# Do Foreign Trade Zones in the United States Spillover?

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## Abstract

This paper empirically tests the geographic and economic spillover effects of foreign trade zones (FTZs) in the United States. We find that ZIP codes that receive FTZ subsites experience growth in new and existing establishments. While these FTZ sites are designed to support manufacturing, our results are driven by spillovers in non-manufacturing industries. Our results show that FTZs spillover in both ZIP codes with FTZ subsites as well ZIP codes bordering FTZ subsites and are strongest within a 5-mile radius of a FTZ. We also find some evidence that FTZs positively impact the likelihood of survival among existing establishments.

JEL Codes: F13, R12, O12

## 1. Introduction

World-wide trade share (trade volume/GDP) has doubled between 1960 and 2009 from 24 percent to 50 percent (World Development Indicators, 2009). Wacziarg and Welch (2008) estimate that the percentage of nations having an open trade policy, as defined by Sachs and Warner (1995), increased from 25 percent in 1960 to 75 percent in 2000. Specifically, in the United States, trade volume (exports plus imports) has grown by 519 percent between 1980 and 2009 while trade share has grown from 21 percent to 26 percent. It has been estimated that during the period between 1980 and 2006, 25 percent of the growth in US merchandise trade is due to policy liberalization, 72 percent of the growth is due to the world economy expanding, and the remaining 3 percent due to falling costs of transportation (Hufbauer and Adler, 2009).

A trade policy followed in several countries to promote international trade is the creation of foreign-trade zones which are geographic areas within which goods can arrive, be handled, manufactured or reconfigured, and re-exported without being subject to customs duty. Foreign-trade zones (FTZs) form an integral part of U.S. trade policy and were first established in the US by the Foreign-Trade Zones Act of 1934. These are secure areas under the supervision of U.S. Customs and Border Protection that are considered outside the customs territory of the United States for the purposes of duty payment. Merchandise may be held in a FTZ without being subject to Customs duties and other ad valorem taxes. Thus, commercial merchandise receives the same Customs treatment in the FTZ as it would outside the United States economy.

While the first several decades of FTZ history was marked by slow growth and little activity, the FTZ program began a rapid escalation in 1980. The number of zones has increased dramatically from 10 general-purpose zones in 1970 to 168 fully active FTZs in fiscal year 2010. For the sample period considered in this study, 2000 to 2009, the number of fully active FTZs has grown from 144 to 168, a 17 percent increase. Additionally, in 2010, there was $34.8 billion of direct exports from FTZs and approximately 320,000 persons employed in about 2,400 firms that operate under FTZ procedures (Department of Commerce, 2011).[1]

The US Department of Commerce states the purpose of FTZs is to "enhance U.S. competitiveness by lowering costs" and to "contribute to maintaining or boosting employment

[1] These export figures do not include certain indirect exports which involve FTZ merchandise that undergo further processing in the United States at non-FTZ sites prior to export.

opportunities and encourage investment by helping local employers remain competitive" (U.S. Department of Commerce, 2011). This is explicitly stated in the Preamble to the 2012 FTZ Board Regulations, "Zones have as their public policy objective the creation and maintenance of employment through the encouragement of operations in the United States which, for customs reasons, might otherwise have been carried out abroad." There is also a strong perception among politicians and the public that FTZs are important for creating employment.[2]

This paper investigates the basic premise that both the creation and expansion of FTZs can create jobs and attract other businesses. While the motivation for establishing FTZs in the U.S. has been to increase employment and development through spillover effects there has been, to the best of our knowledge, no empirical study in the literature which tests the spillover effects. This is despite the fact that there is an important and growing literature studying spillover effects (e.g. Kamien et al. (1992), Görg and Eric Strobl (2001), Greenstone and Moretti (2010) and Autor et al. (2012)). This paper thus empirically tests to what extent foreign-trade zones cause spillovers in neighboring and economically close areas. In theory, spillover effects could be positive or negative. If spatially targeted policies are successful at attracting establishments from outside the immediate area or creating new establishments and new jobs there may be a positive effect on neighboring areas through the forces of agglomeration (see Rosenthal and Strange (2003a) and Brülhart et al. (2012) for a detailed discussion). Spillover effects could also be negative if the incentives offered by the program cause establishments to leave neighboring areas in favor of the targeted area, or if establishments and jobs in neighboring areas are destroyed through competition from targeted areas.

If spatially targeted incentives cause spillovers, these effects should be included in any cost/benefit analysis of these policies. In addition, because many evaluations of spatially targeted redevelopment policies use areas that are either geographically or economically close as a control group, understanding spillovers provides us information on the methodology used to evaluate policy. If spillovers occur on areas used as a benchmark for evaluation, the estimated effects of policy are biased, as the presence of spillovers violates the no interference assumption between treatment and control groups necessary for policy evaluation (Rosenbaum, 2007).

[2] For example, the News Sentinel in Fort Wayne, Indiana, on FTZ 182's expansion reported, "Expanded foreign trade zone could attract Fort Wayne jobs," (News Sentinel, 2011). In a similar vein State Senator Patty Ritchie of New York remarked when Ogdensburg FTZ 118 expanded, "By expanding the existing foreign trade zone to include all of St. Lawrence County, we can encourage more manufacturers and other businesses to come to Northern New York" (Watertown Daily News, 2012).

To test for spillover effects from FTZs, we compare how business activity in areas that receive FTZ status from the Board changed relative to areas which do not receive an FTZ. We test for spillovers in *geographically* close areas, for example those ZIP codes that share a border with a ZIP code receiving an FTZ subsite. The spatial impact of spillovers from FTZs is also investigated by examining how far such spillover effects extend beyond simple bordering ZIP codes. We also test for spillovers into *economically* close groups such as non-manufacturing industries that do not directly receive benefits from FTZ subsites. Finally, we investigate spillover effects of FTZ designations in rural versus urban areas.

We find that the growth in new and existing establishments found in FTZ areas is primarily driven by growth in non-manufacturing industries. Our results show that FTZs spillover in new non-manufacturing establishments in both FTZ ZIP codes and bordering ZIP codes. Specifically, we find a 1.0 percent long-term increase in the growth rate of new non-manufacturing firms in FTZ ZIP codes and a similar longer-term increase in the growth rate in bordering ZIP codes. However these results dissipate quickly and the estimates reveal that the spillover effects are the strongest within a 5-mile radius of a FTZ. We also find evidence that existing establishments have a higher likelihood of surviving when they are in a FTZ-designated site. FTZ areas see higher growth in existing non-manufacturing establishments with growth rates of 0.8 percent in the short-term and 1.8 percent in the longer-term. Bordering ZIP codes show similar spillover effects amongst existing non-manufacturing establishments with growth rates of 0.6 percent and 1.8 percent in the short-term and longer-term, respectively.

The remainder of the paper is organized as follows. In section 2, we discuss the role of foreign trade zones in creating spillover effects. We describe the data and empirical methodology in section 3. The empirical results are discussed in section 4 and concluding remarks in section 5.

## 2. Foreign Trade Zones and Spillovers

A foreign trade zone is a grant of authority given by the FTZ Board to, typically, a public or non-profit organization, such as an economic development organization, or a port authority. This grant allows the creation of geographic areas where firms can activate with Customs and operate outside of the normal duty environment. A zone must be located adjacent to a customs port of entry. All the space within a zone must be within 60 statute miles or 90 minutes driving

time of the adjacent customs port of entry.[3] Each port of entry is entitled to at least one zone. The location of state boundaries and navigable waterways may allow for one port of entry to have multiple zones. Within zones, activity is allowed at general-purpose sites and, on occasion, subzones. A general-purpose site is a space where firms can move to and activate with U.S. Customs and Border Protection in order take advantage of FTZ opportunities. Often general-purpose sites are located at port facilities or airports. A subzone is a location, or collection of parcels, that is operated by a single firm engaged in some specified activity, typically manufacturing.[4] Subzones are typically granted to oil refiners and manufacturers of automobiles, tractors, pharmaceuticals, etc. In our study we consider both general-purpose sites and subzones and henceforth refer to both as "FTZ subsites." Figure 1 displays the counties in the United States which have FTZ subsites.

Under FTZ procedures, foreign and domestic merchandise may be admitted into zones or subsites for operations such as storage, exhibition, assembly, manufacture and processing, without being subject to formal U.S. Customs and Border Protection procedures. The primary advantage for firms is ability to lower operational costs by deferring, reducing or eliminating duties on goods admitted to a FTZ. For example, a firm can defer its duties since it pays customs duties only when and if merchandise is transferred into U.S. Customs and Border Protection territory. With no time limit on the length of time that merchandise can remain in a zone, this allows firms to have greater cash flow for their operating needs. Additionally, firms can avoid inverted tariffs by being allowed to choose the lower of the duty rate on the imported inputs or the duty rate applicable to the final good.[5] Finally, goods that are directly exported from a FTZ are not subject to duties. Thus, FTZs provide firms a variety of options for lowering expenses related to duties.[6]

Reduced duty liabilities are not the only incentive that may attract firms to FTZ areas. Two other benefits of the FTZ program stem from the tax policies and the non-applicability of

[3] The word "space" is used as a catchall term for sites, subzones, parcels, magnet sites, and usage-driven sites. It basically covers any geographical area where zone activity occurs.
[4] Subzones are not subject to the 60 mile/90 minute driving time radius to an adjacent port of entry.
[5] An inverted tariff occurs when the tariff rate to a component part is higher than the tariff on the finished good. Inverted tariff structures can disadvantage U.S. facilities and can be reversed in FTZs because when assembled goods enter into the customs territory of the United States, the importer has a choice of paying the lower of either the rate applicable to the imported input or the rate applicable to the finished good.
[6] More details on the benefits of FTZs are available at http://www.naftz.org/

quota restrictions in FTZs. By federal statute, tangible personal property imported from outside the U.S. and held in a zone, as well as that produced in the U.S. and held in a zone to be exported, are not subject to state and local ad valorem taxes. Also, U.S. quota restrictions do not apply to merchandise admitted to zones. Quota goods, with the permission of the Foreign-Trade Zones Board, are allowed to be transformed in a FTZ to a non-quota article that may then be entered into U.S. Customs and Border Protection territory, free of quota restrictions.

Zone status thus provides companies with an opportunity to reduce certain operating costs associated with a U.S. location that are avoided when operating from a foreign site (National Association of Foreign Trade Zones, 2012). The empirical trade literature has looked at the contribution of FTZs in the context of attracting new investment and the agglomeration effects of foreign direct investment (FDI) flows. Head et al. (1999) examine Japanese investments in the U.S. between 1980 and 1992 to assess the effectiveness of US state promotion efforts to attract these investments and find that state provisions of FTZs have attracted new Japanese investments. On the other hand, Bobonis and Shatz's (2007) study on the effects of seven state-level investment incentive and fiscal policy variables, including the sum of years that a state has a FTZ, on the level of foreign direct investment by state across the United States from 1977-1996 finds that FTZs as a state-level incentive have little influence on the location of FDI.

Our interest in this study is the potential geographic or economic spillovers associated with FTZs. The benefits described above provide incentives for manufacturing firms to locate in FTZ areas and such changes in manufacturing activity could have either economic or geographic spillovers. Economic spillovers would occur if increased manufacturing activity or employment in FTZ areas due the FTZ program led to growth in non-manufacturing establishments or employment, for example in the service or retail industries. Since FTZ areas are designed to impact manufacturing activity, the impact on non-manufacturing activity would only be due to spillovers from the growth of the manufacturing sector. Geographic spillovers would occur if increased manufacturing activity in FTZ areas causes growth in nearby areas. Such growth could be in either the non-manufacturing sector or the manufacturing sector, the latter possibly occurring because of growth in suppliers who, due to their location, are not directly benefited by the FTZ program but instead are attracted by an increase in manufacturing activity within the FTZ area.

