest category of household borrowing.

Using the CCP data, we confirm that our baseline results hold at the individual level, which confirms that our main findings are not the byproduct of migration patterns across

differentially exposed areas. We also use this data to show that most of the effect is coming from the intensive margin, namely, from increases in mortgage balances rather than new mortgages. We then apply the methodology developed in Bhutta and Keys (2016) to show that the increase in leverage is due to households extracting equity from their homes in response to their exposure to import competition. Using data available from the Home Mortgage Disclosure Act (HMDA), we confirm that the increase in household debt triggered by import competition is accounted for by refinancing loans rather than new purchase loans. Finally, we examine the aftermath of this increase in leverage during the Great Recession of 2008-2010. Using individual-level data on mortgage defaults and foreclosures, we find worse outcomes during the crisis for households in regions that were more exposed to import penetration.

We confirm our main findings with a series of robustness tests. We find similar results using the Panel Study of Income Dynamics (PSID) that collects both household debt and labor outcomes, making it possible to compare them at the individual level. We exploit denial data from HMDA to make sure that we are not picking up the effect of differential credit supply shifts across high and low SC areas. We also check that our results are robust to using alternative measures of industry exposure to Chinese competition provided in the literature, or alternative methodologies to compute shipping costs.

The last section of the paper discusses the potential explanations for the sensitivity of household debt to import competition. The textbook version of the life-cycle consumer uses debt to smooth consumption when income shocks are transitory (Friedman, 1957). Yet the displacement of U.S. manufacturing jobs induced by Chinese import penetration seems long-lasting. The fact that exposed households reacted to this shock by taking on more debt is consistent with a host of potential hypotheses. First, it could be that most of debt growth is concentrated among workers for whom the shock was effectively transitory, namely, those with higher education backgrounds that were able to switch to less exposed industries (Autor et al., 2014). Alternatively, although the displacement effect of import penetration seems

permanent in hindsight, it might have been perceived as transitory initially, leading affected workers to borrow in order to smooth consumption. It could also be that credit demand is driven by ratchet effects in consumption, whereby affected households increase their credit demand in order to maintain consumption levels, even if the shock is perceived as being long lasting.[3]

Our paper builds a bridge between the literature on the displacement effects of international trade and the literature on the causes and consequences of the rise in household leverage in the 2000s. Our findings first shed light on the distributive consequences of the rise of import competition in the U.S. in the past decade. We add to a recent stream of studies considering the effect on the labor market of the acceleration of Chinese import penetration (Pierce and Schott, 2012; Autor et al., 2013; Acemoglu et al., 2016; Autor et al., 2014), or of trade shocks more generally (Bernard et al., 2006a,b; Artuç et al., 2010; Ebenstein et al., 2014). Hsieh and Ossa (2011) and di Giovanni et al. (2014) analyze the welfare effect of China's trade integration. Our contribution relative to these papers is our analysis of household balance sheet's response to an increase in import competition. More generally, our work illustrate the distributive effects of globalization (see Goldberg and Pavcnik (2007) for a review), and its impact on inequality (Helpman et al., 2010; Antras et al., 2015).

Our findings also relate to prior work studying the dramatic rise in leverage in the 2000s and its consequences. Mian and Sufi (2009) and Mian and Sufi (2011) show that the advent of securitization allowed low-income or subprime borrowers to take on more mortgage debt. Subsequent work has has showed how the outward shift in credit supply fueled the increase in debt. Adelino et al. (2016b) and Adelino et al. (2016a) present evidence consistent with an expectations-based view where both home buyers and lenders were buying into increasing housing values and defaulted once prices dropped. We document that part of the rise in credit from 2000 to 2007 in regions with exposure to trade is the consequence of higher credit demand associated with adverse labor market shocks. Our findings provide an illustration

[3]Yet another interpretation is that affected households lever up to invest in human or physical capital in response to the shock, rather than to smooth consumption.

for the idea in Rajan (2011) and Kumhof et al. (2015) that the rise in inequality is a long-run determinant of leverage.[4] We also find our effects to be stronger where house prices appreciated the most, namely, where the relaxation of households' borrowing constraints made it easier for them to lever up (Mian and Sufi, 2011; Cooper, 2013; Chen et al., 2013). Finally we relate to early work on the role of consumption smoothing motives for mortgage refinancing and home equity extraction as in Hurst and Stafford (2004).

Another contribution of this paper is the estimation of the response of household leverage decisions to negative income or employment shocks such as those triggered by import competition. A number of recent studies have focused on the effect of credit availability on labor supply[5] and demand.[6] We consider the other direction of the relationship, namely, how households use their balance sheet to insure against labor income shocks. A few studies have studied the response to incomes shocks of credit card debt,[7] or automobile debt[8]. We analyze the response to a large shock to U.S. local labor markets and find heterogeneous responses across debt types.

In the remainder of the paper, we discuss our empirical strategy (Section 2), we present the results (Section 3) and discuss their interpretation (Section 4). Section 5 concludes.

# 2 Data and Empirical Strategy

## 2.1 Household debt

To study household leverage decisions, we use data from the Federal Reserve Bank of New York's Consumer Credit Panel/Equifax Data (CCP), an anonymized nationally representative sample of five percent all individuals with a credit record and a valid Social Security

[4] Coibion et al. (2014) measure inequality directly and find that it has a negative effect on the availability of credit.

[5] See for instance Benmelech et al. (2011), Chodorow-Reich (2014), or Barrot and Nanda (2016).

[6] See for instance Mondragon (2014) Ganong and Noel (2015), Donaldson et al. (2016), Cohen-Cole et al. (2016), Bos et al. (2016), or Bernstein (2016).

[7] See for instance Gross and Souleles (2002), Agarwal et al. (2007), or Agarwal and Qian (2014).

[8] See for instance Aaronson et al. (2012).

number.[9] The CCP tracks individuals over time at a quarterly frequency and collects data on their debt holdings, payment history, credit scores and geographic location. Debt holdings are broken down into mortgages, junior liens such as home equity lines of credit, auto loans, credit card debt, as well as other types of loans.[10]

There are two main limitations with our dataset. First, the CCP includes limited demographic information on each individual: age, credit score and zip code. We therefore compute a variety of demographic controls at the zip code level from the 2000 Census and the IRS to proxy for individual demographic characteristics. In addition, we obtain county-level house price indices from CoreLogic and unemployment data from the Bureau of Labor and Statistics (BLS). Second, the CCP does not allow us to directly measure home equity extraction and thus capture the propensity of individuals to borrow against the value of their home. Given our hypothesis that certain households levered up as a response to labor income shocks, this is where we would expect the effect to be the largest. Instead, we use the methodology of Bhutta and Keys (2016) which captures equity extractions including, but not necessarily limited to, home equity line of credit (HELOC) or second liens.

To complement the measure of equity extraction from Bhutta and Keys (2016), we use data from the Home Mortgage Disclosure Act (HMDA), which requires mortgage lenders to report mortgage applications and originations. The benefit of the HMDA data is a large coverage of over 90% of all mortgages. Moreover for each individual application, HMDA collects the location, the loan amount, the loan type (refinancing or purchase) and whether the loan was ultimately approved or denied by the lender.

We also use the Panel Study of Income Dynamics (PSID), which allows us to trace out the effect of household income to their debt level. Estimating the link between the exposure of households to import competition, debt and income requires a longitudinal dataset with informations on occupation, income, and debt. The PSID provides the necessary

[9] See Lee and van der Klaauw (2010), for a description of the CCP data.

[10] Due to inconsistent collection of student debt data over the period of interest, we exclude student debt from our analysis.

data starting with the sample year 1999. The PSID has collected information on a sample of 5000 individuals since 1968, but it is biannual since 1999. We use the PSID Core Sample and use the procedure of Blundell et al. (2008) to filter the data.

Finally, to capture the change in mortgages due to new house purchases we use the Building Permits Survey (BPS) from the Census. The survey provides data on the number of new housing units authorized by building permits at an annual frequency by counties.

## 2.2 Exposure to import competition

This subsection presents our proxy for industry exposure to import competition based on shipping costs. We provide evidence that shipping costs are a strong predictor of the increase in Chinese imports to the U.S. across industries in the 2000s, as well as of the associated drop in domestic output and employment. We then detail our procedure to aggregate SC at the commuting zone level in order to measure regional exposure to import competition. Finally, we examine potential threats to our identification strategy.

**Shipping costs** — To capture exposure to import competition, we build on prior work (Bernard et al., 2006b; Barrot et al., 2016) and use industry-level shipping costs (SC). More precisely, we exploit product-level U.S. import data and compute the various costs associated with shipments, called Cost-Insurance-Freight, as a percentage of the price paid by the importer. We obtain these data at the six-digit NAICS codes level from from Peter Schott's website for 1989 to 1999. We argue that SC is a structural characteristic rooted in the nature of the output produced by any given industry.[11] According to Hummels (2007), SC depends on the weight-to-value ratio: the mark-up is larger for goods that are heavy relative to their

[11]The main limitation of SC is that it does not take into account unobserved shipping costs – for instance time to ship (Hummels and Schaur, 2013) or information barriers and contract enforcement costs, holding costs for the goods in transit, inventory costs due to buffering the variability of delivery dates, or preparation costs associated with shipment size (Anderson and van Wincoop, 2004). Unless these costs are correlated in systematic ways with SC, they are likely to introduce noise in our measure of the sectoral exposure to displacement risk, which should generate an attenuation bias in our results. For recent contributions to the literature that adopts a structural approach to measure trade costs and estimate their effect on trade, see for instance Hummels and Skiba (2004), Das et al. (2007), or Irarrazabal et al. (2013).

value, because they are more expensive to transport.[12]

We also note that shipping costs are a direct empirical counterpart to the trade costs grounded in gravity-type equations that hold across a large set of trade models (see Arkolakis et al. (2014)). In Appendix A, we show theoretically how shipping costs map into differential domestic industry exposure to foreign productivity shocks. For a given rise in aggregate productivity in a foreign country, its exports to the domestic country are more responsive – higher trade elasticity – in low SC than in high SC industries. This differential exposure translates into larger impact of foreign productivity on local output, especially local labor markets.

We check that SC measured prior to 1999 effectively predict exposure to import penetration in the 2000s. We start by analyzing import penetration in the U.S. over this period. Figure 3 illustrates the change in U.S. import penetration (Panel A) and net import penetration (Panel B), measured respectively as imports and imports minus exports divided by domestic expenditures where expenditures are the sum of domestic shipments plus imports less exports. Import and net import penetration increase by approximately 3.5 percentage points between 2000 and 2007. Decomposing this increase across countries of origin, we find that high income countries' contribution to this change is virtually zero. The deepening of the trade deficit is entirely driven by the contribution of low income countries, itself dominated by the contribution of China.

There are a variety of reasons rooted in Chinese history that explain the surge in exports in the 2000s. Zhu (2012) shows that the country's annual aggregate productivity growth was 2.45% between 1998 and 1998 and jumped up to 4.68% in between 1998 and 2007 – with productivity growth in manufacturing reaching 13.4% per year. This acceleration can be tied to a series of political decisions in the late nineties that stimulated the exit of least productive incumbents. In 1995, the Chinese government reduced its commitment to stable employment in the State sector, allowing the least efficient state-owned firms to exit. In 1997, the 15th

[12]Our findings are quantitatively and qualitatively similar if we use weight-to-value ratios rather than our measure of shipping costs

Congress of the Chinese Communist party legalized the development of private enterprises. Finally, the lead-up to China's accession to WTO in 2001 was associated to tariff cuts and a broadening trade rights.

Given that China accounts for virtually all of U.S. trade deficit, we focus on the effect of shipping costs on Chinese imports. We check whether industries with lower SC were indeed those that experienced the highest penetration by Chinese imports. To do so, we sort manufacturing industries in tertiles of shipping costs measured prior to 1999. We then compute, in each year, the contribution of Chinese imports and net imports to total U.S. imports and net imports by SC tertiles. We present the timeseries in Figure 4. Before 2000, the growth in Chinese import share is similar across SC tertiles. However after 2000 the contribution of low SC imports from China to U.S. imports and net imports shoots up. This demonstrates that virtually all of the acceleration of Chinese import penetration happened in low SC industries.

We then turn to a regression setting to confirm that SC predict the increase in import penetration even after controlling for sector-level characteristics. In Table 2, we consider the change in Chinese imports, exports and net imports, all scaled by U.S. total expenditures, between 2000 and 2007. We regress each of these ratios on shipping costs as well as industry characteristics measured in 1999 including employment, value added, shipments, total factor productivity (TFP), TFP growth, and the lag change in Chinese imports, exports and net imports over the prior seven years. We find that SC, measured in 1998, strongly predict the increase in Chinese import penetration and net import penetration. More precisely, a one standard deviation in SC leads to a 1 percentage point increase in net import penetration from China between 2000 and 2007 – the average is 4% over the same period. Note that these effects are obtained after controlling for import and net import growth from 1991 to 1999. If SC were spuriously correlated with declining industries, these control variables would absorb most of the effect. We find similar effects when we consider import penetration from all countries, rather than Chinese import penetration alone, (Appendix Table A.2). This

does not come as a surprise, given our finding in Figure 3 that China drives most of import penetration growth over the period.

If low SC industries are subject to greater import competition, one would expect the domestic output and employment of such industries to drop over the period. In Table 3, we consider the effect of SC on output, value added and employment growth between 2000 and 2007. Consistent with the previous set of results, we find that a one standard deviation increase in SC is associated with a 12% drop in output and value added, and a 6% drop in employment. Taken together, these results confirm that shipping cost are a valid proxy for industry exposure to import competition, and that they predict displacement of domestic output and labor in the 2000s.

**Commuting zone exposure** — Throughout the paper, we consider Commuting Zones (CZs) as the geographic unit for analysis, following Autor and Dorn (2013). CZs represent labor market clusters of U.S. counties and cover the entire land area of the U.S.[13] The impact of import competition on households is best captured at a level that is neither too coarse (MSA level) nor too fine (Zip code or county level). Hence, CZs are well suited for our analysis because they represent a labor market unit.

To measure any given CZ's exposure to import competition, we exploit its historical industry composition measured prior to 1999, using employment data from the Census' County Business Patterns (CBP). Consider region $J$: its industry composition expressed in terms of industry labor shares is $\{\ell_J^h\}_h$. To assess the impact of the rise of import penetration across regions, we interact SC in industry $h$, $\theta_h$, with industry composition in the region, expressed in labor share:

$$\text{SC}_J = \sum_h \ell_J^h \theta_h$$

[13]See David Dorn's website for more details on CZs definition and construction: ddorn.net/data.htm. CZs are aggregated as clusters of US counties that are characterized by strong within-cluster and weak between-cluster commuting ties.

We find substantial heterogeneity in employment-weighted shipping costs across CZs. In Table A.1, we show that the average exposure to SC is 5.05% across CZs, with a 10th percentile and a 90th percentile of 3.58% and 6.66% respectively.

Our baseline specification takes the form of the following cross-sectional regression at the CZ or individual level:

$$X_J = \beta \ \mathrm{SC}_J + \delta' \mathbf{X}_J + u_J, \tag{2.1}$$

where $X_J$ is the 2000-07 growth in the outcome variable of interest and $\mathbf{X}$ a vector of controls. The coefficient of interest, $\beta$, measures the effect of SC exposure on the outcome variable of interest.

One concern with this approach is that $\mathrm{SC}_J$ is computed based on manufacturing industries only, which represents 20% of total CZ employment on average. One might expect the effect of SC on a given CZ's aggregate outcomes to differ if manufacturing is a large share of total CZ employment. If anything, this should bias our estimates downwards.

## 2.3 Identification

Our empirical strategy rests on the identifying assumption that CZ-level exposure to high and low SC industries is orthogonal to local demand shocks for imports or local productivity shocks, and that exposure only affects household debt through increased import competition and its adverse effects on local labor markets. Our identifying assumption is therefore that U.S. industry-level import demand or productivity shocks are orthogonal to shipping costs.

