A Rising Tide? The Local Incidence of the Second Wave of Globalization*

Rowena Gray[†] and Greg C. Wright[‡]

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Abstract

We estimate the short- and long-run local labor market impacts of the large increase in U.S. imports and exports that occurred during the 1970s. We exploit the sequential opening of overseas shipping container ports over the period to identify the effects, and interpret the local average treatment effect as reflecting the relative impact of containerization on local standards of living, which we find to be positive in both the short and long run. We show that the positive impact of the *export* shock on employment, income, and home and rental prices is large, but short-lived, suggesting that U.S. local labor markets equilibrated quickly. The negative *import* effects are also large and mostly short-lived, but we find strong persistence in the impact on home and rental prices. We show that this is due to the fact that the housing stock is durable and so does not easily contract. This leads to asymmetric adjustment costs for the housing stock that have important welfare implications.

Key Words: Containerization; International Trade; Globalization; Housing Durability

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[†]Gray: Department of Economics, University of California Merced. Email: rowenaegray@gmail.com.

[‡]Wright: Department of Economics, University of California, Merced. Email: gwright4@ucmerced.edu.

1 Introduction

An important topic in current policy debates is the effect that international trade has on standards of living. While this topic has received a great deal of attention, the focus of the literature has been almost exclusively on the short-run impact of trade shocks. Very little is known about the long-run consequences, which may or may not be different than the short-run consequences. We provide new evidence on the short- and long-run labor market effects of a trade shock. In doing so, we highlight the important role played by the housing market in generating an asymmetry between the local impact of exports versus imports as well as in generating heterogeneity in impact across labor markets.

Our research design exploits the fact that the decade of the 1970s witnessed a doubling in the share of international trade in U.S. GDP, from four to eight percent, beginning what would become known as the second wave of globalization (see Figure 1). This was also a period during which the U.S. economy experienced trend breaks in key economic variables. Among other lasting impacts, these changes led to increasing concentration of income among top earners living in certain parts of the country, to which globalization may have contributed. We explore this possibility by exploiting the rapid growth in trade during this period, which was driven in part by the widespread adoption of shipping containers to transport goods and the complementary investments in port and rail technologies that accompanied it.[1] The spread of these technologies was rapid – the share of U.S. trade that could be feasibly shipped via container grew from 16 percent to over 95 percent during the 1970s – generating growth in trade that was roughly balanced between imports and exports and that was driven by increased trade with a diverse set of countries.[2]

Since foreign adoption of container port technologies occurred quickly and was effectively complete by 1980, the sequence of port technology adoption around the world provides a well-defined, short-run historical shock that we can exploit in an impulse-response research design. To do this, we exploit two features of this historical episode: first, the adoption of container port technologies in a foreign country generated a sudden and discontinuous rise in bilateral trade flows between the U.S. and that country (see Figures 2a and 2b); and second, the variation in trade flows due to the new port technologies differentially affected local labor markets in the U.S. due to differences in their pre-period industrial composition. We then use this variation to estimate the contemporaneous (1970-1980), medium-run (1970-1990), and long-run (1970-2000) impact of export and import exposure on employment, income and home and rental prices across labor markets. In short, motivated by a simple gravity model of international trade we predict growth in bilateral exports and imports using indicators for whether a foreign country has adopted container-friendly port technologies in each year, conditional on

[1] See, e.g., Bernhofen et al. (2016) who estimate the contribution of containerization of trade flows to global trade growth over this period. The late 1960s and early 1970s also saw the phase in of the Kennedy Round of negotiations as part of the General Agreement on Trade and Tariffs (GATT). So policy changes undoubtedly generated some portion of this trade growth.

[2] Over the period 1966 to 1980, U.S. imports rose by a factor of 10 and exports by a factor of 8; by comparison, over the 1991 to 2007 period imports from China rose by a factor of 11.5 (see Autor et al. (2013)).

other structural variables. We then use these predicted trade flows to construct plausibly exogenous measures of local exposure to import and export shocks following Autor et al. (2013), which we then use as instruments for actual import and export exposure (constructed using observed trade flows). As a robustness check, we generate the predicted trade flows using a "double-lasso" approach (Belloni et al. (2012)), a method to select the best predictors of the dependent variable without over-fitting. This approach produces very similar results and uses a different source of underlying variation, which helps alleviate concerns about our use of shift-share instruments (see Borusyak et al. (2018), Goldsmith-Pinkham et al. (2018), and Adao et al. (2019b)).[3]

We begin by presenting a simple spatial equilibrium model in which workers migrate across labor markets in response to shocks up to the point that the real wage is equalized across markets (Roback (1982)). A key feature of our model is the housing supply function, which exhibits a kink at the current level of supply, as in (Figure 3). This implies that there are significant costs associated with reducing the housing stock in the face of a swift decline in demand for housing – i.e., it implies that the housing stock is durable – an observation first modeled by Glaeser and Gyourko (2005) and that is explored more recently by Notowidigdo (2020). With a kinked housing supply function, the magnitude of employment gains due to a positive labor demand shock exceeds the magnitude of employment losses due to an equivalently-sized negative labor demand shock. This is because in the face of a positive shock the inflow of workers required to re-equilibrate the real wage across markets is larger than the outflow required due to a negative shock. In the Notowidigdo (2020) model these outflows are rapid and rents adjust downward instantaneously; in contrast, in Glaeser and Gyourko (2005) workers are tied to their homes, so that a negative shock leads to an outflow of workers at the rate of depreciation of the housing stock, leading to a slow and persistent decline in local employment and rents over time. We allow for the possibility of either outcome.

Our results support several specific features of our spatial model, with important implications for the impact of trade shocks on standards of living. First, we provide direct empirical evidence for the kinked housing supply function by documenting that the housing stock readily expands in the face of the export shock, but shows no sign of contraction due to the import shock. We also find that the effects of import competition on employment, home prices, and rents show evidence of persistence, implying a divergence of the short- and long-run outcomes due to the durability of the housing stock. Second, the impact of the export shock on standards of living is a function of the local rate of home ownership as well as the local housing supply elasticity, which we show varies across labor markets at quantities above current supply but is relatively fixed below current supply. We show that these features are highly correlated across labor markets, which concentrates the outcomes of the trade shock geographically beyond the concentration that arises due to markets' differential exposure to the trade shock. Third, all outcomes diminish over time, indicating an equilibration of labor markets that is consistent

[3]The use of predicted trade flows also mitigates possible bias due to the use of the shift-share instruments (see Borusyak et al. (2018)).

with much of the labor literature, which tends to find that factor movement mitigates the impact of local shocks. At the same time, it diverges somewhat from recent findings from Dix-Carneiro and Kovak (2017) who explore a similar time period and find that Brazilian regions that were hit relatively hard by a trade liberalization episode experienced income effects that steadily grew over time.[4]

Overall, we find that the relative short- and long-run gains from export exposure outweigh the losses due to import exposure. We estimate that the export shock raised manufacturing sector employment by 550,000 workers over the decade of the 1970s – the containerization period, and what we consider the short run – whereas the import shock reduced employment by around 300,000 workers for a net gain of around 250,000 jobs.[5] In addition, the net impact of exposure to exports and imports over this short-run period was to raise relative median income by $1279 while also raising relative median home and rental prices by $286 and $18, respectively. This highlights the important role of home-ownership rates in determining purchasing power changes, as these changes represent gains for incumbent property owners and losses for renters and future property owners. Over the long run, the results point to smaller net increases in home and rental prices as persistent import effects drag down the gains due to the export shock. This long-run pattern implies a slow transfer of wealth from home owners to renters and future home buyers due to the persistent effects of exposure to import competition.[6]

We find further evidence for the spatial model when exploring heterogeneity in local housing supply elasticities, which we proxy with highly disaggregated differences in land unavailability from Lutz and Sand (2017).[7] Intuitively, we find that locations with a larger housing supply elasticity see larger adjustments in home and rental prices due to the export shock. In contrast, the size of the local housing supply elasticity has little relationship to the home and rental price response to the import shock, consistent with the idea that the housing supply cannot contract regardless of the size of this elasticity. We calculate that the housing and rental supply elasticities due to the export shock (i.e., due to an outward shift in demand) are around 1.3 and 1.8, respectively, while the elasticities due to the import shock (i.e., due to an inward shift in demand) are both around zero, consistent with a kinked housing supply function.

Finally, noting that our estimates reflect the *direct* effects of the trade shock, we also calculate the magnitude of the *indirect* effects associated with worker migration across labor markets in response to the shock. Our approach here is similar to Hornbeck and Moretti (2018) but differs in that we allow for a kinked housing supply

[4]It is difficult to know exactly what explains these divergent findings, but one possibility is that U.S. capital and labor markets may have been more integrated geographically over the period we examine relative to labor markets in Brazil. Undoubtedly, the difference in findings points to the importance of specific institutional and geographic barriers in mediating the effects of trade shocks.

[5]The manufacturing sector grew by around one million jobs over the period

[6]Interestingly, these findings contrast with Feyrer (2009) who finds that the positive effect on GDP due to the opening of the Suez Canal was equal in magnitude to the negative effect due to the closing of the Canal. Donaldson (2015) points out that while this result is consistent with standard static models of trade, the Feyrer (2009) result is inconsistent with a dynamic model in which physical or human capital investments respond positively to increased trade, but do not immediately decline when trade ceases – i.e., a model with asymmetric factor adjustment costs. Here we are focused on export versus import competition, rather than levels of trade openness as in Feyrer (2009), but we indeed find evidence that (housing) capital adjustment costs are asymmetric.

[7]Recent related work that exploits heterogeneity in housing supply elasticities includes Hornbeck and Moretti (2018), Monte et al. (2018), and Monte (2015).

function and simultaneously consider both positive (export) and negative (import) shocks. We find that the cumulative magnitude of the indirect effects are large and important, equal to approximately 44 percent of the direct effects.[8]

The local labor market effects of international trade have been explored in many recent papers, for instance Topalova (2010), Acemoglu et al. (2016), Autor et al. (2013), and Hakobyan and McLaren (2016). These papers tend to focus exclusively on the effects of import competition, driven either by foreign shocks or changes in trade policy. Kovak (2013) is similar and focuses on a trade liberalization period, though does not separate import from export effects. Feenstra et al. (2019) and Feenstra and Sasahara (2018) are examples of work that incorporate both export and import exposure due to Chinese and global economic growth, with both papers focusing on employment outcomes in the short run. Also similar to our paper, Monte (2015) focuses on the impact of trade shocks on standards of living across local labor markets. He also finds rapid equilibration across markets, finding that there is little relationship between local import exposure and the real wage due to the fact that changes in local prices and commuting patterns offset changes in nominal income. Also related to our work, Adao et al. (2019a) estimate the aggregate (direct and indirect) effects of labor market exposure to shocks. Other recent work has explored the role of new port technologies during this era. For instance, Bernhofen et al. (2016) estimate the contribution of new port technologies to the rise in global trade over the containerization period, while Ducruet et al. (2020) and Brooks et al. (2018) consider port development as a shock to the local economy that is hosting the port. Our paper departs from this literature by simultaneously focusing on export and import exposure due to a global technological shock, by exploring the impact on housing markets, and by estimating the indirect effects along with the direct effects over the short and long run.

The paper is organized as follows. We outline our conceptual framework in Section 2. In Section 3 we outline our research design, including the dataset and identification strategy. In Section 4 we report our estimates of the direct effects of import and export exposure on local labor markets, including heterogeneity in these effects due to differential housing supply elasticities. Section 5 concludes.

2 Theoretical Framework

We consider the canonical Rosen-Roback model of spatial equilibrium in which agents are mobile across labor markets and choose their location to balance income and amenities against housing costs. Hornbeck and Moretti (2018) present a version of the model in order to characterize the impact of Total Factor Productivity (TFP) shocks in a location on income and housing costs in that location (the direct effect) as well as in other locations that are impacted via the general equilibrium movement of workers (the indirect effect), and we follow a similar

[8]This is a bit larger than the 38 percent that Hornbeck and Moretti (2018) report as arising from indirect effects due to TFP shocks, and a bit smaller than Adao et al. (2019a), who find indirect effects equal to about half the aggregate effect.

approach here.[9] The equilibrium in this model straightforwardly relates employment, wages and housing costs to the labor supply elasticity and the housing supply elasticity in a location, and demonstrates that the standard of living consequences of a local shock depend on their relative magnitudes. For example, when labor is supplied relatively inelastically compared to housing then productivity shocks accrue more to workers relative to home owners.[10] Of course, in practice workers may or may not be home owners themselves, and the share of home ownership in a location will matter for the aggregate impact of a shock on local standards of living.

We consider the joint impact of import and export shocks to local labor markets. Much like a TFP shock, import (export) exposure shifts the demand for labor and housing in (out). Autor et al. (2013) present a general equilibrium model of local labor market exposure to a trade shock, which they model as arising from productivity growth in a foreign trading partner or a fall in trade costs. In contrast to Hornbeck and Moretti (2018), the model rules out migration across labor markets, but relaxing this assumption would lead to labor-market-level outcomes that are identical to those associated with a local TFP shock.[11] This is the framework we have in mind here, in which local labor markets are differentially exposed to import and export shocks leading to a net inward or outward shift in the demand for labor and housing.

Where we depart from these models is in our treatment of the housing supply function. Since most studies focus on uni-directional demand shocks – such as TFP growth in Hornbeck and Moretti (2018), or import competition in Autor et al. (2013) and the related "China shock" literature – it is natural in those cases to focus on a subset of the supply curve either above or below the current level of supply, depending on whether demand is shifting in or out. In our case, we simultaneously consider positive and negative demand shocks arising from export and import exposure, respectively, and so we follow Glaeser and Gyourko (2005) in adopting the more realistic assumption that the housing supply function has a kink at the current level of supply (see Figure 3). This is because the housing stock is durable and can contract only via slow depreciation over the long run. Thus, when the demand for housing shifts out the housing supply response is governed by an elasticity that exceeds the elasticity that governs the response to an inward shift in the demand for housing. One consequence is that inward shifts in the demand for housing may lead to relatively large and persistent drops in home and rental prices, with important consequences for local standards of living.

[9] The TFP shocks in their model are by definition factor neutral, and hence shift the demand for all labor types uniformly. In contrast, we jointly consider import and export shocks that may be factor augmenting; however, in our data we observe only a single aggregate labor type and, as a result, we set aside this distinction.

[10] In Section 4.3 we calculate the implied housing supply elasticities from our regression estimates.

[11] The within-labor-market dynamics are quite different. The Autor et al. (2013) model includes two tradeable differentiated-goods sectors and a non-tradable sector. Differential productivity growth, or trade cost reductions, in the two tradable sectors in the foreign country (e.g., China) lead to reallocations of labor across the sectors in the home country local labor market. When the local labor market has a trade imbalance (expenditure and income diverge in the labor market) then there is labor reallocation across tradeables and non-tradeables as well, a prediction we find evidence for in Section 4.1. Extending the model to allow for cross-labor-market migration would lead to additional movement of workers across markets in order to equalize the real wage in all locations.