Whether the economic or geographic spillover effects are a net positive or negative depends on whether the location decisions of firms are due to new business activity that would not have occurred without the FTZ program. If FTZs do create such new activity, then the spillovers would be positive. However, it is possible that the program simply causes a reallocation of economic activity across geography as existing firms choose to relocate to FTZ areas, and new establishments, that would have been created anyway, choose to locate in FTZ areas. This would result in a positive impact on business activity within FTZ areas but at the cost of business activity in non-FTZ areas. Thus, the program could cause negative spillovers to surrounding areas in either manufacturing or non-manufacturing as they change their location decisions. For instance, Hanson and Rohlin (2012) find that location-based tax incentives cause negative spillovers by attracting new business activity that would have occurred in neighboring and economically similar areas. Since we do not know *a priori* whether spillover exist, nor what form they might take, we investigate both the economic and geographic spillovers.

## 3. Data and Methodology

### *3.1 Foreign Trade Zone Data*

The FTZ data on all sites and new activity in sites for the period 2000 to 2009 was collected and cross-checked from three primary sources: (i) various issues of the Foreign Trade Zone Board's publication, *Annual Report of the Foreign-Trade Zones Board to the Congress of the United States*; (ii) the Federal Register database which includes all notices on FTZ applications and Board Orders; and (iii) the Online FTZ Information System (OFIS).[7] The FTZ application notices provide a summary of the zone sites and the scope of activity while Board orders indicate approvals, disapprovals or restrictions of the zone sites. The collated data recorded any *new activity* occurring in zones between January 1, 2000 and December 31, 2010 where "new activity" is defined as any change in acreage within any zone site or subzone. For purposes of this study we constrain our analysis to "new FTZs" which are only newly created sites in a ZIP code which previously did not have a FTZ and any additions made to an existing

[7] The *Annual Report of the Foreign-Trade Zones Board to the Congress of the United States* is available at http://ia.ita.doc.gov/ftzpage/index.html and the Online FTZ Information System (OFIS) is available at http://ita-web.ita.doc.gov/FTZ/OFISLogin.nsf.

site via added acreage site. Most of the new activity is in the form of new subsites with 981 subsites created during this period compared to 96 subsites with added acreage.[8]

### *3.2 Establishment Data*

The ideal dataset to study spillovers has business location at a small geographic scale so that one can more acutely measure the spillovers. We use data from the Dun and Bradstreet (D&B) Marketplace data files which is aggregated at the ZIP code and has been used numerous times to study business location decisions (e.g. Carlton (1983), Rosenthal and Strange (2003b) and Hanson and Rohlin (2012)). This data set contains a wealth of information on establishments including their employment, years of service, ZIP code and the two-digit Standard Industrial Classification (SIC) code. To conduct our analysis we use the 1996 and 2000 to 2009 versions of the data set.[9] Using the D&B data set, three measures of business activity are created: the number of new establishments, the number of existing establishments and the number of employees at existing establishments.[10] We define "new establishments" as businesses with one or less years of service and "existing establishments" as businesses being in service for 4 or more years. The new establishment counts provide a measure of business creation at a local level while counts and employment at existing establishments provide measures of business sustainability or the "death" rate of businesses.

We transform all three measures of business activity by scaling the level in the ZIP in each year relative to some measure of activity in 2000 in that ZIP code. For the existing establishments and employment at existing establishments, we simply divide the level in each year by the relevant level of activity in 2000 for each ZIP code. For new establishments, we divide by the number of existing establishments in 2000, providing a measure of the rate of entry of new firms relative to existing firms and thus avoiding the problem of no new entrants in the

[8] Newly created subsites in which no activity takes place within 3 to 5 years automatically sunset. We did not include 70 such sites in our analysis. Similarly, we did not include 43 subsites which were removed and 42 subsites in which acreage was reduced during our time period.

[9] Dun and Bradstreet issue the data set quarterly during our time period, however, due to data availability we only use one quarter per year, which can vary depending upon the year. We use first quarter data for years 2003, 2006, and 2007, second quarter data for years 2004 and 2009, third quarter data for years 2002, 2005, and 2008 and the fourth quarter data for years 1996, 2000 and 2001.

[10] We chose to not study changes in the number of employees at new establishments because it is difficult to interpret the results. For instance, an increase in the number of new business employees could mean FTZs positively influenced new entrepreneurs to hire more workers upon creation or it could mean that very small firms were never created.

denominator if we scaled by the number of new firms in 2000. Scaling the variables aids in our identification because it helps to control for the density of business activity, the distribution of which is highly skewed with many ZIP codes having little or no business activity and a few ZIP codes with very high activity.[11] Additionally, the scaled variables provide an easier interpretation of the results because changes in the scaled measures of business activity can be interpreted as growth rates relative to the 2000 level.[12]

### *3.3 Summary Statistics*

Table 1 presents selected summary statistics for our sample period separately by FTZ ZIP codes, FTZ-bordering ZIP codes, and non-FTZ ZIP codes (the latter of which are used to construct counterfactuals as described in the following section). Column 1 presents the average measures of business activity over time for ZIP codes that receive new activity during our sample period. FTZ ZIP codes have a slightly higher rate of new establishment entry than the set of ZIP codes outside of FTZ areas. For example, FTZ ZIP codes in 1996 experienced 4.8 new businesses relative to the level of existing establishments in 2000 while ZIP codes outside of FTZ areas experienced 3.6 new establishments (column 3), the difference of which is statistically significant. The entry rate is higher for FTZ ZIP codes than non-FTZ area ZIP codes in all years, and a similar pattern is found in the FTZ-bordering ZIP codes in column 2. However, the differences between the areas are typically not large and are smaller when the focus is restricted to manufacturing (columns 4 through 6).

There does appear to be substantial differences in the number of, and employment at, existing establishments across locations. Since 2000, the number of existing establishments and employment in existing establishments has been lower than the level in 2000 (scaled value is less than one), although there is some evidence of improvements in the later years of our sample period. Additionally, the levels in FTZ ZIP codes have been lower relative to 2000 than in the

[11] While FTZs are concentrated in MSAs, with nearly 82 percent of FTZ ZIP codes inside MSAs, over half of all ZIP codes in the United States are outside of MSAs. Since many of these are in rural areas with little business activity and because there are relatively few FTZ ZIP codes outside of MSAs, throughout our analysis we utilize a sample comprised of all ZIP codes with FTZ subsites, all other MSA ZIP codes and a 25 percent random sample of all non-MSA ZIP codes. All of our results are robust to the sampling of non-MSA ZIP codes.

[12] One concern with using the scaled values, or growth rates, is that the results could be driven by areas with little business activity for which small increases in the number of firms would result in large changes relative to the 2000 baseline. We have investigated this issue and find no evidence that such ZIP codes are driving our results. An example of this analysis investigating the effects across MSA status is presented as a robustness check.

non-FTZ area ZIP codes, and appear to be lower than the levels in nearby ZIP codes. These results are particularly strong for manufacturing in columns 4 through 6. These results are suggestive that the ZIP codes receiving new FTZ activity, which is primarily associated with manufacturing, may be selected because they are declining relative to other potential locations and thus are selected to help these areas improve. Our methodological approach is designed to account for these negative pre-selection trends, as we discuss in the following section.

### *3.4 Empirical Methodology*

Our main research interest is identifying how FTZ subsites in a ZIP code changes business activity in that ZIP code or bordering ZIP codes. Let $Y_{ijt}$ represent one of our three measures of business activity in ZIP code *i*, for industry *j*, and in time *t*. We want to study how $Y\_ij$ changes if ZIP code *i* receives an FTZ subsite at time $t = 0$. Receiving a FTZ subsite could have different effects in the near-term and longer-term. For example, it may be that the subsite designation causes an immediate jump in business activity but the impact fades over time. Alternatively, firms may not be able to respond immediately to the program so the only effects of the program are in the long-term. Due to the ambiguity associated with when the impacts of FTZ designations may be realized, we study both the short-term and long-term impacts. For the ZIP codes receiving FTZ subsites, we define the short-term effect as the change in business activity from one-year prior to one-year post FTZ designation as: $\Delta Y_{ij}^{SR} = Y_{ij(t+1)} - Y_{ij(t-1)}$. For the long-term effect, we calculate the change in business activity from one-year prior to three years post FTZ designation as: $\Delta_{ij}^{LR} = Y_{ij(t+3)} - Y_{ij(t-1)}$.[13]

Our primary methodology is a difference-in-difference matching approach based on the propensity score $P(X)$, defined as the probability of treatment conditional on the set of observable characteristics (Rosenbaum and Rubin, 1983).[14] The fundamental difficulty with estimating the effects of FTZ designation is identifying the appropriate counterfactual. For the case of FTZ ZIP codes, to estimate the effect of FTZ designation on business activity within the ZIP code, the average treatment on the treated (ATT), we want to measure

[13] Ideally, we would like to study even longer-term outcomes but are limited by data availability. Thus, we recognize that the four-year window that we refer to as "longer-term" is not necessarily the long-run but we are limited from studying longer-run effects by data availability.

[14] For a further discussion and other examples of difference-in-difference matching, see Heckman, Ichimura and Todd (1997), Heckman et al (1998), Girma and Görg (2007) and Busso, Gregory and Kline (forthcoming).

$$\Delta^{ATT} = E(\Delta_1 | FTZ = 1) - E(\Delta_0 | FTZ = 1) \quad (1)$$

where $\Delta_1$ is the change in business activity associated with receiving an FTZ subsite and $\Delta_0$ is the change in activity associated with not receiving an FTZ subsite.[15] The fundamental causal problem is that we do not observe the counterfactual $E(\Delta_0 | FTZ = 1)$, which is the change in business activity in FTZ ZIP codes that would have occurred if no FTZ subsite had been selected. To identify the ATT in this context requires that the Mean Conditional Independence Assumption

$$E(\Delta_0 | P(X), FTZ = 1) = E(\Delta_0 | P(X), FTZ = 0) \quad (2)$$

is satisfied. Equation (2) states that conditional on the propensity score $P(X)$, there is no difference across FTZ designation in the average change in business activity that would occur without FTZ designation. Thus, conditional on the propensity score, the changes in ZIP codes that do not receive FTZ subsites are appropriate counterfactuals.[16]

Mean conditional independence is a strong assumption and if it is violated then our estimates of the effects of FTZ designation will be biased. To increase the likelihood that our identifying assumption is satisfied, we take advantage of the FTZ selection process. Although all ZIP codes within FTZ areas are eligible to receive subsites, only some of these ZIP codes actually do receive a subsite, possibly for some reason unobserved by the researcher. This makes it less likely that the change in business activity under non-treatment is the same across FTZ-designation within the FTZ areas. Consequently, we construct counterfactuals from the set of ZIP codes not in FTZ areas. These are ZIP codes that do not receive an FTZ designation, not because they were not selected, but because they were not eligible to be selected. Thus, we are not comparing ZIP codes selected to have an FTZ subsite to those ZIP codes specifically not selected for which mean conditional independence is less likely to hold. Figure 2 illustrates how our identification strategy operates using an area in the northeast of the United States as an example. The black areas represent ZIP codes with new FTZ activity while the remaining grey areas represent ZIP codes in FTZ areas without new activity. We construct counterfactuals from the white area, the ZIP codes ineligible for new FTZ activity.

[15] For simplicity, we have dropped the subscripts for industry and time as well as the superscripts denoting short-term and long-term effects

[16] As a robustness check, we also estimated all results using Mahalanobis matching. This method matches directly on the covariates as opposed to the propensity score generated by the covariates, thus it provides an alternative specification that does not depend on the estimation of the propensity score. These results were not substantively different and are available upon request.