A first identification threat is the fact that SC might be correlated with industry-level productivity shocks in the U.S. Suppose, for instance, that some U.S. industries are in decline irrespective of the entry of China. Workers in these industries might be more likely to become unemployed, and might also take on more debt to sustain their consumption. Import penetration might also increase in these declining industries without being the main

force driving unemployment and household leverage patterns. If for some reasons SC is lower in these declining industries, the relationship we emphasize in this paper might be spurious. We feel that this is unlikely to be the case for the following reason. If industries with low SC indeed experience a negative productivity shock over the period, then we would expect them to export less. In column (3) and (4) of Table 2, we find that U.S. exports rise relatively more in low SC than in high SC industries, which is inconsistent with the hypothetical correlation of SC with negative industry-level productivity shocks in the U.S. In addition, productivity growth of U.S. manufacturing industries is not correlated with SC (see columns (7-8) of Table 3); to the contrary the productivity growth tends to decline with SC over the sample period.

A related concern is that the U.S. might have experienced a negative aggregate productivity shock over this period. This hypothesis does not invalidate our econometric methodology. It does however affect the interpretation of our results as coming from higher productivity in China (push factor), or to lower productivity in the U.S. (pull factor). The differential pass-through across industries with high and low SC leads to a similar increase in imports in low SC industries in both cases. The fact that we only see an increase in net imports from China, and that this coincides with a surge in Chinese productivity growth largely mitigates this concern.

One may also be worried by reverse causality, namely, by the fact that the increase in household debt might have causally affected labor markets outcomes. Recent studies link individual leverage to the ease of finding a new job for an unemployed worker. Cohen-Cole et al. (2016), for instance, argues that access to debt allows unemployed workers to search for a job longer. Bos et al. (2016) find that worse credit scores reduce the likelihood of finding a job, and Bernstein (2016) shows that debt overhang leads to a reduction in labor supply. Hence, the causality might run from household debt to unemployment. However, none of these stories can easily account for the fact that areas where household debt increased in the first place are precisely those exposed to low SC industries that experienced high import

penetration.

A related reverse causality story might be that rising house prices spurred both household demand for credit (Mian and Sufi (2011)), as well as corporate investments (Chaney et al. (2012)). Greater local corporate demand for intermediate goods might in turn increase import penetration. Our findings would be consistent with this view if low SC areas are also areas where home prices appreciated the most, which is not what we find empirically. Moreover, this channel unambiguously predicts that employment should go up where credit demand increases. Instead, we find that unemployment rises more in areas with higher debt growth.

# 3 Results

As outlined earlier, we investigate the role of import competition for household debt over the period from 1999 to 2007. We start looking at the effect at the commuting zone level on both employment variables as in Autor et al. (2013), our first stage, and subsequently at debt measures, our second stage. Then we zoom-in looking directly at individual debt using our measure of exposure to import penetration.

## 3.1 Labor markets

We start presenting further evidence for the validity of our instrument and its first stage. In Table 3, columns (5-6), we found that employment growth was stronger in industries with low trade exposure. We turn our focus to Commuting Zones and after mapping shipping costs into the geographical areas we reproduce the specification:

$$\Delta L_J = \beta \ \mathrm{SC}_J + \delta' \mathbf{X}_J + u_J, \tag{3.1}$$

This first stage regression is similar to the one used in Autor et al. (2013). $\Delta L_J$ is the 2000-2007 change in a CZ level employment variable and $\mathbf{X}$ a vector of CZ controls. Regressions

are weighted by CZ adult population. Table 4 presents the results of these cross-sectional regressions where we consider the log change in the number of unemployed people (Panel A) and the change in the unemployment rate (Panel B). We find that unemployment increases in regions with low SC, that is regions with higher import penetration, relative to less exposed regions. A one standard deviation increase in SC is associated with a 7% lower growth in the number of unemployed people, and a 0.2 percentage points lower increase in unemployment, which amounts to 20% of the cross-sectional standard deviation in the change in unemployment rates over the period. When we include house price appreciation in our specification, we find it to be associated with lower unemployment growth. This is consistent with the finding in Charles et al. (2016) that housing booms had a positive effect on employment. The effect of house price appreciation is of the same order of magnitude as the effect of SC.

In Table 5, we consider the effect of exposure to import competition on household income growth. We consider successively the average (Panel A) and median (Panel B) household income per working-age adult and regress it on our proxy for import competition, at the commuting zone level. Average and median household income are obtained from Autor et al. (2013) and defined as the sum of individual incomes of all working-age household members (age 16-64), divided by the number of household members of that age group. Total income comprises wage and salary income, business and investment income, social security and welfare income, and income from other non-specified sources. We find that a one standard deviation in SC is associated with a 1.5% to 3% higher growth in average income. The magnitude of the effect on median income is similar.

## 3.2 Household debt at the commuting zone level

We now turn to the center of our analysis of the sensitivity of household debt growth to import competition. We estimate a similar specification as (3.1) with our measures of debt

as dependent variables:

$$\Delta D_J = \beta \text{ SC}_J + \delta' \mathbf{X}_J + u_J, \tag{3.2}$$

We first consider the log change in total debt in Panel A of Table 6. Across specifications, the coefficients are highly statistically significant. They are little affected by the introduction of controls. A one standard deviation increase in SC is associated with a 5.7% lower debt growth over the period, which amounts to 30% of the cross-sectional standard deviation of the log change in total debt over the sample period. A concern with debt growth is that it could be mechanically driven by increases in income. This is the reason why we consider the effect of SC on changes in debt-to-income ratios in Panel B. Here again, we find the coefficients to be statistically and economically significant, with a one standard deviation in SC explaining 25% of the cross-sectional variation in the change in DTI ratios. We find similar results in Appendix Table A.3 where we use the weight-to-value ratio instead of shipping costs to proxy for commuting zone exposure to import competition.

By means of comparison, we also introduce house price appreciation between 2000 and 2007 as a dependent variable in the regression. The increase in house prices has been found by Mian and Sufi (2011) to be a major driver of households refinancing and leverage decision. House price appreciation is positively associated with both debt growth and DTI growth, with an economic magnitude that is equivalent the effect of import competition: a one standard deviation in house price appreciation explains approximately 30% of the variation in debt growth.

We then split the analysis by type of debt. We consider three main categories of debt, mortgage, auto loans and credit cards. We also subdivide mortgage debt into mortgage loans and home equity lines of credit (HELOC). We present the results in Table 7. In 2000, the average household balance sheet was composed of approximately 78% mortgage debt, 7% automobile debt, 8% credit card debt, and 7% other debt. In columns (1) to (3), we find

that mortgage debt growth is more sensitive to SC exposure than other categories. The effect is especially pronounced for HELOC. Auto debt (column 4) does not vary much with SC across commuting zones. One possible reason for this is that automobile debt captures durable consumption (see Di Maggio et al. (2014)). Regions with high exposure to import competition are unlikely to raise additional debt to fund new consumption. Finally, we find an increase in credit card debt in regions with higher exposure to trade. Given the importance of mortgages to household balance sheets, we conclude that most of the cross-sectional variation in overall debt growth is explained by differences in mortgage borrowing.

Taken together, these results indicate that the increased penetration by Chinese imports over the 2000-2007 period significantly affected household debt, primarily via mortgages. This first set of results raise questions about the channels through which the rise of import penetration has lead to greater debt level. To tease out between different mechanisms linking both outcomes, we zoom-in at the individual level using the Consumer Credit Panel/Equifax Data.

## 3.3 Household debt at the individual level

### 3.3.1 Consumer credit panel

The CCP is instrumental to our study of the link between import penetration and the rise in household leverage for several reasons. A first reason is that our commuting zone level results could be explained by migrations, for instance if individuals with higher debt systematically leave high SC areas. We can rule this concern out by running our tests at the individual level. Second, we have greater detail on the source of the increase in debt. Do households extract equity out of their house? Answering such questions will help separate demand-driven theories for the increase in household debt from supply-driven ones. Further, the granularity of the CCP allows us to consider heterogeneity in households response to import competition. Last, the richness of the dataset allows for tighter controls. In particular, we can control for individuals' age and credit score, for State fixed effects and for other demographics at the

zip code level. The CCP also allows us to identify where consumers live, as opposed to the broader commuting zone measures for the areas in which they work, allowing us to control for house prices at the most disaggregated level using data from CoreLogic.[14] This allows us to more carefully rule out the hypothesis that the rise in household leverage is explained by local house price appreciation.

We merge the CCP with our measures of trade exposure using industry composition at the CZ level. Hence our regressions consider the effect of exposures to import competition in the cross-section of CZ on debt growth at the individual level. We run the following specification.

$$\Delta D_{i,J} = \beta \ \mathrm{SC}_J + \delta' \mathbf{X}_J + \gamma' \mathbf{Z}_i + + u_{i,J}, \tag{3.3}$$

where $\Delta D_{i,J}$ is the 2000-07 growth in measures of household credit over the sample period for an individual $i$ in CZ $J$. Given the granularity of the CCP, we consider a new set of left-hand side variables rather than just the level of aggregate debt at the CZ, or the average debt-to-income. $X_i$ and $Z_j$ are vectors of individual and CZ level covariates respectively.[15] We restrict the sample to individuals who do not move from the CZ where they lived in 2000. This ensures that our findings at the CZ level are not driven by migration patterns.

We present the results in Table 8. In Panel A, we consider the change in the log of total debt plus one. Across specifications, the coefficient on SC is negative and significant, and very close to the results we found at the individual level. The increase in debt is significantly higher in CZ where industries have higher exposure to trade. Although the introduction of individual level controls for age and credit score attenuates the coefficient slightly, the results remain significant. Similarly, we find in Panel B that individuals in commuting zones with low exposure to import competition experience a lower growth in their debt-to-income ratio. As we did in Table 6, we introduce county-level house price appreciation to explain

[14] We use the most granular available data from CoreLogic from zipcode to state level.

[15] Some controls, like house prices, are county level variables. Income is defined at the ZIP code level. Formally they are included in $\mathbf{Z}_i$.

the rise in debt. Unsurprisingly, we find that local house prices are associated with higher debt growth, whichever way it is measured.

We next analyze the effect of import competition on debt growth by debt type. In Panel A of Table 9, we consider the effect of SC on the extensive margin, namely the propensity to take on debt. We run logistic regressions where the sample is restricted to individuals with zero debt as of 2000Q4 and where the dependent variable is an indicator for having a positive debt balance (within type) in 2007Q4. SC have little or no effect on total debt, a negative effect on mortgage debt and a positive effect on other debts. In Panel B, we separately study the intensive margin of the effect of SC for each type of debt, namely, the effect for individuals that hold debt both in 2000 and 2007. We find that even for those, exposure to import competition has a positive effect on total and mortgage debt growth, and a negative effect on auto debt, which is one would expect if auto debt is a proxy for durable consumption.

To further interpret our results we explore the intensity of the treatment across groups of individuals. We separate our sample across several age and risk (credit score) categories in the group of four Figures 6. In Figure 6a and 6c we reproduce the regression specification from Table 8 for ten different age groups both for total debt and debt-to-income.[16] We focus on the regression coefficient on SC across groups and we find it to U-shaped across the age distribution. The middle-age population seems to be the most affected of all age groups. In Figure 6b and 6d we reproduce the specification across ten risk categories. We estimate that most of the negative coefficients are with individuals in the upper tail credit scores, with FICO scores of 700 and above.

### 3.3.2 Panel study of income dynamics

While the sample size is much smaller compared to the CCP the PSID allows us to track households by occupation and to trace out the effect of import competition directly on

[16]Due to the sample size we reduce the number of credit bins (age bins) when we look at particular age (credit) categories.

income, and subsequently on the debt of the household. In Table 10, we consider the effect of SC based on households' occupation in the PSID. In panel A, we first run a regression of employment status and income on SC. We find results similar to the first part of our analysis, where employment and labor income drop for households that are in occupations more exposed to import competition. We confirm our previous results for debt and debt-to-income ratios, as both quantities rise for the most exposed areas. In panel B, we use the detail information from the PSID about the source of household debt to decompose the effect. Most of the increase in debt is driven by mortgage and to a smaller extent credit cards. There are no effects on auto loans.

In Table 11 we run an OLS specification of debt on SC (reduced form) and on income. We then a simple endogenous regression of debt growth on income growth and find a positive coefficient. In column (3) we use SC as an instrument for income and estimate the instrumental variable specification of debt regressed on instrumented income. We find a negative regression coefficients, contrary to the OLS coefficient. This suggests that the endogenity of income and debt growth goes against our story that debt is used to smooth negative income shocks. In addition, this regression results directly links a drop in income from import competition to an increase in debt. We extend the specification to debt-to-income in columns (4) to (6), to estimate the effect of income of the debt-to-income ratio and find again a negative coefficient in the instrumental variable specification.

## 3.4 Home equity extraction

We examine the role of home equity extraction in explaining the rise in household debt due to import competition. We follow Bhutta and Keys (2016) and construct a measure of home equity extraction each year. We present the result in Table 12. We consider two variables: an extraction flag that is an indicator for equity extraction during the sample period, and the value of the equity extracted. We find there is more equity extraction in regions exposed to import competition. The point estimates are statistically and economically significant

and indicate that a one standard deviation in SC is associated with a 0.8% lower propensity to extract home equity, and a 6% lower value of home equity extraction. Bhutta and Keys (2016) further show that equity extraction is concentrated in regions with high house price appreciation, where households "cash-in" the capital gains of their investment. We therefore split the sample into areas with high versus low house price appreciation instrumented with the elasticity of housing supply obtained from Albert Saiz, to see where equity extraction comes from. We only find a significant relationship between SC and the propensity to extract and the amount of home equity extracted in CZs with high house appreciations.

To complement our direct findings using the CCP, we examine refinancing activity from a different perspective using the HMDA data. We present our results in Table 13. We estimate the change in demand for refinancing loans to demand for all other types of loans across CZ. We find across specifications that the demand for refinancing was higher in areas with larger exposure (columns (3) and (4)). The surge in demand for refinancing contrasts with demand for home purchases, which shows no significant differences across areas (columns (1) and (2)).

These results suggest that the interaction of rising house prices in the first half of the 2000s and the rise of import competition during that same period led to a sharp increase in household debt through home equity extraction. We compare our results to current theories of consumption choice in Section 4 to see how they match with what we document empirically.

### 3.5 Delinquencies, foreclosure and credit scores

We now move on to the consequences of the credit expansion triggered by import competition. We investigate individual level outcomes throughout as well as after the crisis such as mortgage delinquencies, foreclosure and changes in credit scores. In Table 14, we present the results of this analysis. We measure credit scores, delinquencies, and foreclosure starting in 2001 to the onset of the Great Recession in 2007 and during the Great Recession from 2008 to 2011. We first investigate the effects on individuals credit scores (columns (1) and

(2)) and whether credit scores had fallen by a large amount (columns (3) and (4)). We find exposure to import competition had a negative impact on individuals' credit score during the crisis.

We then find that CZ with higher exposure to import competition experience higher delinquencies and bankruptcies, especially during the crisis. A one standard deviation decrease in SC is indeed associated with a .02% and .09% higher propensity of mortgage delinquency and foreclosure respectively, before the crisis (columns (5) and (7)). During the Great Recession, the effects go up to .21% and .27% respectively (columns (6) and (8)).

Finally we investigate the sources of issues based on the local house price appreciation instrumented with the elasticity of housing supply obtained from Albert Saiz, over the pre-crisis period from 2000 to 2007. We estimate our specification on each subsample for the later period from 2008 to 2011. We find that not only more exposed areas experienced worst outcomes during the crisis, but the intensity was higher in areas that had experienced a greater rate of house prices increase. Credit scores in low house price appreciation areas did not decline significantly due to exposure to import competition, however it did decline a lot in areas that also experienced house prices increase.

Although suggestive, these findings are consistent with the view according to which households might not necessarily have borrowed optimally in response to their exposure to import competition, a topic that we discuss in the next section.

