WORKING PAPERS
RESEARCH DEPARTMENT

WORKING PAPER NO. 04-3
HOW DID THE MIAMI LABOR MARKET ABSORB THE MARIEL IMMIGRANTS?

Ethan Lewis*
Federal Reserve Bank of Philadelphia

January 12, 2004

FEDERAL RESERVE BANK OF PHILADELPHIA
Ten Independence Mall, Philadelphia, PA 19106-1574• (215) 574-6428• www.phil.frb.org

How Did the Miami Labor Market Absorb the Mariel Immigrants?

Ethan Lewis[*]
Federal Reserve Bank of Philadelphia[**]

January 12, 2004

[*] I would especially like to thank David Card, Ken Chay, John DiNardo, David Lee, Ann Harrison and Steven Raphael for their support and advice on this project. I would also like to thank the members of the graduate labor office at UC Berkeley, all of whom have provided helpful suggestions on this work. This research was carried out with the support of a Dissertation Fellowship from the California Census Data Research Center.
[**] The views expressed here are those of the author and do not necessarily reflect the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

Abstract

Card's (1990) well-known analysis of the Mariel boatlift concluded that this mass influx of mostly less-skilled Cubans to Miami had little impact on the labor market outcomes of the city's less-skilled workers. This paper evaluates two explanations for this. First, consistent with an open economy framework, this paper asks whether after the boatlift Miami increased its production of unskilled-intensive manufactured goods, allowing it to "export" the impact of the boatlift. Second, this paper asks whether Miami adapted to the boatlift by implementing new skill-complementary technologies more slowly than they otherwise would have. Using a confidential micro data version of the Annual Surveys of Manufactures, I show that following the boatlift, Miami's relative output of different manufacturing industries trended similarly to other cities with similar pre-boatlift trends in manufacturing mix. The response of industry mix to the boatlift therefore appears to be small. Supporting the second type of adjustment, utilization of Cuban labor by Miami's industries rose proportionately to the supply increase generated by the boatlift. In addition, post-boatlift computer use at work was lower in Miami than other cities with similar levels of computer-based employment before the event, even among non-Hispanic workers in the same detailed cells defined by industry, occupation and education. This suggests the boatlift induced Miami's industries to employ more unskilled-intensive production technologies. The results suggest an explanation for why native wages are consistently found to be insensitive to local immigration shocks: markets adapt production technology to local factor supplies.

JEL: J2, F1, O3.
Keywords: Immigration, Heckscher-Ohlin, technical change

1. Introduction and Background

This paper asks how Miami's labor market adjusted when a large number of Cuban refugees, most of them less skilled, settled permanently in Miami following the 1980 Mariel boatlift.[1] Despite the size and unexpected nature of the event, it had surprisingly little impact on the wages and employment rates of Miami's less-skilled workers, as Card's (1990) widely-cited paper demonstrated.[2] Motivated by this evidence, this paper first investigates whether Miami responded to the boatlift like a Heckscher-Ohlin (HO) open economy. HO suggests the boatlift may have had little impact on the relative price of unskilled labor in Miami because Miami effectively "exported" the Cuban refugees' labor embodied in unskilled-intensive goods.[3] Besides the fact that the Miami economy is a small part of an apparently well-integrated US economy (e.g. Hanson and Slaughter (2002)), HO is a compelling explanation for Miami's experience because at the time of the boatlift, Miami had a large unskilled manufacturing sector (e.g. apparel) accustomed to absorbing Cuban refugees. This paper evaluates the importance of open-economy adjustments by measuring the extent to which Miami's manufacturing mix shifted toward unskilled-intensive industries following the boatlift. This evaluation serves as a test of HO more generally: as a substantial and one-time shock to Miami's endowment of less-skilled labor, the boatlift can provide unique "quasi-experimental" evidence about the extent to which factor endowments influence industry mix in a way consistent with the HO model.

---

[1] Card (1990) reports the boatlift increased the size of the Miami labor force by around 7 percent. The event took place between May and September 1980.

[2] Miami's experience after the boatlift is also consistent with a large body of research that finds immigration has little local impact on native labor market outcomes (Borjas (1994), Friedberg and Hunt (1995)).

[3] Another possibility is that unskilled native workers left Miami in response to the boatlift. However, Saiz (2003) has shown that if anything it was *skilled* natives who left in response to the boatlift – because of a negative consumption amenity (as revealed by a permanent fall in house prices) – which would only tend to reinforce the impact of the boatlift.