To further improve the identification, we attempt to be as flexible as possible when implementing our matching procedure with regards to the outcome and time period considered. We estimate the matching procedure separately for each outcome-industry combination so that the ZIP codes used to construct the counterfactual are those that best match the FTZ ZIP codes for that particular outcome-industry combination. Also, we control for trends in the data by matching on lagged values of the outcome-industry combination. Thus, we account not only for the pre-period levels of business activity but also the trends in these variables. We further control for trends by estimating the matching period separately for each year of FTZ designation during our sample period. Thus, we are allowing for differential trends depending on when during our sample period an FTZ subsite was designated.

Specifically, to calculate the propensity score for FTZ designation, we estimate a regression separately for each year from 2001-2005 within the sample of ZIP codes that are not borders. The dependent variable of the regression takes the value of one if the ZIP code received an FTZ site in that year and a zero otherwise. More specifically, for each year-outcome-industry combination, we estimate

$$I(FTZ = 1|Border = 0)_{ijt} = \alpha + \beta_1 Y_{ij(t-1)} + \beta_2 Y_{ij1996} + \gamma W_{ij(t-1)} + \epsilon_{ijt} \qquad (3)$$

where $Y_{ij(t-1)}$ is the value of outcome *Y* in industry *j* in the year prior, $Y_{ij1996}$ is the value in 1996, and $W_{ij(t-1)}$ represent additional controls measured in the year prior. Since FTZ designation is predominantly intended for manufacturing, we include in *W* the proportion of existing establishments in manufacturing within the ZIP code and the proportion of employment in existing establishments in manufacturing. Additionally, because there are different levels of business activity associated with cities, as well as differential likelihoods of FTZ subsites being selected across geography, we include indicators for whether the ZIP code is in the non-central city part of an MSA or a central-city part of an MSA.

We estimate equation (3) using a logit and use the results to predict the propensity score $\hat{P}(X)^F_{ijt}$ which is the probability that a ZIP code receives an FTZ subsite conditional upon *X*, the set of observable characteristics defined above. We then use the propensity score in a matching algorithm to construct the counterfactual changes we are interested in from the sample of non-eligible ZIP codes. For our base estimates we employ a calipered nearest-neighbor algorithm with replacement where each FTZ ZIP code is matched to the 10 non-FTZ eligible ZIP codes that have the most similar propensity scores, provided that the difference between the propensity

score of the FTZ ZIP and the potential match is "small."[17] In our base estimates we use a caliper of 0.01 but all results are robust to varying the caliper window. Standard errors are produced by bootstrapping the entire procedure using 1000 replications.

We are also interested in estimating the potential spillover effects of FTZ designation into surrounding ZIP codes. To estimate potential spillovers, we employ the same methodological approach based on propensity score matching in ZIP codes neighboring ZIP codes receiving FTZ subsites. In our primary analysis, we investigate the ZIP codes that directly neighbor a ZIP code with new FTZ activity. However, this approach is somewhat dependent on the irregular shape of ZIP codes and therefore could miss potential spillover effects that may be slightly further. As a robustness check, we also investigate effects in nearby areas using all ZIP codes within various rings surrounding FTZ ZIP codes defined by mileage. The estimation of the propensity score for FTZ-borders is similar to that for FTZ ZIP codes except the dependent variable takes a value of one if the ZIP code borders a ZIP code that received an FTZ site in that year, and a zero otherwise. The propensity score for the FTZ-borders is then estimated in the sample of non-FTZ ZIP codes as

$$I(Border = 1|FTZ = 0)_{ijt} = \alpha + \beta_1 Y_{ij(t-1)} + \beta_2 Y_{ij1996} + \gamma W_{ij(t-1)} + \epsilon_{ijt} \qquad (4)$$

where all variables are defined as before. The matching procedure is then performed as discussed previously.[18]

Matching methods rely on balancing the distributions of the covariates across treatment status, a proposition that can be tested empirically. Table A-1 presents balancing tests for all variables used to estimate the propensity scores for FTZ ZIP codes. The first column presents the mean value of each covariate for the FTZ ZIP codes while the second column presents the mean value for all potential matches, those non-FTZ, non-border ZIP codes outside of FTZ areas. Asterisks denote the results from t-tests across treatment status for each variable. The third and fourth columns present the same information but for those FTZ ZIP codes and non-FTZ ZIP codes on the common support, meaning those FTZ ZIP codes for which valid matches were

[17] Note that the algorithm locally imposes common support, meaning that the only observations utilized in the estimates will be those treated and control observations for whom a close match is found, defined as being within the specified caliper distance. Thus, only those non-FTZ ZIP codes that are matched to an FTZ ZIP code will be used to construct the counterfactuals. Additionally, only those FTZ ZIP codes for which a match is found within the caliper will be included in the estimation sample.

[18] In our border analysis we only consider the borders of FTZ ZIP codes that are in the common support in our FTZ ZIP code analysis. Thus, we do not produce estimates for ZIP codes that receive an FTZ subsite but for which a valid match could not be found, nor the ZIP codes that border such FTZ ZIP codes.

made and the matched ZIP codes. The results in Table A-1 demonstrate that the matching procedure is balancing the covariate distributions. The mean values are generally more similar, and often nearly identical, across treatment status among ZIP codes in the common support. Additionally, the differences are typically not statistically significant, but in the few cases where a statistically significant difference exists, the absolute difference in the mean values has decreased and the difference is small. Similar improvements in balance for FTZ-bordering ZIP codes are found in Table A-2. While balance of the covariates does not prove that mean conditional independence is satisfied, the fact that balance has improved indicates that the matching procedure is producing counterfactuals from untreated observations with similar covariates, including trends in outcomes, to the FTZ ZIP codes.

## 4. Results

### *4.1 Spillover Effects in FTZ Areas*

Table 2 presents the estimated short-term and longer-term impacts of FTZ subsites on our three measures of business activity within FTZ ZIP codes, all relative to the relevant 2000 level of business activity. We begin by discussing the results in the top panel which considers the impact of FTZ subsites across all industries. The results in column 1 of Table 1 show that one year after a FTZ designation, the short-term, ZIP codes that received a FTZ subzone experienced positive growth of 1.5 percent in new establishment start-ups, and 1.7 percent growth in employment at existing establishments; both are statistically significant at the 1 percent level.[19] These observed changes in FTZ ZIP codes correspond to the first term in equation (1).

To determine the role that FTZs played in this positive growth in new establishment start-ups and employment we need to determine what would have occurred in the absence of the program, i.e. the counterfactual specified in the second term of equation (1). Column 2 in the top panel of Table 2 present the counterfactual changes estimated from our matching methodology from ZIP codes outside of FTZ areas that had similar economic trends, manufacturing composition and central city/MSA status. These matched ZIP codes increased their new firm start-ups by 1.1 percent and had existing firms increase their employment by 0.8 percent. However, matched ZIP codes experience a greater loss of existing establishments with a decrease

[19] Henceforth, all results that are reported are statistically significant at least at the 10 percent level unless otherwise noted.

of 1.3 percent. Column 3 in the top panel presents the difference between the observed and counterfactual changes, the estimated ATT as specified in equation (1), which is interpreted as the impact of FTZ subsites on business activity across all industries in the short-term in FTZ ZIP codes. All three measures show small positive differences although only the growth of existing establishments is statistically different from zero at conventional levels. These results suggest that in the short-term (1 year after receiving designation ) having a FTZ subzone in your ZIP code improves the likelihood that existing firms in the ZIP code will stay in business.

In contrast, the longer-term changes across all industries, presented in columns 4 through 6, are typically larger for both the observed and counterfactual changes as well as the estimated ATT. Specifically, column 4 shows that FTZ ZIP codes had a 3.1 percent increase in new establishments, 7.7 percent increase in existing establishments, and 4.8 percent increase in employment at existing establishments. However, there is also growth in the counterfactual areas (Column 5). Overall, the ATTs in Column 6 show that for all industries ZIP codes where a FTZ subzone was placed had an additional 1.6 percent growth in exiting establishments and 0.8 percent growth in new establishments. The estimated impact on employment at existing establishments is negative but not statistically significant. Overall, this evidence suggests that after a few years, areas with FTZs attracted more entrepreneurs and experienced less existing business failures.

Although studying the impact of FTZs on "all industries" provides a total impact of FTZ subsites with FTZ ZIP codes, the underlying mechanisms are unclear. An increase in business activity across all business types could simply be driven by increases in manufacturing at the FTZ subsites due to the lower costs of production. Alternatively, it could be due positive geographic or economic spillovers. For example, it is possible that increased manufacturing at FTZ subsites attracts additional manufacturing from suppliers to the ZIP code outside of FTZ subsites which would be a form of geographic spillovers. Or the growth in business activity could be due to economic spillovers resulting from the attraction of non-manufacturing business, for example in retail or service, following the increase in manufacturing activity. Of course, it is possible that the "all industry" impacts are a combination of direct and spillover effects. To investigate potential spillovers, we estimate the effects of FTZ subsites on all three measures of business activity separately for manufacturing and non-manufacturing. Because our data is aggregated to the ZIP code level, we cannot distinguish between the direct impact of FTZs on

manufacturing within subsites or highly localized spillovers into manufacturing within the ZIP code but outside the subsite. However, any increase in non-manufacturing activity must represent economic spillovers.

The estimated effects on manufacturing activity are presented in the middle panel of Table 2. We find an increase in new manufacturing establishments in both the short- and long-term, however, neither is statistically different from their matched areas. Also, in the long-term we find that the number of existing manufacturing establishments grows by 9.6 percent while their matched areas only grow at 6.7 percent. This leads to an estimated difference of 2.4 percent, although not statistically significant at conventional levels. Overall, there is little evidence that FTZs lead to strong growth in manufacturing.[20]

Instead, the non-manufacturing estimates in the bottom panel of Table 2 indicate that the growth in new and existing establishments found in all industries is primarily driven by economic spillovers. Column 6 of Table 1 indicates that after 3 years, areas with FTZ subsites had an additional 1.0 percent growth in new business formation in the non-manufacturing sector. Additionally, FTZ areas had higher growth in existing non-manufacturing establishments in both time horizons with differential growth rates of 0.8 percent in the short-term and 1.8 percent in the long-term. This evidence suggests that creating a FTZ subsite spurs economic growth in non-manufacturing industries both in terms of new business formation and decreasing existing business failures. We also separately investigated the effects within the service and retail industries which are the two largest sectors of non-manufacturing. Overall we find a similar pattern of results for both service and retail, although the results are less precisely estimated (see Appendix Table A-3).

### *4.2 Spillover Effects in FTZ Bordering Areas*

The results in Table 2 suggest that FTZs produce spillover effects within ZIP codes that have FTZ subsites. We now investigate whether FTZs create geographic spillovers by impacting business activity in ZIP codes that border ZIP codes with FTZ subsites. As discussed in section 2, such effects, if they exist, could be either positive or negative depending on whether they lead to new business activity or to a reallocation of economic activity across geography. Table 3

[20] It is possible that FTZs have a large positive impact on manufacturing within FTZ subsites that overcome the negative pre-trends in manufacturing in the ZIP codes that receive subsites but manufacturing outside of the subsites is not strongly benefited by spillovers or do not grow without receiving the tax advantages of being in a subsite.

presents the short-term and long-term impacts within FTZ-bordering ZIP codes estimated using the matching methodology described above.

Overall, the results in Table 3 suggest that FTZs produce positive geographic spillovers in neighboring areas that are similar to the impact within FTZ ZIP codes. The estimated difference between the observed and counterfactual changes in business activity across all industries in columns 3 and 6 of the top panel of Table 3 suggest that FTZ-bordering ZIP experience growth in both new and existing establishments in both time periods. Specifically, the number of new businesses grew an additional 0.6 percent in the short-term and 1.1 percent in the long-term while the number of existing businesses grew an additional 0.5 percent after 1 year and 1.6 percent after 3 years. Focusing on manufacturing in the middle panel, which can only be impacted through geographic spillovers since by definition there are no FTZ subsites in these ZIP codes, the results show that there was slight additional growth in the neighboring areas but none of the estimates are statistically different from zero. The non-manufacturing results indicate that neighboring areas did have positive economic spillovers with new businesses growing an additional 0.7 percent and 1.1 percent while existing establishments grew an additional 0.6 percent and 1.8 percent. Interestingly, the magnitudes of the spillover effects in the actual FTZ ZIP codes are almost identical to their neighboring areas suggesting that the positive spillovers spread across geography, a proposition we test in the next section.