## 3.6 Credit supply

Our purpose is to estimate a rise in household debt that originates from this demand channel. One may be concerned that we might be picking up higher credit supply rather than credit demand, if, for instance, credit supply loosens significantly more in low SC areas. While we cannot formally reject this hypothesis, we investigate variations in outcomes that we expect to be driven by an increase in the supply of credit. First we focus on the rate of denials in mortgage applications from HMDA in Table A.5. We find that both the number as well as

the total value of denials has grown less in the areas with a smaller exposure. The findings from this regression does not dismiss geographical variations in the supply of credit, however it is at odds with an increase in the supply of credit in the low SC areas, without a larger rise in the demand for credit in these areas. We pursue in this direction by gathering information on new housing from the Building Permit Survey. We find (see Table A.6) that there was no significant variation in the growth of new permits in more exposed areas. Our point estimates suggest a relative increase in new permits in areas with higher SC. This evidence on the direction of the growth of new residential housing indicates our findings are unlikely to come from CZ-specific shocks to the supply of credit. Finally we also inspect the supply side of the economy and we do not find any increase in corporate loans in exposed areas over the sample period (see Appendix Table A.7). Overall, the evidence seems inconsistent with the idea that low SC areas experience a positive credit supply shock across all debt types.

## 3.7 Robustness

Our measure of heterogeneity in trade exposure is an alternative to Autor et al. (2013) and Acemoglu et al. (2016), who instrument for Chinese import penetration into the U.S. with Chinese import penetration into other developed countries. There, the identification assumption is that U.S. industry-level import demand or productivity shocks are uncorrelated with those of other developed countries. Ours is that these shocks are orthogonal to shipping costs. For the purpose of the analysis of household debt, our measure is somewhat more likely to satisfy the exclusion restriction.

To further assess the robustness of our findings we estimate alternate specifications in Table A.10. First we consider different measures of exposure to import competition and their effects on debt and the debt-to-income ratio in Table A.10. We explore the effects of Chinese import penetration directly using the Acemoglu et al. (2016) instrument for the change in exposure at the commuting zone level to Chinese imports, a measure of industry trade costs estimated from industry level gravity equations and the NTR-gap from Pierce and Schott

(2012), as well as the share of textile in total employment. The results confirm our analysis and show that overall across measures of exposure to import competition, household debt does increase in areas that are more exposed.

We then run several variations of our main specification. First we introduce industry controls in our specification (column (5)). Then we reestimate SC exposure using solely Chinese imports, removing all other nations imports (column (6)). To assess if the results are driven by a spurious correlation between California and its computer industry (low SC), we further exclude both from the sample (columns (7) and (8)). We then control for a coastal regions and for regions where the house price boom was the largest, like California, Nevada, Florida,and Arizona (columns (9) and (10)). Finally we also include a total measure of trade costs adding industry level tariffs to SC (column (11)). We find no significant differences across these five specifications and relative to our baseline estimate, attesting of the robustness of our instrument.

# 4 Understanding the Channel

We next discuss the possible interpretations for our findings. Neoclassical consumption theory (Friedman (1957)) links income shocks and the aversion to intertemporal consumption fluctuations to the level of borrowing at the household level. Consumption only responds to permanent shifts in income and not to transitory ones. Borrowing being the mirror image of consumption, it responds to transient fluctuations and not to permanent ones. To illustrate this point we recall the simple formulation of the permanent income hypothesis with quadratic utility in Appendix B. If labor follows an AR(1) process of the form $y_{t+1} = \bar{y} + \rho(y_t - \bar{y}) + \varepsilon_{t+1}$, we show the changes in borrowing is given by:

$$b_{t+1} - b_t = -\frac{1-\rho}{1-\beta\rho}\left(y_t - \bar{y}\right), \tag{4.1}$$

where $\beta$ represents agents' subjective discount factor. Households increase their debt whenever their income falls below its average level, $\bar{y}$. The response of borrowing to labor income variations depends on the persistence of the labor income process. If shocks have no persistence ($\rho = 0$), debt responds one to one to deviations of labor income from its trend. When labor income is more persistent ($\rho \to 1$), the borrowing response is muted, going to zero in the limit.

The evidence presented in Artuç et al. (2010) or Autor et al. (2014) indicate that the impact of import competition on labor income varies across the workers distribution. More skilled workers are able to reallocate into different industries, while low-skilled workers, or workers with industry-specific capital are more permanently affected by import competition. Hence, in line with the PIH, it could be that households who increase borrowing the most are those that are indeed hit by a transitory shock, because they can easily find another job.

Alternatively, it could be that even workers that end up being permanently excluded from the labor market also borrow more in the first place, if they anticipate the shock to be temporary instead. There is evidence from other studies that households' consumption decisions do react to permanent shocks, in sharp contrast with PIH predictions. For instance, Pistaferri (2001) uses survey data to separate the permanent and transitory component of income; tracing out the response of savings to income shocks, he finds the marginal propensity to save out of permanent shocks to be significantly different from zero and to range between 16% and 20%. These results suggest the quadratic utility PIH model fails to fully characterize households behavior.

Several theories could account for households borrowing out of permanent negative income shocks, due to precautionary savings motives or ratchet effects in consumption. Carroll (2009) shows that in a standard consumption model with a precautionary motive for savings, households have a marginal propensity to consume out of permanent shocks that is strictly smaller than one – which translates into households borrowing out of permanent shocks to their income. Carroll (2000) investigates consumption decisions when consumers have util-

ity functions featuring habits. This class of preferences generate low marginal propensity to consume by inducing a stickiness in consumption choices. As a result, the optimal consumption response to a negative permanent income shock will be weaker, potentially leading to borrowing to finance this excess consumption.[17] Relatedly, Chetty and Szeidl (2016) show that households do not respond one to one to permanent shocks when they have "consumption commitments" , i.e., when they own goods such as housing that cannot be adjusted in response to fluctuations in income. The illiquidity of these goods creates excessive smoothness of consumption, leading to a dampened response of consumption to income shocks, permanent or transitory, and therefore to potentially higher borrowing.

# 5 Conclusion

We analyze the effect of import competition on household balance sheets from 2000 to 2007 using individual-level data on leverage and defaults. We exploit cross-regional variation in exposure to foreign import competition using industry level shipping costs and initial differences in regions' industry specialization. We confirm the adverse effect of import competition on local labor markets during this period and we show that household debt increased significantly in regions where manufacturing industries are more exposed to import competition. A one standard deviation increase in exposure to import competition explains 30% of the cross-regional variation in the growth in household leverage over the period.Our results highlight the distributive effects of globalization and their implications for household debt.

[17] In a similar vein, Bertrand and Morse (Forthcoming) look at the role of external habit on the consumption profile of households.

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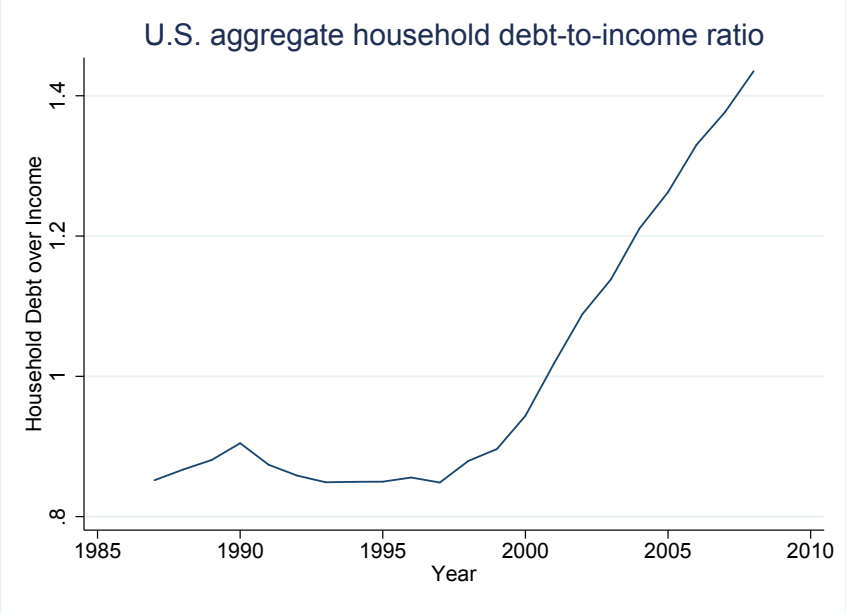
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# Figures

Panel A. Debt-to-income ratio




Panel B. Chinese imports

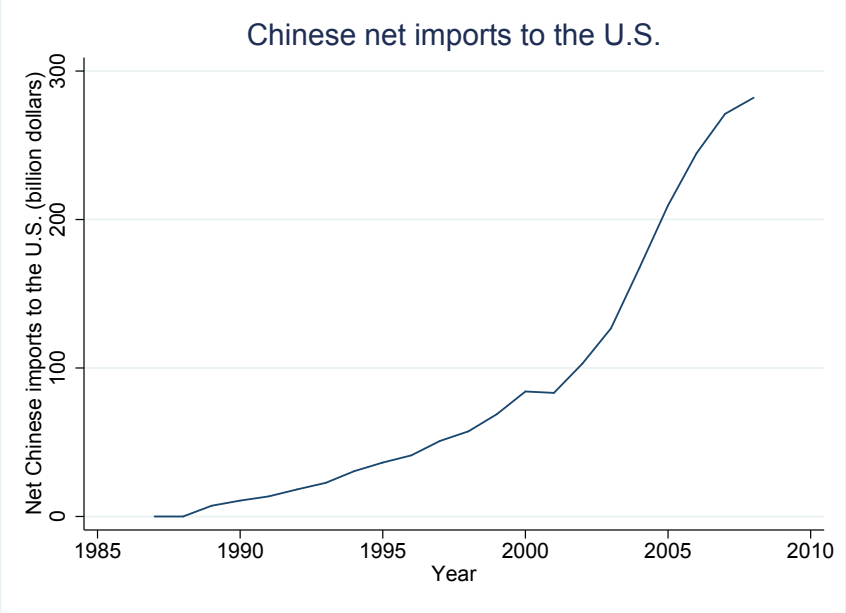
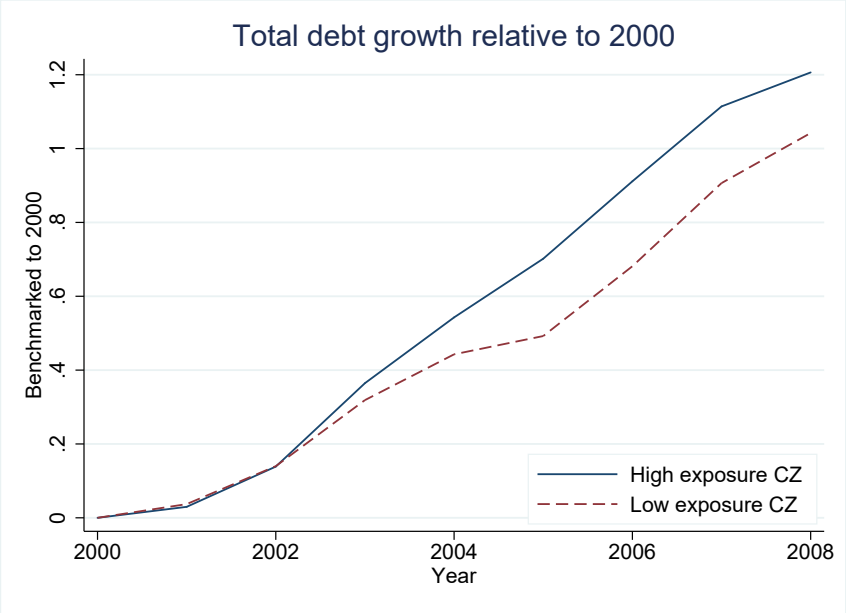



**Figure 1**

Aggregate U.S. Household Debt-to-Income Ratio and Chinese Net Imports to the U.S.

**Note:** This figure presents the time series of U.S. aggregate household debt-to-income ratio from 1987 to 2007 (panel A), and of the value of net Chinese imports over the same period (panel B).

Panel A. Total household debt




Panel B. Debt to income ratio

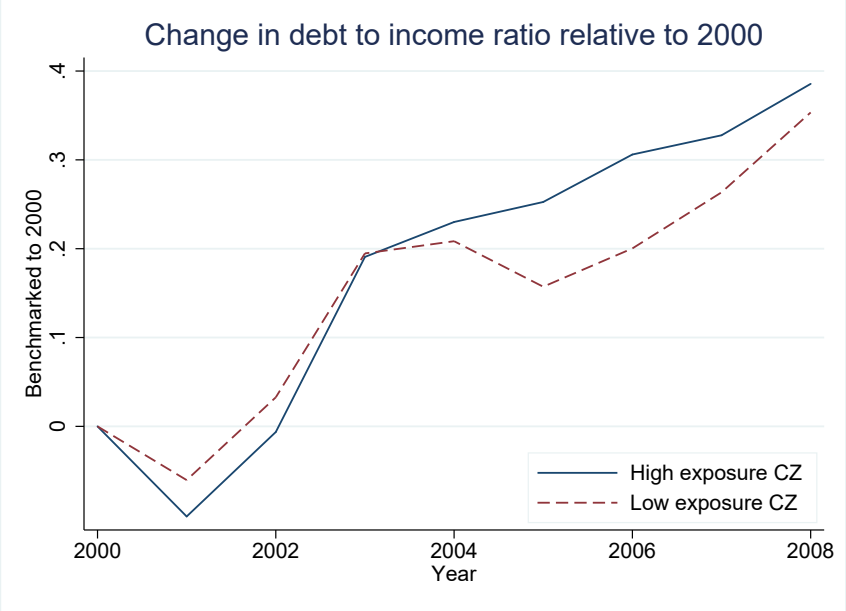
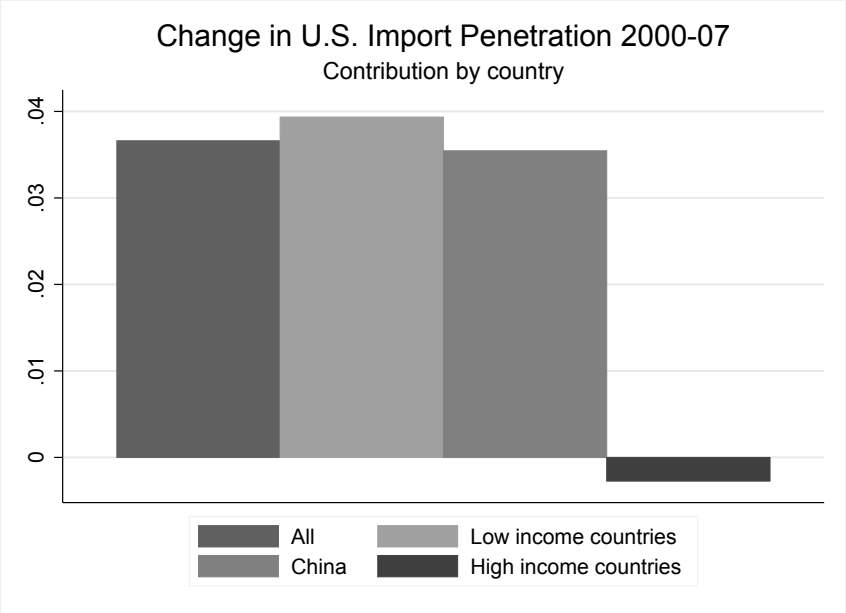



**Figure 2**

Household Debt Across High and Low Exposure Areas

**Note:** This figure presents the cumulative debt growth (panel A) and change in debt to income ratio (panel B) for Commuting Zones in the top (low exposure) and bottom (high exposure) quintiles of shipping costs measured prior to 1999.