This paper also considers a second explanation for Miami's experience: the boatlift induced Miami producers to adopt new skill-complementary technologies more slowly. The early 1980s was a period when the gap between the wages of skilled and unskilled workers widened while the relative supply of skilled workers rose. Some research has attributed to the spread of technologies, such as computers, that raise the relative productivity of skilled workers and replace unskilled workers (Autor, Katz and Krueger (1998)). Though skill-biased technological change (SBTC) is often taken as exogenous, some models suggest the presence of a large skilled work force may *induce* modes of production to become more skill-intensive. In models by Acemoglu (2002, 1998), the size of the potential market for an innovation affects the incentive to invest in R&D, and thus a large supply of skilled labor induces skill-augmenting innovations.[4] More relevant to the present paper is the research of Beaudry and Green (2000, 2003). They show that when firms can chose between high skill-share ("new") and low skill-share ("traditional") modes of production, the relative supply of skilled labor affects the combination of technologies firms will optimally choose: areas with more skilled labor will use more of the high skill-share methods. In addition, when technology can be chosen endogenously, it is not necessarily the case that an increase in the relative supply of a factor lowers its relative wage.[5]

Miami may have adjusted to the boatlift by adopting new skill-complementary technologies more slowly than they otherwise would have. If this were a large part of the adjustment,

[4] In Acemoglu's model, agents have monopoly rights over their innovations, and thus can charge a markup on each unit sold. For this reason, the size of the market is important.

[5] In fact, Beaudry and Green (2000) give conditions for the "perverse" result where relative wages rise with relative supply.

little shift in industry mix would be required to absorb the Mariel immigrants and maintain unskilled relative wages. Instead, one would observe higher rates of utilization of unskilled labor and slower adoption of these technologies.

Besides Beaudry and Green's work, other evidence on US labor markets during the 1980s suggests that technology shifts in response to local factor supply shocks. Saad-Lessler (2003) showed that in large US states during the 1980s movements in factor-output ratios within industry were related to changes in the state's factor supplies. Lewis (2003) showed that changes in worker mix in US metropolitan areas during the 1980s were largely absorbed by within-industry changes in skill intensity, without much change in relative wages. In addition, computer use increased more rapidly (among similar workers) in markets where the relative supply of college-educated grew more rapidly. Thus localities may adapt production technology to their factor mix.

To evaluate the role of open-economy adjustments to the Mariel boatlift, I use a confidential micro data version of the Annual Surveys of Manufacturers, and look for evidence of a trend break in manufacturing mix following the boatlift. Manufacturing is chosen because it is a major traded sector, particularly for unskilled employment. Initially comparing Miami to a set of 11 mostly midwestern and southern metropolitan areas with similar trends to Miami in manufacturing mix during the 1970s, I find little evidence of an accommodating change in industry mix after the boatlift. To be sure that this not an artifact of the particular choice of comparison group, I show that among 108 large metropolitan areas, the more closely a metropolitan area matched Miami's trends in manufacturing mix during the 1970s, the more

similar were its trends to Miami after the boatlift. Overall, there is little evidence the boatlift caused trend breaks in the output of any of Miami's manufacturing industries**.** One exception to this is that it appears skilled manufacturing sectors declined steadily in Miami after the boatlift, a trend which may be related to the apparent flight of skilled workers from Miami beginning sometime after the boatlift (Saiz (2003)).

This paper does not examine trends in non-manufacturing sectors.[6] However, Card's earlier version of the boatlift paper (Card (1989)) found the broad mix of industries in Miami was similar in 1978-79 and 1983-84; in any case, there is little unskilled employment in traded industries outside manufacturing. In addition, the Cuban share of employment rose across a wide array of Miami's industries after the boatlift, suggesting the Mariel immigrants were absorbed *within* industry. To provide more direct evidence that this might have been accommodated by a shift away from (compared to other markets) unskilled-replacing technology, the paper compares the amount of computer use at work in Miami to other cities. Four years after the boatlift, workers in Miami were less likely to use computers at work than workers in the comparison cities used in this study, as well as in the comparison cities used in Card (1990). This computer-use gap diminishes substantially but does not disappear when limiting the comparison to non-Hispanic workers in the same detailed cells defined by age, education, occupation and industry.

[6] In a future version of this paper, I may use County Business Patterns data to look for evidence of industry mix changes outside manufacturing. An electronic version of these data going back to the early 1970s has recently become available to me.

Taken as a whole, the findings of this paper suggest that the Miami labor market did not adjust to the boatlift in a manner consistent with HO. The boatlift may have induced a shift away from skill-biased technologies, something not predicted by the simple HO model.