3 Research Design

We explore the impact of the rapid expansion in U.S. trade beginning in the late 1960s on employment, home prices and rents, and nominal income. To do this, we estimate three separate specifications capturing the local projection (Jordà (2005)) of the shock on outcomes across 722 U.S. Commuting Zones (CZs), l, over the short, medium and long run. These impulse-response specifications are given by the following:

$$y_{lt} - y_{l,1970} = \beta_t^x \triangle E_{l,66-80}^X + \beta_t^m \triangle E_{l,66-80}^M + \gamma_t MS_{l,1959} + \omega_t \big(y_{l,1970} - y_{l,1960}\big) + \alpha_s + \epsilon_{lt} \tag{1}$$

where y_{lt} is the log value of a local outcome and $\{\beta_t^x, \beta_t^m\}$ are the effects of export and import exposure, respectively, for $t \in \{1980, 1990, 2000\}$. The variables $\triangle E^X$ and $\triangle E^M$ represent the change in export and import exposure in a CZ over the containerization period, 1966 to 1980; α_s are state fixed effects to control for state-specific policy variation; and $\big(y_{l,1970} - y_{l,1960}\big)$ are pre-period decadal changes in the outcome variables. We also control for the output share of manufacturing in 1959, $MS_{l,1959}$, in order to focus on variation due to differences in the industry mix *within* the manufacturing sector across CZs. We weight observations by the start-of-period (1959) CZ employment. We note that the outcomes vary across specifications – reflecting contemporaneous, medium-run, and long-run changes – but the treatment variables do not. As a result, the estimated effects can be interpreted as the contemporaneous-, medium-, and long-run impulse-responses to the common trade shock, where the impulse is sudden and large and effectively over by 1980.

3.1 Data and Variable Construction

Our measures of export and import exposure are constructed as in Acemoglu et al. (2016), and are given by:

$$\triangle E_{l,66-80}^X = \sum_j \frac{L_{lj,1959}}{L_{l,1959}} \frac{\triangle X_{j,66-80}}{Y_{j,1959}} \tag{2}$$

$$\triangle E_{l,66-80}^M = \sum_j \frac{L_{lj,1959}}{L_{l,1959}} \frac{\triangle M_{j,66-80}}{\big(Y_{j,1959} - X_{j,1959} + M_{j,1959}\big)} \tag{3}$$

where L_{lj} is employment in CZ l and four-digit Standard Industrial Classification (SIC) industry j and Y_j is total shipments in industry j. The denominator in (3) is therefore industry absorption. In words, the national-level change in export share of industry output, or industry import penetration, over the period 1966 to 1980 is allocated to local labor markets according to the relative importance of each industry in the local market in 1959. These industry values are then summed up to the local labor market level (with employment weights that sum to 1).

We obtain values for employment in a four-digit SIC industry and county ($L_{lj,1959}$) from the County Business Patterns (CBP) for 1959,[12] 1960, 1970, 1980, 1990, and 2000.[13] National industrial output data for 1959 ($Y_{j,1959}$) come from the National Bureau of Economic Research, Center for Economic Studies (NBER-CES) Manufacturing Industry Database. Our use of 1959 shares, before the start of the sample period, follows the best practice for shift-share estimators outlined in Goldsmith-Pinkham et al. (2018). Values for U.S. imports and exports by origin and destination across four-digit SIC industries over the period 1966 to 1980 come from Feenstra et al. (2005) and are deflated using the Personal Consumption Expenditure (PCE) price index to 2012 values.[14] Figures 5a and 5b plot the distribution of the measures (2) and (3) across U.S. CZs. One key fact highlighted by the Figures is the very different geographic distributions of export versus import exposure, which will be useful for identifying their relative impacts.

Our outcome variables of interest are at the commuting zone (CZ) level, which is aggregated from the underlying county-level data as in Autor et al. (2013).[15] These variables are decadal total employment, drawn from the CBP with missing values interpolated via the fixed point algorithm used by Autor et al. (2013); decadal median housing prices and rents, drawn from the Census of Housing and Population (CHP) in each decade from 1960 to 2000; and decadal median income from the CHP, again over the period 1960 to 2000. Values are deflated using the 2012 PCE.

In the construction of our instrumental variables, described in the next section, we exploit data from several additional sources. Our main variation comes from the sequence of international port and rail expansions over what we consider to be the "containerization period", 1966 to 1980.[16] Over this period countries around the world progressively upgraded their port and transportation infrastructure to varying degrees in order to efficiently handle shipping containers. The year in which each country became capable of handling containers is obtained from Bernhofen et al. (2016), who compiled these data from the *Containerization International Yearbook*. Figure 6 documents the sequence of major port openings along with total (imports plus exports) U.S. trade with each country in the year in which the container port opened. This containerization indicator – denoted $Port_{ct}$, where c is country of origin or destination – is set to 1 in the year in which either the country's port or rail infrastructure is able to handle shipping containers (and is 1 in all subsequent years). By including rail capability the indicator allows for variation due to rail traffic that may be linked to container-ready ports in other countries, such as Rotterdam in Europe (a major hub of container traffic); however, the results are almost entirely invariant to the use of a "port-only" (no rail) indicator. Finally, we drop Canada and Mexico from the sample since trade with these countries clearly relies on a large number of land border crossings, which

[12] We obtain the 1959 data from the Hathi Trust, which provides these data in PDF format, which we digitized.

[13] The 2000 and 2010 CBP data are converted to U.S. SIC industries using a concordance from Pierce and Schott (2012).

[14] One nice feature of the data is that both the CBP and trade data are reported at the SIC 4-digit level, so the match is very clean, minimizing measurement error. When matching to 1959 data we do have to concord the CBP data to the 1972 SIC classification, which requires relatively minor adjustments.

[15] The county-to-CZ concordances are from David Dorn: http://www.ddorn.net/data.htm

[16] Globally the containerization period was 1966 to 1983, but U.S. trade flows were 97 percent containerized by 1980.

mitigates the impact of ports. Trade with these countries is also more likely to be endogenous to economic conditions in U.S. local labor markets.

When constructing our instrumental variables, we sometimes include interactions of the containerization indicators with distance to the foreign country, bilateral tariffs, and other standard bilateral gravity measures, which we obtain from Fouquin et al. (2016). We also include interactions with an indicator for whether a product is able to be containerized or not, again obtained from Bernhofen et al. (2016). Non-containerizable products include, for example, finished autos and certain steel products and constitute 20 percent of total U.S. trade, on average, over the period. Importantly, this indicator is drawn from a 1968 analysis by the German Engineer's Society and so pre-dates the subsequent rapid growth in container traffic. In Section 3.2.3 we further exploit the non-containerizability of some products as a placebo test of our research design.

Table 1 presents summary statistics for the main trade exposure variables along with the main dependent variables, each of which is multiplied by 100 throughout for ease of interpretation. We note that the distribution of both trade exposure variables across CZs is such that a 5 percentage point difference in either import or export exposure is approximately equal to the difference in exposure between the CZ at the 90th percentile and the CZ at the 10th percentile. We sometimes provide this context in interpreting our estimates. In an absolute sense, the change in trade exposure over the period 1966 to 1980 was large, with U.S. imports rising by a factor of 10 and exports by a factor of 8; by comparison, over the 1991 to 2007 ("China shock") period imports from China rose by a similar factor of 11.5 (see Autor et al. (2013)). On average, CZs saw a change in export and import exposure over the 1966-1980 period of 2.02 and 2.24 percentage points, respectively. There is significant skewness to the distribution as evidenced by the much smaller median values. The 1970s also saw rapid growth in all of the outcome variables, particularly home prices and rents, with later years seeing more moderated growth (or declines in the case of manufacturing employment).

3.2 Identification

Our outcomes of interest are at the U.S. local labor market level. As a result, in specification (1) the exclusion restriction will be violated if shocks to local labor markets within a state and CZ are systematically correlated with both the extent of local exposure to imports and exports as well as with the error term (and not absorbed by the pre-trend controls or the manufacturing share in 1959). For instance, increasing efficiency gains due to automation in some industry may generate new U.S. exports in CZs in which those industries are active, while also directly affecting labor market outcomes in those CZs.

Motivated by a model of bilateral trade, we address these threats to identification by exploiting the plausibly exogenous opening of foreign container ports around the world over the period 1966 to 1980. Due to the large fixed costs associated with building container-ready port and transportation infrastructure, most countries were reluctant to make these investments until there were sufficient container-friendly shipping routes already in place. As a result, early U.S. investments in container infrastructure along the Eastern seaboard and, later, investments by Western European countries were critical to developing the shipping routes that would spur subsequent investments by other countries. This led to a progressive opening of container-ready ports around the world over the period, as documented in Figure 6. As Table 6 documents, the main U.S. trading partners were early adopters so that by 1972 80 percent of U.S. trade went via container-friendly ports. This, of course, limits the temporal variation available due to the timing of port openings. At the same time, we show in Section 3.2.4 that port openings had very different impacts *across* countries due to differences in the distance to the U.S. and the level of bilateral trade policy barriers in place. Furthermore, as noted, some products were not containerizable, which meant that products were differentially affected by new container ports, leading to shifts in the composition of foreign trade with the U.S. Overall, these sources of heterogeneity generated substantial variation in CZ exposure to container-port driven trade (e.g., see Figures 5a and 5b).

The impact of the opening of a container port on trade flows was large and immediate. We see this in Figures 2a and 2b where we plot log bilateral exports and imports between the U.S. and its trading partners as a function of the time since the foreign partner adopted container infrastructure, where $t = 0$ is the year of adoption. Clearly there is a marked increase in both exports and imports (larger for exports) in the year in which the foreign port began handling containers. This discontinuity is the key variation that we exploit in our empirical strategy.

3.2.1 Instrumental Variable Strategy

Our approach is to instrument for observed local exposure to imports and exports over this period with *predicted* exposure. To do this, we first note that in (2) and (3) the potentially endogenous components are the values $\triangle X_{j,66-80} = \sum_c \sum_{t=67}^{80} \triangle X_{jc,t:t-1}$ and $\triangle M_{j,66-80} = \sum_c \sum_{t=67}^{80} \triangle M_{jc,t:t-1}$, respectively, where we have simply written the change in total exports over the period as the sum over the annual changes across individual export destinations (c), and similarly for imports. Our goal is to generate predicted bilateral exports and imports between the U.S. and its trading partners in each year, $\hat{X}_{jct}$ and $\hat{M}_{jct}$, by isolating variation that is exogenous to U.S. local labor market conditions. These can then be summed over to get the predicted values $\widehat{\triangle X}_{j,66-80}$ and $\widehat{\triangle M}_{j,66-80}$, which will be used to construct new versions of (2) and (3) that will serve as instruments for the original measures.

To generate the predicted trade flows, $\hat{X}_{jct}$ and $\hat{M}_{jct}$, we start with the symmetric Constant Elasticity of Substitution (CES) equilibrium condition for exports from the U.S. to country c relative to those from some third country i to c, similar to Romalis (2007) and Feenstra et al. (2019). A related condition holds for *imports* into the U.S. from country c and is also presented below. This approach allows us to derive our predicted flows structurally while also highlighting the sources of potential endogeneity. In Section 4.2.2 we present an alternative, non-structural approach using the double-LASSO method (Belloni et al. (2012)). The CES export ratio is given by:

$$\frac{X_{jvt}^{US,c}}{X_{jvt}^{i,c}} = \left(\frac{c_{jt}^{US} t_{jt}^{US,c}}{c_{jt}^{i} t_{jt}^{i,c}}\right)^{1-\sigma} \tag{4}$$

where $X_{jvt}^{US,c}$ and $X_{jvt}^{i,c}$ are exports from the U.S. or country i to c of product variety v in industry j and year t; c_{jt}^{i} is the industry-specific marginal costs of production in country i; $t_{jt}^{i,c}$ are industry-specific, bilateral iceberg trade costs between i and c; and σ is the elasticity of substitution. Assuming that there are N_{jt}^{US} and N_{jt}^{i} symmetric varieties produced in each industry in each country and year, so that $X_{jt}^{US,c} = N_{jt}^{US} X_{jvt}^{US,c}$ and $X_{jt}^{i,c} = N_{jt}^{i} X_{jvt}^{i,c}$, we can rearrange (4) to get:

$$X_{jt}^{US,c} = \frac{N_{jt}^{US}\left(c_{jt}^{US} t_{jt}^{US,c}\right)^{1-\sigma}}{\sum_{k\neq US} N_{jt}^{k}\left(c_{jt}^{i} t_{jt}^{i,j}\right)^{1-\sigma}} \sum_{i\neq US} X_{jt}^{i,c}$$

Taking logs we get:

$$\ln X_{jt}^{US,c} = \alpha_{jt}^{US} + \ln\left(t_{jt}^{US,c}(P_t^c)\right)^{1-\sigma} + \ln\left(\sum_{i\neq US} X_{jt}^{i,c}\right) - \ln\left(\sum_{i\neq US} N_{jt}^{i}\left(c_{jt}^{i} t_{jt}^{i,c}\right)^{1-\sigma}\right) + \epsilon_{jt}^{c}. \tag{5}$$

where $\alpha_{jt}^{US} = \ln\left(N_{jt}^{US}\left(c_{jt}^{US}\right)^{1-\sigma}\right)$ are U.S. industry-specific shocks. We now also write trade costs, $t_{jt}^{US,c}(P_t^c)$, as a function of whether a foreign port is containerized, whereby $P_t^c = \{0, 1\}$ is an indicator for the existence of a container port in country c.

The third term in (5), $\sum_{i\neq US} X_{jt}^{i,c}$, reflects third-country trade flows with c that we can directly control for. Finally, the last term, $-\ln\left(\sum_{i\neq US} N_{jt}^{i}\left(c_{jt}^{i} t_{jt}^{i,c}\right)^{1-\sigma}\right)$, reflects third-country productivity or variety shocks (i.e., shocks to the trading partners of U.S. trading partners) as well as bilateral trade costs between those countries and j. In this sense, the model clarifies the identification issue: to the extent that these third-country variables end up in the error term and are correlated with both exports from the U.S. to country c and the timing of a container port opening in c, they will introduce omitted variable bias to our estimate of the impact of the container port opening on U.S. exports. However, it is important to note that our final specification will require only that this potentially endogenous variation is uncorrelated with U.S. local labor market outcomes. In other words, the relevant exclusion restriction will be violated to the extent that shocks to U.S. local labor markets during the containerization era were correlated with trade between U.S. trading partners and third countries in a way that also affected the timing of U.S. trading partner port infrastructure investments. Violations of the exclusion restriction would therefore occur only via several chains of influence.

Nevertheless, we attempt to control for the final term in (5) by adding controls for variety, productivity, and trade cost effects in third countries (and implement the IV strategy discussed above as well). To do this, we first construct a single trade-weighted measure of aggregate TFP for country j's trading partners in year t, where we use pre-period (1962) trade weights from i to c.[17] We also control for the log trade-weighted average tariff faced by country c when exporting to its trading partners i, which we denote $\overline{\tau}_t^c$. Ideally, we would also like to control for port openings in third countries, however these are highly (or perfectly in some cases) co-linear with the port opening variable of interest (for country c). In lieu of this, in a robustness check we focus only on the early container port openings, whose timing should be less correlated with container port openings in third countries, an issue that we explore in greater detail in the context of pre-trends in Section 3.2.3.