### *4.3 Results across Distance Bands*

To investigate how the spillover effects dissipate over space we repeat the matching analysis separately for those ZIP codes within 0-5 miles and then 5-10 miles of a FTZ subsite. We focus on non-manufacturing businesses because most of our previous results are in non-manufacturing.[21] In addition to providing information about the degree of localization of spillover effects, these results also serve as robustness checks on our prior results. Primarily the results serve as a check for our border definition used in the previous section but they also investigate whether our prior results were simply picking up the possibility that FTZ subsites were placed in locations expected to grow.[22] The first three columns in Table 4 present the

[21] Similarly, we don't find substantive results in manufacturing across distance. These results are presented in Appendix Table A-4.
[22] Note that this is unlikely given the negative trends in Tables 1 and A-1.

results for surrounding ZIP codes within 0 to 5 miles from the FTZ subsite while the last three columns show the estimates for ZIP codes 5 to 10 miles from the subsite.[23]

First, comparing the observed growth rates between the two distances around the FTZ subsite in columns 1 and 4, we find that the observed growth rate in non-manufacturing new businesses dissipates with distance from the FTZ subsite. Specifically, in the short-term, new establishments grew 2.1 percent in the areas 0 to 5 miles from the subsite while areas 5 to 10 miles away grew only 1.6 percent. This pattern persists in the long-term with growth rates of 5.3 percent and 3.3 percent in the 0 to 5 mile and 5 to 10 mile bands respectively. Estimates for existing establishments illustrate a dissipating pattern in the long-term. For instance, existing employment 0 to 5 mile band grew 4.4 percent while only growing 3.5 percent in the 5 to 10 mile band. These results of observed changes across distance are consistent with dissipating impacts across geography.

The estimated ATTs, the difference between observed and counterfactual changes, in columns 3 and 6 of Table 4 also suggest that the impact on new business activity dissipates over space. In the short-term, new establishment activity grew an additional 1.1 percent relative to their matches in the 0 to 5 mile distance band while only growing an additional 0.5 percent (not statistically significant) in the 5 to 10 mile band. In the long-term, we find a strikingly similar pattern for the new establishments, but larger in magnitude. Estimates suggest that ZIP codes 0 to 5 miles from the FTZ subsite had 2.6 percent more new businesses than their matched areas while ZIP codes 5 to 10 miles away only had 0.7 percent (not statistically significant) more new business. Analysis on the number of existing establishments and their employment show little evidence of spillovers over both distance bands after controlling for pre-existing trends. Overall this evidence suggests that the spillover effect from FTZ subsites are relatively localized, with the effects dissipating roughly five miles from the subsite.

### *4.4 Rural vs. Urban Spillover Effects*

Understanding whether or not positive spillover effects occur in urban and rural areas is important for policy makers. Policies, particularly related to economic redevelopment, often have disparate effects depending on the amount of existing business in the area. The same policy can have varying effects on entrepreneurship because of the difficulty in spurring economic

[23] Technically, the 0 to 5 mile and 5 to 10 mile distances are measured from the centroid of the FTZ ZIP code.

activity in rural areas. To understand how FTZ subsites impact local economies in rural and urban areas, we identify whether or not a subzone is located in a metropolitan statistical area (MSA). Then we separately estimate the ATTs for FTZ ZIP codes in MSAs and non-MSAs using the methodology described previously. Again, we focus on the non-manufacturing effects in Table 5 because, similar to our previous results, we find little effect in manufacturing (see Appendix Table A-5).[24]

The top panel of Table 5 presents the results for FTZ ZIP codes. Columns 1 and 2 show strong positive growth in non-manufacturing industries for new and existing establishments. This is particularly true 3 years after a FTZ subsite is established with new establishments growing an additional 0.9 percent in FTZ ZIP codes compared to their matches and existing establishment growth increasing by an additional 2.0 percent. Comparatively, non-MSA estimates tend to be slightly larger in magnitude due to there being less non-manufacturing activity in those areas previously as well as be less precise because there are fewer non-MSA FTZs (see Table 1). However, the differences across MSA status are not large except for a larger negative effect on employment in existing establishments in rural areas. The results in the bottom panel of Table 5 demonstrate that there are also similar results for non-manufacturing in FTZ-bordering ZIP codes across MSA status. Overall the results in Table 5 suggest that FTZs have impact in both MSA and non-MSA areas. Additionally, the results suggest that our previous results are not being driven by our scaling of business activity relative to 2000 levels. The similarity of results in MSA and non-MSA areas suggests that our previous results are not driven by large relative growth in areas with little baseline business activity.

## 5. Conclusion

Foreign Trade Zones in the United States are an integral part of US trade policy and are created with the intent of providing US firms a competitive edge in global trade as well as to stimulate domestic employment and to create, presumably positive, spillover effects. However, with no studies in the literature examining whether FTZs spillover, it is difficult to determine the policy effects of FTZs. This study, the first to the best of our knowledge, investigates whether

[24] The manufacturing estimates are, in general, small and insignificant with the only exception being that existing establishments in non-MSA areas grew by 8.2 percent after 3 years. This result suggests that FTZ subsites in non-MSA areas were successful in retaining existing manufacturing. Again, the large magnitude of the estimate is indicative of the small amount of existing business present in these rural areas

FTZs sanctioned by the Federal Trade Zones Board between 2000 and 2009 spillover. We conduct our study by identifying how FTZ subsites in a ZIP code changes business activity in that ZIP code or bordering ZIP codes in the short-term (defined as the change in business activity from one-year prior to one-year post FTZ designation) and the long-term (defined as the change in business activity from one-year prior to three years post FTZ designation).

We find that the growth in new and existing establishments found in all industries in FTZ areas is primarily driven by growth in non-manufacturing industries. We find that FTZs spillover in new non-manufacturing establishments in both FTZ ZIP codes and bordering ZIP codes. Specifically, FTZ areas see higher growth in existing establishments in non-manufacturing with growth rates of 0.8 percent in the short-term and 1.8 percent in the long-term. Bordering ZIP codes show similar spillover effects amongst existing non-manufacturing establishments with growth rates of 0.6 percent and 1.8 percent in the short-term and long-term, respectively. However these results dissipate quickly and the estimates reveal that the spillover effects are the strongest within a 5-mile radius of a FTZ. We also find some evidence that existing establishments have a higher likelihood of surviving when they are in a FTZ-designated site. Propensity score matching techniques were used to identify other ZIP codes most similar in terms of economic trends, manufacturing composition, and Metropolitan Statistical Area status. Our results remain robust in that new establishments in that the non-manufacturing sector in the same MSA status see higher growth rates in the long-term in both FTZ ZIP codes and bordering ZIP codes.

Thus, FTZs appear to be successful in promoting both new and existing business activity. However, we find no evidence of higher employment in existing firms although we believe that new establishments by hiring new worker promote employment. Additionally, since the spillover effects of FTZs are highly localized, regional development may require the establishment of a number of sites to be spread geographically in order for them to have a widespread impact.

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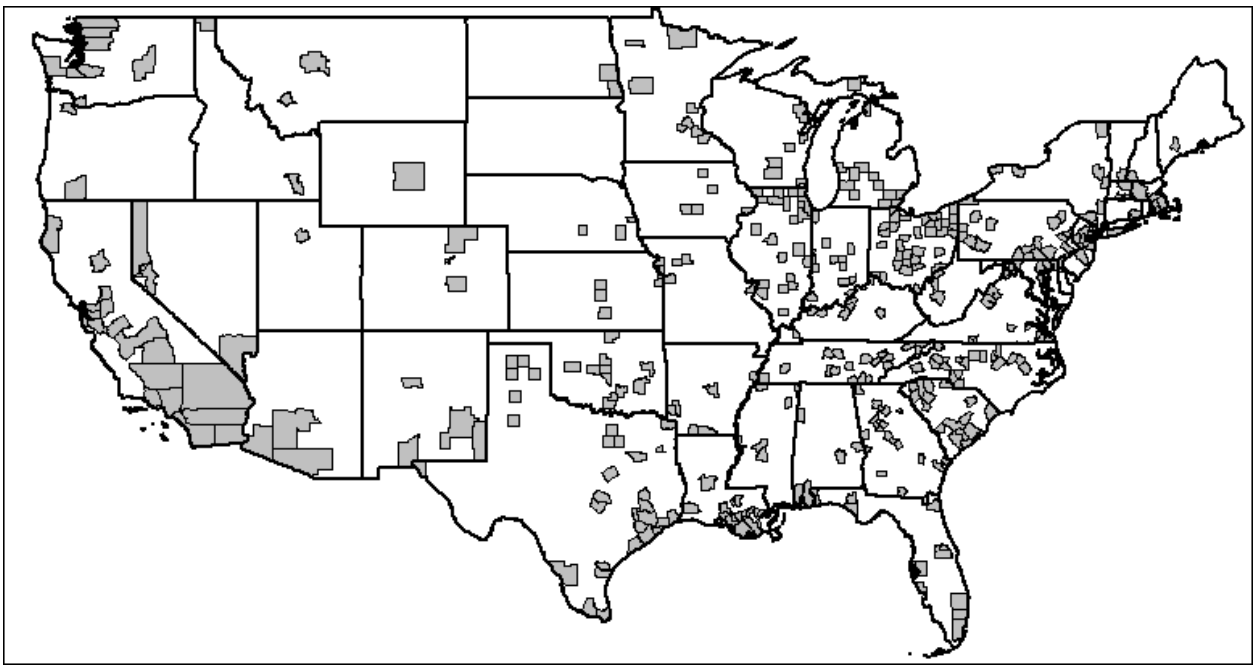
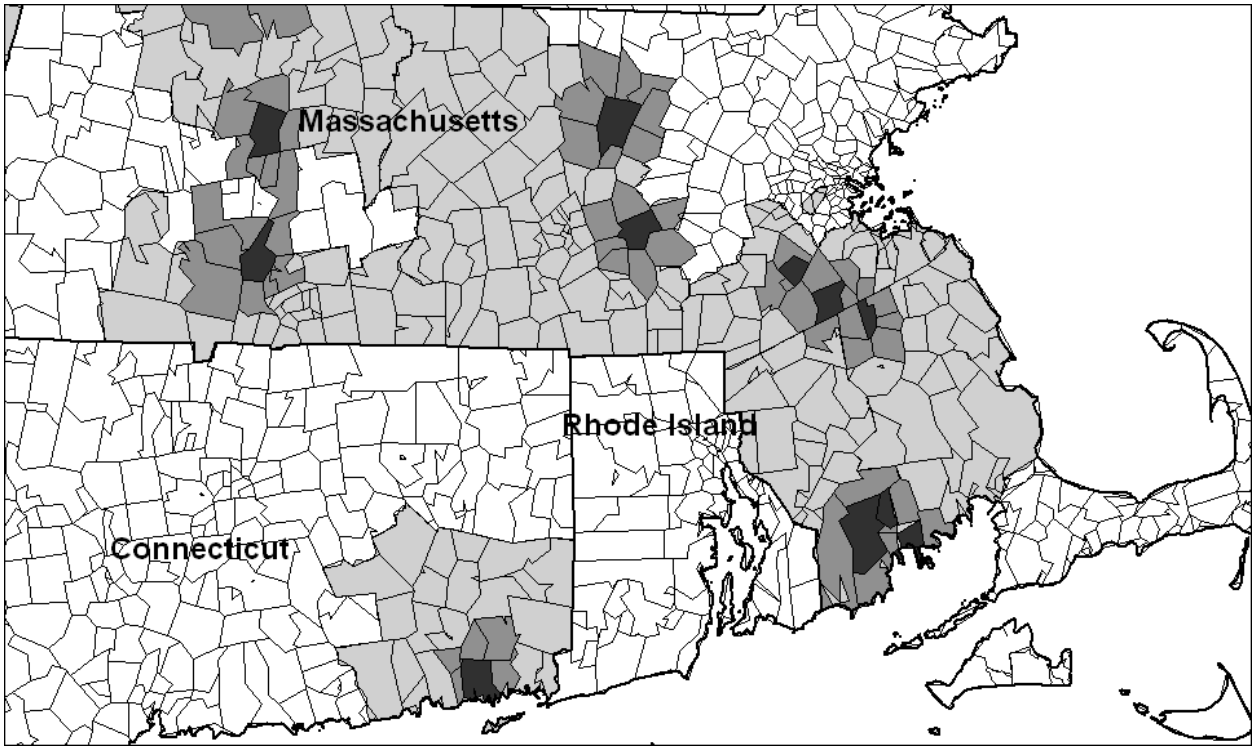
Figure 1: Counties in the United States that have Foreign Trade Zones



Notes:
1) Grey areas represent counties with FTZ areas.