Panel A. Contribution to imports




Panel B. Contribution to net imports

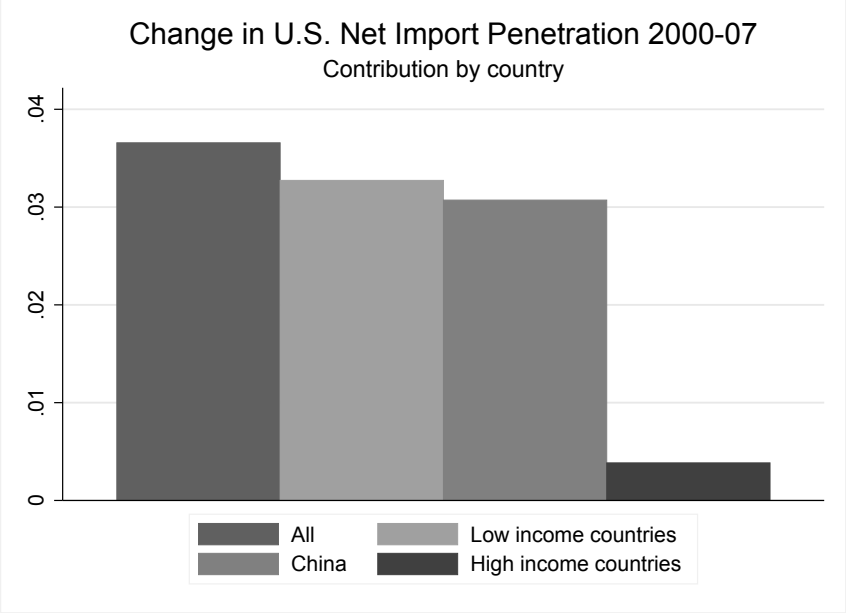
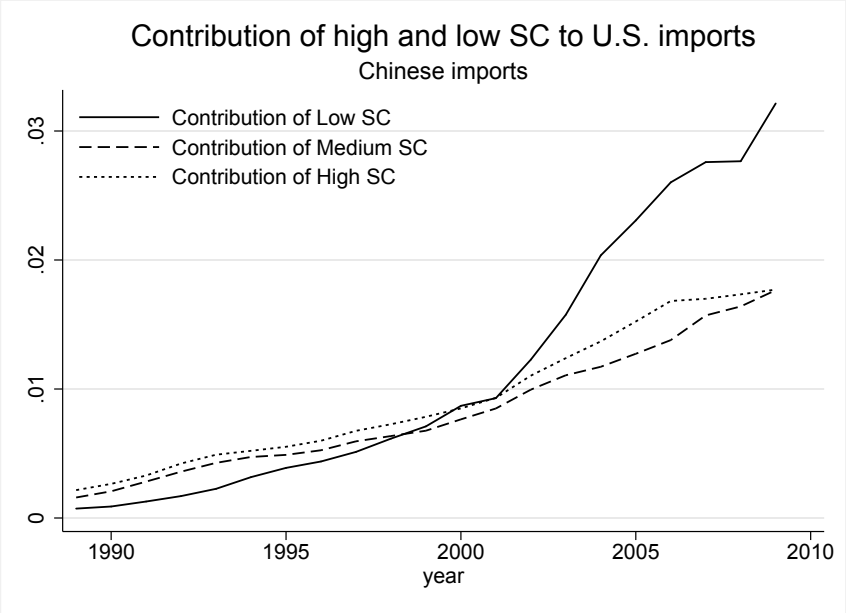



**Figure 3**

Contribution to U.S. Import and Net Import Penetration by Country

**Note:** This figure presents the change in U.S. import penetration (panel A) and net import penetration (panel B) from 2000 to 2007. Import penetration is measured as the ratio of imports to U.S. expenditures themselves measured as domestic shipments plus net imports. We decompose the change in import penetration by countries: low income countries (including China), China, and high income countries.

Panel A. Contribution to imports




Panel B. Contribution to net imports

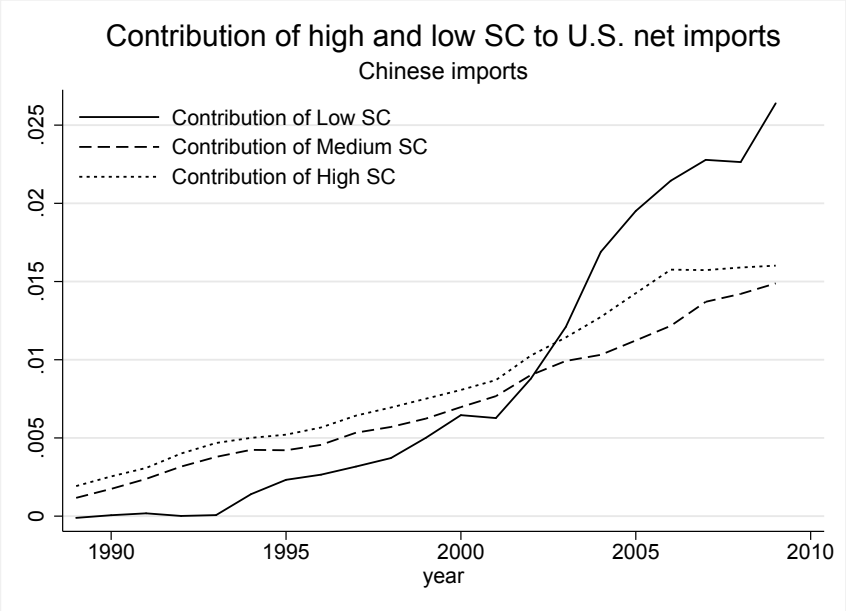



**Figure 4**

Contribution of High and Low SC to U.S. Net Imports from China

**Note:** This figure presents the contribution of high, medium, and low shipping costs industries to U.S. import penetration (panel A) and net import penetration (panel B) from China. The contribution to import penetration is defined as imports divided by total U.S. expenditures, themselves measured as domestic shipments plus net imports.

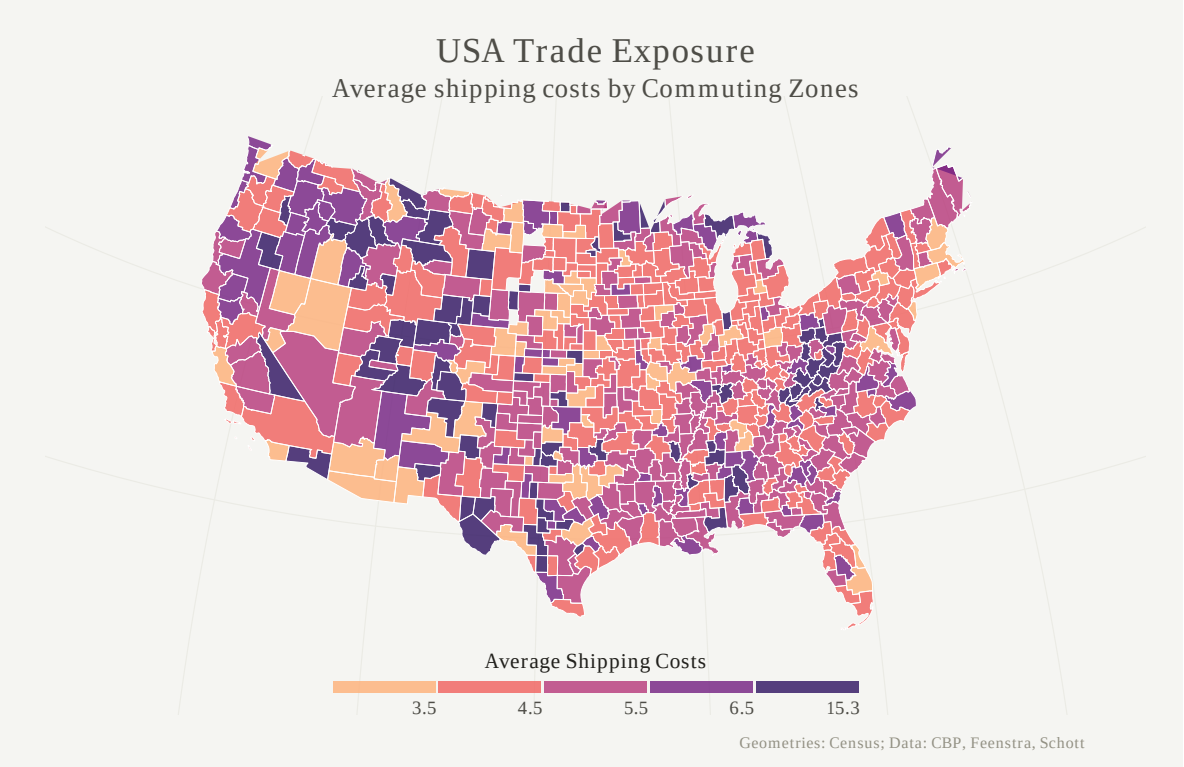
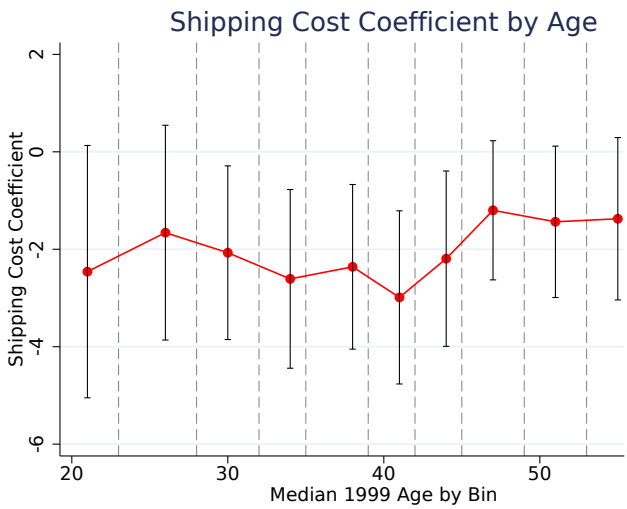


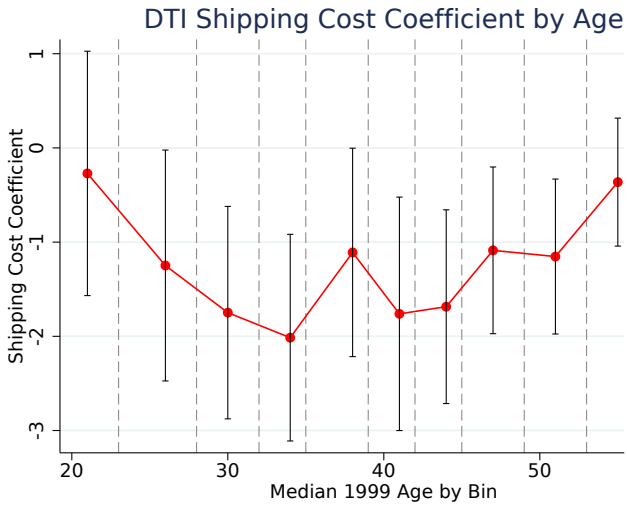

**Figure 5**
Average Shipping Costs by Commuting Zones
**Note:** This figure presents the distribution of shipping costs across commuting zones.



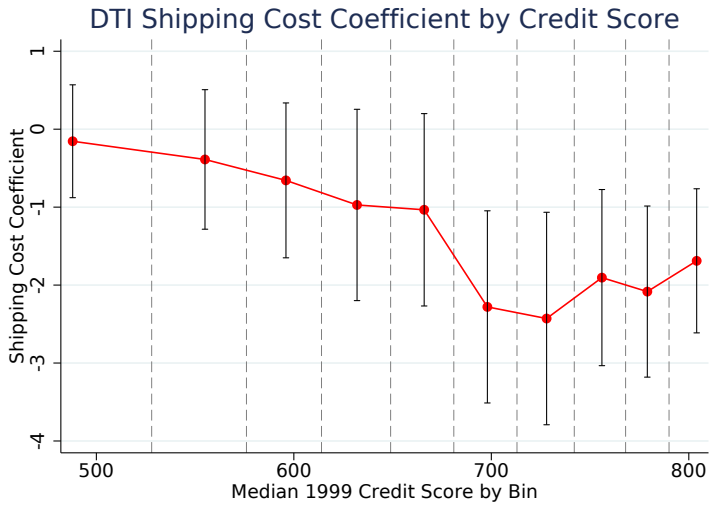

**(a)** Debt: Shipping Costs Coefficient by Age




**(b)** Debt: Shipping Costs Coefficient by Risk




**(c)** DTI: Shipping Costs Coefficient by Age




**(d)** DTI: Shipping Costs Coefficient by Risk

**Figure 6**
Coefficients by Age and Risk Categories

# Tables

**Table 1**
Summary Statistics

| | Observations | Mean | Median | Std. dev. |
|---|---|---|---|---|
| **6-digit industry level** | | | | |
| $\Delta_{2000-2007}$ Imports (China) | 384 | 0.054 | 0.019 | 0.082 |
| $\Delta_{2000-2007}$ Exports (China) | 384 | 0.006 | 0.001 | 0.013 |
| $\Delta_{2000-2007}$ Net imports (China) | 384 | 0.049 | 0.011 | 0.084 |
| $\Delta_{2000-2007}$ Log shipments | 385 | 0.062 | 0.131 | 0.556 |
| $\Delta_{2000-2007}$ Log value added | 385 | 0.049 | 0.088 | 0.571 |
| $\Delta_{2000-2007}$ Log employment | 385 | -0.306 | -0.237 | 0.446 |
| $\Delta_{2000-2007}$ TFP | 385 | 0.022 | 0.012 | 0.213 |
| Shipping costs | 385 | 0.042 | 0.036 | 0.031 |
| **CZ Level** | | | | |
| $\Delta 2000-2007$ # of unemployed | 733 | 0.117 | 0.145 | 0.253 |
| $\Delta 2000-2007$ unemployment rate | 733 | 0.003 | 0.004 | 0.012 |
| $\Delta 2000-2007$ log debt | 733 | 0.596 | 0.589 | 0.204 |
| $\Delta 2000-2007$ DTI | 733 | 0.414 | 0.377 | 0.320 |
| $\Delta 2000-2007$ log mortgage debt | 733 | 0.753 | 0.737 | 0.276 |
| $\Delta 2000-2007$ log auto debt | 733 | 0.552 | 0.552 | 0.212 |
| $\Delta 2000-2007$ log credit card debt | 733 | 0.312 | 0.322 | 0.164 |
| Shipping costs | 733 | 0.049 | 0.044 | 0.021 |
| $\Delta 2000-2007$ HPI | 733 | 0.356 | 0.325 | 0.170 |
| **Individual Level** | | | | |
| $\Delta_{2000-07}$ Credit Score | 5,421,474 | 19.883 | 21.000 | 82.022 |
| $\Delta_{2007-11}$ Credit Score | 5,205,656 | 9.193 | 10.000 | 71.170 |
| $\Delta_{2000-07}$ Log(Debt+1) | 5,866,525 | 0.389 | 0.271 | 4.279 |
| $\Delta_{2000-07}$ DTI | 5,696,148 | 0.707 | 0.011 | 3.112 |
| $\Delta_{2000-07}$ HPI | 5,795,325 | 0.454 | 0.417 | 0.260 |
| Shipping Costs | 5,747,023 | 0.042 | 0.040 | 0.010 |
| Extract Flag | 3,265,214 | 0.471 | 0.000 | 0.499 |
| Extract Value | 3,265,214 | 5.087 | 0.000 | 5.449 |
| Mtg Delinq. by '07 | 5,866,525 | 0.129 | 0.000 | 0.335 |
| Mtg. Delinq. '08-'11 | 5,736,735 | 0.115 | 0.000 | 0.319 |
| Foreclosure by '07 | 5,866,525 | 0.030 | 0.000 | 0.171 |
| Foreclosure '08-'11 | 5,740,848 | 0.040 | 0.000 | 0.195 |

**Note:** This table presents summary statistics for the three samples used in this paper. Panel A presents statistics for 385 4-digit manufacturing industries. Panel B presents statistics for 735 Commuting Zones, and Panel C presents statistics for the individual-level sample obtained from the CCP.

**Table 2**
Shipping Costs and International Trade Flows

| | $\Delta_{2000-07}$ Trade flows / (Shipments+Net imports) Weighted regressions, Chinese trade flows | | | | | |
|---|---|---|---|---|---|---|
| | Imports | | Exports | | Net imports | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Shipping costs | -0.472* | -0.350** | -0.077* | -0.049** | -0.400 | -0.320** |
| | (0.242) | (0.144) | (0.045) | (0.019) | (0.249) | (0.147) |
| Log employment | | 0.013** | | -0.001 | | 0.015** |
| | | (0.006) | | (0.001) | | (0.007) |
| Log value added | | -0.005 | | 0.004 | | -0.010 |
| | | (0.012) | | (0.004) | | (0.015) |
| Log shipments | | -0.010 | | -0.003 | | -0.006 |
| | | (0.011) | | (0.003) | | (0.013) |
| TFP | | 0.187 | | -0.029* | | 0.224 |
| | | (0.135) | | (0.017) | | (0.145) |
| TFP growth | | -0.003 | | 0.075* | | -0.087 |
| | | (0.134) | | (0.040) | | (0.174) |
| $\Delta_{1991-1999}$ Imports | | 0.795*** | | | | |
| | | (0.193) | | | | |
| $\Delta_{1991-1999}$ Exports | | | | 0.085 | | |
| | | | | (0.554) | | |
| $\Delta_{1991-1999}$ Net imports | | | | | | 0.783*** |
| | | | | | | (0.200) |
| Observations | 384 | 379 | 384 | 379 | 384 | 379 |
| $R^2$ | 0.030 | 0.328 | 0.030 | 0.186 | 0.021 | 0.289 |

**Note:** This table presents the result of panel regressions assessing the effect of shipping costs (SC) on the change in imports, exports, and net imports from China to the U.S. from 2000 to 2007, all normalized by domestic expenditures measured as domestic shipments plus net imports. Regressions are weighted by the industry share in total U.S. expenditures, measured as domestic shipments plus net imports. Robust standard errors are reported in parentheses. *, ** and *** means statistically different from zero at 10%, 5% and 1% level of significance.