Following (5), we generate predicted bilateral exports from the coefficients on the port dummy and its interaction with a range of bilateral trade costs, which we take as a flexible functional form for $t_{jt}^{US,c}(P_t^c)$. Specifically, we estimate:

$$\ln X_{jt}^{US,c} = \delta_j + \gamma_t + \beta_1 P_t^c + \beta_2 \ln \mathbf{T}_{jt}^{US,c} + \beta_3 \left(P_t^c \times \ln \mathbf{T}_{jt}^{US,c}\right) + \beta_4 \ln \left(\sum_{i \neq US} X_{jt}^{i,c}\right) + \ln \overline{TFP}_t^c + \ln \overline{\tau}_t^c + \epsilon_{jt}^c. \quad (6)$$

where $\mathbf{T}_{jt}^{US,c}$ is now a vector of bilateral trade costs between the U.S. and c and $\overline{TFP}_t^c$ is trade-weighted average TFP in country c's trading partners in each year, where trade-weights are constructed using 1962 trade flows.[18] Similarly $\overline{\tau}_t^c$ is the trade-weighted average tariff faced by country c when exporting to its trading partners. From here we calculate $\hat{X}_{jct}$ which, as noted above, we then use to construct measure (2), which serves as our IV for export exposure.

Finally, we note that the *import* equilibrium is symmetric to the export equilibrium (5), and is formally given by:

$$\ln M_{jt}^{j,US} = \alpha_{jt}^c + \ln \left(t_{jt}^{c,US}\right)^{1-\sigma} + \ln \left(\sum_{i \neq j} M_{jt}^{i,US}\right) - \ln \left(\sum_{i \neq j} N_{jt}^i \left(c_{jt}^i t_{jt}^{i,US}\right)^{1-\sigma}\right) + \epsilon_{jt}^j. \quad (7)$$

where $\alpha_{jt}^c = \ln \left(N_{jt}^c \left(c_{jt}^j\right)^{1-\sigma}\right)$ are country c-specific shocks; $t_{jt}^{c,US}$ are symmetric bilateral trade costs; $\sum_{i \neq j} M_{jt}^{i,US}$ are third-country imports to the U.S.; and $-\ln \left(\sum_{i \neq c} N_{jt}^i \left(c_{jt}^i t_{jt}^{i,US}\right)^{1-\sigma}\right)$ are third-country shocks as before. We generate predicted imports following a symmetric specification to (6) with imports as the dependent variable and then use these values to construct measure (3), which serves as our IV for import exposure.

[17] Data on TFP come from the Penn World Tables.

[18] As discussed in the next section, the bilateral trade costs that we include are the distance to c, tariff barriers, a common language indicator, and a former colony indicator.

3.2.2 Controls for Intervening Trade Exposure

There are two primary potential channels of causation in the medium and long run. First, the trade shock may directly impact outcomes in the initial period that then persist into future periods, which might be thought of as "outcome persistence". In a standard economic geography model this persistence in outcomes will diminish over time as factors move across local labor markets in response to the shock, mitigating its effects and leading to an eventual convergence in outcomes across markets.

However, this channel is potentially confounded by a second channel, due to the fact that the trade shock itself may persist. To be more specific, we show below that foreign container port openings generated a discontinuous, one-time rise in the level of U.S. trade flows (see Figures 2a and 2b); however, this one-time shock may have generated growth in trade in future periods as well, perhaps due to increasing efficiency in the use of port infrastructure or due to spillovers from the growing global network of container ports. Stated differently, foreign container port openings may have increased trade growth, not just trade levels, and as such the treatment effect due to these port openings may have spilled over into future periods, what we will refer to as "treatment persistence".[19] These intervening treatments can be thought of as omitted variables in (1), such that the medium- and long-run estimates that we obtain $\{\beta^x_{1990}, \beta^m_{1990}, \beta^x_{2000}, \beta^m_{2000}\}$ reflect the sum of the two effects:

$$\beta^k_{1990} = \underbrace{\theta^k_{1980}}_{\text{Outcome Persistence}} + \underbrace{\gamma^k \theta^k_{1990}}_{\text{Treatment Persistence}} \quad \text{and} \quad \beta^k_{2000} = \underbrace{\theta^k_{1980}}_{\text{Outcome Persistence}} + \underbrace{\gamma^k \theta^k_{2000} + \delta^k \theta^k_{1990}}_{\text{Treatment Persistence}}$$

for $k \in \{X, M\}$ and where θ^k_{1980} in each equation reflects the outcome persistence channel – i.e., it is the direct effect of the initial period container shock on outcomes over the 1980-1990 period and the 1990-2000 periods. The parameters $\{\gamma^k, \delta^k\}$ then reflect the reduced form effects of treatment persistence – i.e., they are the effects of the initial period trade exposure due to the container shock on future trade exposure, conditional on the set of controls in (1).

In fact, we can estimate these parameters in our data: γ – the impact of the initial trade shock on trade exposure in the subsequent period, 1980 to 1990 – is positive for both exports and imports (0.03 and 0.10, respectively, and significant at the one percent level). This indicates that without controlling for medium-run treatment persistence the estimated β's will *overstate* the true impact of the initial shock on outcomes, though we note that the magnitude of this channel is not large.[20] In contrast, we find that δ is negative for exports and imports (-0.004 and -0.02, respectively, and significant at the one percent level) such that without controlling for long-run treatment persistence the estimates will *understate* the true long-run impact of the initial shock, again likely by only a relatively small amount.[21] The estimated coefficients in our longer-run regressions can

[19]This scenario is similar to Cellini et al. (2010) who explore the dynamic effects of the passage of school bonds, where the outcomes depend not only on passage of a particular bond measure but also on the entire history of bond proposals.

[20]For example, the effect of export treatment persistence on outcomes in 1990 will be $0.03 \times \theta^x_{1990}$.

[21]We note that the medium-run treatment persistence dominates the long-run for both exports and imports ($\delta^k > \gamma^k$), so that

therefore be thought of as reflecting the direct treatment effect plus omitted variable bias due to treatment persistence into future periods.

In principle, the outcome persistence channel can be recovered by conditioning on intervening treatments. However, it is important to note that in practice these controls may be endogenous to the extent that they are correlated with unobservables. As a result, controlling for intervening trade exposure trades off possible endogeneity bias for bias due to the persistence in treatment on outcomes. With this in mind, we control for intervening import and export exposure in some specifications and discuss the implications of differences in the estimates.

3.2.3 Further Threats to Identification

A potential concern is that there remains variation in the error term in (6) that is both correlated with the timing of container port openings as well as with U.S. CZ-level outcomes.[22] Our structural approach to generating predicted trade flows should go a long way toward eliminating this variation, as will the fact that in most cases U.S. labor market output is small relative to the volume of container traffic through any foreign port. Nevertheless, a good place to start in looking for additional problematic variation is in the relationship between U.S. bilateral trade and the timing of container port openings.

With this in mind, we ask whether pre-period bilateral trade flows between the U.S. and its partners can, on average, predict the timing of foreign container-port openings. Ideally, we would like to know whether port openings are as good as randomly assigned with respect to *counterfactual* changes in bilateral trade flows, but since we do not observe counterfactual outcomes we instead focus on pre-trends in outcomes, as is standard. We also split the sample in two ways. First, by early and late adopters of container-port technologies. This addresses the possibility that late adopters responded endogenously to the additional global trade generated by early adopters. Second, we split the sample by the share of U.S. trade in total trade in the destination or origin country, since countries with high U.S. trade shares are more likely to be responsive to U.S. CZ-specific shocks, which is the primary threat to the validity of the exclusion restriction. As we see in Table 1 columns (1) and (2), conditional on controls there is no statistically significant relationship between the timing of port openings and the volume of bilateral trade with the U.S. in the 5 years preceding the opening, suggesting (though not proving) that container port openings are indeed as good as randomly assigned with respect to counterfactual changes in bilateral trade flows. In columns (3)-(10) we see that this result is robust to each of the samples. Nevertheless, in a robustness section we also estimate versions that exclude variation due to late adopters.

Finally, we note that we can exploit the fact that some products cannot be placed in containers in order to partially test the validity of our research design. Figures 4a and 4b are similar to Figures 2a and 2b except that

β^k_{2000} will overstate the true impact of the initial shock.

[22] Specification (1) also includes pre-trends in outcomes and state fixed effects, which may absorb a portion of this variation.

they focus narrowly on trade in products that are not containerizable, presenting a placebo scenario in which trade should be unaffected. The Figures show that as expected the opening of foreign container ports did not raise the observable flow of non-containerizable trade.[23]

3.2.4 First Stage

We begin by presenting first-stage estimates of the impact of container port openings on our measures of U.S. local labor market exposure to imports and exports. As discussed in detail in Section 3.2.1, we first generate *predicted* bilateral imports and exports using exogenous variation from port openings. These predicted trade flows are then combined with pre-period employment across U.S. local labor markets to construct predicted labor market exposure measures based on (2) and (3). These measures are then used as instruments for *actual* labor market exposure to imports and exports.

First, Table 2 presents estimates from specification (6) and its counterpart for imports – i.e., the regressions that generate predicted trade flows. The contemporaneous impact of container port openings on trade flows was economically large and statistically significant, indicating that port openings increased exports by between 200 and 300 percent over the period 1966 to 1980 (columns (2) and (3)) and increased imports by around 200 percent (columns (7) and (8)). This is consistent with the findings from Bernhofen et al. (2016) who find that container ports increased world trade by 350 percent over a 20 year period. The interactions with cross-country features indicate that the effect was increasing in the distance to the foreign port and decreasing in the level of foreign tariffs, while shared language had little differential impact. Being a former U.S. colony was associated with a relatively smaller impact. The strictest specification explains around 40 percent of the variation in log exports and imports.

We then generate predicted exposure to exports and imports by using the predicted flows to construct measures (2) and (3). Table 4 presents the first stage results, which indicate that the first stage is strong with an F-stat of 38.

4 Effect of the Container Shock

In this section we report our estimates of the short-, medium-, and long-run impact of container-driven import and export exposure over the period 1966-1980 on U.S. local labor markets. We focus on employment, median income, median rents and median home prices.[24] In Section 4.3 we explore asymmetry in the costs associated with adjusting the housing stock and we discuss the important consequences of this asymmetry for local pur-

[23] We note that there is some evidence of a partial crowding out of non-containerizable exports in the short-term as seen by the small drop in the treatment period in Figure 4a.

[24] We note that the estimates in this sub-section represent *relative* impacts across CZs, and should not be interpreted as national-level effects. We calculate the indirect and national-level effects in Sections 4.4 and 4.5.

chasing power, both in the short and long run. In that section we also explore heterogeneity due to differential housing supply elasticities. In Section 4.2 we explore a range of robustness specifications including focusing on early port technology adopters only, holding the product set fixed, and an alternative IV strategy exploiting LASSO-based predicted trade exposures. Throughout, we multiply the trade exposure measures and outcome measures by 100 for ease of interpretation.

When assessing the economic magnitudes of the shock and the implied elasticities we exploit the fact that for some outcome $y = \ln Y$, specification (1) implies that:[25]

$$\triangle Y_t = \sum_l \left[Y_{lt} \left(\mathrm{e}^{(\hat{\beta}_t^x \triangle E^X_{l,66-80} + \hat{\beta}_t^m \triangle E^M_{l,66-80})} - 1 \right) \right] \tag{8}$$

where $\hat{\beta}_t^x \triangle E^X_{l,66-80} + \hat{\beta}_t^m \triangle E^M_{l,66-80}$ is the sum of the estimated export and import effects on the outcome over the period 1970 to t, given observed changes in export and import exposure in each CZ.

4.1 Direct Effects of the Trade Shock

4.1.1 Employment

Table 5 presents the OLS (top) and 2SLS (bottom) results for the change in local log employment as in specification (1). The estimates for the contemporaneous period, 1970-1980, are presented in Column (1). We then present two separate estimates for each of the periods 1970-1990 and 1970-2000, where the estimates in Columns (2) and (4) reflect the total effect of the shock in that period and the estimates in Columns (3) and (5) attempt to isolate outcome persistence only by controlling for intervening trade exposure. Again, we note that these controls may be correlated with the error term and so the estimates should be interpreted with this in mind. All specifications include state fixed effects with standard errors clustered at the CZ level.[26]

The pattern of results indicates a clear contemporaneous impact: export exposure raises employment growth and import exposure reduces it. In the medium-run (1970-1990) both the OLS (top panel) and 2SLS (bottom panel) estimates in Column (2) indicate no statistically significant effect due to export exposure, but there is a persistent negative impact on employment due to import exposure, though with only marginal growth in the second decade. Interestingly, in Column (3) we see that this persistence may not be driven solely by persistence in outcomes but, rather, is at least to some extent driven by persistence in treatment, as the effect becomes smaller and statistically insignificant when controlling for intervening import exposure. Columns (4) and (5) also indicate no statistically significant impact on employment in the long run.

The contemporaneous 2SLS estimates in Column (1) indicate that, on average, a one percentage point

[25] Acemoglu et al. (2016) interpret this as the difference between the actual and counterfactual outcome in the case when there was no trade shock.

[26] A regression of export exposure, or import exposure, on state fixed effects produces an R^2 of 0.06 and 0.25, respectively. So the bulk of the variation being exploited is within state and across CZs.

increase in export exposure led to a 4.75 percentage point relative increase in employment. At the same time, a one percentage point increase in import exposure reduced relative employment by 2.13 percentage points. Table 6 highlights that this effect was concentrated in the manufacturing sector, with small employment spillovers to the non-manufacturing sector.[27] Given these estimates and the observed rise in export and import exposure over the period in each CZ, (8) implies that the export shock increased employment by around 550,000 workers while the import shock reduced employment by around 300,000 workers. Thus, the total effect of the trade shock was to increase employment in manufacturing over the 1970s by around 250,000 workers during a period in which the sector grew by about one million workers.

4.1.2 Income and Housing

In this section we evaluate the direct impact of the container-induced trade shock on income and housing. First, Table 7 presents the OLS (top) and 2SLS (bottom) results where the dependent variable is the change in log median income. The results indicate a positive impact on income due to export exposure and a negative impact due to import exposure in the contemporaneous period. The contemporaneous 2SLS estimates indicate that a one percentage point increase in CZ export exposure led to a 4.16 percentage point relative increase in income, while a one percentage point increase in import exposure led to a 1.73 percentage point relative decline in income.

The impact on home prices is reported in Table 8 and the impact on housing rents is reported in Table 9. We find that the estimates for export exposure are similar for prices and rents, with both rising due to export exposure in the contemporaneous period only. In contrast, the impact on home and rental prices due to import exposure is negative, grows in magnitude over time in each specification, and is highly significant over the first two decades. The persistence, and growth, in the effect due to import exposure clearly stands out, though we note that the marginal impact in the long-run period is small, suggesting some cross-labor-market equilibration over time. The contemporaneous 2SLS estimates indicate that a one percentage point increase in CZ export exposure produced a 5.74 percentage point relative increase in home prices, and a 4.18 percentage point relative increase in rents. For import exposure, a one percentage point rise led to a 2.2 percentage point relative decline in home prices and a 2.7 percentage point relative decline in rents. Again, it is important to note that the change in home and rental prices represents an increase in standard of living for incumbent home owners, and a decrease for non-incumbent (future) home owners and renters. For the former group the overall impact was a sizable welfare gain, while the latter group experienced only small gains.

[27] The manufacturing sector also shows signs of persistence in the employment effect due to the export shock in the medium run, even conditional on intervening trade exposure (column (3)). This suggests that the lack of observed persistence in the CZ-wide estimates of the export shock in Table 5 is likely due to the mitigating effects of labor mobility across sectors within a CZ. Thus, the positive persistence in employment in the manufacturing sector in the medium run may have attracted workers from the non-manufacturing sector, reducing the CZ-wide employment gain due to the export shock. Finally, we note that there is no persistence in the long run in either sector.