Figure 2: Example of FTZ Areas, FTZ ZIP Codes, and FTZ Borders




Notes:

1) FTZ ZIP codes are shaded black while border ZIP codes are shaded medium-grey. The light grey areas represent ZIP codes in FTZ areas that are eligible for FTZ subsites but neither have a subsite nor neighbor a ZIP code with a subsite.

**Table 1: Means of Selected Variables by FTZ Status of ZIP Codes**

| | All industries | | | Manufacturing | | |
|---|---|---|---|---|---|---|
| Variable | FTZ | FTZ Border | Non-FTZ Area | FTZ | FTZ Border | Non-FTZ Area |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| New establishments, 1996 | 0.048*** | 0.046*** | 0.036 | 0.046 | 0.050*** | 0.042 |
| New establishments, 2001 | 0.043** | 0.044*** | 0.037 | 0.062 | 0.060** | 0.055 |
| New establishments, 2002 | 0.044*** | 0.044*** | 0.036 | 0.056 | 0.055** | 0.049 |
| New establishments, 2003 | 0.055*** | 0.055*** | 0.045 | 0.068 | 0.068** | 0.061 |
| New establishments, 2004 | 0.031*** | 0.032*** | 0.025 | 0.028 | 0.029 | 0.027 |
| New establishments, 2005 | 0.044*** | 0.042*** | 0.032 | 0.042 | 0.043*** | 0.036 |
| New establishments, 2006 | 0.068*** | 0.067*** | 0.049 | 0.067* | 0.068*** | 0.057 |
| New establishments, 2007 | 0.102*** | 0.099*** | 0.071 | 0.095** | 0.093*** | 0.075 |
| New establishments, 2008 | 0.091*** | 0.091*** | 0.061 | 0.052* | 0.055*** | 0.044 |
| New establishments, 2009 | 0.093*** | 0.096*** | 0.065 | 0.037* | 0.038*** | 0.031 |
| Existing establishments, 1996 | 0.901*** | 0.848*** | 0.789 | 0.895** | 0.878** | 0.849 |
| Existing establishments, 2001 | 0.661*** | 0.707*** | 0.742 | 0.709*** | 0.791*** | 0.823 |
| Existing establishments, 2002 | 0.672*** | 0.718*** | 0.750 | 0.728*** | 0.820*** | 0.849 |
| Existing establishments, 2003 | 0.649*** | 0.691*** | 0.709 | 0.710*** | 0.794** | 0.816 |
| Existing establishments, 2004 | 0.706*** | 0.752*** | 0.766 | 0.783*** | 0.859** | 0.884 |
| Existing establishments, 2005 | 0.693*** | 0.734** | 0.746 | 0.776*** | 0.843** | 0.866 |
| Existing establishments, 2006 | 0.662*** | 0.700** | 0.711 | 0.746*** | 0.808** | 0.826 |
| Existing establishments, 2007 | 0.648*** | 0.683** | 0.691 | 0.744** | 0.798 | 0.813 |
| Existing establishments, 2008 | 0.710** | 0.752 | 0.743 | 0.810*** | 0.875* | 0.894 |
| Existing establishments, 2009 | 1.090* | 1.181*** | 1.128 | 1.019** | 1.097 | 1.109 |
| Existing employment, 1996 | 0.834 | 0.837 | 0.844 | 1.076 | 1.224 | 1.305 |
| Existing employment, 2001 | 0.526*** | 0.610*** | 0.703 | 0.570** | 0.865 | 0.893 |
| Existing employment, 2002 | 0.543*** | 0.633*** | 0.711 | 0.600** | 0.946 | 0.952 |
| Existing employment, 2003 | 0.521*** | 0.599*** | 0.669 | 0.573** | 0.837 | 0.918 |
| Existing employment, 2004 | 0.569*** | 0.641*** | 0.723 | 0.650** | 0.932 | 0.993 |
| Existing employment, 2005 | 0.566*** | 0.634*** | 0.720 | 0.654** | 1.005 | 1.037 |
| Existing employment, 2006 | 0.562*** | 0.627*** | 0.694 | 0.638** | 0.980 | 0.994 |
| Existing employment, 2007 | 0.551*** | 0.613*** | 0.691 | 0.684** | 0.933 | 1.046 |
| Existing employment, 2008 | 0.564*** | 0.654*** | 0.727 | 0.683** | 1.004 | 1.136 |
| Existing employment, 2009 | 0.684*** | 0.814*** | 0.920 | 0.748** | 1.096** | 1.291 |
| MSA | 0.815*** | 0.760*** | 0.650 | | | |
| MSA, Central City | 0.199*** | 0.168*** | 0.083 | | | |
| N | 573 | 3718 | 10956 | | | |

Notes:

1) Existing establishment and existing employment refers to establishments that are at least 4 years old and are scaled relative to the 2000 level of the outcome in each ZIP code. New establishments refer to establishments that are no more than one year old and are scaled by the level of existing establishments in 2000.

2) Asterisks denote whether the mean value for either FTZ ZIP codes or FTZ-bordering ZIP codes is statistically different from the mean value in non-FTZ areas at the 10% (*), 5% (**) or 1% (***) levels.

**Table 2: Estimated Effects on Establishments and Employment of FTZ Designation in the Same ZIP Codes**

| | Short-term | | | Long-term | | |
|---|---|---|---|---|---|---|
| | Observed change | Counterfactual change | Difference (ATT) | Observed change | Counterfactual change | Difference (ATT) |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| **All industries** | | | | | | |
| New Establishments | 0.015*** | 0.011*** | 0.003 | 0.031*** | 0.023*** | 0.008* |
| | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) | (0.004) |
| Existing Establishments | -0.005 | -0.013*** | 0.008** | 0.077*** | 0.060*** | 0.016** |
| | (0.003) | (0.004) | (0.004) | (0.012) | (0.010) | (0.010) |
| Existing Employment | 0.017** | 0.008* | 0.009 | 0.048*** | 0.056*** | -0.008 |
| | (0.009) | (0.009) | (0.012) | (0.012) | (0.014) | (0.018) |
| **Manufacturing** | | | | | | |
| New Establishments | 0.017*** | 0.010** | 0.007 | 0.008** | 0.006 | 0.003 |
| | (0.005) | (0.006) | (0.006) | (0.004) | (0.005) | (0.006) |
| Existing Establishments | 0.012 | 0.004 | 0.008 | 0.092*** | 0.067*** | 0.024 |
| | (0.010) | (0.009) | (0.013) | (0.016) | (0.013) | (0.019) |
| Existing Employment | 0.014 | 0.073** | -0.059 | 0.062 | 0.173*** | -0.111 |
| | (0.024) | (0.043) | (0.049) | (0.051) | (0.086) | (0.097) |
| **Non-manufacturing** | | | | | | |
| New Establishments | 0.015*** | 0.010*** | 0.004 | 0.033*** | 0.023*** | 0.010** |
| | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) | (0.004) |
| Existing Establishments | -0.006* | -0.014*** | 0.008** | 0.078*** | 0.059*** | 0.018** |
| | (0.003) | (0.004) | (0.004) | (0.012) | (0.010) | (0.010) |
| Existing Employment | 0.011 | 0.011** | 0.000 | 0.052*** | 0.063*** | -0.010 |
| | (0.009) | (0.010) | (0.014) | (0.012) | (0.012) | (0.016) |

Notes:

1) Short-term estimates represent the change for one year before to one year after FTZ designation. Long-term estimates represent the change for one year before to three years after FTZ designation.

2) Existing establishment and existing employment refers to establishments that are at least 4 years old and are scaled relative to the 2000 level of the outcome in each ZIP code. New establishments refer to establishments that are no more than one year old and are scaled by the level of existing establishments in 2000.

3) Each outcome is estimated using propensity score matching where the propensity score is estimated using a logit that includes the outcome in the pre-period and 1996, the fraction of existing establishments and existing employment in manufacturing and indicators for whether the ZIP code is in an MSA or in the central city MSA. Counterfactuals are produced using 10 nearest neighbors. Standard errors are produced by bootstrapping the procedure using 1000 replications are presented in parentheses. Asterisks denote statistical significance at the 10% (*), 5% (**) and 1% (***) levels.

**Table 3: Estimated Effects on Establishments and Employment of FTZ Designation in FTZ-Bordering ZIP Codes**

| | Short-term | | | Long-term | | |
|---|---|---|---|---|---|---|
| | Observed change | Counterfactual change | Difference (ATT) | Observed change | Counterfactual change | Difference (ATT) |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| **All industries** | | | | | | |
| New Establishments | 0.017*** | 0.011*** | 0.006*** | 0.035*** | 0.024*** | 0.011*** |
| | (0.002) | (0.002) | (0.003) | (0.004) | (0.002) | (0.004) |
| Existing Establishments | -0.014*** | -0.019*** | 0.005* | 0.073*** | 0.057*** | 0.016** |
| | (0.003) | (0.003) | (0.003) | (0.010) | (0.009) | (0.007) |
| Existing Employment | -0.007 | 0.010 | -0.017 | 0.039*** | 0.054*** | -0.015 |
| | (0.008) | (0.007) | (0.010) | (0.013) | (0.011) | (0.018) |
| **Manufacturing** | | | | | | |
| New Establishments | 0.010* | 0.007* | 0.003 | 0.011** | 0.004 | 0.007 |
| | (0.005) | (0.005) | (0.006) | (0.005) | (0.005) | (0.005) |
| Existing Establishments | -0.006 | -0.007 | 0.002 | 0.053*** | 0.048*** | 0.005 |
| | (0.008) | (0.007) | (0.010) | (0.013) | (0.010) | (0.014) |
| Existing Employment | 0.109*** | 0.050 | 0.058 | 0.161*** | 0.132** | 0.030 |
| | (0.053) | (0.040) | (0.066) | (0.057) | (0.055) | (0.079) |
| **Non-manufacturing** | | | | | | |
| New Establishments | 0.018*** | 0.011*** | 0.007*** | 0.037*** | 0.026*** | 0.011*** |
| | (0.002) | (0.002) | (0.003) | (0.004) | (0.002) | (0.004) |
| Existing Establishments | -0.014*** | -0.019*** | 0.006* | 0.077*** | 0.059*** | 0.018*** |
| | (0.003) | (0.003) | (0.003) | (0.011) | (0.010) | (0.007) |
| Existing Employment | -0.006 | 0.001 | -0.007 | 0.043*** | 0.058*** | -0.015 |
| | (0.008) | (0.008) | (0.011) | (0.012) | (0.012) | (0.016) |

Notes:

1) Short-term estimates represent the change for one year before to one year after FTZ designation. Long-term estimates represent the change for one year before to three years after FTZ designation.