**Table 3**
Import Competition and Domestic Output

| | $\Delta_{2000-07}$ Log flows | | | | | | $\Delta_{2000-07}$ Log TFP | |
|---|---|---|---|---|---|---|---|---|
| | Shipments | | Value added | | Employment | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Shipping costs | 5.834*** | 4.360*** | 6.130*** | 5.265*** | 2.536** | 2.103*** | -1.642 | -0.685 |
| | (1.946) | (1.132) | (2.333) | (1.640) | (1.002) | (0.665) | (1.275) | (0.541) |
| Log employment | | -0.125* | | -0.153* | | -0.145*** | | -0.030 |
| | | (0.074) | | (0.088) | | (0.054) | | (0.032) |
| Log value added | | -0.045 | | -0.030 | | 0.075 | | 0.021 |
| | | (0.141) | | (0.171) | | (0.101) | | (0.055) |
| Log shipments | | 0.225* | | 0.217 | | 0.085 | | -0.007 |
| | | (0.123) | | (0.168) | | (0.068) | | (0.053) |
| TFP | | -0.199 | | 0.394 | | -0.104 | | 1.037* |
| | | (0.442) | | (0.562) | | (0.308) | | (0.561) |
| TFP growth | | -0.769 | | -1.248 | | -1.013* | | -0.513 |
| | | (0.760) | | (0.938) | | (0.534) | | (0.552) |
| $\Delta_{1991-1999}$ Log shipments | | -0.178 | | | | | | |
| | | (0.129) | | | | | | |
| $\Delta_{1991-1999}$ Log value added | | | | -0.076 | | | | |
| | | | | (0.164) | | | | |
| $\Delta_{1991-1999}$ Log employment | | | | | | 0.459*** | | |
| | | | | | | (0.133) | | |
| $\Delta_{1991-1999}$ TFP | | | | | | | | 0.248*** |
| | | | | | | | | (0.079) |
| Observations | 384 | 379 | 384 | 379 | 384 | 379 | 384 | 379 |
| $R^2$ | 0.107 | 0.235 | 0.104 | 0.200 | 0.033 | 0.214 | 0.026 | 0.530 |

**Note:** This table presents the result of panel regressions assessing the effect of shipping costs (SC) on the growth in domestic shipments, value aded, employment and TFP from 2000 to 2007. Regressions are weighted by the industry share in total U.S. expenditures, measured as domestic shipments plus net imports. Robust standard errors are reported in parentheses. *, ** and *** means statistically different from zero at 10%, 5% and 1% level of significance.

**Table 4**
Import Competition and Unemployment, CZ level

| | Panel A: $\Delta_{2000-07}$ log # unemployed | | | | Panel B: $\Delta_{2000-07}$ unemployment rate | | | |
|---|---|---|---|---|---|---|---|---|
| Shipping costs | -6.017*** | -4.451*** | -3.427*** | -3.291*** | -0.227*** | -0.128*** | -0.089** | -0.081** |
| | (1.326) | (1.121) | (1.136) | (1.075) | (0.055) | (0.044) | (0.044) | (0.038) |
| $\Delta$ HPI | | | | -0.526*** | | | | -0.029*** |
| | | | | (0.078) | | | | (0.005) |
| Log employment | | 0.186 | 0.036 | -0.133* | | 0.007 | 0.001 | -0.008** |
| | | (0.115) | (0.099) | (0.079) | | (0.005) | (0.004) | (0.004) |
| Share Exposed | | 0.618*** | 0.198 | -0.232 | | 0.054*** | 0.038*** | 0.015* |
| | | (0.229) | (0.241) | (0.218) | | (0.010) | (0.011) | (0.008) |
| Log income | | 0.584*** | 0.070 | -0.000 | | 0.024*** | 0.004 | -0.000 |
| | | (0.155) | (0.208) | (0.181) | | (0.006) | (0.008) | (0.006) |
| Log Debt | | -0.227* | -0.020 | 0.159* | | -0.008 | 0.001 | 0.011*** |
| | | (0.132) | (0.111) | (0.086) | | (0.005) | (0.005) | (0.004) |
| DTI | | 0.087 | 0.078 | 0.052 | | 0.001 | -0.000 | -0.002 |
| | | (0.143) | (0.098) | (0.072) | | (0.006) | (0.004) | (0.003) |
| $\Delta_{91,99}$ HMDA loan origination | | -0.018 | -0.002 | -0.009 | | -0.001 | 0.000 | -0.000 |
| | | (0.015) | (0.014) | (0.011) | | (0.001) | (0.001) | (0.000) |
| $\Delta_{91,99}$ CH Import Penetration | | 0.749 | 1.684 | 4.339** | | -0.015 | 0.086 | 0.232** |
| | | (3.220) | (2.613) | (1.952) | | (0.176) | (0.138) | (0.090) |
| Census controls | No | No | Yes | Yes | No | No | Yes | Yes |
| Weights | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. |
| Observations | 733 | 733 | 733 | 733 | 733 | 733 | 733 | 733 |
| $R^2$ | 0.094 | 0.196 | 0.355 | 0.494 | 0.063 | 0.235 | 0.376 | 0.578 |
| Magnitude SC | -0.127 | -0.094 | -0.073 | -0.070 | -0.005 | -0.003 | -0.002 | -0.002 |
| Magnitude HP | | | | -0.089 | | | | -0.005 |

**Note:** This table presents the results of cross-sectional regressions of the change in the log number of unemployed workers and the change in unemployment rate from 2000 to 2007 on our proxy for import competition, at the commuting zone level. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table 5**
Import Competition and Household Income, CZ level

| | Panel A: Average annual income growth | | | | Panel B: Median annual income growth | | | |
|---|---|---|---|---|---|---|---|---|
| Shipping costs | 1.449*** | 0.741*** | 0.730** | 0.694*** | 0.982*** | 0.797*** | 0.966*** | 0.928*** |
| | (0.361) | (0.272) | (0.310) | (0.266) | (0.363) | (0.245) | (0.297) | (0.254) |
| Δ HPI | | | | 0.199*** | | | | 0.205*** |
| | | | | (0.024) | | | | (0.020) |
| Log employment | | -0.067 | -0.063 | 0.002 | | -0.095*** | -0.092** | -0.026 |
| | | (0.042) | (0.040) | (0.029) | | (0.035) | (0.036) | (0.024) |
| Share Exposed | | -0.479*** | -0.433*** | -0.269*** | | -0.464*** | -0.405*** | -0.236*** |
| | | (0.058) | (0.071) | (0.051) | | (0.059) | (0.064) | (0.047) |
| Log income | | -0.109** | -0.040 | -0.013 | | -0.143*** | -0.158** | -0.130*** |
| | | (0.042) | (0.071) | (0.052) | | (0.040) | (0.064) | (0.049) |
| Log Debt | | 0.059 | 0.053 | -0.016 | | 0.095** | 0.092** | 0.022 |
| | | (0.047) | (0.044) | (0.031) | | (0.037) | (0.039) | (0.026) |
| DTI | | -0.003 | -0.025 | -0.014 | | -0.009 | -0.038 | -0.027 |
| | | (0.051) | (0.039) | (0.025) | | (0.038) | (0.033) | (0.020) |
| $\Delta_{91,99}$ HMDA loan origination | | 0.008 | 0.001 | 0.004 | | 0.008** | 0.003 | 0.005* |
| | | (0.005) | (0.005) | (0.003) | | (0.004) | (0.004) | (0.003) |
| $\Delta_{91,99}$ CH Import Penetration | | 1.856* | 1.443* | 0.435 | | 2.272** | 1.566* | 0.528 |
| | | (1.008) | (0.837) | (0.563) | | (0.991) | (0.800) | (0.591) |
| Census controls | No | No | Yes | Yes | No | No | Yes | Yes |
| Weights | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. |
| Observations | 715 | 715 | 715 | 715 | 715 | 715 | 715 | 715 |
| $R^2$ | 0.052 | 0.312 | 0.377 | 0.574 | 0.024 | 0.378 | 0.433 | 0.645 |
| Magnitude SC | 0.031 | 0.016 | 0.015 | 0.015 | 0.021 | 0.017 | 0.020 | 0.020 |
| Magnitude HP | | | | 0.034 | | | | 0.035 |

**Note:** This table presents the results of cross-sectional regressions of average and median houshold income per working-age adult on our proxy for import competition, at the commuting zone level. Average and median household income are obtained from Autor et al. (2013) and defined as the sum of individual incomes of all work-age household members (age 16-64), divided by the number of household members of that age group. Total income comprises wage and salary income, business and investment income, social security and welfare income, and income from other nonspecified sources. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table 6**
Import Competition and Household Debt Growth, CZ level

| | Panel A: $\Delta_{2000-07}$ Debt | | | | Panel B: $\Delta_{2000-07}$ DTI | | | |
|---|---|---|---|---|---|---|---|---|
| Shipping costs | -3.258*** | -2.354*** | -2.670*** | -2.748*** | -7.169*** | -3.629** | -3.689*** | -3.726*** |
| | (0.784) | (0.745) | (0.664) | (0.638) | (1.952) | (1.467) | (1.341) | (1.351) |
| $\Delta$ HPI | | | | 0.304*** | | | | 0.146 |
| | | | | (0.043) | | | | (0.098) |
| Log employment | | -0.185*** | -0.191*** | -0.093 | | -0.382*** | -0.435*** | -0.388*** |
| | | (0.066) | (0.061) | (0.063) | | (0.133) | (0.127) | (0.139) |
| Share Exposed | | -0.923*** | -0.977*** | -0.729*** | | -0.602* | -0.707** | -0.588* |
| | | (0.167) | (0.167) | (0.154) | | (0.314) | (0.336) | (0.326) |
| Log income | | -0.024 | 0.147 | 0.187* | | -0.157 | -0.027 | -0.007 |
| | | (0.089) | (0.123) | (0.109) | | (0.175) | (0.251) | (0.248) |
| Log Debt | | 0.172** | 0.169*** | 0.066 | | 0.377*** | 0.426*** | 0.377*** |
| | | (0.069) | (0.064) | (0.065) | | (0.144) | (0.134) | (0.146) |
| DTI | | 0.050 | 0.065 | 0.080 | | 0.382** | 0.405*** | 0.413*** |
| | | (0.062) | (0.046) | (0.051) | | (0.148) | (0.118) | (0.123) |
| $\Delta_{91,99}$ HMDA loan origination | | 0.019** | 0.010 | 0.014* | | 0.011 | 0.012 | 0.013 |
| | | (0.009) | (0.009) | (0.008) | | (0.020) | (0.020) | (0.021) |
| $\Delta_{91,99}$ CH Import Penetration | | 2.673* | 2.258 | 0.725 | | 2.533 | 2.437 | 1.700 |
| | | (1.605) | (1.480) | (1.356) | | (3.108) | (3.409) | (3.509) |
| Census controls | No | No | Yes | Yes | No | No | Yes | Yes |
| Weights | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. |
| Observations | 733 | 733 | 733 | 733 | 733 | 733 | 733 | 733 |
| $R^2$ | 0.051 | 0.416 | 0.488 | 0.574 | 0.058 | 0.546 | 0.566 | 0.571 |
| Magnitude SC | -0.069 | -0.050 | -0.057 | -0.058 | -0.152 | -0.077 | -0.078 | -0.079 |
| Magnitude HP | | | | 0.052 | | | | 0.025 |

**Note:** This table presents the results of cross-sectional regressions of debt growth from 2000Q4 to 2007Q4 on our proxy for import competition, at the commuting zone level. We measure change in debt two ways: first as a log change and second as a change in debt to income ratio. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table 7**
Import Competition and Household Debt Growth by Debt Type, CZ level

| | $\Delta_{2000-07}$ Log debt | | | | |
|---|---|---|---|---|---|
| | All mortgage | Mortgage loans | HELOC | Auto | Credit card |
| | (1) | (2) | (3) | (4) | (5) |
| Shipping costs | -3.276*** | -2.469* | -5.841* | -0.797 | -1.327*** |
| | (0.710) | (1.498) | (3.005) | (0.675) | (0.448) |
| $\Delta$ HPI | 0.352*** | 0.220* | 0.289 | 0.243** | -0.075** |
| | (0.048) | (0.124) | (0.207) | (0.122) | (0.031) |
| Controls | Yes | Yes | Yes | Yes | Yes |
| Weights | Pop. | Pop. | Pop. | Pop. | Pop. |
| Observations | 733 | 730 | 683 | 733 | 733 |
| $R^2$ | 0.490 | 0.477 | 0.254 | 0.363 | 0.327 |
| Magnitude SC | -0.069 | -0.052 | -0.124 | -0.017 | -0.028 |
| Magnitude HP | 0.060 | 0.037 | 0.049 | 0.041 | -0.013 |

**Note:** This table presents the results of cross-sectional regressions of debt growth from 2000Q4 to 2007Q4 on our proxy for import competition, at the commuting zone level. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table 8**

Import Competition and Household Debt Growth, Individual level

| | Panel A: Δ Log (debt+1) | | | | | Panel B: Δ DTI | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Shipping Costs | -1.738** | -2.670*** | -1.854*** | -1.956*** | -2.046*** | -2.066*** | -1.162** | -1.171** | -1.262*** | -1.322*** |
| | (0.750) | (0.664) | (0.642) | (0.644) | (0.625) | (0.527) | (0.451) | (0.461) | (0.460) | (0.454) |
| Δ HPI | | | | | 0.180*** | | | | | 0.140*** |
| | | | | | (0.050) | | | | | (0.049) |
| Log Employment | | -0.011* | -0.020*** | -0.024*** | -0.028*** | | 0.014** | 0.007 | 0.004 | 0.001 |
| | | (0.006) | (0.006) | (0.006) | (0.006) | | (0.006) | (0.006) | (0.007) | (0.007) |
| Share Exposed | | -0.672*** | -0.878*** | -0.869*** | -0.840*** | | -0.426*** | -0.481*** | -0.479*** | -0.455*** |
| | | (0.125) | (0.120) | (0.117) | (0.109) | | (0.103) | (0.107) | (0.106) | (0.107) |
| Log Income | | -0.203*** | 0.008 | 0.037* | 0.038** | | -0.048* | -0.024 | -0.006 | -0.005 |
| | | (0.024) | (0.019) | (0.019) | (0.019) | | (0.026) | (0.025) | (0.025) | (0.025) |
| Log Debt +1 | | | -0.262*** | -0.269*** | -0.269*** | | | | | |
| | | | (0.001) | (0.002) | (0.002) | | | | | |
| DTI | | | | | | | | -0.050*** | -0.054*** | -0.054*** |
| | | | | | | | | (0.013) | (0.014) | (0.014) |
| $\Delta_{91,99}$ HMDA Loan Origination | | 0.018** | 0.015** | 0.011 | 0.008 | | 0.016*** | 0.017*** | 0.013** | 0.011** |
| | | (0.008) | (0.008) | (0.008) | (0.007) | | (0.005) | (0.005) | (0.005) | (0.005) |
| $\Delta_{91,99}$ CH Import Penetration | | 0.434 | 0.424 | 0.297 | 0.303 | | 1.131 | 1.290 | 1.214 | 1.214 |
| | | (1.244) | (1.028) | (1.001) | (0.990) | | (0.965) | (1.017) | (1.001) | (0.979) |
| Credit Score | | | 0.004*** | | | | | 0.001*** | | |
| | | | (0.000) | | | | | (0.000) | | |
| Age | | | -0.051*** | | | | | -0.026*** | | |
| | | | (0.001) | | | | | (0.001) | | |
| Risk Bins | No | No | No | Yes | Yes | No | No | No | Yes | Yes |
| Age Bins | No | No | No | Yes | Yes | No | No | No | Yes | Yes |
| Census | No | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes | Yes |
| State FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 5,747,023 | 5,631,162 | 5,128,389 | 5,128,389 | 5,128,389 | 5,347,397 | 5,254,329 | 4,752,698 | 4,752,698 | 4,752,698 |
| R-Squared | 0.002 | 0.002 | 0.076 | 0.079 | 0.079 | 0.005 | 0.007 | 0.033 | 0.044 | 0.044 |