Converting these estimates to dollar values using (8), we find that the short-run overall rise in income (in 2012 dollars) was equivalent to \$1,279 while the overall rise in home and rental prices was equivalent to \$286 and \$18, respectively. These short-run calculations can also be extended to incorporate the medium-run impacts of import exposure on home and rental prices, thereby incorporating the persistence in the import effects that are evident in Tables 8 and 9. To do this, we use the medium-run import estimates drawn from Column (2) of these Tables, while continuing to use the short-run estimates of the export effect from Column (1). In this case, the medium-run effects on home and rental prices fall to \$119 and \$6. The persistence in the import effects on home and rental prices thus led to a transfer of wealth from incumbent home owners to future home owners and renters.

The fact that the relative income effects are concentrated in the initial period, while seeming to diminish in later periods (Table 7), suggests that markets equilibrated over time in response to the shock. This is also supported by the fact that the shock impacts relative employment growth very little beyond the short run. As noted in the Introduction, this contrasts with the results from Dix-Carneiro and Kovak (2017), who found that Brazilian regions that were hit relatively hard by import competition experienced employment losses that grew over time. It is difficult to know exactly what explains these divergent findings but, consistent with a simple general equilibrium model, changes in the relative returns to factors across local labor markets in the U.S. due to the shock likely led to equilibrating factor movements that did not occur in the Brazilian case. This suggests that labor and financial market frictions in Brazil may have been more severe relative to the U.S.

4.2 Robustness

4.2.1 Focusing on Early Adopters

In this section we present estimates from identical specifications as above except that the IVs are now constructed using only variation from foreign country port openings during the 1966-1973 (early) period. As noted in section 3.2.3, late adopters were likely motivated by prior port openings around the world and the increasing global trade flows that followed. These port openings may therefore be endogenous to U.S. outcomes to the extent that these outcomes were also driven by prior port openings. Appendix A reproduces our main 2SLS specifications, where we see that the early adopting port variation produces a LATE that is similar in magnitude to the estimates in Tables 5 through 9, indicating that late adopters did not differentially affect outcomes in an economically important way.

4.2.2 LASSO-based IVs

We also experimented with using a double-lasso approach (Belloni et al. (2012)) to generate predicted exports and imports in the construction of the instrumental variables, rather than using the structural approach described in

Section 3.2.1. The idea is to find the "best" predictors of bilateral trade flows without over-selecting potentially spurious covariates, beginning with a large set of regressors. We include the port opening indicator and a set of typical "gravity" variables (bilateral distance, bilateral tariffs, common language, former colony), and then include interactions between the port variable and the set of trade costs, as well as interactions of these trade costs with one another. We then used the best predictors to generate predicted imports and exports and use these to construct instruments for (2) and (3). The first stage F-Stat in this case is 75, quite a bit stronger than when using the structural IVs. Appendix B reproduces the main 2SLS specifications and presents the results using these new IVs, where we see that the results are very similar to the baseline estimates.

4.2.3 Holding the Product Set Fixed

Here we explore the extent to which the effects of the trade shock are driven by new products or existing products. We again construct instruments for (2) and (3) but we restrict the bilateral trade flows used to construct the variables to a fixed set of HS6 products, namely those that existed in 1970. The use of 6-digit flows means that there may be growth and decline in the product set at more disaggregate levels that we do not observe. However, over the period 1970 to 2000 the number of 6-digit products grew by X percent, indicating substantial growth in the new product margin at this level. Appendix C reproduces the main 2SLS specifications using the import and export regressors derived from the fixed product set, along with IVs constructed using the same fixed set of products. Across the specifications in Table X, the estimates are X-Y percent smaller than the main estimates from Table Y. The results in the other tables are of similarly smaller magnitudes. We conclude that new products introduced between 1970 and 2000 accounted for around X percent of

4.3 Asymmetric Adjustment Costs in Housing

The fact that the positive impact of the export shock on house prices and rents is concentrated in the contemporaneous period, but the negative impact of the import shock persists beyond that, is worth further comment. This pattern is consistent with a model such as the one presented in Glaeser and Gyourko (2005) to explain urban decline, in which the housing stock expands relatively freely under positive demand shocks but cannot easily contract in the face of negative shocks, contracting only via depreciation over decades or centuries. In other words, it is consistent with the existence of asymmetric adjustment costs for the housing stock leading to a kinked housing supply curve, as depicted in Figure 3.[28] The evidence in Tables 8 and 9 suggests that housing stock adjustment costs may indeed be asymmetric, and hence may exacerbate the consequences arising from import competition by increasing their magnitude and prolonging their effects.

[28] Related parts of the literature include Kenny (2003), who models asymmetric adjustment costs in housing production but is concerned with adjustment in housing construction flows, not stocks. Flavin and Nakagawa (2008) incorporate adjustment costs into consumers' housing purchase decision, but do not model the supply decision.

A direct test of the asymmetric adjustment cost hypothesis is presented in Table 10, which reports estimates that are again based on specification (1) where the dependent variable is now the log change in the number of housing units in a CZ. Here we see clear evidence of this asymmetry: the export shock generates a large contemporaneous rise in the supply of homes with continued, but smaller, increases in future periods; in contrast, the import shock has little impact on the supply of homes in any period.

We can use these estimates to calculate the average implied, short-run housing supply elasticities for output levels beyond current supply – i.e., to the right of the kink in Figure 3. To do this, we note that equation (8) implies that the percent change in an outcome over the period 1970 to t in CZ l ($\frac{\triangle Y_{lt}}{Y_{lt}}$) due to the export shock is given by $\mathrm{e}^{(\hat{\beta}_t^x \triangle E^X_{l,66-80})} - 1$. Evaluating this at the mean value of export exposure, $\overline{\triangle E^X}_{66-80}$, we can calculate an average housing supply elasticity, ϵ_t^{HS}, induced by the positive export shock (i.e., along the housing supply curve *above* current supply):

$$\epsilon_t^{HS} \equiv \frac{\%\triangle Q_t^H}{\%\triangle P_t^H} = \frac{\mathrm{e}^{(\hat{\beta}_t^{Qx}\overline{\triangle E^X}_{66-80})} - 1}{\mathrm{e}^{(\hat{\beta}_t^{Px}\overline{\triangle E^X}_{66-80})} - 1} \tag{9}$$

where $\hat{\beta}_t^{Qx}, \hat{\beta}_t^{Px}$ are the estimates of the impact of the shock on housing quantities, Q_t^H, and home prices, P_t^H, respectively. A similar elasticity can be obtained for rents. Using the estimates from Tables 8, 9, and 10 these calculations give export-induced average housing supply elasticities with respect to home prices and rents over the period 1970-1980 of 1.31 and 1.80, respectively,[29] such that each 1 percent rise in the number of households in a CZ due to the export shock increased the average price of homes by 0.82 percent and the average price of rental units by 0.57 percent (applying the inverse elasticities).[30] We further note that the implied supply elasticities due to the *import* shock (i.e., along the housing supply curve *below* current supply) are much smaller and mostly near zero, but the coefficients ($\hat{\beta}_t^{Qm}, \hat{\beta}_t^{Pm}$) are not precisely estimated.

We can further test the data against the theory of asymmetric adjustment costs by exploring heterogeneity in the estimated housing supply elasticities. First, in the face of an *export* shock we expect that housing stock adjustments will be relatively quick, and home and rental price effects relatively mitigated, in areas with relatively large housing supply elasticities. However, we expect the home and rental price response due to an *import* shock to be invariant to differences in local housing supply elasticities since contraction occurs only via the slow process of depreciation, whose rate should be unrelated to the local housing supply elasticity. In Figure 3 this implies that the supply curve to the left of the equilibrium point is fixed across labor markets, whereas there may be significant heterogeneity in the slope of the supply curve to the right of the equilibrium. Thus, a simple model of asymmetric adjustment costs makes the following prediction:

[29] Saiz (2010) reports a similar average housing supply elasticity of 1.54 at the MSA level. Gyourko (2009) reports estimates from the literature ranging from 1 to 3.

[30] This is consistent with other findings in the literature showing that rents are less responsive than home prices to shocks.

Proposition 1 *The home and rental price response to an* export *shock is* decreasing *in the local housing supply elasticity, while the home and rental price response to an* import *shock is* invariant *to the local housing supply elasticity.*

With this in mind, we extend specification (1) to include interaction terms between each trade shock and a measure of the share of local land that is *unavailable* for development due to the steepness of the slope or other natural impediments such as oceans, rivers, lakes, etc. This measure is drawn from Lutz and Sand (2017) and expands on the popular measure developed by Saiz (2010), in part by providing more detailed geographic variation. Importantly, Lutz and Sand (2017) show that the measure is uncorrelated with housing demand factors and so represents a reliable proxy for supply constraints in the housing market. We exploit county-level values that we aggregate up to the local labor market (CZ) level. Generally speaking, the literature has found that total land unavailability is an important determinant of growth in home prices and rents – e.g., see Glaeser et al. (2008) or Mian and Sufi (2011). In our case, regressing home price growth (each period stacked, 1970-2000) on total land unavailability (which is time invariant and assumed to be pre-determined) and applying the coefficient, we calculate that CZs at the 90th percentile of total land unavailability experienced growth in home prices over the period that was 14 percent greater, on average, than the 10th percentile, and 16 percent greater in the case of rental price growth.

The interaction terms therefore allow for systematic differences across markets in the housing supply response to the trade shock due to differences in local geography. We denote local land unavailability by Λ_l and estimate:

$$\begin{aligned} y_{lt} - y_{l,1970} = {} & \beta_{1t}\big(\triangle E^X_{l,66-80} \cdot \Lambda_l\big) + \beta_{2t}\big(\triangle E^M_{l,66-80} \cdot \Lambda_l\big) + \beta_{3t}\triangle E^X_{l,66-80} + \beta_{4t}\triangle E^M_{l,66-80} + \psi_t \Lambda_l + \\ & + \gamma_t MS_{l,1959} + \omega_t\big(y_{l,1970} - y_{l,1960}\big) + \alpha_s + \epsilon_{lt} \end{aligned} \tag{10}$$

Table 11 presents three sets of 2SLS estimates in which the dependent variables are the log change in the number of housing units (panel A), the log change in home price (panel B) and the log change in rent (panel C).[31] Each panel presents a similar pattern of results. As before, export exposure increases the supply of homes along with home prices and rents in the contemporaneous period, with no statistically significant effect (and small economic effects) in later periods. With respect to CZ heterogeneity, we find that the contemporaneous effect on housing supply is decreasing in land unavailability, while the effects on home prices and rents are increasing in the measure. This is consistent with a mitigating effect of home building on local home prices and rents in locations with relatively greater land availability. In addition, the overall effect is driven by the interaction terms, indicating that the shock is strongly mediated by local land unavailability. Taking the mean export exposure over the contemporaneous period, a CZ at the 90th percentile of land unavailability experienced

[31] Here we instrument for $\triangle E^X_{l,66-80} \cdot \Lambda_l$ with $\triangle \hat{E}^X_{l,66-80} \cdot \Lambda_l$ under the assumption that Λ_l is pre-determined and exogenous.

11 percentage points faster growth in home prices and 8 percentage points faster growth in rents relative to a CZ at the 10th percentile of land unavailability. Import exposure, on the other hand, produced persistent outcomes that are nearly invariant to land unavailability, consistent with Proposition 1. This offers further support for the view that asymmetry in the housing supply response to export versus import shocks is of an important economic magnitude, and is a key determinant of the overall welfare impact of a trade shock.

Similar to the calculation of the average export-induced housing supply elasticities above, the estimates from Table 11 can be used to construct *CZ-specific* housing supply elasticities. To do this, we follow the same approach as above and combine the estimates from Table 11 with the observed changes in export and import exposure and values of land unavailability. This CZ-specific housing supply elasticity (now indexed by l) is given by:

$$\epsilon_{lt}^{HS} = \frac{\mathrm{e}^{\left(\hat{\beta}_{1t}^{Q}\overline{\triangle E^X}_{66-80}\Lambda_l + \hat{\beta}_{3t}^{Q}\overline{\triangle E^X}_{66-80}\right)} - 1}{\mathrm{e}^{\left(\hat{\beta}_{1t}^{P}\overline{\triangle E^X}_{66-80}\Lambda_l + \hat{\beta}_{3t}^{P}\overline{\triangle E^X}_{66-80}\right)} - 1} \tag{11}$$

where again $\hat{\beta}_t^Q, \hat{\beta}_t^P$ are the estimates of the export impacts on housing quantities and prices, respectively, and we perform a similar calculation for rents. The resulting elasticities display significant heterogeneity within reasonable bounds: the 90th percentile elasticity with respect to home prices is 3.81 while the 10th percentile is 1.13. For rents the 90-10 values are 3.02 and 0.80. We use these CZ-specific elasticities in our calculation of the indirect effects of the trade shock in the next section.

4.4 Indirect Effects of the Trade Shock

In this section we use our estimates of the direct effect of the trade shock in some CZ l to infer the indirect effects of that local shock on other CZs o, using an approach that is close to Hornbeck and Moretti (2018). We note that we necessarily make important assumptions in producing these estimates (about the labor supply elasticity and the pattern of migration across CZs) and so the values should be interpreted with that in mind. In short, we use our estimated housing supply elasticities, along with an assumed labor demand elasticity, to calculate the impact of the general equilibrium movement of workers across CZs due to the trade shock in l on income and home and rental prices in each CZ o.[32] We calculate both short- and medium-run effects, where the latter include the medium-run impact on home and rental prices and account for the persistence in these effects. The indirect effects in each o associated with a shock in some l can then be summed over to obtain the indirect effects associated with each l, and these can be summed over to obtain the national-level indirect effects.

As a starting point, we use our estimates of the direct employment impact of the trade shock from Table

[32] We assume there is no international migration and that employment changes in a labor market are due to increases in the number of workers only, rather than an increase in hours worked by existing workers.

5 to generate the predicted net (export effect - import effect) change in employment in each CZ l due to the shock. Note that for some CZs this will be a positive value and for others a negative value (when the import competition impact dominates). Next, we assume that the change in employment in l derives from migration into or out of l from other CZs o, and we allocate a portion of the total employment change in l to each o, such that o's workforce rises or falls due to the shock in l. Since we cannot observe the actual pattern of migration in response to the shock, we instead use 1980 Census data on individuals' location of previous residence to allocate employment changes in CZ l due to the trade shock according to the share of workers who migrated to l from some CZ o during that period (or out of l into o in the case where import competition dominates and l sees net out-migration).[33]

Finally, we use our estimates of the CZ-specific housing supply elasticities calculated in Section 4.3, along with a uniform labor demand elasticity drawn from Hornbeck and Moretti (2018) equal to -0.15,[34] to calculate how the indirect employment change in each CZ o impacts o's home prices, rental prices, and income. To do this we use Census data on the number of workers per household in 1970 in a CZ in order to map the change in employment in a CZ into a change in the number of housing units in that CZ. We then apply the calculated housing supply elasticities in order to get the implied percentage change in home and rental prices. Given the initial levels of home values and rents in 1970, we use these estimates to calculate the total dollar change in home value and rent over the short run (1970-1980) and, separately, the medium run (1970-1990), accounting for the observed persistence in the latter case. We then follow the same process to calculate the change in income over the period using the assumed labor demand elasticity. These indirect outcomes can then be summed up across o to get the total indirect impact on workers due to each l's direct exposure to the trade shock. Summing over l then gives the national-level indirect effect.