2) Existing establishment and existing employment refers to establishments that are at least 4 years old and are scaled relative to the 2000 level of the outcome in each ZIP code. New establishments refer to establishments that are no more than one year old and are scaled by the level of existing establishments in 2000.

3) Each outcome is estimated using propensity score matching where the propensity score is estimated using a logit that includes the outcome in the pre-period and 1996, the fraction of existing establishments and existing employment in manufacturing and indicators for whether the ZIP code is in an MSA or in the central city MSA. Counterfactuals are produced using 10 nearest neighbors. Standard errors are produced by bootstrapping the procedure using 1000 replications are presented in parentheses. Asterisks denote statistical significance at the 10% (*), 5% (**) and 1% (***) levels.

**Table 4: Estimated Effects on Non-manufacturing Establishments and Employment of FTZ Designation in Rings of ZIP Codes Surrounding FTZ ZIP Codes**

| | 0-5 Miles | | | 5-10 Miles | | |
|---|---|---|---|---|---|---|
| | Observed change | Counterfactual change | Difference (ATT) | Observed change | Counterfactual change | Difference (ATT) |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| **Short-term** | | | | | | |
| New Establishments | 0.021*** | 0.010*** | 0.011* | 0.016*** | 0.012*** | 0.005 |
| | (0.007) | (0.003) | (0.007) | (0.002) | (0.002) | (0.002) |
| Existing Establishments | -0.005 | -0.010** | 0.004 | -0.015*** | -0.020*** | 0.004 |
| | (0.006) | (0.004) | (0.006) | (0.004) | (0.004) | (0.004) |
| Existing Employment | -0.003 | 0.007 | -0.009 | -0.011 | 0.001 | -0.012 |
| | (0.011) | (0.037) | (0.037) | (0.015) | (0.014) | (0.018) |
| **Long-term** | | | | | | |
| New Establishments | 0.053*** | 0.027*** | 0.026** | 0.033*** | 0.026*** | 0.007 |
| | (0.013) | (0.005) | (0.013) | (0.003) | (0.003) | (0.004) |
| Existing Establishments | 0.080*** | 0.065*** | 0.015 | 0.070*** | 0.055*** | 0.015* |
| | (0.014) | (0.014) | (0.012) | (0.013) | (0.011) | (0.008) |
| Existing Employment | 0.044** | 0.050** | -0.006 | 0.035* | 0.049** | -0.013 |
| | (0.020) | (0.040) | (0.046) | (0.018) | (0.016) | (0.021) |

Notes:

1) Short-term estimates represent the change for one year before to one year after FTZ designation. Long-term estimates represent the change for one year before to three years after FTZ designation.

2) Existing establishment and existing employment refers to establishments that are at least 4 years old and are scaled relative to the 2000 level of the outcome in each ZIP code. New establishments refer to establishments that are no more than one year old and are scaled by the level of existing establishments in 2000.

3) Each outcome is estimated using propensity score matching where the propensity score is estimated using a logit that includes the outcome in the pre-period and 1996, the fraction of existing establishments and existing employment in manufacturing and indicators for whether the ZIP code is in an MSA or in the central city MSA. Counterfactuals are produced using 10 nearest neighbors. Standard errors are produced by bootstrapping the procedure using 1000 replications are presented in parentheses. Asterisks denote statistical significance at the 10% (*), 5% (**) and 1% (***) levels.

**Table 5: Estimated Differences between Observed and Counterfactual Changes in Non-manufacturing Establishments and Employment of the FTZ Designation by MSA Status**

| | MSA | | Non-MSA | |
|---|---|---|---|---|
| | Short-term | Long-term | Short-term | Long-term |
| | 1 | 2 | 3 | 4 |
| **FTZ ZIP Codes** | | | | |
| New Establishments | 0.002 | 0.009* | 0.009* | 0.006 |
| | (0.002) | (0.004) | (0.004) | (0.005) |
| Existing Establishments | 0.008** | 0.020** | 0.013 | 0.022 |
| | (0.004) | (0.011) | (0.012) | (0.021) |
| Existing Employment | 0.003 | -0.005 | -0.011 | -0.035 |
| | (0.014) | (0.019) | (0.025) | (0.041) |
| **Bordering ZIP Codes** | | | | |
| New Establishments | 0.005* | 0.013** | 0.007** | 0.009* |
| | (0.003) | (0.006) | (0.004) | (0.004) |
| Existing Establishments | 0.004 | 0.016* | 0.008 | 0.021 |
| | (0.004) | (0.007) | (0.009) | (0.017) |
| Existing Employment | -0.005 | -0.006 | -0.012 | -0.024 |
| | (0.018) | (0.023) | (0.025) | (0.030) |

Notes:

1) Short-term estimates represent the change for one year before to one year after FTZ designation. Long-term estimates represent the change for one year before to three years after FTZ designation.

2) Existing establishment and existing employment refers to establishments that are at least 4 years old and are scaled relative to the 2000 level of the outcome in each ZIP code. New establishments refer to establishments that are no more than one year old and are scaled by the level of existing establishments in 2000.

3) Each outcome is estimated using propensity score matching where the propensity score is estimated using a logit that includes the outcome in the pre-period and 1996, the fraction of existing establishments and existing employment in manufacturing and indicators for whether the ZIP code is in an MSA or in the central city MSA. Counterfactuals are produced using 10 nearest neighbors. Standard produced by bootstrapping the procedure using 1000 replications are presented in parentheses. Asterisks denote statistical significance at the 10% (*), 5% (**) and 1% (***) levels.

**Table A-1: Balancing Tests for FTZ Zip Codes**

| | Unmatched Sample | | Matched Sample | |
|---|---|---|---|---|
| Variable | FTZ ZIP codes | non-FTZ ZIP codes | FTZ ZIP codes | non-FTZ ZIP codes |
| New establishments, 1996 | 0.048 | 0.036*** | 0.046 | 0.046 |
| New establishments, 2001 | 0.040 | 0.037 | 0.040 | 0.039 |
| New establishments, 2002 | 0.043 | 0.036 | 0.043 | 0.045 |
| New establishments, 2003 | 0.052 | 0.044 | 0.052 | 0.050 |
| New establishments, 2004 | 0.031 | 0.025 | 0.031 | 0.031 |
| New establishments, 2005 | 0.042 | 0.032 | 0.042 | 0.040 |
| New establishments, manufacturing, 1996 | 0.046 | 0.042 | 0.044 | 0.045 |
| New establishments, manufacturing, 2001 | 0.043 | 0.055 | 0.043 | 0.039 |
| New establishments, manufacturing, 2002 | 0.040 | 0.049 | 0.040 | 0.049* |
| New establishments, manufacturing, 2003 | 0.069 | 0.062 | 0.069 | 0.079 |
| New establishments, manufacturing, 2004 | 0.022 | 0.027 | 0.022 | 0.024 |
| New establishments, manufacturing, 2005 | 0.044 | 0.035 | 0.044 | 0.039 |
| New establishments, non-manufacturing, 1996 | 0.049 | 0.036*** | 0.046 | 0.046 |
| New establishments, non-manufacturing, 2001 | 0.041 | 0.037 | 0.041 | 0.041 |
| New establishments, non-manufacturing, 2002 | 0.044 | 0.036 | 0.044 | 0.051** |
| New establishments, non-manufacturing, 2003 | 0.051 | 0.044 | 0.051 | 0.053 |
| New establishments, non-manufacturing, 2004 | 0.032 | 0.025 | 0.032 | 0.027* |
| New establishments, non-manufacturing, 2005 | 0.042 | 0.032 | 0.042 | 0.045 |
| New establishments, retail, 1996 | 0.067 | 0.058* | 0.064 | 0.069 |
| New establishments, retail, 2001 | 0.053 | 0.050 | 0.053 | 0.058 |
| New establishments, retail, 2002 | 0.044 | 0.047 | 0.044 | 0.045 |
| New establishments, retail, 2003 | 0.058 | 0.056 | 0.058 | 0.053 |
| New establishments, retail, 2004 | 0.025 | 0.025 | 0.025 | 0.029 |
| New establishments, retail, 2005 | 0.028 | 0.025 | 0.028 | 0.033 |
| New establishments, service, 1996 | 0.046 | 0.036*** | 0.045 | 0.044 |
| New establishments, service, 2001 | 0.041 | 0.044 | 0.041 | 0.035 |
| New establishments, service, 2002 | 0.041 | 0.041 | 0.041 | 0.045 |
| New establishments, service, 2003 | 0.052 | 0.052 | 0.052 | 0.055 |
| New establishments, service, 2004 | 0.043 | 0.031 | 0.043 | 0.040 |
| New establishments, service, 2005 | 0.043 | 0.035 | 0.043 | 0.050 |
| Existing establishments, 1996 | 0.901 | 0.785*** | 0.893 | 0.892 |
| Existing establishments, 2001 | 0.673 | 0.743*** | 0.673 | 0.665 |
| Existing establishments, 2002 | 0.653 | 0.750*** | 0.653 | 0.668 |
| Existing establishments, 2003 | 0.655 | 0.709** | 0.655 | 0.660 |
| Existing establishments, 2004 | 0.716 | 0.766** | 0.716 | 0.721 |
| Existing establishments, 2005 | 0.709 | 0.744 | 0.709 | 0.707 |

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**Table A-1 continued: Balancing Tests for FTZ Zip Codes**

| | Unmatched Sample | | Matched Sample | |
|---|---|---|---|---|
| Variable | FTZ ZIP codes | non-FTZ ZIP codes | FTZ ZIP codes | non-FTZ ZIP codes |
| Existing establishments, manufacturing, 1996 | 0.895 | 0.847** | 0.909 | 0.923 |
| Existing establishments, manufacturing, 2001 | 0.707 | 0.823** | 0.707 | 0.705 |
| Existing establishments, manufacturing, 2002 | 0.684 | 0.850** | 0.684 | 0.684 |
| Existing establishments, manufacturing, 2003 | 0.716 | 0.817 | 0.716 | 0.777* |
| Existing establishments, manufacturing, 2004 | 0.798 | 0.886 | 0.798 | 0.843 |
| Existing establishments, manufacturing, 2005 | 0.806 | 0.868 | 0.806 | 0.850 |
| Existing establishments, non-manufacturing, 1996 | 0.902 | 0.785*** | 0.893 | 0.886 |
| Existing establishments, non-manufacturing, 2001 | 0.669 | 0.739*** | 0.669 | 0.669 |
| Existing establishments, non-manufacturing, 2002 | 0.650 | 0.744*** | 0.650 | 0.652 |
| Existing establishments, non-manufacturing, 2003 | 0.652 | 0.704** | 0.652 | 0.661 |
| Existing establishments, non-manufacturing, 2004 | 0.713 | 0.761** | 0.713 | 0.714 |
| Existing establishments, non-manufacturing, 2005 | 0.704 | 0.739 | 0.704 | 0.699 |
| Existing establishments, retail, 1996 | 0.966 | 0.959 | 0.946 | 0.937 |
| Existing establishments, retail, 2001 | 0.632 | 0.745** | 0.632 | 0.629 |
| Existing establishments, retail, 2002 | 0.599 | 0.757*** | 0.599 | 0.590 |
| Existing establishments, retail, 2003 | 0.581 | 0.701** | 0.581 | 0.601 |
| Existing establishments, retail, 2004 | 0.693 | 0.773* | 0.693 | 0.707 |
| Existing establishments, retail, 2005 | 0.615 | 0.730** | 0.615 | 0.627 |
| Existing establishments, service, 1996 | 0.921 | 0.848*** | 0.915 | 0.908 |
| Existing establishments, service, 2001 | 0.713 | 0.751 | 0.713 | 0.710 |
| Existing establishments, service, 2002 | 0.685 | 0.784** | 0.685 | 0.689 |
| Existing establishments, service, 2003 | 0.696 | 0.740 | 0.696 | 0.730** |
| Existing establishments, service, 2004 | 0.767 | 0.819 | 0.767 | 0.771 |
| Existing establishments, service, 2005 | 0.758 | 0.809 | 0.758 | 0.755 |
| Existing employment, 1996 | 0.834 | 0.849 | 0.812 | 0.786 |
| Existing employment, 2001 | 0.529 | 0.705* | 0.529 | 0.525 |
| Existing employment, 2002 | 0.537 | 0.713** | 0.537 | 0.535 |
| Existing employment, 2003 | 0.528 | 0.670* | 0.528 | 0.521 |
| Existing employment, 2004 | 0.545 | 0.724** | 0.545 | 0.539 |
| Existing employment, 2005 | 0.539 | 0.720** | 0.539 | 0.558 |
| Existing employment, manufacturing, 1996 | 1.076 | 1.391 | 1.059 | 1.203 |
| Existing employment, manufacturing, 2001 | 0.609 | 0.890 | 0.609 | 0.585 |
| Existing employment, manufacturing, 2002 | 0.589 | 0.951 | 0.589 | 0.630 |
| Existing employment, manufacturing, 2003 | 0.623 | 0.910 | 0.623 | 0.644 |
| Existing employment, manufacturing, 2004 | 0.550 | 0.993 | 0.550 | 0.558 |
| Existing employment, manufacturing, 2005 | 0.858 | 1.054 | 0.858 | 0.709 |