**Note:** This table presents the results of cross-sectional regressions of debt growth from 2000Q4 to 2007Q4 on our proxy for import competition, at the individual level. We measure change in debt two ways: first as a log change where we add 1 to zero balances and second as a change in debt to income ratio where debt is measured at the individual level and income is the average IRS income from an individual's zip code. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Individual level data comes from the FRBNY CCP/Equifax Data, while shipping costs, along with employment and share exposed controls, are measured at the commuting zone level. Changes in county-level house price indices come from from CoreLogic. In some regressions, controls for individual age and credit score in 1999 are replaced by quantile indicators variables for 5 percentile bins. Census controls are zip code-level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Debt to income is trimmed at the +/- 2.5% level. Standard errors are clustered at the commuting zone level. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table 9**

Import Competition and Household Debt Growth by Debt Type, Individual level

| | Panel A: Extensive margin (Debt dummy) | | | | | Panel B: Intensive margin (Δ Log Debt) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) Any | (2) Mtg | (3) Auto | (4) CCard | (5) Other | (6) Total | (7) Mtg | (8) Auto | (9) CCard | (10) Other |
| Shipping Costs | -0.003 | -0.255** | 0.241 | 0.040 | 0.419*** | -2.098*** | -1.323*** | 0.693** | -0.268 | -0.360 |
| | (0.079) | (0.109) | (0.152) | (0.088) | (0.117) | (0.505) | (0.404) | (0.278) | (0.260) | (0.498) |
| Δ HPI | 0.000 | -0.013 | -0.019 | 0.032*** | 0.022 | 0.119** | 0.167*** | 0.027 | -0.040** | 0.081** |
| | (0.016) | (0.017) | (0.032) | (0.008) | (0.015) | (0.048) | (0.038) | (0.020) | (0.020) | (0.033) |
| Log Employment | -0.003*** | -0.002 | -0.002 | 0.001 | -0.006*** | -0.004 | 0.005 | -0.015*** | -0.006** | -0.012** |
| | (0.001) | (0.002) | (0.003) | (0.001) | (0.002) | (0.005) | (0.005) | (0.003) | (0.002) | (0.006) |
| Share Exposed | -0.023 | -0.049* | -0.033 | -0.110*** | 0.002 | -0.596*** | -0.412*** | -0.043 | -0.079* | -0.521*** |
| | (0.019) | (0.026) | (0.043) | (0.019) | (0.028) | (0.106) | (0.089) | (0.057) | (0.041) | (0.099) |
| Log Income | -0.005 | -0.006 | -0.002 | -0.023*** | -0.001 | 0.010 | 0.039*** | -0.008 | 0.024*** | -0.024 |
| | (0.003) | (0.006) | (0.005) | (0.005) | (0.004) | (0.017) | (0.013) | (0.009) | (0.008) | (0.018) |
| Log Debt +1 | 0.002*** | 0.024*** | 0.017*** | 0.013*** | 0.011*** | -0.204*** | -0.017*** | -0.008*** | -0.093*** | -0.106*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.002) | (0.001) | (0.001) | (0.001) | (0.002) |
| $\Delta_{91,99}$ HMDA Loan Origination | -0.004*** | -0.008*** | -0.004** | -0.002* | -0.001 | 0.009* | 0.003 | -0.005 | -0.002 | 0.009 |
| | (0.001) | (0.002) | (0.002) | (0.001) | (0.002) | (0.005) | (0.004) | (0.004) | (0.003) | (0.007) |
| $\Delta_{91,99}$ CH Import Penetration | 0.015 | -0.143 | -0.285 | 0.066 | -0.010 | 0.557 | 0.739 | 0.351 | -0.182 | 0.634 |
| | (0.168) | (0.292) | (0.293) | (0.189) | (0.312) | (0.793) | (0.890) | (0.740) | (0.435) | (1.183) |
| Risk Bins | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Age Bins | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Census | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| State FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 5,057,918 | 2,998,825 | 3,529,640 | 1,375,562 | 2,414,223 | 4,125,283 | 1,607,372 | 843,714 | 2,981,706 | 1,586,362 |
| R-Squared | | | | | | 0.117 | 0.042 | 0.011 | 0.034 | 0.024 |
| Psuedo R-Squared | 0.016 | 0.087 | 0.035 | 0.034 | 0.018 | | | | | |
| # of 1s | 2,813,595 | 949,266 | 1,097,640 | 624,271 | 811,542 | | | | | |

**Note:** This table presents the results of cross-sectional regressions of debt growth from 2000Q4 to 2007Q4 on our proxy for import competition, at the individual level. For extensive margin analysis (Panel A), logistic regressions are run for individuals starting with zero debt of a certain type in 2000Q4, with our dependent variable an indicator for having a positive debt balance (within type) in 2007Q4, so that this panel analyzes individuals entering a new debt market. For intensive margin analysis, changes in debt are calculated as changes in log debt from 2000Q4 to 2007Q4, without adding 1 to zero balances, so that individuals with zero balances in at least one of these two periods are excluded from this regression specification. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Individual level data comes from the FRBNY CCP/Equifax Data, while shipping costs, along with employment and share exposed controls, are measured at the commuting zone level. Changes in county-level house price indices come from from CoreLogic. In some regressions, controls for individual age and credit score in 1999 are replaced by quantile indicators variables for 5 percentile bins. Census controls are zip code-level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Debt to income is trimmed at the +/- 2.5% level. Standard errors are clustered at the commuting zone level. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table 10**
Individual-level Analysis using the PSID

| | Panel A: change 1999-2007 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Unemployed | | ΔLog(labor inc.+1) | | ΔLog(debt+1) | | ΔDTI | |
| Shipping costs | -0.61* | -0.59 | 9.36*** | 10.58*** | -11.35** | -12.35** | -6.88** | -8.13** |
| | (0.33) | (0.37) | (3.24) | (3.54) | (5.16) | (5.33) | (3.12) | (3.58) |
| Individual level controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| State fixed effect | No | Yes | No | Yes | No | Yes | No | Yes |
| Observations | 719 | 719 | 719 | 719 | 719 | 719 | 719 | 719 |
| $R^2$ | 0.110 | 0.149 | 0.217 | 0.257 | 0.240 | 0.287 | 0.115 | 0.155 |
| | Panel B: split of debt-to-income ratio | | | | | | | |
| | Total debt | | Mortgage | | Credit card | | Auto | |
| Shipping costs | -6.88** | -8.13** | -6.18** | -6.54** | -2.22** | -2.62** | 0.24 | 0.17 |
| | (3.12) | (3.58) | (2.74) | (3.04) | (0.87) | (1.12) | (0.20) | (0.24) |
| Individual level controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| State fixed effect | No | Yes | No | Yes | No | Yes | No | Yes |
| Observations | 719 | 719 | 642 | 642 | 680 | 680 | 602 | 602 |
| $R^2$ | 0.115 | 0.155 | 0.131 | 0.182 | 0.041 | 0.083 | 0.054 | 0.106 |

**Note:** This table presents the results of cross-sectional regressions of income and debt growth from 1999 to 2007 on Shipping Costs, at at the individual level. We measure change in debt two ways: first as a log change and second as a change in debt to income ratio. The coefficient of interest estimates differential exposure to import competition. Individual-level exposure to Shipping Costs is measured using the industry where the individual is active in 1999. Controls are coming from PSID and include race, education, gender marital status dummies as well as age, labor income, total debt value, debt-to-income ratio and the number of family members measured in 1999 . Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table 11**
Individual-level Analysis using the PSID

| | All Debt (value) | | | DTI | | |
|---|---|---|---|---|---|---|
| | (1) OLS | (2) OLS | (3) IV | (4) OLS | (5) OLS | (6) IV |
| Shipping costs | -11.35** | | | -6.88** | | |
| | (5.16) | | | (3.12) | | |
| $\Delta$ log(labor income +1) | | 0.18*** | -1.21* | | -0.15*** | -0.73** |
| | | (0.05) | (0.70) | | (0.05) | (0.37) |
| Observations | 719 | 719 | 719 | 719 | 719 | 719 |
| $R^2$ | 0.240 | 0.252 | | 0.115 | 0.146 | |

**Note:** This table presents the results of cross-sectional regressions of income and debt growth from 1999 to 2007 on Shipping Costs, at at the individual level. We measure change in debt two ways: first as a log change and second as a change in debt to income ratio. The coefficient of interest estimates differential exposure to import competition. Individual-level exposure to Shipping Costs is measured using the industry where the individual is active in 1999. Controls are coming from PSID and include race, education, gender marital status dummies as well as age, labor income, total debt value, debt-to-income ratio and the number of family members measured in 1999 . Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table 12**
Import Competition and Home Equity Extraction, Individual level

| | Extract Flag | | | Extract Value | | |
|---|---|---|---|---|---|---|
| | (1) All | (2) High | (3) Low | (4) All | (5) High | (6) Low |
| Shipping Costs | -0.457*** | -0.966*** | -0.180 | -6.422*** | -13.268*** | -2.165 |
| | (0.147) | (0.235) | (0.141) | (1.709) | (2.952) | (1.499) |
| Δ HPI | 0.060*** | 0.026 | 0.023* | 0.864*** | 0.330 | 0.422*** |
| | (0.012) | (0.020) | (0.013) | (0.151) | (0.235) | (0.146) |
| Log Employment | 0.002 | -0.007*** | 0.010*** | 0.040 | -0.054* | 0.133*** |
| | (0.002) | (0.002) | (0.002) | (0.027) | (0.028) | (0.018) |
| Share Exposed | -0.103*** | -0.274*** | 0.018 | -1.557*** | -3.758*** | -0.008 |
| | (0.032) | (0.041) | (0.021) | (0.396) | (0.527) | (0.233) |
| Log Income | 0.033*** | 0.028*** | 0.035*** | 0.584*** | 0.531*** | 0.543*** |
| | (0.005) | (0.007) | (0.005) | (0.054) | (0.087) | (0.052) |
| Log Debt +1 | 0.021*** | 0.021*** | 0.022*** | 0.237*** | 0.241*** | 0.235*** |
| | (0.000) | (0.001) | (0.000) | (0.004) | (0.007) | (0.004) |
| $\Delta_{91,99}$ HMDA Loan Origination | -0.005*** | -0.009** | -0.003** | -0.029* | -0.050 | -0.027 |
| | (0.002) | (0.003) | (0.002) | (0.018) | (0.040) | (0.017) |
| $\Delta_{91,99}$ CH Import Penetration | 0.431 | 0.476 | 0.473** | 6.773 | 8.750 | 6.036** |
| | (0.333) | (0.510) | (0.240) | (4.175) | (6.574) | (2.763) |
| Risk Bins | Yes | Yes | Yes | Yes | Yes | Yes |
| Age Bins | Yes | Yes | Yes | Yes | Yes | Yes |
| Census | Yes | Yes | Yes | Yes | Yes | Yes |
| State FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 3,069,768 | 1,487,187 | 1,582,579 | 3,069,768 | 1,487,189 | 1,582,579 |
| R-Squared | | | | 0.070 | 0.056 | 0.065 |
| Pseudo R-Squared | 0.044 | 0.034 | 0.044 | | | |
| # of 1s | 1,468,027 | 779,038 | 688,989 | | | |

**Note:** This table presents the results of cross-sectional regressions of proxies for home equity extraction from 2000Q4 to 2007Q4 on our proxy for import competition, at the individual level. Equity extraction in a given year is identified as in Bhutta and Keys 2015, with an extract flag defined as an indicator for equity extraction in at least one calendar year from between 2001 and 2007, inclusive. This indicator is used as the dependent variable in a logistic regression, while the log translated *value* extracted is used as the dependent variable in an OLS specification. Regressions are performed using the entire sample, along with a split into individuals in areas with higher than average vs. lower than median house price appreciation. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Individual level data comes from the FRBNY CCP/Equifax Data, while shipping costs, along with employment and share exposed controls, are measured at the commuting zone level. Changes in county-level house price indices come from from CoreLogic. In some regressions, controls for individual age and credit score in 1999 are replaced by quantile indicators variables for 5 percentile bins. Census controls are zip code-level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Debt to income is trimmed at the +/- 2.5% level. Standard errors are clustered at the commuting zone level. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table 13**
Shipping Cost and Loan Applications (HMDA), Number of loans, CZ level

| | $\Delta_{2000-07}$ Log Applications | | | |
|---|---|---|---|---|
| | Home Purchase | | Refinancing | |
| | (1) Number (#) | (2) Value ($) | (3) Number (#) | (4) Value ($) |
| Shipping costs | -1.078 | -1.190 | -2.979** | -4.183*** |
| | (0.985) | (1.018) | (1.235) | (1.281) |
| Δ HPI | 0.353*** | 0.955*** | 0.836*** | 1.496*** |
| | (0.096) | (0.094) | (0.109) | (0.102) |
| Log employment | 0.211*** | 0.083** | 0.135* | 0.019 |
| | (0.037) | (0.040) | (0.075) | (0.056) |
| Share Exposed | -1.112*** | -1.053*** | -0.547* | -0.996*** |
| | (0.245) | (0.237) | (0.280) | (0.296) |
| Log income | -0.277* | -0.229 | -0.302 | -0.015 |
| | (0.166) | (0.176) | (0.344) | (0.322) |
| $\Delta_{91,99}$ CH Import Penetration | -5.333** | -4.249* | -3.257 | -1.774 |
| | (2.420) | (2.278) | (2.542) | (2.558) |
| $\Delta_{91,99}$ HMDA loan origination | 0.022 | 0.022* | -0.009 | 0.009 |
| | (0.014) | (0.013) | (0.016) | (0.017) |
| Log(# Home Purchase App) | -0.253*** | | | |
| | (0.036) | | | |
| Log($ Home Purchase App) | | -0.131*** | | |
| | | (0.038) | | |
| Log(# Refinancing App) | | | -0.202*** | |
| | | | (0.067) | |
| Log($ Refinancing App) | | | | -0.094** |
| | | | | (0.046) |
| Census controls | Yes | Yes | Yes | Yes |
| Weights | Pop. | Pop. | Pop. | Pop |
| Observations | 733 | 733 | 733 | 733 |
| $R^2$ | 0.458 | 0.572 | 0.638 | 0.779 |

**Note:** This table presents the results of cross-sectional regressions of growth in loan applications separately for refinancing loans and for other types of loans from 2000Q4 to 2007Q4 on our proxy for import competition, at the commuting zone level. Growth in loan applications is measured as the log change in the number of loan applications. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table 14**