Dividing this national-level effect by the number of U.S. workers, we find that the indirect effects of the trade shock raised income per worker (in 2012 dollars) in the U.S. by \$572, while increasing home value per worker by \$87 and rent per worker by \$5 in the short run, and by \$62 and \$3 in the medium run. Again, the medium-run effects are smaller than the short-run effects due to the persistent decline in home and rental prices, which counteracts the overall net rise in these values.

[33] Specifically, we impute the CZ of previous residence by using the Census data to estimate a gravity model of migration across Metropolitan Statistical Area (MSA) pairs over the period 1975-1980 (the earliest date range for which Census reports geographic detail on migration). Our gravity regression includes bilateral distance, origin population, destination population, an indicator for sharing a border, and economic distance based on a measure of industrial similarity. The R-squared from this regression is 0.73. We then use the coefficients from this MSA-level regression to predict the general bilateral migration patterns across CZs. We use MSA flows because, unfortunately, county-to-county migration data (that we could aggregate to the CZ level) is not available until 2005, and these recent migration patterns would be endogenous to our shocks. Clearly the shortcoming of this approach is that the determinants of migration patterns across MSAs may not exactly match the determinants across CZs, but we find that our calculations of the indirect effects are not very sensitive to the exact sizes of the gravity coefficients.

[34] This assumes an average labor share of 0.65 and flexible capital share of 0.20. The notion that the labor demand elasticity is uniform across CZs is of course stylized (e.g., see Monte et al. (2018)), but its estimation at the CZ level during our period is beyond the scope of this paper.

4.5 Total Impact on Standards of Living

The total national-level effects are given by the sum of the direct and indirect effects, which amount to an \$1851 rise in income per worker (in 2012 dollars) and an increase in home value and rent per worker (in 2012 dollars) of \$181 and \$9, respectively, over the medium run (1970-1990). In this section we perform back-of-the-envelope calculations that highlight heterogeneity in outcomes across CZs, including due to differences in home ownership rates. As noted previously, while a local rise in home or rental prices represents a *gain* for incumbent home and property owners, it represents a *loss* for non-incumbent home buyers or renters. As a result, high (low) home-ownership rates in a local labor market will lead to on-average gains (losses) due to export exposure and on-average losses (gains) due to import exposure. Figure 8 maps home-ownership rates at the beginning of the container shock in 1970 across U.S. counties, where we see that there was indeed wide variation in the prevalence of home ownership. For instance, only 14 percent of homes in the Bronx were owner occupied in 1970, whereas many Michigan counties were above 80 percent.

In light of our approach thus far, the impact of the trade shock will vary across CZs for three primary reasons: 1) the magnitude of the export and import shocks will vary; 2) the housing supply elasticity will vary; and 3) the share of incumbent home owners versus non-incumbent home owners and renters will vary. These factors will independently generate concentration of the effects in certain markets, but this concentration will be further exacerbated due to systematic correlation in these factors across markets. In particular, home ownership is more prevalent in areas that have more available land – i.e., a larger housing supply elasticity – and this has important implications for the response of housing markets to shocks. Figure 9 plots the home ownership rate in 1970 against land unavailability and we see that the slope is negative (and is statistically significant at the one percent level). As a consequence, in places with relatively large housing supply elasticities and high home ownership (e.g., the Great Lakes region) an export shock will lead to relatively large average gains due to high home ownership, but these gains will dissipate relatively quickly due to the large local supply elasticity. Thus, in the long run these two features work in opposite directions in their impact on the level of home prices and rents. At the other extreme, in places with small housing supply elasticities and low home ownership (e.g., San Francisco) an export shock will lead to relatively large average losses since most people are renters, and this effect is more likely to persist due to the small local supply elasticity. This leads to an exacerbated, negative long-run welfare impact via the housing market (though income effects may offset this). Finally, since the impact of import exposure is invariant to the local housing supply elasticity (see Section 4.3), the prevalence of home ownership and the magnitude of the trade shock determine the geography of the effects.

We can calculate the total effects for individual labor markets, and we list the top 10 and bottom 10 in Table **??** along with the decomposition into direct and indirect effects. We also list the percentile of each labor market in the distribution of trade shock magnitudes, housing supply elasticities, and home ownership rates.

5 Concluding Remarks

XXX

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Figure 1: U.S. Merchandise Trade as a Share of GDP

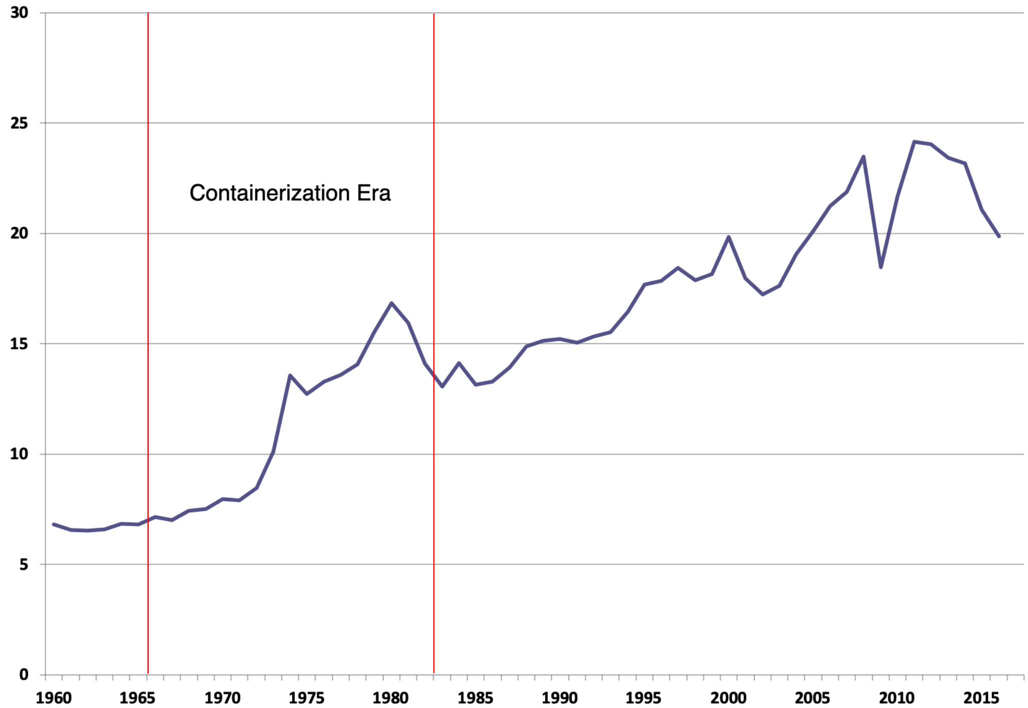
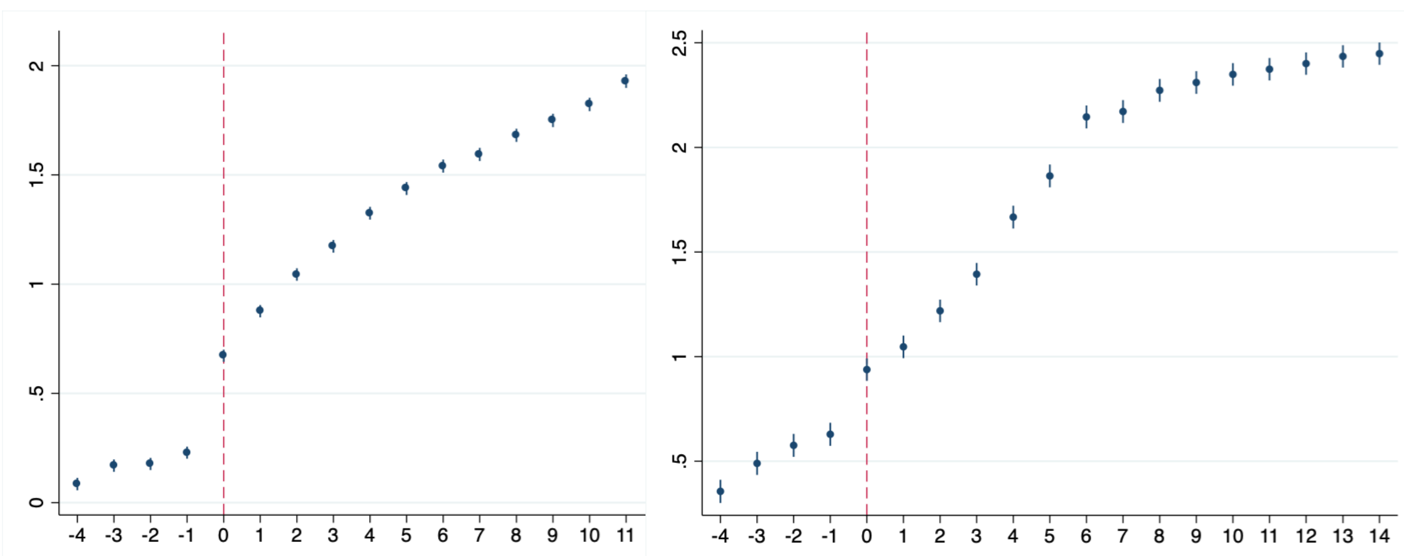


Figure 2: Port Adoption Treatment Effects on Log Bilateral Exports and Imports



(a) Exports Trajectory **(b) Imports Trajectory**

Note: The figure plots the coefficients of a regression of log *containerizable* exports or imports on an indicator (0,1) for whether a country adopted container-friendly port technologies in a given year.

Figure 3: Housing Demand and Supply with Asymmetric Housing Supply Costs

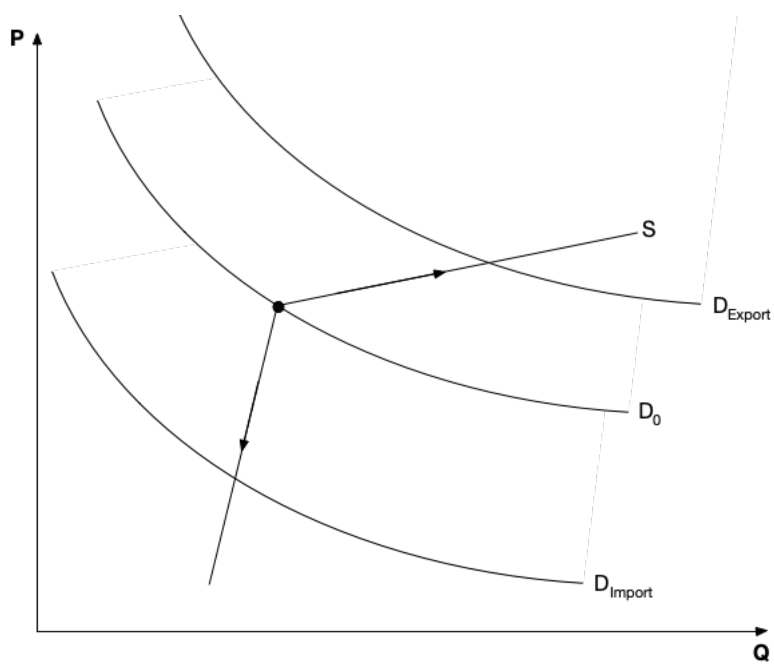
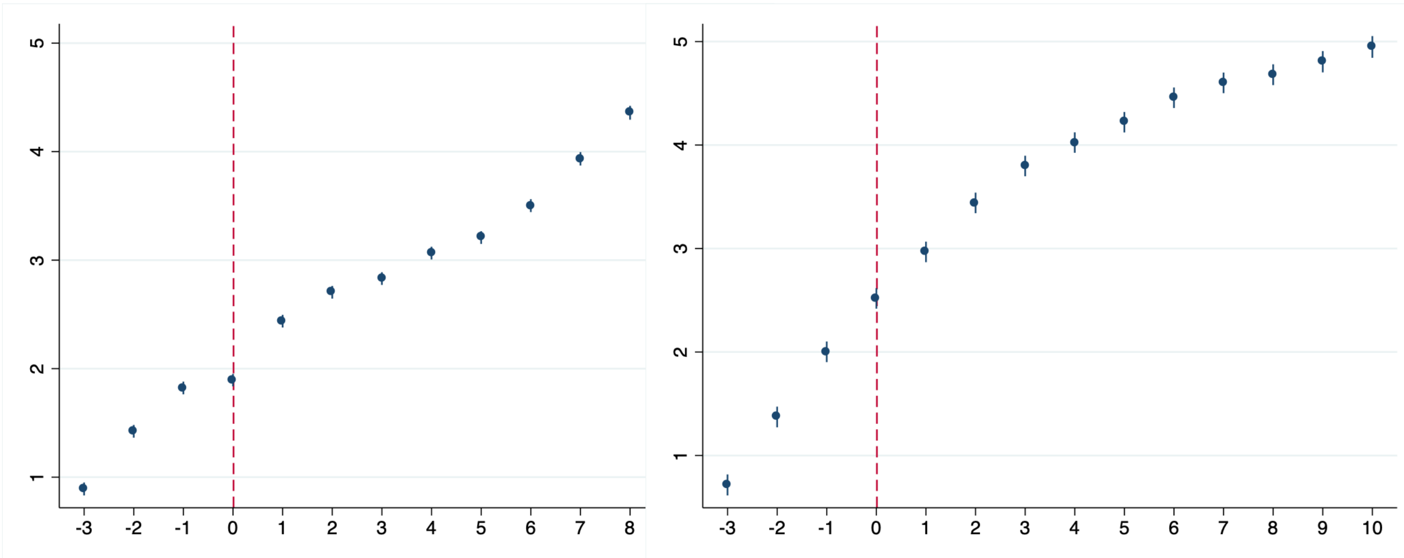


Figure 4: Placebo Treatment Effects on Log Bilateral Exports and Imports

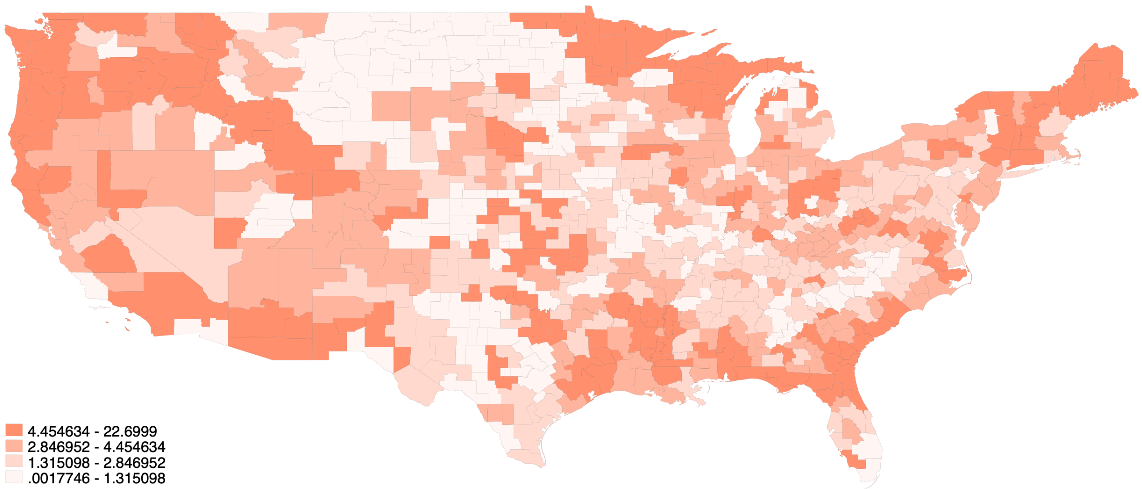


(a) Exports Trajectory **(b) Imports Trajectory**

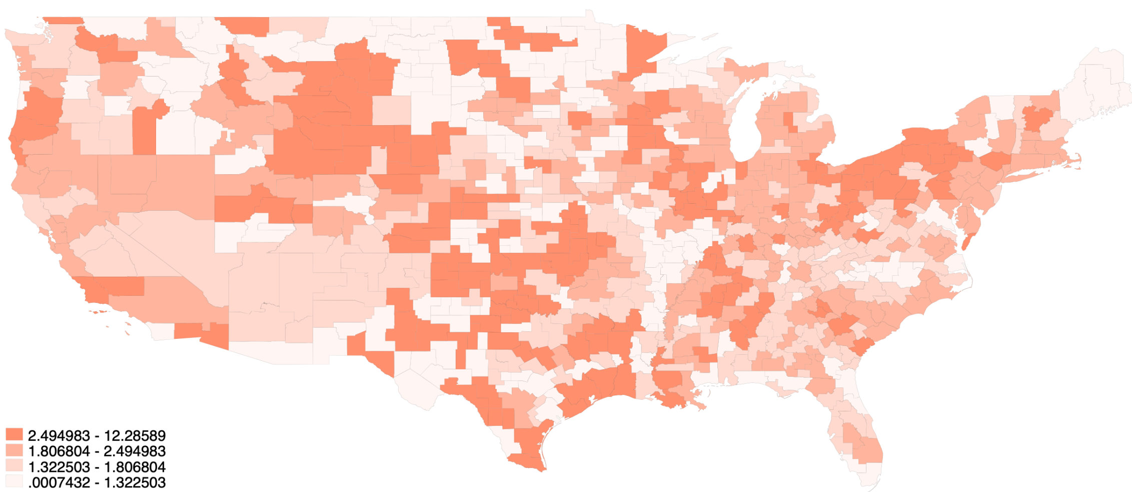
Note: The figure plots the coefficients of a regression of log *non-containerizable* exports or imports on an indicator (0,1) for whether a country adopted container-friendly port technologies in a given year.