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**Table A-1 continued: Balancing Tests for FTZ Zip Codes**

| | Unmatched Sample | | Matched Sample | |
|---|---|---|---|---|
| Variable | FTZ ZIP codes | non-FTZ ZIP codes | FTZ ZIP codes | non-FTZ ZIP codes |
| Existing employment, non-manufacturing, 1996 | 0.818 | 0.828 | 0.801 | 0.786 |
| Existing employment, non-manufacturing, 2001 | 0.545 | 0.711* | 0.545 | 0.541 |
| Existing employment, non-manufacturing, 2002 | 0.554 | 0.720** | 0.554 | 0.546 |
| Existing employment, non-manufacturing, 2003 | 0.530 | 0.676* | 0.530 | 0.518 |
| Existing employment, non-manufacturing, 2004 | 0.581 | 0.731** | 0.581 | 0.567 |
| Existing employment, non-manufacturing, 2005 | 0.561 | 0.735 | 0.561 | 0.565 |
| Existing employment, retail, 1996 | 0.937 | 1.041 | 0.899 | 0.919 |
| Existing employment, retail, 2001 | 0.496 | 0.735 | 0.496 | 0.484 |
| Existing employment, retail, 2002 | 0.486 | 0.773 | 0.486 | 0.447* |
| Existing employment, retail, 2003 | 0.537 | 0.699 | 0.537 | 0.541 |
| Existing employment, retail, 2004 | 0.573 | 0.782* | 0.573 | 0.556 |
| Existing employment, retail, 2005 | 0.473 | 0.766** | 0.473 | 0.464 |
| Existing employment, service, 1996 | 0.833 | 0.926 | 0.821 | 0.829 |
| Existing employment, service, 2001 | 0.650 | 0.809 | 0.650 | 0.636 |
| Existing employment, service, 2002 | 0.600 | 0.776 | 0.600 | 0.607 |
| Existing employment, service, 2003 | 0.580 | 0.713 | 0.580 | 0.596 |
| Existing employment, service, 2004 | 0.638 | 0.788 | 0.638 | 0.623 |
| Existing employment, service, 2005 | 0.615 | 0.823 | 0.615 | 0.619 |
| Pct. of existing establishments in manufacturing, 2001 | 0.008 | 0.020 | 0.008 | 0.008 |
| Pct. of existing establishments in manufacturing, 2002 | 0.008 | 0.026 | 0.008 | 0.007 |
| Pct. of existing establishments in manufacturing, 2003 | 0.005 | 0.026 | 0.005 | 0.005 |
| Pct. of existing establishments in manufacturing, 2004 | 0.002 | 0.027* | 0.002 | 0.002 |
| Pct. of existing establishments in manufacturing, 2005 | 0.005 | 0.015 | 0.005 | 0.005 |
| Pct. of existing employment in manufacturing, 2001 | 0.019 | 0.027 | 0.019 | 0.019 |
| Pct. of existing employment in manufacturing, 2002 | 0.015 | 0.029 | 0.015 | 0.013 |
| Pct. of existing employment in manufacturing, 2003 | 0.009 | 0.030 | 0.009 | 0.009 |
| Pct. of existing employment in manufacturing, 2004 | 0.007 | 0.030 | 0.007 | 0.004* |
| Pct. of existing employment in manufacturing, 2005 | 0.012 | 0.030 | 0.012 | 0.012 |
| MSA, non-central city | 0.815 | 0.650*** | 0.830 | 0.858 |
| MSA, central city | 0.199 | 0.083*** | 0.164 | 0.170 |

Notes:

1) Non-FTZ ZIP codes do not include ZIP codes that border an FTZ ZIP code.

2) Asterisks denote whether the difference in the mean of the FTZ and non-FTZ sample for each variable is statistically significant at the 10% (*), 5% (**) and 1% (***) levels

**Table A-2: Balancing Tests for FTZ-bordering Zip Codes**

| | Unmatched Sample | | Matched Sample | |
|---|---|---|---|---|
| Variable | border ZIP codes | non-border ZIP codes | border ZIP codes | non-border ZIP codes |
| New establishments, 1996 | 0.046 | 0.036*** | 0.044 | 0.045 |
| New establishments, 2001 | 0.039 | 0.037 | 0.038 | 0.036 |
| New establishments, 2002 | 0.046 | 0.036*** | 0.046 | 0.048 |
| New establishments, 2003 | 0.051 | 0.044** | 0.051 | 0.051 |
| New establishments, 2004 | 0.032 | 0.025*** | 0.032 | 0.031 |
| New establishments, 2005 | 0.040 | 0.032** | 0.040 | 0.039 |
| New establishments, manufacturing, 1996 | 0.050 | 0.042*** | 0.050 | 0.048 |
| New establishments, manufacturing, 2001 | 0.062 | 0.055 | 0.062 | 0.059 |
| New establishments, manufacturing, 2002 | 0.062 | 0.049* | 0.062 | 0.064 |
| New establishments, manufacturing, 2003 | 0.054 | 0.062 | 0.054 | 0.051 |
| New establishments, manufacturing, 2004 | 0.028 | 0.027 | 0.028 | 0.028 |
| New establishments, manufacturing, 2005 | 0.038 | 0.035 | 0.039 | 0.046 |
| New establishments, non-manufacturing, 1996 | 0.046 | 0.036*** | 0.044 | 0.045 |
| New establishments, non-manufacturing, 2001 | 0.038 | 0.037 | 0.038 | 0.036 |
| New establishments, non-manufacturing, 2002 | 0.046 | 0.036*** | 0.046 | 0.046 |
| New establishments, non-manufacturing, 2003 | 0.051 | 0.044** | 0.051 | 0.056 |
| New establishments, non-manufacturing, 2004 | 0.032 | 0.025*** | 0.032 | 0.031 |
| New establishments, non-manufacturing, 2005 | 0.040 | 0.032** | 0.040 | 0.038 |
| New establishments, retail, 1996 | 0.068 | 0.058*** | 0.065 | 0.064 |
| New establishments, retail, 2001 | 0.048 | 0.050 | 0.048 | 0.047 |
| New establishments, retail, 2002 | 0.049 | 0.047 | 0.050 | 0.050 |
| New establishments, retail, 2003 | 0.053 | 0.056 | 0.053 | 0.054 |
| New establishments, retail, 2004 | 0.033 | 0.025** | 0.033 | 0.030* |
| New establishments, retail, 2005 | 0.032 | 0.025** | 0.032 | 0.028** |
| New establishments, service, 1996 | 0.043 | 0.036*** | 0.041 | 0.042 |
| New establishments, service, 2001 | 0.043 | 0.044 | 0.042 | 0.038* |
| New establishments, service, 2002 | 0.047 | 0.041 | 0.047 | 0.048 |
| New establishments, service, 2003 | 0.051 | 0.052 | 0.051 | 0.047 |
| New establishments, service, 2004 | 0.039 | 0.031** | 0.039 | 0.037 |
| New establishments, service, 2005 | 0.043 | 0.035** | 0.043 | 0.044 |
| Existing establishments, 1996 | 0.848 | 0.785*** | 0.846 | 0.852 |
| Existing establishments, 2001 | 0.712 | 0.743*** | 0.712 | 0.709 |
| Existing establishments, 2002 | 0.686 | 0.750*** | 0.687 | 0.683 |
| Existing establishments, 2003 | 0.688 | 0.709** | 0.688 | 0.683 |
| Existing establishments, 2004 | 0.767 | 0.766 | 0.769 | 0.761 |
| Existing establishments, 2005 | 0.739 | 0.744 | 0.742 | 0.734 |

continued next page

**Table A-2 continued: Balancing Tests for FTZ-bordering Zip Codes**

| | Unmatched Sample | | Matched Sample | |
|---|---|---|---|---|
| Variable | border ZIP codes | Non-border ZIP codes | border ZIP codes | Non-border ZIP codes |
| Existing establishments, manufacturing, 1996 | 0.878 | 0.847*** | 0.886 | 0.892 |
| Existing establishments, manufacturing, 2001 | 0.818 | 0.823 | 0.819 | 0.829 |
| Existing establishments, manufacturing, 2002 | 0.802 | 0.850** | 0.805 | 0.802 |
| Existing establishments, manufacturing, 2003 | 0.776 | 0.817 | 0.776 | 0.797 |
| Existing establishments, manufacturing, 2004 | 0.873 | 0.886 | 0.876 | 0.906* |
| Existing establishments, manufacturing, 2005 | 0.829 | 0.868 | 0.833 | 0.861 |
| Existing establishments, non-manufacturing, 1996 | 0.847 | 0.785*** | 0.845 | 0.848 |
| Existing establishments, non-manufacturing, 2001 | 0.706 | 0.739*** | 0.706 | 0.702 |
| Existing establishments, non-manufacturing, 2002 | 0.681 | 0.744*** | 0.682 | 0.677 |
| Existing establishments, non-manufacturing, 2003 | 0.684 | 0.704** | 0.684 | 0.683 |
| Existing establishments, non-manufacturing, 2004 | 0.762 | 0.761 | 0.764 | 0.766 |
| Existing establishments, non-manufacturing, 2005 | 0.735 | 0.739 | 0.737 | 0.739 |
| Existing establishments, retail, 1996 | 0.955 | 0.959 | 0.960 | 0.949 |
| Existing establishments, retail, 2001 | 0.673 | 0.745*** | 0.673 | 0.666 |
| Existing establishments, retail, 2002 | 0.637 | 0.757*** | 0.639 | 0.637 |
| Existing establishments, retail, 2003 | 0.631 | 0.701*** | 0.631 | 0.622 |
| Existing establishments, retail, 2004 | 0.730 | 0.773** | 0.732 | 0.721 |
| Existing establishments, retail, 2005 | 0.687 | 0.730** | 0.689 | 0.698 |
| Existing establishments, service, 1996 | 0.893 | 0.848*** | 0.894 | 0.893 |
| Existing establishments, service, 2001 | 0.719 | 0.751** | 0.720 | 0.708 |
| Existing establishments, service, 2002 | 0.727 | 0.784*** | 0.728 | 0.712 |
| Existing establishments, service, 2003 | 0.711 | 0.740* | 0.711 | 0.718 |
| Existing establishments, service, 2004 | 0.816 | 0.819 | 0.818 | 0.819 |
| Existing establishments, service, 2005 | 0.796 | 0.809 | 0.799 | 0.796 |
| Existing employment, 1996 | 0.837 | 0.849 | 0.829 | 0.821 |
| Existing employment, 2001 | 0.620 | 0.705** | 0.621 | 0.609* |
| Existing employment, 2002 | 0.582 | 0.713*** | 0.582 | 0.570 |
| Existing employment, 2003 | 0.623 | 0.670 | 0.623 | 0.608 |
| Existing employment, 2004 | 0.661 | 0.724** | 0.662 | 0.645 |
| Existing employment, 2005 | 0.655 | 0.720* | 0.654 | 0.666 |
| Existing employment, manufacturing, 1996 | 1.224 | 1.391 | 1.279 | 1.177 |
| Existing employment, manufacturing, 2001 | 0.752 | 0.890 | 0.753 | 0.723 |
| Existing employment, manufacturing, 2002 | 0.982 | 0.951 | 0.993 | 1.045 |
| Existing employment, manufacturing, 2003 | 0.769 | 0.910 | 0.769 | 0.794 |
| Existing employment, manufacturing, 2004 | 0.847 | 0.993 | 0.851 | 0.867 |
| Existing employment, manufacturing, 2005 | 0.884 | 1.054 | 0.859 | 0.910 |