Import Competition, Delinquencies and Foreclosures

| | Δ Credit Score | | Bottom Credit Δ Decile | | Mortgage Delinquency | | Foreclosure | |
|---|---|---|---|---|---|---|---|---|
| | (1) 2000q4-2007 | (2) 2007q4-2011 | (3) 2000q4-2007 | (4) 2007q4-2011 | (5) 2001-2007 | (6) 2008-2011 | (7) 2001-2007 | (8) 2008-2011 |
| Shipping Costs | -17.177 | 26.247** | 0.046 | -0.112** | -0.017 | -0.206*** | -0.083*** | -0.257*** |
| | (12.914) | (10.416) | (0.038) | (0.052) | (0.050) | (0.073) | (0.030) | (0.068) |
| Δ HPI | 8.477*** | -7.282*** | -0.013*** | 0.027*** | -0.021** | 0.007 | -0.011*** | 0.006 |
| | (1.304) | (0.982) | (0.003) | (0.004) | (0.009) | (0.007) | (0.003) | (0.004) |
| Log Employment | 0.066 | -0.419*** | 0.001** | 0.002*** | 0.002** | 0.002* | 0.001*** | 0.001* |
| | (0.156) | (0.122) | (0.000) | (0.001) | (0.001) | (0.001) | (0.000) | (0.001) |
| Share Exposed | -4.289* | 7.128*** | 0.008 | -0.033*** | -0.008 | -0.066*** | 0.001 | -0.051*** |
| | (2.246) | (1.719) | (0.006) | (0.010) | (0.013) | (0.018) | (0.006) | (0.015) |
| Log Income | -0.768 | -2.052*** | 0.000 | 0.010*** | 0.009*** | 0.012*** | 0.000 | 0.008*** |
| | (0.499) | (0.380) | (0.001) | (0.002) | (0.003) | (0.003) | (0.001) | (0.001) |
| Log Debt +1 | 1.607*** | -0.488*** | -0.003*** | 0.002*** | 0.018*** | 0.010*** | 0.003*** | 0.003*** |
| | (0.053) | (0.047) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| $\Delta_{91,99}$ HMDA Loan Origination | 0.320** | -0.204* | -0.001* | 0.001 | -0.004*** | -0.002** | -0.002*** | -0.002** |
| | (0.154) | (0.119) | (0.000) | (0.001) | (0.001) | (0.001) | (0.000) | (0.001) |
| $\Delta_{91,99}$ CH Import Penetration | -60.973*** | -26.101 | 0.231*** | 0.248* | 0.021 | 0.174 | 0.026 | 0.012 |
| | (23.331) | (20.501) | (0.082) | (0.127) | (0.164) | (0.204) | (0.057) | (0.150) |
| Risk Bins | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Age Bins | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Census | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| State FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 4,919,039 | 4,661,428 | 4,919,039 | 4,661,428 | 5,128,389 | 5,044,524 | 5,128,389 | 5,047,699 |
| R-squared | 0.059 | 0.018 | | | | | | |
| Pseudo R-squared | | | 0.036 | 0.040 | 0.133 | 0.092 | 0.124 | 0.091 |
| # of 1s | | | 501,513 | 492,573 | 696,050 | 594,755 | 160,521 | 201,161 |

**Note:** This table analyzes mortgage delinquencies and foreclosures at the individual level. Logistic regressions are performed using indicators for these bad outcomes having occurred between 2001Q1 and 2008Q4, or between 2001Q1 and 2011Q4, both inclusive. The analysis is restricted to individuals appearing in Equifax in 2000Q4, 2007Q4, and the relevant end period (either 2008Q4 or 2011Q4) for a given regression. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Individual level data comes from the FRBNY CCP/Equifax Data, while shipping costs, along with employment and share exposed controls, are measured at the commuting zone level. Changes in county-level house price indices come from from CoreLogic. In some regressions, controls for individual age and credit score in 1999 are replaced by quantile indicators variables for 5 percentile bins. Census controls are zip code-level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Debt to income is trimmed at the +/- 2.5% level. Standard errors are clustered at the commuting zone level. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table 15**
Import Competition, Delinquencies and Foreclosures

| | Δ Credit Score | | Bottom Credit Δ Decile | | Mortgage Delinquency | | Foreclosure | |
|---|---|---|---|---|---|---|---|---|
| | (1) High | (2) Low | (3) High | (4) Low | (5) High | (6) Low | (7) High | (8) Low |
| Shipping Costs | 187.029*** | 31.983 | -0.792*** | -0.154 | -0.455** | -0.261 | -0.625*** | -0.261** |
| | (31.552) | (30.100) | (0.152) | (0.131) | (0.184) | (0.196) | (0.183) | (0.124) |
| Δ HPI | -5.795*** | -3.733*** | 0.023*** | 0.012** | 0.019** | -0.003 | 0.009 | 0.001 |
| | (1.482) | (1.164) | (0.006) | (0.005) | (0.010) | (0.006) | (0.006) | (0.004) |
| Log Employment | -0.518 | 0.350 | 0.002 | -0.001 | -0.000 | -0.001 | 0.001 | 0.002 |
| | (0.476) | (0.233) | (0.002) | (0.001) | (0.002) | (0.002) | (0.001) | (0.001) |
| Share Exposed | 14.500*** | 12.644*** | -0.073*** | -0.043** | -0.086*** | -0.093*** | -0.081*** | -0.041*** |
| | (4.498) | (3.371) | (0.021) | (0.019) | (0.017) | (0.026) | (0.020) | (0.016) |
| Log Income | -1.604** | -1.278*** | 0.008*** | 0.005** | 0.016*** | 0.009*** | 0.007*** | 0.007*** |
| | (0.622) | (0.431) | (0.003) | (0.002) | (0.003) | (0.003) | (0.002) | (0.002) |
| Log Debt +1 | -0.752*** | -0.421*** | 0.002*** | 0.001*** | 0.011*** | 0.011*** | 0.003*** | 0.003*** |
| | (0.086) | (0.050) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| $\Delta_{91,99}$ HMDA Loan Origination | 0.731 | -0.290 | -0.003 | 0.001 | 0.001 | -0.001 | 0.005 | -0.000 |
| | (2.605) | (0.331) | (0.010) | (0.001) | (0.010) | (0.002) | (0.005) | (0.001) |
| $\Delta_{91,99}$ CH Import Penetration | -144.532* | 76.105 | 0.882*** | -0.203 | 0.921*** | -0.535 | 0.549*** | -0.148 |
| | (76.676) | (68.364) | (0.282) | (0.272) | (0.184) | (0.433) | (0.187) | (0.266) |
| Constant | 56.432*** | 38.860*** | | | | | | |
| | (13.591) | (7.600) | | | | | | |
| Risk Bins | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Age Bins | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Census | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| State FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,595,061 | 1,749,317 | 1,595,061 | 1,749,317 | 1,718,135 | 1,893,788 | 1,719,289 | 1,894,945 |
| R-squared | 0.016 | 0.019 | | | | | | |
| Pseudo R-squared | | | 0.042 | 0.038 | 0.089 | 0.094 | 0.082 | 0.092 |
| # of 1s | | | 187,945 | 182,166 | 207,700 | 243,197 | 80,363 | 82,346 |

**Note:** This table analyzes mortgage delinquencies and foreclosures at the individual level. Logistic regressions are performed using indicators for these bad outcomes having occurred between 2001Q1 and 2008Q4, or between 2001Q1 and 2011Q4, both inclusive. The analysis is restricted to individuals appearing in Equifax in 2000Q4, 2007Q4, and the relevant end period (either 2008Q4 or 2011Q4) for a given regression. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Individual level data comes from the FRBNY CCP/Equifax Data, while shipping costs, along with employment and share exposed controls, are measured at the commuting zone level. Changes in county-level house price indices come from from CoreLogic. In some regressions, controls for individual age and credit score in 1999 are replaced by quantile indicators variables for 5 percentile bins. Census controls are zip code-level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Debt to income is trimmed at the +/- 2.5% level. Standard errors are clustered at the commuting zone level. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

# Appendix

## A Gravity Model of Trade

In an online appendix, we expose a simple gravity model of trade along the lines of Melitz (2003) and Chaney (2008). We derive the elasticity of trade flows and equilibrium labor to a change in the productivity of a trade partner. More precisely we find:

$$-\frac{\partial \log L^h_{U,U}}{\partial \log z_C} = \gamma_h \frac{\vartheta^h_{C,U}}{\sum_k \vartheta^h_{k,U}}, \tag{A.1}$$

where $z_C$ is the China's productivity; $(\vartheta^h_{C,U})^{-1}$ represents how "close" Chinese producers ($C$ index), are from the U.S. product market ($U$, index) in sector $h$:

$$\vartheta^h_{C,U} = M^h_C \left(w_C \tau^h_{C,U}\right)^{-\gamma_h} f_{C,U}^{1-\frac{\gamma_h}{\sigma_h - 1}}, \tag{A.2}$$

where $M^h_C$ represents the mass of firms in sector $h$ operating in China, $z_C$ productivity in China. What affects the gravity index are proportional trade costs $\tau^h_{C,U}$, and fixed export costs $f_{C,U}$. Finally $\sigma_h$ and $\gamma_h$ are the sector specific demand elasticity and Pareto tail parameter of the firm size distribution, respectively. If Chinese producers are close the the US market, then their impact on the competitive environment of the market is large and they have a greater effect on local labor displacement. The gravity term $(\vartheta^h_{C,U})^{-1}$ represents the intensity of import competition for a given change in productivity in China. It is directly related to the proportionnal transport cost: $\partial \log \vartheta / \partial \log \tau = -\gamma$. An increase in $\tau$ implies a decrease in $\vartheta$, hence a lower elasticity of local production and labor markets to foreign productivity as in equation (A.1)

## B Consumption Response to Income Shocks

We start solving a simple model of consumption insurance. We assume an agent maximizes lifetime expected utility:

$$U_0 = \sum_{h=0}^{\infty} \beta^h u(c_h),$$

subject to the following budget constraint:

$$b_t + c_t \leq R^{-1} b_{t+1} + y_t,$$

where $b_t$ is the agents' demand for a riskless bond with price $R^{-1}$ and $y_t$ the labor income process.

To make things transparent we assume $\beta = R^{-1}$ and that utility is quadratic and follows $u(c_t) = -(c_t - \gamma)^2/2$. Under these assumptions the Euler equation is $c_t = \mathbf{E}_t c_{t+1}$. Given a boundary condition we are able to solve for the level of borrowing given current borrowing as follows:

$$b_{t+1} = b_t + (\beta^{-1} - 1) \sum_{k=0}^{\infty} \beta^k \mathbf{E}_t y_{t+k} - \beta^{-1} y_t$$

Now given income follows an AR(1) process of the form:

$$y_{t+1} = \bar{y} + \rho(y_t - \bar{y}) + \varepsilon_{t+1},$$

we are able to solve for the future level of borrowing using the law of iterated expectations:

$$b_{t+1} = b_t - \frac{1-\rho}{1-\beta\rho}(y_t - \bar{y})$$

# C Appendix Figures




**(a)** Debt (intensive margin): Shipping Costs Coefficient by Age

**(b)** Debt (intensive margin): Shipping Costs Coefficient by Risk

**Figure A.1**
Intensive margin of debt by risk and age categories

# D Appendix Tables

**Table A.1**
Summary Statistics: high versus low SC

| | Low SC | | High SC | |
|---|---|---|---|---|
| | Obs | Mean | Obs | Mean |
| Shipping costs | 366 | 0.037 | 350 | 0.061 |
| Δ # of unemployed | 366 | 0.197 | 350 | 0.041 |
| Δ unemployment rate | 366 | 0.006 | 350 | 0.000 |
| Average income growth | 366 | 0.017 | 350 | 0.057 |
| Median income growth | 366 | -0.008 | 350 | 0.027 |
| Δ log debt | 366 | 0.622 | 350 | 0.573 |
| Δ DTI | 366 | 0.455 | 350 | 0.372 |
| Share of population unemployed | 366 | 0.054 | 350 | 0.065 |
| Share of housing in urban setting | 366 | 0.531 | 350 | 0.440 |
| Share of housing which is vacant | 366 | 0.122 | 350 | 0.162 |

**Note:** This table presents summary statistics separately for high and low SC areas. .

**Table A.2**
Shipping Costs and Net Trade Flows

| | $\Delta_{2000-07}$ Trade flows / (Shipments+Net imports) Weighted regressions, all trade flows | | | | | |
|---|---|---|---|---|---|---|
| | Imports | | Exports | | Net imports | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Shipping costs | -0.939*** | -0.922*** | -0.396 | -0.513 | -0.670 | -0.564* |
| | (0.340) | (0.310) | (0.412) | (0.393) | (0.450) | (0.316) |
| Log employment | | -0.005 | | -0.036** | | 0.035** |
| | | (0.012) | | (0.016) | | (0.014) |
| Log value added | | -0.017 | | -0.009 | | -0.008 |
| | | (0.025) | | (0.035) | | (0.034) |
| Log shipments | | 0.015 | | 0.023 | | -0.011 |
| | | (0.026) | | (0.034) | | (0.029) |
| TFP | | 0.184 | | -0.164 | | 0.376 |
| | | (0.208) | | (0.131) | | (0.234) |
| TFP growth | | -0.193 | | 0.352 | | -0.585 |
| | | (0.198) | | (0.283) | | (0.399) |
| $\Delta_{1991-1999}$ Imports | | 0.138 | | | | |
| | | (0.093) | | | | |
| $\Delta_{1991-1999}$ Exports | | | | 0.006 | | |
| | | | | (0.177) | | |
| $\Delta_{1991-1999}$ Net imports | | | | | | 0.148 |
| | | | | | | (0.132) |
| Observations | 384 | 379 | 384 | 379 | 384 | 379 |
| $R^2$ | 0.055 | 0.096 | 0.006 | 0.050 | 0.018 | 0.106 |

**Note:** This table presents the result of panel regressions assessing the effect of shipping costs (SC) on the change in imports, exports, and net imports to the U.S. from 2000 to 2007, all normalized by domestic expenditures measured as domestic shipments plus net imports. Regressions are weighted by the industry share in total U.S. expenditures, measured as domestic shipments plus net imports. Robust standard errors are reported in parentheses. *, ** and *** means statistically different from zero at 10%, 5% and 1% level of significance.

**Table A.3**

Alternative Proxy for Import Competition: Weight-to-Value Ratio

| | Panel A: $\Delta_{2000-07}$ Log debt | | | | Panel B: $\Delta_{2000-07}$ DTI | | | |
|---|---|---|---|---|---|---|---|---|
| Weight-to-value ratio | -0.011** | -0.016*** | -0.016*** | -0.017*** | -0.027*** | -0.023*** | -0.022*** | -0.022*** |
| | (0.004) | (0.004) | (0.004) | (0.004) | (0.010) | (0.006) | (0.007) | (0.007) |
| $\Delta$ HPI | | | | 0.305*** | | | | 0.147 |
| | | | | (0.044) | | | | (0.099) |
| Log employment | | -0.203*** | -0.204*** | -0.107* | | -0.408*** | -0.454*** | -0.407*** |
| | | (0.066) | (0.061) | (0.062) | | (0.133) | (0.125) | (0.137) |
| Share Exposed | | -0.937*** | -0.938*** | -0.690*** | | -0.614* | -0.650* | -0.530 |
| | | (0.170) | (0.160) | (0.151) | | (0.324) | (0.333) | (0.327) |
| Log income | | -0.005 | 0.156 | 0.197* | | -0.126 | -0.016 | 0.004 |
| | | (0.086) | (0.124) | (0.109) | | (0.173) | (0.252) | (0.248) |
| Log Debt | | 0.190*** | 0.184*** | 0.081 | | 0.403*** | 0.448*** | 0.398*** |
| | | (0.069) | (0.064) | (0.064) | | (0.145) | (0.133) | (0.143) |
| DTI | | 0.043 | 0.056 | 0.071 | | 0.372** | 0.392*** | 0.399*** |
| | | (0.064) | (0.046) | (0.051) | | (0.153) | (0.116) | (0.121) |
| $\Delta_{91,99}$ HMDA loan origination | | 0.022** | 0.014 | 0.018** | | 0.015 | 0.016 | 0.018 |
| | | (0.009) | (0.009) | (0.008) | | (0.020) | (0.021) | (0.021) |
| $\Delta_{91,99}$ CH Import Penetration | | 2.910* | 2.186 | 0.642 | | 2.941 | 2.353 | 1.608 |
| | | (1.609) | (1.511) | (1.370) | | (3.042) | (3.427) | (3.515) |
| Census controls | No | No | Yes | Yes | No | No | Yes | Yes |
| Weights | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. |
| Observations | 733 | 733 | 733 | 733 | 733 | 733 | 733 | 733 |
| $R^2$ | 0.013 | 0.419 | 0.488 | 0.574 | 0.019 | 0.547 | 0.566 | 0.570 |
| WVR Magnitude | -0.046 | -0.065 | -0.066 | -0.069 | -0.112 | -0.096 | -0.090 | -0.091 |
| HPI Magnitude | | | | 0.052 | | | | 0.025 |