Figure 5: Distribution of Export and Import Exposure Over the Period 1966 to 1980

(a) Export Exposure



(b) Import Exposure



Note: The figures map the values of the export and import exposure measures covering 1966-1980 across U.S. Commuting Zones, as defined by (2) and (3).

Figure 6: Foreign Container Port Openings and U.S. Total Bilateral Trade in Year of Opening

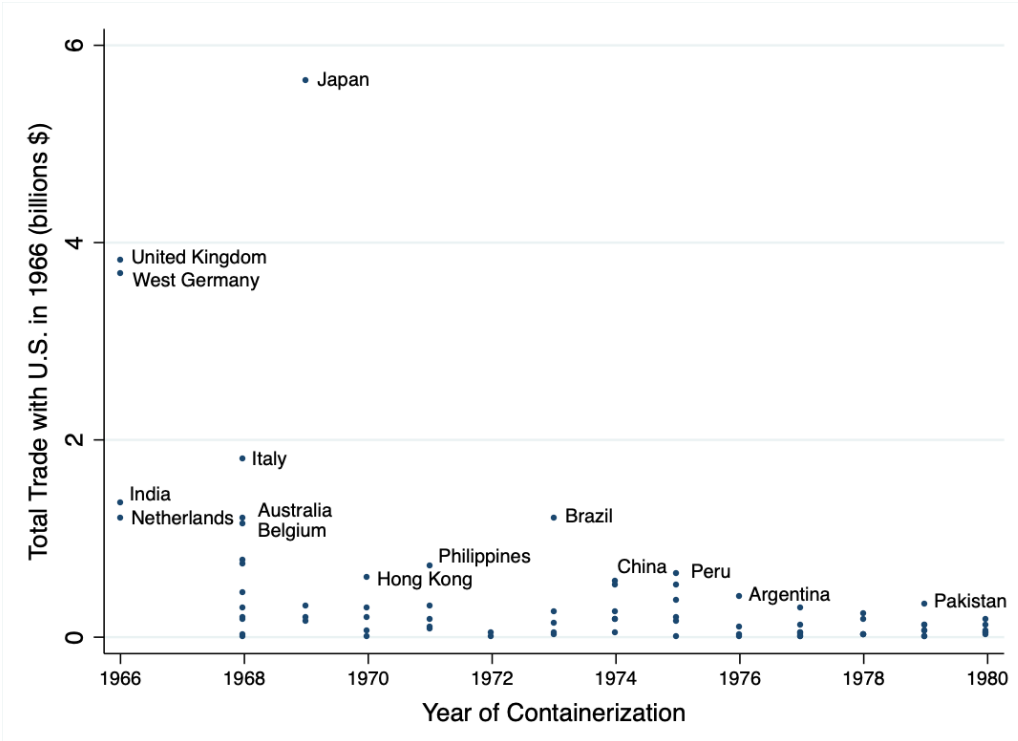
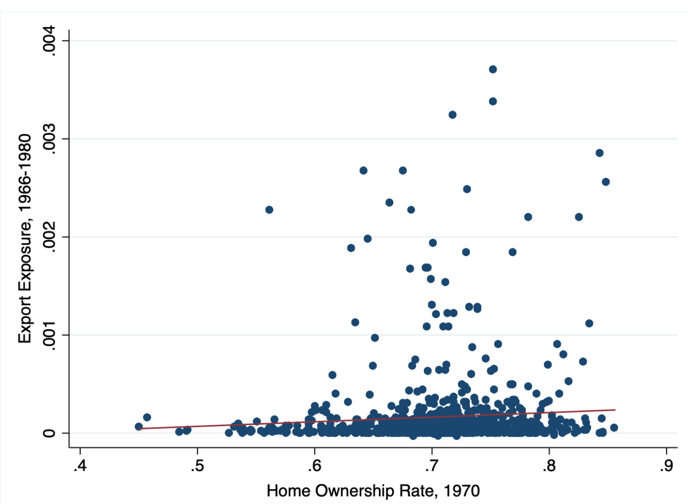
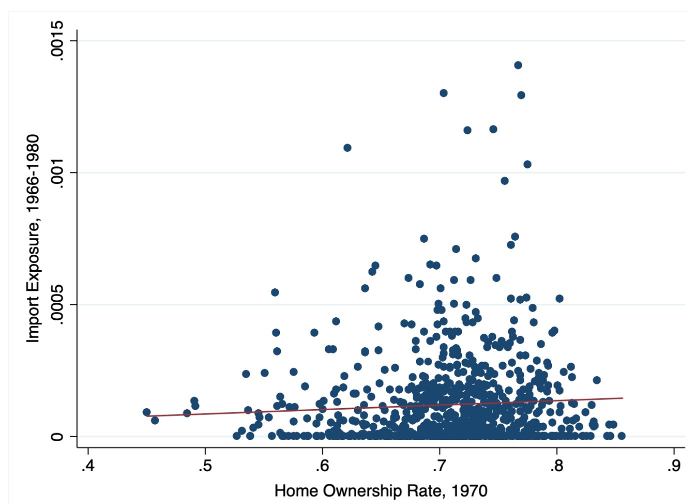


Figure 7: Correlation Between Home Ownership Across U.S. States in 1970 and Export and Import Exposure



(a) **Export Exposure & Home Ownership**



(b) **Import Exposure & Home Ownership**

Figure 8: Home Ownership Rates Across U.S. Counties, 1970

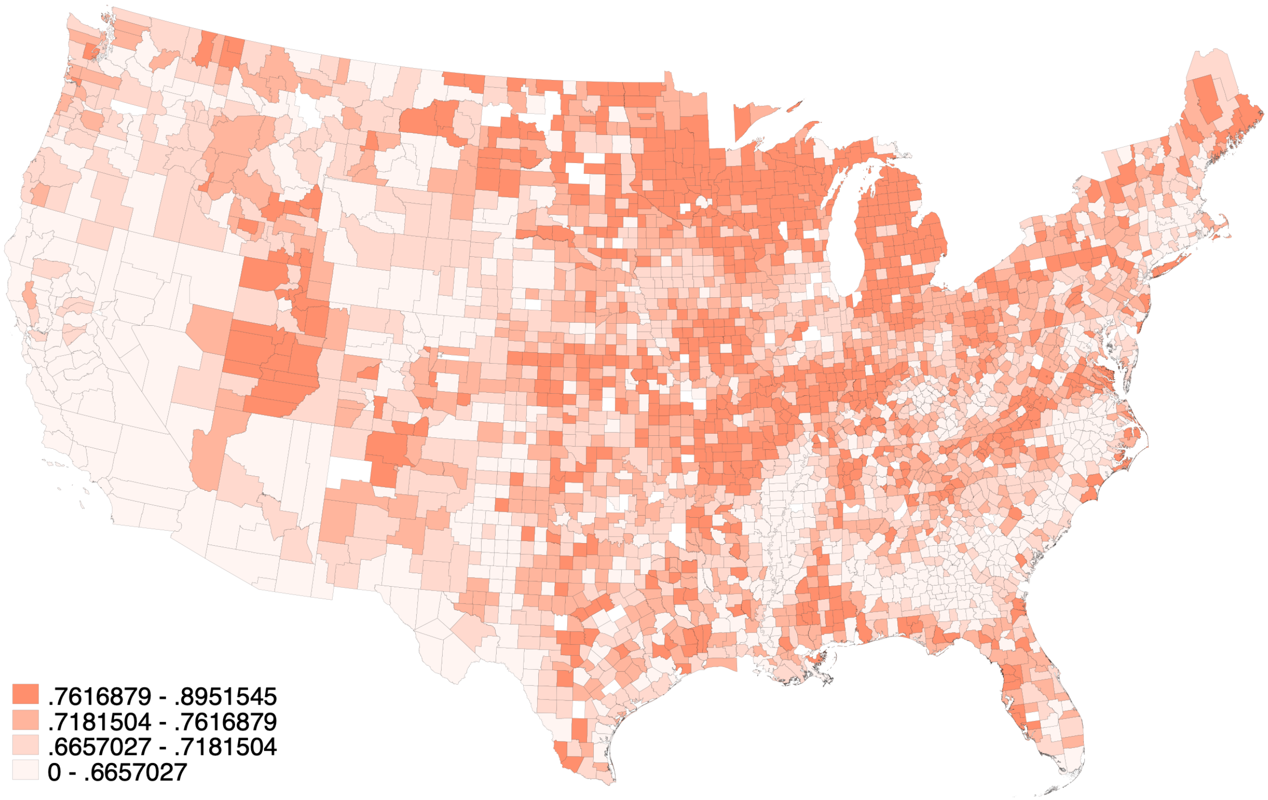


Figure 9: Correlation between Home Ownership Rates in 1970 and Land Unavailability

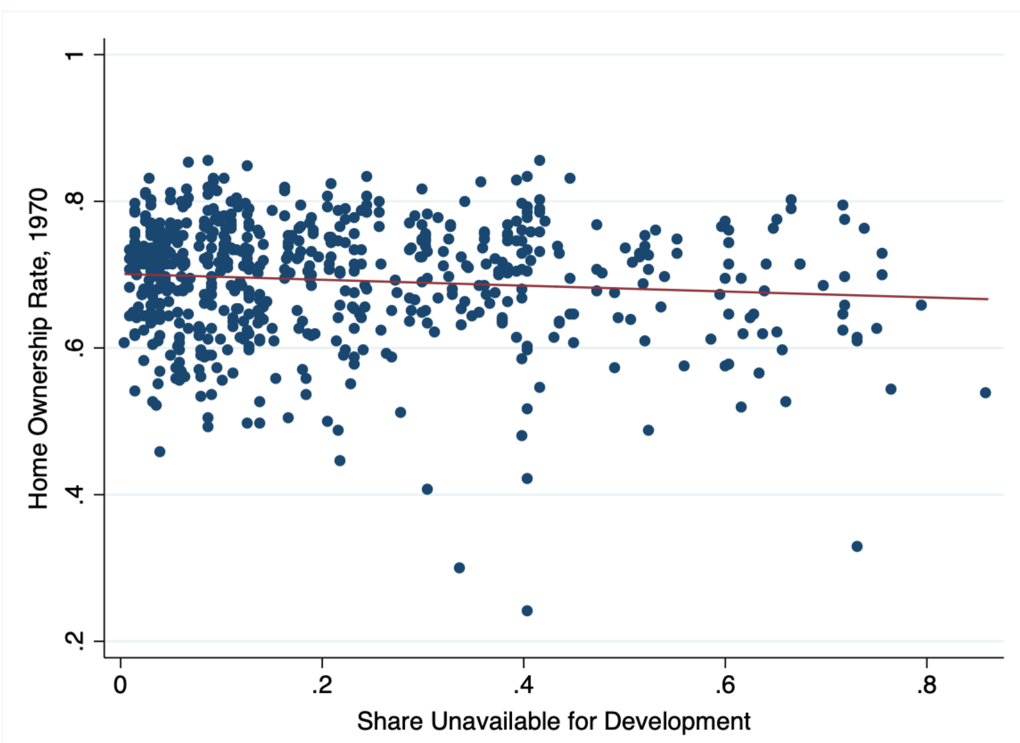


Table 1: **Summary Statistics at the Commuting Zone Level**

	Observations Per Decade	1966-1980 Mean/S.D.	1966-1980 Median	1970-1980 Mean/S.D.	1980-1990 Mean/S.D.	1990-2000 Mean/S.D.
100 $\times$ $\triangle$ in Export Exposure	722	2.02	1.19			
		(2.89)				
100 $\times$ $\triangle$ in Import Exposure	722	2.24	1.26			
		(3.13)				
100 $\times$ Log $\triangle$ in Total Employment	722			24.43	18.12	18.54
				(14.04)	(12.16)	(13.28)
100 $\times$ Log $\triangle$ in Mfg Employment	722			11.86	-6.91	-3.52
				(8.85)	(6.82)	(5.07)
100 $\times$ Log $\triangle$ in Non-Mfg Employment	722			24.37	19.02	19.34
				(13.32)	(11.05)	(12.97)
100 $\times$ Log $\triangle$ in Home Prices (2012 $)	722			27.30	16.54	6.23
				(23.32)	(16.05)	(15.57)
100 $\times$ Log $\triangle$ in Rents (2012 $)	722			22.04	20.76	4.92
				(31.09)	(27.82)	(14.76)
100 $\times$ Log $\triangle$ in Income (2012 $)	722			6.88	7.70	11.59
				(9.03)	(11.21)	(14.81)

Notes: The table reports summary statistics for the main independent variables over the period of the shock (1966-1980) and for the main dependent variables for each decade individually. Total employment is total non-farm employment.