2. Data

The Annual Surveys of Manufacturers (ASM) data used in this project were made available in the Census Bureau's Longitudinal Research Database (LRD), a confidential dataset that links establishment-level survey data from Censuses of Manufactures (CM), occurring once every five years, in years ending in "2" and "7," and the Annual Survey of Manufactures (ASM), occurring every year.[7] This project uses the ASM data. For the purpose of the survey, an establishment is (usually) defined a physical location where production takes place.[8]

The ASM, whose survey design goal is to produce reliable aggregate statistics on shipments by industry, collects detailed shipment, cost and asset information from a sample of manufacturing establishments each year. Beginning two years after a CM, firms are selected to be in the ASM using the previous CM as the sampling frame. Large establishments, and ones that produce a large share of any industry's output, are always included in the ASM. Very small establishments are excluded from the survey. Among medium-sized establishments, a random sample is drawn, stratified on firm size. Once selected, an

[7] The description of the LRD and the ASM in this section is based upon LRD documentation (US Department of Commerce (1999)), appendices to the Census Bureau's industry series reports (for example, US Department of Commerce (2002)), and ASM and CM survey forms, available on the Census Bureau's website.
[8] It sometimes happens that a single large establishment produces distinct product lines; when the amounts are significant, the Census Bureau attempts to treat each product line within the same physical location as a separate establishment.

establishment is surveyed every year (unless it shuts down) for the subsequent five years. To maintain the representativeness of the sample, newly active firms may be added during the five-year period using updated records on the universe of manufacturing establishments.[9] However, Davis, Haltiwanger and Schuh (1991) have shown that the Bureau is not successful at maintaining the ASMs representativeness within a panel, and that as a result the ASM does not reliably measure one-year changes in manufacturing employment. They do provide evidence, through comparisons to other data, that long-run growth rates are reliably measured in the ASM.

Another weakness of the ASM is that very small firms are not observed, and since the present project is concerned with measuring aggregate growth in each industry, it would be a problem if much of the activity were to occur in small manufacturing firms. ASM documentation reports that the data are representative of the vast majority of production.

This also makes use of employment and labor force data from the 1980 and 1990 Censuses of Population 5 percent micro samples (PUMS) and annual county population estimates from the County Age, Sex, Race files (US Department of Commerce (1985, 1993, 1998)). Importantly, the 1980 Census was taken before the boatlift occurred.[10] All of the data were

[9] Lists of enterprises come from IRS and Social Security Administration records. In addition, the Census Bureau surveys manufacturing enterprises to obtain lists of new establishments opened by multi-unit enterprises.

[10] The census purports to be a snapshot of the US population as of April 1st of the census year. The boatlift began after this date in 1980.

aggregated to the metropolitan area level in a way that matched the 1990 Census definitions of the metropolitan area boundaries as closely as possible.[11]

3. Industry Mix

The section looks for evidence of unskilled-accommodating changes in manufacturing mix in Miami following the boatlift. In order to account for changes to Miami's manufacturing mix that might have occurred in the absence of the boatlift, I initially compare Miami to eleven metropolitan areas (aggregated), chosen because they had similar trends in output to Miami in four broad skill-rated manufacturing aggregates during the 1970s.[12] Later I will perform a more general comparison that involves a larger number of cities. The three-digit industries in these aggregates are listed in the appendix table and are described further below. In short, though, the major trend that needed to be matched on was the rapid contraction of Miami's apparel sector during the 1970s, which also occurred in these comparison cities.

Before examining changes in manufacturing mix in these cities, it is useful to see how Maimi's labor market changed after the boatlift relative to this set of comparison cities (which are different than those used in Card (1990)). Table 1 presents changes in the labor force attributes of Miami and the comparison cities between 1980 and 1990. Miami's Cuban labor force grew by 13 percent during the decade, similar to estimates of the boatlift's impact presented in Card (1989). High school dropouts increased their presence in Miami's labor force by 8 percent and decreased their presence in the comparison cities' labor force by 25

[11] Deaton and Lubotsky's (2003) tabulations (with a couple minor corrections) are used to construct metropolitan areas in the 1980 and 1990 PUMS.

[12] The eleven metro areas are Cincinnati, OH; Cleveland, OH; Minneapolis-St. Paul, MN; Rochester, NY; Pittsburgh, PA; Nashville, TN; Greensboro-Winston-Salem, NC; Richmond-Petersburg, VA; Nassau-Suffolk, NY; Riverside-San Bernardino, CA; Chicago, IL

percent. The latter number is typical of the national as a whole – the 1980s was a period of rapid educational attainment. Because of the boatlift, Miami experienced smaller growth in the supply of skills. Table 1 also shows that more educated workers decreased their presence in Miami's work force in comparison to these other cities.