**Note:** This table presents the results of cross-sectional regressions of debt growth from 2000Q4 to 2007Q4 on our proxy for import competition, at the commuting zone level. We measure change in debt two ways: first as a log change and second as a change in debt to income ratio. The coefficient of interest estimates differential exposure to import competition, as proxied by the weight-to-value ratio. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table A.4**
Import Competition and Household Debt Growth, Instrumented Regressions

| | Δ Import Penetration | | Δ Unemployment rate | |
|---|---|---|---|---|
| | (1) Δ Import Penetration | (2) Δ Debt | (3) Δ Unemployment rate | (4) Δ Debt |
| Shipping Costs | -0.279*** | | -0.081*** | |
| | (0.101) | | (0.022) | |
| Δ Import Penetration | | 7.322** | | |
| | | (3.023) | | |
| Δ Unemployment rate | | | | 25.160** |
| | | | | (10.789) |
| Δ HPI | -0.004 | 0.211*** | -0.011*** | 0.454*** |
| | (0.006) | (0.072) | (0.002) | (0.136) |
| Log employment | -0.001 | -0.022** | 0.001** | -0.046*** |
| | (0.001) | (0.009) | (0.000) | (0.016) |
| Share Exposed | 0.015 | -0.952*** | 0.012** | -1.150*** |
| | (0.017) | (0.164) | (0.005) | (0.259) |
| Log income | -0.002 | 0.055*** | 0.000 | 0.033 |
| | (0.002) | (0.021) | (0.001) | (0.022) |
| Log Debt | 0.000 | -0.269*** | 0.000 | -0.269*** |
| | (0.000) | (0.002) | (0.000) | (0.002) |
| $\Delta_{91,99}$ HMDA loan origination | -0.001 | 0.015 | -0.000 | 0.014 |
| | (0.001) | (0.011) | (0.000) | (0.012) |
| $\Delta_{91,99}$ CH Import Penetration | 0.582** | -3.959 | 0.098* | -2.153 |
| | (0.229) | (2.550) | (0.057) | (1.972) |
| Risk Bins | Yes | Yes | Yes | Yes |
| Age Bins | Yes | Yes | Yes | Yes |
| Census | Yes | Yes | Yes | Yes |
| State FE | Yes | Yes | Yes | Yes |
| Observations | 5,128,389 | 5,128,389 | 5,128,389 | 5,128,389 |
| R-squared | | 0.08 | | 0.08 |
| F | | 1483.81 | | 1616.39 |
| p-value | | 0.00 | | 0.00 |

**Note:** This table presents the results of cross-sectional regressions of debt growth from 2000Q4 to 2007Q4 on our proxy for import competition, at the commuting zone level. We measure change in debt two ways: first as a log change and second as a change in debt to income ratio. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table A.5**
Shipping Cost and Denial Rates (HMDA), CZ level

| | 2007 Denials Rate | | | |
|---|---|---|---|---|
| | Home Purchase | | Refinancing | |
| | Number (#) | Value ($) | Number (#) | Value ($) |
| Shipping costs | 0.173 | -0.072 | -0.444* | -0.499** |
| | (0.281) | (0.272) | (0.253) | (0.254) |
| Δ HPI | 0.013 | 0.035 | -0.183*** | -0.132*** |
| | (0.033) | (0.037) | (0.022) | (0.023) |
| Log employment | 0.017*** | 0.018*** | 0.006 | 0.005 |
| | (0.006) | (0.006) | (0.004) | (0.004) |
| Share Exposed | -0.056 | -0.084* | -0.284*** | -0.301*** |
| | (0.047) | (0.050) | (0.058) | (0.061) |
| Log income | 0.123** | 0.119** | 0.004 | 0.004 |
| | (0.050) | (0.051) | (0.041) | (0.044) |
| $\Delta_{91,99}$ CH Import Penetration | 1.007** | 1.016** | -0.112 | 0.357 |
| | (0.472) | (0.504) | (0.574) | (0.656) |
| $\Delta_{91,99}$ HMDA loan origination | 0.013*** | 0.014*** | -0.002 | -0.003 |
| | (0.003) | (0.003) | (0.003) | (0.004) |
| # Home Purchase Denials Rate | 0.016 | | | |
| | (0.034) | | | |
| $ Home Purchase Denials Rate | | 0.122*** | | |
| | | (0.038) | | |
| # Home Refinancing Denials Rate | | | 0.543*** | |
| | | | (0.055) | |
| $ Home Refinancing Denials Rate | | | | 0.523*** |
| | | | | (0.062) |
| Census controls | Yes | Yes | Yes | Yes |
| Weights | Pop. | Pop. | Pop. | Pop. |
| Observations | 733 | 733 | 733 | 733 |
| $R^2$ | 0.558 | 0.562 | 0.494 | 0.401 |

**Note:** This table presents the results of cross-sectional regressions of denials rate on loan applications in 2007 on our proxy for import competition, at the commuting zone level. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table A.6**
Shipping Costs and Growth in Residential Building Permits

| | Panel A: $\Delta_{2000-07}$ Log buildings | | | | Panel B: $\Delta_{2000-07}$ Log units | | | |
|---|---|---|---|---|---|---|---|---|
| Shipping costs | 13.303*** | 3.348* | 1.644 | 1.494 | 10.567*** | 5.793** | 2.564 | 2.342 |
| | (2.175) | (1.916) | (1.942) | (1.851) | (2.413) | (2.320) | (2.330) | (2.131) |
| $\Delta$ HPI | | | | 0.619** | | | | 0.917*** |
| | | | | (0.277) | | | | (0.302) |
| Log employment | | 0.313* | 0.468*** | 0.667*** | | 0.059 | 0.321* | 0.616** |
| | | (0.171) | (0.166) | (0.222) | | (0.258) | (0.187) | (0.248) |
| Share Exposed | | -0.329 | -0.210 | 0.305 | | -0.511 | -0.430 | 0.333 |
| | | (0.393) | (0.446) | (0.422) | | (0.453) | (0.515) | (0.429) |
| Log income | | -0.380* | 0.103 | 0.189 | | -0.533* | 0.405 | 0.531 |
| | | (0.202) | (0.281) | (0.294) | | (0.290) | (0.383) | (0.380) |
| Log Debt | | -0.361* | -0.576*** | -0.787*** | | -0.024 | -0.378* | -0.691** |
| | | (0.186) | (0.189) | (0.242) | | (0.305) | (0.220) | (0.272) |
| DTI | | 0.288* | 0.343** | 0.376** | | -0.038 | -0.035 | 0.013 |
| | | (0.163) | (0.133) | (0.146) | | (0.331) | (0.194) | (0.178) |
| $\Delta_{91,99}$ HMDA loan origination | | 0.039* | -0.005 | 0.003 | | 0.065* | 0.002 | 0.014 |
| | | (0.024) | (0.027) | (0.022) | | (0.036) | (0.033) | (0.025) |
| $\Delta_{91,99}$ CH Import Penetration | | -4.562 | -6.048 | -9.273* | | -1.117 | -1.972 | -6.749 |
| | | (7.278) | (6.497) | (5.281) | | (8.574) | (6.991) | (4.944) |
| Census controls | No | No | Yes | Yes | No | No | Yes | Yes |
| Weights | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. |
| Observations | 694 | 694 | 694 | 694 | 694 | 694 | 694 | 694 |
| $R^2$ | 0.111 | 0.274 | 0.347 | 0.394 | 0.062 | 0.101 | 0.259 | 0.351 |

**Note:** This table presents the results of cross-sectional regressions of residential building permit growth from 2000Q4 to 2007Q4 on our proxy for import competition, at the commuting zone level. We measure growth in residential housing in two ways: as the log change in building and as the log change in units. The coefficient of interest estimates differential exposure to import competition, as proxied by the weight-to-value ratio. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table A.7**
Import Competition and Corporate Debt Growth

| | $\Delta_{2000-07}$ Log corporate debt | | | |
|---|---|---|---|---|
| Shipping costs | -1.803 | -0.384 | -0.289 | -0.391 |
| | (1.648) | (1.122) | (1.164) | (1.161) |
| $\Delta$ HPI | | | | 0.397*** |
| | | | | (0.088) |
| Log employment | | -0.250** | -0.329*** | -0.202* |
| | | (0.116) | (0.115) | (0.113) |
| Share Exposed | | -1.638*** | -1.536*** | -1.212*** |
| | | (0.277) | (0.280) | (0.272) |
| Log income | | -0.350** | -0.315 | -0.262 |
| | | (0.162) | (0.252) | (0.241) |
| Log Debt | | 0.278** | 0.325*** | 0.190 |
| | | (0.119) | (0.122) | (0.121) |
| DTI | | 0.195* | 0.112 | 0.132 |
| | | (0.100) | (0.100) | (0.104) |
| $\Delta_{91,99}$ HMDA loan origination | | 0.037** | 0.029* | 0.034** |
| | | (0.016) | (0.016) | (0.015) |
| $\Delta_{91,99}$ CH Import Penetration | | -3.033 | -2.962 | -4.965** |
| | | (2.829) | (2.332) | (2.258) |
| Census controls | No | No | Yes | Yes |
| Weights | Pop. | Pop. | Pop. | Pop. |
| Observations | 733 | 733 | 733 | 733 |
| $R^2$ | 0.004 | 0.366 | 0.412 | 0.451 |

**Note:** This table presents the results of cross-sectional regressions of the growth in small business loans from 2000 to 2007 on our proxy for import competition, at the commuting zone level. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table A.8**
Shipping Cost and Loan Applications (HMDA), Number of loans, CZ level

| | $\Delta_{2000-07}$ Log Originated Loans | | | |
|---|---|---|---|---|
| | Home Purchase | | Refinancing | |
| | (1) Number (#) | (2) Value ($) | (3) Number (#) | (4) Value ($) |
| Shipping costs | -0.739 | -0.440 | -2.422* | -2.905* |
| | (1.089) | (1.263) | (1.448) | (1.634) |
| Δ HPI | -0.122 | 0.285*** | 0.736*** | 1.064*** |
| | (0.076) | (0.093) | (0.071) | (0.084) |
| Log employment | 0.146*** | 0.085 | 0.161** | 0.095 |
| | (0.048) | (0.061) | (0.079) | (0.082) |
| Share Exposed | -1.319*** | -1.457*** | -0.855** | -1.432*** |
| | (0.270) | (0.329) | (0.373) | (0.451) |
| Log income | -0.449** | -0.240 | -0.320 | 0.020 |
| | (0.190) | (0.287) | (0.306) | (0.263) |
| Log(# Home Purchase Loans) | -0.215*** | | | |
| | (0.051) | | | |
| Log($ Home Purchase Loans) | | -0.156** | | |
| | | (0.062) | | |
| Log(# Refinancing Loans) | | | -0.214*** | |
| | | | (0.061) | |
| Log($ Refinancing Loans) | | | | -0.138** |
| | | | | (0.057) |
| Census controls | Yes | Yes | Yes | Yes |
| Weights | Pop. | Pop. | Pop. | Pop. |
| Observations | 735 | 735 | 734 | 734 |
| $R^2$ | 0.258 | 0.314 | 0.580 | 0.680 |

**Note:** This table presents the results of cross-sectional regressions of growth in loan originations separately for refinancing loans and for other types of loans from 2000Q4 to 2007Q4 on our proxy for import competition, at the commuting zone level. Growth in loan applications is measured as the log change in the number of loan applications. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table A.9**
Import Competition and Home Prices

| | $\Delta_{2000-07}$ Home Price Index | | | |
|---|---|---|---|---|
| Shipping costs | -1.350 | 1.466* | 0.993 | 0.257 |
| | (1.278) | (0.799) | (0.976) | (0.811) |
| $\Delta$ HPI | | | | |
| Employment | | -0.440*** | | -0.320*** |
| | | (0.102) | | (0.101) |
| Share Exposed | | -0.744*** | | -0.816*** |
| | | (0.202) | | (0.204) |
| Income | | -0.476*** | | -0.134 |
| | | (0.131) | | (0.188) |
| 1999 Debt | | 0.485*** | | 0.339*** |
| | | (0.111) | | (0.110) |
| 1999 DTI | | -0.115 | | -0.050 |
| | | (0.125) | | (0.102) |
| $\Delta$_91, 99 HMDA loan origination | | 0.005 | | -0.013 |
| | | (0.013) | | (0.013) |
| $\Delta$_91, 99 CH Import Penetration | | 5.350* | | 5.042** |
| | | (3.058) | | (2.516) |
| Census controls | No | No | Yes | Yes |
| Weights | Pop. | Pop. | Pop. | Pop. |
| Observations | 733 | 733 | 733 | 733 |
| $R^2$ | 0.005 | 0.425 | 0.389 | 0.501 |

**Note:** This table presents the results of cross-sectional regressions of the change in the Home Price Index from 2000 to 2007 on our proxy for import competition, at the commuting zone level. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

## Table A.10
Import Competition and Household Debt Growth - Robustness

| | $\Delta_{2000-07}$ Log debt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Alternative Proxies for Import Competition | | | | Alternative Specifications for SC | | | | | | |
| | | | | | Industry controls | SC based on CH imp. | SC excl. Comp. equip. | Excluding California | Coastal region dummy | Canflaz dummy | SC+tariffs |
| Instr. CZ import exposure, 99-07 | 0.021* | | | | | | | | | | |
| | (0.011) | | | | | | | | | | |
| NTR gap | | 0.320** | | | | | | | | | |
| | | (0.148) | | | | | | | | | |
| Gravity residual | | | 0.040** | | | | | | | | |
| | | | (0.020) | | | | | | | | |
| Emp share of textile | | | | 0.803** | | | | | | | |
| | | | | (0.312) | | | | | | | |
| Shipping Costs | | | | | -2.495*** | -0.912** | -1.709*** | -2.312*** | -2.704*** | -1.926*** | -1.592** |
| | | | | | (0.620) | (0.382) | (0.628) | (0.679) | (0.657) | (0.587) | (0.676) |
| Census controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Weights | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. |
| Observations | 715 | 733 | 733 | 733 | 733 | 731 | 733 | 715 | 733 | 733 | 733 |
| $R^2$ | 0.507 | 0.475 | 0.474 | 0.474 | 0.500 | 0.475 | 0.476 | 0.459 | 0.539 | 0.620 | 0.479 |

**Note:** This table presents the results of cross-sectional regressions of debt growth from 2000Q4 to 2007Q4 on alternative proxy for import competition, at the commuting zone level. We measure change in debt two ways: first as a log change and second as a change in debt to income ratio. The coefficient of interest estimates differential exposure to import competition, as proxied by (i) the Acemoglu et al. (2016) instrument for the change in CZ's average import exposure over the period 1999-2007, (ii) the NTR gap, namely, the difference between the non-NTR (normal trade relations) rates applied to non-market economies, and the NTR tariff rates (Pierce and Schott, 2012), and (iii) the residual of gravity regressions. The instrument for the change in CZ's average import exposure over the period 1999-2007 used in Columns (1) and (4) - available on David Dorn's website - is an employment-weighted average of annualized changes in exposure to Chinese imports with commuting zones, where import exposure in each industry is instrumented using the growth in imports from China in each other high-income countries excluding the Unties States. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

**Table A.11**
Import Competition and Unemployment Insurance

| | Unemployment growth | | $\Delta_{2000-07}$ Log debt | | $\Delta_{2000-07}$ DTI | |
|---|---|---|---|---|---|---|
| | High UI | Low UI | High UI | Low UI | High UI | Low UI |
| Shipping costs | -3.309** | -3.364** | -0.971 | -3.637*** | -1.269 | -4.925** |
| | (1.313) | (1.475) | (0.777) | (1.043) | (1.175) | (2.118) |
| Census controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Weights | Pop. | Pop. | Pop. | Pop. | Pop. | Pop. |
| Observations | 309 | 311 | 309 | 311 | 309 | 311 |
| $R^2$ | 0.432 | 0.414 | 0.476 | 0.562 | 0.493 | 0.615 |

**Note:** This table presents the results of cross-sectional regressions of the growth in unemployment, income and household debt, at the commuting zone level interacted with the level of unemployment insurance benefits. The coefficient of interest estimates differential exposure to import competition, as proxied by shipping costs. Census controls are commuting zone level variables for the vacancy rate, percent white, percent black, share with education <high school, share with high school diploma only, unemployment rate, poverty rate, and percent urban, all coming from the 2000 census. Robust standard errors are presented in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.