continued next page

**Table A-2 continued: Balancing Tests for FTZ-bordering Zip Codes**

| | Unmatched Sample | | Matched Sample | |
|---|---|---|---|---|
| Variable | border ZIP codes | Non-border ZIP codes | border ZIP codes | Non-border ZIP codes |
| Existing employment, non-manufacturing, 1996 | 0.818 | 0.828 | 0.812 | 0.796* |
| Existing employment, non-manufacturing, 2001 | 0.625 | 0.711** | 0.627 | 0.619 |
| Existing employment, non-manufacturing, 2002 | 0.590 | 0.720*** | 0.590 | 0.582 |
| Existing employment, non-manufacturing, 2003 | 0.631 | 0.676 | 0.631 | 0.616 |
| Existing employment, non-manufacturing, 2004 | 0.669 | 0.731** | 0.671 | 0.648 |
| Existing employment, non-manufacturing, 2005 | 0.680 | 0.735 | 0.681 | 0.705 |
| Existing employment, retail, 1996 | 0.956 | 1.041** | 0.959 | 0.954 |
| Existing employment, retail, 2001 | 0.566 | 0.735** | 0.567 | 0.545** |
| Existing employment, retail, 2002 | 0.577 | 0.773** | 0.579 | 0.571 |
| Existing employment, retail, 2003 | 0.541 | 0.699** | 0.541 | 0.550 |
| Existing employment, retail, 2004 | 0.695 | 0.782** | 0.698 | 0.655* |
| Existing employment, retail, 2005 | 0.650 | 0.766** | 0.654 | 0.660 |
| Existing employment, service, 1996 | 0.905 | 0.926 | 0.910 | 0.911 |
| Existing employment, service, 2001 | 0.658 | 0.809 | 0.661 | 0.645 |
| Existing employment, service, 2002 | 0.633 | 0.776* | 0.634 | 0.605 |
| Existing employment, service, 2003 | 0.654 | 0.713 | 0.654 | 0.644 |
| Existing employment, service, 2004 | 0.769 | 0.788 | 0.771 | 0.806 |
| Existing employment, service, 2005 | 0.826 | 0.823 | 0.833 | 0.830 |
| Pct. of existing establishments in manufacturing, 2001 | 0.009 | 0.020** | 0.009 | 0.007 |
| Pct. of existing establishments in manufacturing, 2002 | 0.007 | 0.026** | 0.007 | 0.006 |
| Pct. of existing establishments in manufacturing, 2003 | 0.010 | 0.026** | 0.010 | 0.011 |
| Pct. of existing establishments in manufacturing, 2004 | 0.007 | 0.027*** | 0.007 | 0.008** |
| Pct. of existing establishments in manufacturing, 2005 | 0.007 | 0.015** | 0.008 | 0.006 |
| Pct. of existing employment in manufacturing, 2001 | 0.017 | 0.027* | 0.017 | 0.013* |
| Pct. of existing employment in manufacturing, 2002 | 0.014 | 0.029** | 0.014 | 0.013 |
| Pct. of existing employment in manufacturing, 2003 | 0.018 | 0.030 | 0.018 | 0.020 |
| Pct. of existing employment in manufacturing, 2004 | 0.011 | 0.030*** | 0.011 | 0.011 |
| Pct. of existing employment in manufacturing, 2005 | 0.013 | 0.030** | 0.013 | 0.011 |
| MSA, non-central city | 0.760 | 0.650*** | 0.774 | 0.777 |
| MSA, central city | 0.168 | 0.083*** | 0.149 | 0.144 |

Notes:

1) Non-border ZIP codes do not include FTZ ZIP codes.

2) Asterisks denote whether the difference in the mean of the border and non-border sample for each variable is statistically significant at the 10% (*), 5% (**) and 1% (***) levels

**Table A-3: Estimated Differences between Observed and Counterfactual Changes in Establishments and Employment in the Service and Retail of FTZ Designation in the Same or Bordering Zip Code**

| | FTZ ZIP codes | | FTZ-bordering ZIP codes | |
|---|---|---|---|---|
| | Short-term | Long-term | Short-term | Long-term |
| | 1 | 2 | 3 | 4 |
| **Service** | | | | |
| New Establishments | -0.001 | 0.005 | 0.006** | 0.014*** |
| | (0.004) | (0.005) | (0.004) | (0.006) |
| Existing Establishments | -0.003 | -0.008 | 0.001 | 0.006 |
| | (0.007) | (0.016) | (0.005) | (0.013) |
| Existing Employment | -0.004 | -0.051 | -0.024 | -0.041 |
| | (0.043) | (0.046) | (0.022) | (0.029) |
| **Retail** | | | | |
| New Establishments | 0.001 | 0.009 | 0.001 | 0.005* |
| | (0.004) | (0.006) | (0.003) | (0.004) |
| Existing Establishments | 0.014 | 0.012 | -0.001 | 0.002 |
| | (0.011) | (0.013) | (0.007) | (0.009) |
| Existing Employment | -0.019 | -0.011 | -0.012 | -0.025 |
| | (0.025) | (0.039) | (0.015) | (0.019) |

Notes:
1) Short-term estimates represent the change for one year before to one year after FTZ designation. Long-term estimates represent the change for one year before to three years after FTZ designation.
2) Existing establishment and existing employment refers to establishments that are at least 4 years old and are scaled relative to the 2000 level of the outcome in each ZIP code. New establishments refer to establishments that are no more than one year old and are scaled by the level of existing establishments in 2000.
3) Each outcome is estimated using propensity score matching where the propensity score is estimated using a logit that includes the outcome in the pre-period and 1996, the fraction of existing establishments and existing employment in manufacturing and indicators for whether the ZIP code is in an MSA or in the central city MSA. Counterfactuals are produced using 10 nearest neighbors. Standard produced by bootstrapping the procedure using 1000 replications are presented in parentheses. Asterisks denote statistical significance at the 10% (*), 5% (**) and 1% (***) levels.

**Table A-4: Effects on Manufacturing Firms and Employment of FTZ Designation in Rings of ZIP Codes Surrounding FTZ ZIP Codes**

| | 0-5 Miles | | | 5-10 Miles | | |
|---|---|---|---|---|---|---|
| | Observed change | Counterfactual change | Difference (ATT) | Observed change | Counterfactual change | Difference (ATT) |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| **Short-term** | | | | | | |
| New Establishments | 0.003 | -0.001 | 0.004 | 0.010* | 0.011** | -0.001 |
| | (0.011) | (0.009) | (0.012) | (0.006) | (0.006) | (0.007) |
| Existing Establishments | -0.005 | 0.005 | -0.010 | -0.006 | -0.007 | 0.001 |
| | (0.012) | (0.009) | (0.014) | (0.013) | (0.009) | (0.015) |
| Existing Employment | 0.138 | 0.122* | 0.016 | 0.041 | 0.027 | 0.015 |
| | (0.127) | (0.077) | (0.146) | (0.037) | (0.051) | (0.064) |
| **Long-term** | | | | | | |
| New Establishments | -0.001 | -0.005 | 0.004 | 0.014* | 0.006 | 0.007 |
| | (0.009) | (0.009) | (0.009) | (0.008) | (0.006) | (0.008) |
| Existing Establishments | 0.052** | 0.063*** | -0.011 | 0.047*** | 0.048*** | -0.002 |
| | (0.021) | (0.014) | (0.023) | (0.017) | (0.013) | (0.019) |
| Existing Employment | 0.204** | 0.195** | 0.009 | 0.056 | 0.209** | -0.153 |
| | (0.139) | (0.110) | (0.174) | (0.046) | (0.086) | (0.099) |

Notes:

1) Short-term estimates represent the change for one year before to one year after FTZ designation. Long-term estimates represent the change for one year before to three years after FTZ designation.

2) Existing establishment and existing employment refers to establishments that are at least 4 years old and are scaled relative to the 2000 level of the outcome in each ZIP code. New establishments refer to establishments that are no more than one year old and are scaled by the level of existing establishments in 2000.

3) Each outcome is estimated using propensity score matching where the propensity score is estimated using a logit that includes the outcome in the pre-period and 1996, the fraction of existing establishments and existing employment in manufacturing and indicators for whether the ZIP code is in an MSA or in the central city MSA. Counterfactuals are produced using 10 nearest neighbors. Standard errors are produced by bootstrapping the procedure using 1000 replications are presented in parentheses. Asterisks denote statistical significance at the 10% (*), 5% (**) and 1% (***) levels.

**Table A-5: Estimated Differences between Observed and Counterfactual Changes in Manufacturing Establishments and Employment of FTZ Designation by MSA Status**

| | MSA | | Non-MSA | |
|---|---|---|---|---|
| | Short-term | Long-term | Short-term | Long-term |
| | 1 | 2 | 3 | 4 |
| **FTZ ZIP Codes** | | | | |
| New Establishments | 0.004 | -0.003 | 0.020 | 0.025 |
| | (0.007) | (0.006) | (0.014) | (0.015) |
| Existing Establishments | 0.003 | -0.000 | 0.009 | 0.082* |
| | (0.013) | (0.021) | (0.040) | (0.048) |
| Existing Employment | -0.051 | -0.069 | -0.020 | 0.076 |
| | (0.049) | (0.103) | (0.092) | (0.165) |
| **Bordering ZIP Codes** | | | | |
| New Establishments | 0.001 | 0.009 | -0.011 | -0.004 |
| | (0.006) | (0.006) | (0.011) | (0.012) |
| Existing Establishments | -0.002 | -0.010 | -0.034 | -0.011 |
| | (0.011) | (0.015) | (0.030) | (0.042) |
| Existing Employment | 0.036 | -0.031 | -0.091 | 0.001 |
| | (0.074) | (0.094) | (0.122) | (0.173) |

Notes:
1) Short-term estimates represent the change for one year before to one year after FTZ designation. Long-term estimates represent the change for one year before to three years after FTZ designation.
2) Existing establishment and existing employment refers to establishments that are at least 4 years old and are scaled relative to the 2000 level of the outcome in each ZIP code. New establishments refer to establishments that are no more than one year old and are scaled by the level of existing establishments in 2000.
3) Each outcome is estimated using propensity score matching where the propensity score is estimated using a logit that includes the outcome in the pre-period and 1996, the fraction of existing establishments and existing employment in manufacturing and indicators for whether the ZIP code is in an MSA or in the central city MSA. Counterfactuals are produced using 10 nearest neighbors. Standard produced by bootstrapping the procedure using 1000 replications are presented in parentheses. Asterisks denote statistical significance at the 10% (*), 5% (**) and 1% (***) levels.