Table 2: Predicted Exports and Imports

	Log Exports				Log Imports			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Port-Rail Indicator	0.122***	1.387***	2.764***	2.477***	2.261***	1.753***	1.977***	2.278***
	(0.0138)	(0.0310)	(0.207)	(0.189)	(0.0730)	(0.0642)	(0.555)	(0.500)
Log Distance		-0.641***	-0.920***	-1.063***		-0.143***	-0.356***	-0.197***
		(0.0299)	(0.0320)	(0.0278)		(0.0507)	(0.0617)	(0.0536)
Log Tariff		0.113***	0.429***	0.440***		-0.0690	-0.0185	0.113
		(0.0332)	(0.0421)	(0.0390)		(0.0496)	(0.0807)	(0.0755)
Colonized		0.404***	2.047***	2.085***		0.333***	1.361***	1.568***
		(0.0321)	(0.0620)	(0.0535)		(0.0476)	(0.102)	(0.0916)
Common Language		0.505***	0.447***	0.568***		-0.123***	-0.298***	-0.307***
		(0.0193)	(0.0222)	(0.0192)		(0.0361)	(0.0454)	(0.0379)
Third-Country		5.22e-08***	5.18e-08***	5.59e-08***				
Exports to j		(1.23e-09)	(1.15e-09)	(1.11e-09)				
Third-Country						2.01e-08***	2.94e-08***	2.62e-08***
Exports to *U.S.*						(9.02e-10)	(9.51e-10)	(9.72e-10)
Third-Country TFP		0.181***	0.245***	0.326***		-0.623***	-0.555***	-0.487***
		(0.0276)	(0.0276)	(0.0275)		(0.0710)	(0.0708)	(0.0634)
Port-Rail x Distance			0.974***	1.071***			0.420***	0.416***
			(0.0248)	(0.0220)			(0.0600)	(0.0526)
Port-Rail x Tariff			-0.500***	-0.475***			-0.123*	-0.0402
			(0.0292)	(0.0273)			(0.0677)	(0.0655)
Port-Rail x Language			0.0253	-0.0327			0.281***	-0.0660*
			(0.0275)	(0.0252)			(0.0442)	(0.0387)
Port-Rail x			-1.930***	-1.985***			-1.221***	-0.838***
Colonized			(0.0501)	(0.0445)			(0.0879)	(0.0831)
Observations	439707	439707	439707	439707	145350	142205	142205	142205
Product and Year FE	no	no	no	yes	no	no	no	yes
Adjusted R^2	.147	.221	.232	.429	.175	.245	.248	.402

Notes: The table reports the results from specification (6) along with a symmetric version for imports. The coefficients on variables involving the Port-Rail indicator are then used to generate predicted imports and exports, which are then used to construct the IVs.

Table 3: Pre-Period Trends in Trade and the Timing of Port Containerization

	MAIN SPECS		EARLY ADOPTER		LATE ADOPTER		RELIANT ON U.S.		NOT RELIANT ON U.S.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Import Growth	-0.00458		-0.00368		-0.00414		0.0000377		-0.00724	
	(0.00454)		(0.0288)		(0.00428)		(0.00963)		(0.00452)	
Export Growth		0.00374		-0.00545		0.00313		-0.00314		0.00547
		(0.00459)		(0.0126)		(0.00416)		(0.0108)		(0.00400)
N	3933	4342	1104	1102	2829	3240	2325	2358	1608	1984
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: The dependent variable is an indicator for the opening of a foreign container port. The regressors are import and export growth in the 5-year period prior to the port opening.

Table 4: First Stage

	Export Exposure	Import Exposure
Predicted Export Exposure	0.535***	-0.003
	(0.005)	(0.007)
Predicted Import Exposure	-0.005*	0.826***
	(0.003)	(0.003)
Manufacturing Share	-0.002***	-0.003***
	(0.000)	(0.000)
Employment Pre-Trends	-0.001	0.001
	(0.000)	(0.000)
Observations	721	721
K-P Wald F-Statistic	37.94	37.94

Notes: The table reports first stage results of export and import exposure on their predicted exposures and controls. Predicted exposure is constructed as described in Section 2.2.1.

Table 5: Trade Exposure and Employment Growth

	1970-1980	1970-1990		1970-2000	
	(1)	(2)	(3)	(4)	(5)
			OLS		
Export Exposure	3.309**	3.173	2.229	3.715	2.329
	(1.731)	(2.506)	(3.198)	(4.608)	(4.541)
Import Exposure	-1.316**	-1.740*	-2.379	-2.225	-2.304
	(0.655)	(0.914)	(2.199)	(2.686)	(3.004)
Manufacturing Share	-0.004	0.005	0.005	0.002	0.002
	(0.005)	(0.003)	(0.004)	(0.003)	(0.003)
Pre-Trend in Employment	0.008***	0.008***	0.008***	0.008***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Export Exposure, 80-90			4.502*		8.277
			(3.256)		(17.344)
Import Exposure, 80-90			-9.189		-9.895
			(9.101)		(11.850)
Export Exposure, 90-00					-12.566
					(26.594)
Import Exposure, 90-00					-17.508
					(27.802)
			2SLS		
Export Exposure	4.750*	5.030	3.774	5.751	5.355
	(3.002)	(4.737)	(4.021)	(4.732)	(4.511)
Import Exposure	-2.134**	-2.722	-3.047	-4.649	-3.654
	(1.161)	(1.748)	(3.767)	(6.921)	(5.294)
Manufacturing Share	-0.003	0.005	0.006	0.002	0.002
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Pre-Trend in Employment	0.008***	0.008***	0.008***	0.008***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Export Exposure, 80-90			7.167*		9.911
			(9.508)		(20.034)
Import Exposure, 80-90			-17.058		-6.819
			(15.359)		(10.050)
Export Exposure, 90-00					-38.931
					(37.002)
Import Exposure, 90-00					-34.814
					(66.301)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports estimates of the cumulative effects from specification (1). The dependent variable is 100 × the change in log employment in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include 100 × import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table 6: **Trade Exposure and Employment Growth by Sector, 2SLS Only**

	1970-1980	1970-1990		1970-2000	
	(1)	(2)	(3)	(4)	(5)
			Manufacturing, 2SLS		
Export Exposure	6.203***	6.638*	6.414*	8.386	8.608
	(2.273)	(4.112)	(4.222)	(9.729)	(7.059)
Import Exposure	-3.374***	-2.748	-4.385	-5.105	-5.283
	(1.059)	(2.353)	(3.039)	(7.525)	(7.832)
Manufacturing Share	-0.006	0.002	0.002	0.000	-0.000
	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)
Pre-Trend in Income	-0.000	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Export Exposure, 80-90			14.677*		10.304
			(10.307)		(24.503)
Import Exposure, 80-90			-9.711		-6.081
			(15.220)		(10.348)
Export Exposure, 90-00					-8.392
					(9.660)
Import Exposure, 90-00					-4.923
					(6.645)
			Non-Manufacturing, 2SLS		
Export Exposure	2.070*	3.347	2.524	3.187	2.637
	(1.091)	(5.779)	(4.839)	(4.782)	(4.140)
Import Exposure	-1.192*	-3.829	-2.383	-1.625	-1.561
	(0.724)	(3.170)	(3.379)	(2.853)	(3.208)
Manufacturing Share	-0.006	0.003	0.002	0.000	-0.000
	(0.005)	(0.003)	(0.004)	(0.003)	(0.003)
Pre-Trend in Income	-0.000	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Export Exposure, 80-90			8.241**		14.365
			(5.578)		(22.852)
Import Exposure, 80-90			-7.049		-5.321
			(15.017)		(10.290)
Export Exposure, 90-00					-7.859
					(9.327)
Import Exposure, 90-00					-6.317
					(6.357)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports 2SLS estimates of the cumulative effects from specification (1), separately for the Manufacturing sector (top) and the Non-manufacturing sector (bottom). The dependent variable is 100 × the change in log employment in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include 100 × import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table 7: **Trade Exposure and Income Growth**

	1970-1980	1970-1990		1970-2000	
	(1)	(2)	(3)	(4)	(5)
			OLS		
Export Exposure	3.727***	2.382	2.022	2.139	2.179
	(1.084)	(2.441)	(2.606)	(2.195)	(2.700)
Import Exposure	-1.534***	-0.948	-0.576	-0.736	-0.369
	(0.412)	(1.234)	(1.980)	(2.770)	(2.805)
Manufacturing Share	-0.004**	-0.001	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Pre-Trend in Income	-0.000	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Export Exposure, 80-90			10.743		7.964
			(26.328)		(9.998)
Import Exposure, 80-90			-4.321		-9.972
			(4.867)		(8.975)
Export Exposure, 90-00					6.238
					(18.837)
Import Exposure, 90-00					-9.747
					(16.301)
			2SLS		
Export Exposure	4.663**	3.601	3.321	3.155	2.030
	(2.642)	(3.062)	(3.235)	(3.258)	(3.360)
Import Exposure	-1.925**	-1.263	-0.893	-0.193	0.172
	(0.892)	(0.991)	(1.001)	(0.804)	(0.886)
Manufacturing Share	-0.004**	-0.001	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Pre-Trend in Income	-0.000	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Export Exposure, 80-90			-6.768		15.230
			(14.171)		(39.668)
Import Exposure, 80-90			-4.053		-14.346
			(4.757)		(27.332)
Export Exposure, 90-00					10.355
					(9.954)
Import Exposure, 90-00					-12.087
					(15.924)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports estimates of the cumulative effects from specification (1). The dependent variable is 100 $\times$ the change in log median income in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). Values are in 2012 dollars. The regressors include 100 $\times$ import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called “outcome persistence” estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table 8: **Trade Exposure and Home Price Growth**

	1970-1980	1970-1990		1970-2000	
	(1)	(2)	(3)	(4)	(5)
			OLS		
Export Exposure	4.928***	4.359	4.023	2.116	1.452
	(1.578)	(4.285)	(5.338)	(4.245)	(4.133)
Import Exposure	-2.245***	-4.246***	-4.105***	-5.611*	-4.840
	(0.679)	(1.535)	(1.095)	(3.122)	(6.913)
Manufacturing Share	-0.001	0.001	0.001	0.004***	0.004**
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Pre-Trend in Home Price	-0.001	0.002*	0.002	0.002**	0.002**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Export Exposure, 80-90			4.799		13.223*
			(4.937)		(7.391)
Import Exposure, 80-90			7.260		-6.822
			(13.124)		(9.356)
Export Exposure, 90-00					10.812
					(7.534)
Import Exposure, 90-00					-14.643
					(15.235)
			2SLS		
Export Exposure	6.136***	5.531	4.692	4.069	2.604
	(2.603)	(3.991)	(5.700)	(4.260)	(5.100)
Import Exposure	-3.822***	-5.016**	-4.889**	-5.462	-5.884
	(2.003)	(2.791)	(2.804)	(7.711)	(8.828)
Manufacturing Share	0.001	0.001	0.000	0.004***	0.004**
	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)
Pre-Trend in Home Price	-0.001	0.002*	0.002*	0.002**	0.002**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Export Exposure, 80-90			16.157		16.526*
			(19.146)		(9.555)
Import Exposure, 80-90			6.581		-24.392
			(12.849)		(29.930)
Export Exposure, 90-00					17.652
					(17.350)
Import Exposure, 90-00					-17.155
					(18.629)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports estimates of the cumulative effects from specification (1). The dependent variable is 100 × the change in log median home price in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). Values are in 2012 dollars. The regressors include 100 × import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table 9: Trade Exposure and Rental Price Growth

	1970-1980	1970-1990		1970-2000	
	(1)	(2)	(3)	(4)	(5)
			OLS		
Export Exposure	3.235**	1.413*	0.807	0.737	0.369
	(1.714)	(0.805)	(1.424)	(1.734)	(1.993)
Import Exposure	-1.080***	-1.694***	-1.444***	-3.542**	-2.520
	(0.366)	(0.319)	(0.664)	(1.237)	(2.504)
Manufacturing Share	0.001**	0.003*	0.002	0.003	0.004
	(0.001)	(0.002)	(0.002)	(0.004)	(0.005)
Pre-Trend in Rental Price	-0.001	-0.000	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Export Exposure, 80-90			9.160**		16.353
			(5.661)		(18.525)
Import Exposure, 80-90			11.301		-7.790
			(10.333)		(5.894)
Export Exposure, 90-00					26.505
					(45.664)
Import Exposure, 90-00					-12.822
					(13.873)
			2SLS		
Export Exposure	4.183**	2.259	2.025	1.719	1.133
	(2.038)	(1.438)	(1.536)	(3.642)	(4.828)
Import Exposure	-2.310***	-3.167***	-3.307**	-4.856*	-4.394
	(0.515)	(1.388)	(1.558)	(3.188)	(4.169)
Manufacturing Share	0.001	0.003	0.003	0.004	0.006
	(0.003)	(0.002)	(0.002)	(0.004)	(0.005)
Pre-Trend in Rental Price	-0.001	-0.000	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Export Exposure, 80-90			8.515		11.882*
			(3.449)		(6.801)
Import Exposure, 80-90			11.925		-7.736
			(10.100)		(5.721)
Export Exposure, 90-00					13.098*
					(8.137)
Import Exposure, 90-00					-5.511
					(9.958)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports estimates of the cumulative effects from specification (1). The dependent variable is 100 × the change in log median rental price in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). Values are in 2012 dollars. The regressors include 100 × import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table 10: Trade Exposure and Housing Supply

	1970-1980	1970-1990		1970-2000	
	(1)	(2)	(3)	(4)	(5)
			OLS		
Export Exposure	5.048**	7.194	7.576	8.262	10.190
	(2.330)	(9.733)	(11.803)	(13.735)	(19.016)
Import Exposure	-1.080	-2.694	0.344	0.542	0.520
	(4.520)	(4.603)	(1.767)	(1.225)	(1.833)
Manufacturing Share	0.001	0.003	0.002	0.004***	0.004***
	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Pre-Trend in Rental Price	-0.001	-0.000	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Export Exposure, 80-90			7.773		11.074
			(9.449)		(13.537)
Import Exposure, 80-90			13.056		-9.013
			(15.951)		(24.534)
Export Exposure, 90-00					13.755
					(14.001)
Import Exposure, 90-00					-5.128
					(5.196)
			2SLS		
Export Exposure	7.491**	9.290	9.311	10.801	9.720
	(3.938)	(10.338)	(13.536)	(14.642)	(15.828)
Import Exposure	-2.310	-1.567	-1.307	0.356	0.394
	(2.853)	(1.294)	(1.993)	(1.104)	(1.157)
Manufacturing Share	0.001	0.002	0.002	0.004***	0.004***
	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Pre-Trend in Rental Price	-0.001	-0.000	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Export Exposure, 80-90			14.874***		14.322*
			(11.653)		(13.897)
Import Exposure, 80-90			11.172		-7.136
			(10.165)		(12.721)
Export Exposure, 90-00					13.255
					(16.151)
Import Exposure, 90-00					-15.562
					(13.312)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports estimates of the cumulative effects from specification (1). The dependent variable is 100 × the change in log total housing units in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include 100 × import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table 11: Trade Exposure Interacted with Land Unavailability, 2SLS Only

	1970-1980	1970-1990		1970-2000	
	(1)	(2)	(3)	(4)	(5)
	PANEL A Dep Var: Log △ Housing Supply				
Export Exposure × Land Unavailability	7.112***	8.004*	7.935	9.470	8.153
	(2.475)	(5.662)	(6.851)	(9.091)	(10.438)
Import Exposure × Land Unavailability	-0.410	-1.125	1.014	-0.503	-1.176
	(0.980)	(2.221)	(3.752)	(2.513)	(4.844)
Export Exposure	1.207**	1.971	3.078	2.813	2.049
	(0.582)	(3.461)	(3.055)	(4.117)	(5.128)
Import Exposure	-2.144	-2.835	-2.507	-1.953	-1.707*
	(2.237)	(2.315)	(1.909)	(1.442)	(0.952)
	PANEL B Dep Var: Log △ Home Prices				
Export Exposure × Land Unavailability	5.129***	5.020	4.115	5.278	5.003
	(0.944)	(3.878)	(4.092)	(4.243)	(6.663)
Import Exposure × Land Unavailability	-0.728*	-1.105	-0.873	-0.615	-1.441
	(0.477)	(2.089)	(1.177)	(1.632)	(2.903)
Export Exposure	3.883**	4.883	4.620	4.776	4.512
	(1.810)	(3.873)	(4.020)	(3.911)	(3.072)
Import Exposure	-2.674**	-3.091**	-2.878**	-4.001	-3.219*
	(1.703)	(2.006)	(1.991)	(1.725)	(1.852)
	PANEL C Dep Var: Log △ Rents				
Export Exposure × Land Unavailability	3.292**	4.105**	3.287	4.931	4.510
	(1.541)	(2.053)	(2.908)	(4.565)	(4.726)
Import Exposure × Land Unavailability	-1.174	-1.195	-0.993	-1.814	-1.305
	(0.804)	(1.276)	(1.513)	(3.007)	(3.241)
Export Exposure	2.610*	3.655	3.117	3.870	3.443
	(1.562)	(3.246)	(4.001)	(4.415)	(4.817)
Import Exposure	-2.241**	-2.635**	-2.209**	-3.176*	-3.010
	(1.142)	(1.109)	(1.275)	(2.213)	(2.661)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓
Intervening Exposure Controls			✓		✓

Notes: The table reports 2SLS estimates from three separate specifications given by (10), where the outcomes are listed at the top of each panel. The dependent variable is 100 × the change in log outcome in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include 100 × import and export exposure as defined in equations (2) and (3) in the text. The land unavailability measure is described in Section 4.3 and is included on its own but not reported in the table. Columns (3) and (5) add additional controls for import and export exposure during intervening periods. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment in all specifications. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Appendix

A Variation from Early Port Adopters Only

Table A.1: Trade Exposure and Employment Growth, 2SLS Only

	1970-1980	1980-1990		1990-2000	
	(1)	(2)	(3)	(4)	(5)
			2SLS		
Export Exposure	7.486**	5.257	3.675	0.730	0.868
	(3.681)	(3.698)	(2.785)	(0.699)	(0.547)
Import Exposure	-6.275**	-6.647**	-2.679	-3.825	-3.304
	(3.155)	(2.914)	(3.199)	(2.686)	(3.004)
Pre-Trend in Employment	0.008***	0.008***	0.008***	0.008***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Export Exposure, 80-90			164.502*		98.277
			(93.956)		(217.344)
Import Exposure, 80-90			-19.189		-69.895
			(16.101)		(111.850)
Export Exposure, 90-00					-432.566
					(1631.594)
Import Exposure, 90-00					-373.508
					(674.802)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports 2SLS estimates of the cumulative effects from specification (1), using only variation from early port adopters (see Section 4.2.1). The dependent variable is the change in log employment in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table A.2: Trade Exposure and Income Growth, 2SLS Only

	1970-1980	1980-1990		1990-2000	
	(1)	(2)	(3)	(4)	(5)
			2SLS		
Export Exposure	4.673*	0.401***	0.621	0.139	0.330
	(2.969)	(0.150)	(0.789)	(0.108)	(0.460)
Import Exposure	-3.225**	-1.285	-0.951	-1.281	-1.096
	(1.811)	(0.987)	(1.048)	(0.846)	(0.895)
Manufacturing Share	-0.004**	-0.001	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Pre-Trend in Income	-0.000	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Export Exposure, 80-90			-6.768		35.230
			(24.171)		(39.668)
Import Exposure, 80-90			-4.053		-24.446
			(4.757)		(27.432)
Export Exposure, 90-00					305.455
					(299.954)
Import Exposure, 90-00					-122.087
					(158.924)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports 2SLS estimates of the cumulative effects from specification (1), using only variation from early port adopters (see Section 4.2.1). The dependent variable is the change in log median income in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table A.3: **Trade Exposure and Home Price Growth, 2SLS Only**

	1970-1980	1980-1990		1990-2000	
	(1)	(2)	(3)	(4)	(5)
			2SLS		
Export Exposure	14.936***	3.531*	2.692	0.069	0.604
	(4.603)	(1.791)	(1.600)	(0.260)	(1.100)
Import Exposure	-6.712**	-3.816**	-3.289*	-1.262**	-0.884*
	(2.924)	(1.791)	(1.904)	(0.711)	(0.528)
Manufacturing Share	-0.001	0.001	0.000	0.004***	0.004**
	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)
Pre-Trend in Home Price	-0.001	0.002*	0.002*	0.002**	0.002**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Export Exposure, 80-90			36.157		162.526*
			(49.146)		(89.555)
Import Exposure, 80-90			6.581		-24.392
			(12.849)		(91.930)
Export Exposure, 90-00					1087.652
					(727.350)
Import Exposure, 90-00					-177.155
					(580.629)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports 2SLS estimates of the cumulative effects from specification (1), using only variation from early port adopters (see Section 4.2.1). The dependent variable is the change in log median home price in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table A.4: **Trade Exposure and Rental Price Growth, 2SLS Only**

	1970-1980	1980-1990		1990-2000	
	(1)	(2)	(3)	(4)	(5)
			2SLS		
Export Exposure	11.117**	7.259	4.625	0.719	0.833
	(5.538)	(5.338)	(3.536)	(0.642)	(0.828)
Import Exposure	-8.310***	-4.567***	-5.307***	-0.456***	-0.494***
	(2.855)	(1.488)	(1.758)	(0.188)	(0.169)
Manufacturing Share	0.001	0.002	0.002	0.004***	0.004***
	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Pre-Trend in Rental Price	-0.001	-0.000	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Export Exposure, 80-90			84.874***		114.322*
			(31.653)		(63.897)
Import Exposure, 80-90			11.172		-70.136
			(10.165)		(53.721)
Export Exposure, 90-00					423.255
					(426.151)
Import Exposure, 90-00					-455.562
					(343.412)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports 2SLS estimates of the cumulative effects from specification (1), using only variation from early port adopters (see Section 4.2.1). The dependent variable is the change in log median rental price in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

B Estimates from Lasso-Based IVs

Table B.5: Trade Exposure and Employment Growth, 2SLS Only

	1970-1980	1980-1990		1990-2000	
	(1)	(2)	(3)	(4)	(5)
			2SLS		
Export Exposure	7.486**	5.257	3.675	0.730	0.868
	(3.681)	(3.698)	(2.785)	(0.699)	(0.547)
Import Exposure	-6.275**	-6.647**	-2.679	-3.825	-3.304
	(3.155)	(2.914)	(3.199)	(2.686)	(3.004)
Pre-Trend in Employment	0.008***	0.008***	0.008***	0.008***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Export Exposure, 80-90			164.502*		98.277
			(93.956)		(217.344)
Import Exposure, 80-90			-19.189		-69.895
			(16.101)		(111.850)
Export Exposure, 90-00					-432.566
					(1631.594)
Import Exposure, 90-00					-373.508
					(674.802)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports 2SLS estimates of the cumulative effects from specification (1), using variation from lasso-based iv's (see Section 4.2.2). The dependent variable is the change in log employment in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table B.6: Trade Exposure and Income Growth, 2SLS Only

	1970-1980	1980-1990		1990-2000	
	(1)	(2)	(3)	(4)	(5)
			2SLS		
Export Exposure	4.673*	0.401***	0.621	0.139	0.330
	(2.969)	(0.150)	(0.789)	(0.108)	(0.460)
Import Exposure	-3.225**	-1.285	-0.951	-1.281	-1.096
	(1.811)	(0.987)	(1.048)	(0.846)	(0.895)
Manufacturing Share	-0.004**	-0.001	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Pre-Trend in Income	-0.000	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Export Exposure, 80-90			-6.768		35.230
			(24.171)		(39.668)
Import Exposure, 80-90			-4.053		-24.446
			(4.757)		(27.432)
Export Exposure, 90-00					305.455
					(299.954)
Import Exposure, 90-00					-122.087
					(158.924)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports 2SLS estimates of the cumulative effects from specification (1), using variation from lasso-based iv's (see Section 4.2.2). The dependent variable is the change in log median income in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table B.7: Trade Exposure and Home Price Growth, 2SLS Only

	1970-1980	1980-1990		1990-2000	
	(1)	(2)	(3)	(4)	(5)
			2SLS		
Export Exposure	14.936***	3.531*	2.692	0.069	0.604
	(4.603)	(1.791)	(1.600)	(0.260)	(1.100)
Import Exposure	-6.712**	-3.816**	-3.289*	-1.262**	-0.884*
	(2.924)	(1.791)	(1.904)	(0.711)	(0.528)
Manufacturing Share	-0.001	0.001	0.000	0.004***	0.004**
	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)
Pre-Trend in Home Price	-0.001	0.002*	0.002*	0.002**	0.002**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Export Exposure, 80-90			36.157		162.526*
			(49.146)		(89.555)
Import Exposure, 80-90			6.581		-24.392
			(12.849)		(91.930)
Export Exposure, 90-00					1087.652
					(727.350)
Import Exposure, 90-00					-177.155
					(580.629)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports 2SLS estimates of the cumulative effects from specification (1), using variation from lasso-based iv's (see Section 4.2.2). The dependent variable is the change in log median home price in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table B.8: **Trade Exposure and Rental Price Growth, 2SLS Only**

	1970-1980	1980-1990		1990-2000	
	(1)	(2)	(3)	(4)	(5)
			2SLS		
Export Exposure	11.117**	7.259	4.625	0.719	0.833
	(5.538)	(5.338)	(3.536)	(0.642)	(0.828)
Import Exposure	-8.310***	-4.567***	-5.307***	-0.456***	-0.494***
	(2.855)	(1.488)	(1.758)	(0.188)	(0.169)
Manufacturing Share	0.001	0.002	0.002	0.004***	0.004***
	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Pre-Trend in Rental Price	-0.001	-0.000	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Export Exposure, 80-90			84.874***		114.322*
			(31.653)		(63.897)
Import Exposure, 80-90			11.172		-70.136
			(10.165)		(53.721)
Export Exposure, 90-00					423.255
					(426.151)
Import Exposure, 90-00					-455.562
					(343.412)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports 2SLS estimates of the cumulative effects from specification (1), using variation from lasso-based iv's (see Section 4.2.2). The dependent variable is the change in log median rental price in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

C Estimates Holding the Product Set Fixed at the 1970 Set

Table C.9: Trade Exposure and Employment Growth, 2SLS Only

	1970-1980	1980-1990		1990-2000	
	(1)	(2)	(3)	(4)	(5)
			2SLS		
Export Exposure	7.486**	5.257	3.675	0.730	0.868
	(3.681)	(3.698)	(2.785)	(0.699)	(0.547)
Import Exposure	-6.275**	-6.647**	-2.679	-3.825	-3.304
	(3.155)	(2.914)	(3.199)	(2.686)	(3.004)
Pre-Trend in Employment	0.008***	0.008***	0.008***	0.008***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Export Exposure, 80-90			164.502*		98.277
			(93.956)		(217.344)
Import Exposure, 80-90			-19.189		-69.895
			(16.101)		(111.850)
Export Exposure, 90-00					-432.566
					(1631.594)
Import Exposure, 90-00					-373.508
					(674.802)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports 2SLS estimates of the cumulative effects from specification (1), using variation from a fixed set of products, defined as the 1970 product set (see Section 4.2.3). The dependent variable is the change in log employment in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table C.10: **Trade Exposure and Income Growth, 2SLS Only**

	1970-1980	1980-1990		1990-2000	
	(1)	(2)	(3)	(4)	(5)
			2SLS		
Export Exposure	4.673*	0.401***	0.621	0.139	0.330
	(2.969)	(0.150)	(0.789)	(0.108)	(0.460)
Import Exposure	-3.225**	-1.285	-0.951	-1.281	-1.096
	(1.811)	(0.987)	(1.048)	(0.846)	(0.895)
Manufacturing Share	-0.004**	-0.001	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Pre-Trend in Income	-0.000	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Export Exposure, 80-90			-6.768		35.230
			(24.171)		(39.668)
Import Exposure, 80-90			-4.053		-24.446
			(4.757)		(27.432)
Export Exposure, 90-00					305.455
					(299.954)
Import Exposure, 90-00					-122.087
					(158.924)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports 2SLS estimates of the cumulative effects from specification (1), using variation from a fixed set of products, defined as the 1970 product set (see Section 4.2.3). The dependent variable is the change in log median income in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table C.11: **Trade Exposure and Home Price Growth, 2SLS Only**

	1970-1980	1980-1990		1990-2000	
	(1)	(2)	(3)	(4)	(5)
			2SLS		
Export Exposure	14.936***	3.531*	2.692	0.069	0.604
	(4.603)	(1.791)	(1.600)	(0.260)	(1.100)
Import Exposure	-6.712**	-3.816**	-3.289*	-1.262**	-0.884*
	(2.924)	(1.791)	(1.904)	(0.711)	(0.528)
Manufacturing Share	-0.001	0.001	0.000	0.004***	0.004**
	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)
Pre-Trend in Home Price	-0.001	0.002*	0.002*	0.002**	0.002**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Export Exposure, 80-90			36.157		162.526*
			(49.146)		(89.555)
Import Exposure, 80-90			6.581		-24.392
			(12.849)		(91.930)
Export Exposure, 90-00					1087.652
					(727.350)
Import Exposure, 90-00					-177.155
					(580.629)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports 2SLS estimates of the cumulative effects from specification (1), using variation from a fixed set of products, defined as the 1970 product set (see Section 4.2.3). The dependent variable is the change in log median home price in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.

Table C.12: Trade Exposure and Rental Price Growth, 2SLS Only

	1970-1980	1980-1990		1990-2000	
	(1)	(2)	(3)	(4)	(5)
			2SLS		
Export Exposure	11.117**	7.259	4.625	0.719	0.833
	(5.538)	(5.338)	(3.536)	(0.642)	(0.828)
Import Exposure	-8.310***	-4.567***	-5.307***	-0.456***	-0.494***
	(2.855)	(1.488)	(1.758)	(0.188)	(0.169)
Manufacturing Share	0.001	0.002	0.002	0.004***	0.004***
	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Pre-Trend in Rental Price	-0.001	-0.000	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Export Exposure, 80-90			84.874***		114.322*
			(31.653)		(63.897)
Import Exposure, 80-90			11.172		-70.136
			(10.165)		(53.721)
Export Exposure, 90-00					423.255
					(426.151)
Import Exposure, 90-00					-455.562
					(343.412)
Observations	722	722	722	722	722
State FE	✓	✓	✓	✓	✓

Notes: The table reports 2SLS estimates of the cumulative effects from specification (1), using variation from a fixed set of products, defined as the 1970 product set (see Section 4.2.3). The dependent variable is the change in log median rental price in a commuting zone (CZ) over the period noted (1970-1980, 1980-1990, 1990-2000). The regressors include import and export exposure as defined in equations (2) and (3) in the text. Columns (3) and (5) add additional controls for import and export exposure during intervening periods, our so-called "outcome persistence" estimates. We control for pre-trends in the outcome variable and the manufacturing share of employment in total CZ employment. Standard errors are clustered at the CZ level. *** Significant at the 1 percent, ** 5 percent, * 10 percent level.