Table 1 provides some suggestive evidence confirming that the boatlift had little impact on Miami's labor force, at least after 10 years, compared to these cities. Statistically significant changes include the 6 percent decline in the employment rates of blacks and non-Cuban Hispanics relative to the comparison cities, but it is worth noting that the fall in employment rates is less than this for the subgroup most likely to be most competitive with the Mariel immigrants, high school dropouts. Changes to the structure of wages in Miami and these other cities are also statistically similar. The apparent 20 percent decline in wages for non-Cuban Hispanics is either spurious – it is not statistically significant – or not causally related to the Mariel boatlift, as it concentrated among more educated Hispanics. Thus the boatlift appears in these data to have had little lasting impact on the labor market outcomes of less-skilled workers in Miami.

Defining Industry Categories

The ASM is a very industrially disaggregated dataset, reporting industry at the four-digit level. But given the size of the sample, it is infeasible to fully exploit this level of detail. Instead, four aggregates will be examined. First, apparel will be examined separately as it is Miami's single largest manufacturing industry, and as it is a major low-skill employer that tends to expand with the availability of less-skilled labor (Lewis (2003)). Industries other

than apparel are classified into three categories based upon their output responsiveness to the local availability of high school dropouts in US metropolitan areas during the 1980s, which serves to reflect the likely impact of Mariel immigrants on the Miami labor market.[13] "Group 1" industries responded most positively to dropouts, group 2 industries had little response to dropouts, and group 3 industries generally responded negatively to dropouts. The industries in each of these categories are listed in the appendix. The three groups plus apparel partition manufacturing.

These industry groups were designed to be approximately equal in size in terms of the shares of the Mariel immigrants that were likely to be employed by them, ascertained using the employment shares of the Cuban migrants who arrived just before the Mariel boatlift (1975-80) in 1980. Table 2 shows that these pre-Mariel Cubans in 1980 had for the most part similar education levels to "Mariel" immigrants (Cubans who arrived 1980-81, and age 26-64 in 1990) observed in 1990, although more pre-Mariel Cubans completed high school. The share of employment in each industry group is shown in the lower panel. In total, approximately 30 percent of pre-Mariel Cubans worked in manufacturing. Fewer of the

[13] More specifically, industries j were ranked on the coefficient g_j from the regressions:

$$\%\Delta Q_{jc} = f_j + g_j \%\Delta L_{dropouts c} + h_j \%\Delta P_c + w_{jc}$$

where $\%\Delta Q_{jc}$ represents output growth between 1980 and 1990 in industry j and city c, $\%\Delta L_{dropouts,c}$ represents high school dropout labor force growth in city c, and $\%\Delta P_c$ represents population growth in c. Output was measured in the ASM, and labor force and population were measured in the Census of Population. After ranking industries on this dropout-responsiveness measure, they were then grouped into approximately equal-sized sectors based on the employment shares of pre-Mariel (1975-80 arrival cohort) Cubans in 1980. Each regression uses the subset of Lewis's (2003) sample of 179 cities for which there was a plant with nonzero output in 1980. Apparel, not included in the three groups, is second to only to yarn and fabric mills on this dropout-responsiveness measure.

Mariel immigrants actually ended up in these industries by 1990, reflecting a general decline in manufacturing.

Results

Figure 1 plots apparel value added per capita, normalized to its pre-1980 level, annually between 1972 and 1996 for Miami and the region of comparison cities.[14] Superimposed on the figure are fitted linear trends for each region. They show a steep decline in apparel output in the 1970s in Miami.[15] By design there is also a steep decline in the 1970s in the comparison cities, which were chosen to match on this trend and on the 1970s trend in the other three aggregates (shown below).[16]

We are looking for evidence of a post-1980 trend change in Miami relative to the comparison cities, and the figure shows that the contraction in the 1970s abated around 1980 in the comparison region and in the early 1980s in Miami. Note that the jump in Miami's output in 1984 also coincides with an updating of the ASM panel that year – the true series doesn't necessarily change so sharply there.[17] (See discussion in data section.) In any case, the average recovery seems to have been larger in Miami, as indicated by the linear trends, but note also that it seems to fade over time.

---

[14] Output or value added in the ASM is measured as the total value of shipments minus materials and energy costs (with adjustments for inventory changes). This definition avoids the double counting of intermediate goods produced in the manufacturing sector. The source for annual population estimates is described in the data section.

[15] These trends were computed without the 1980 data point.

[16] The simple average of the four trend differences from Miami during the 1970s was the matching criteria. Each aggregate was weighted equally because each was an approximately equal employer of pre-Mariel Cubans. (See Table 2.) 108 cities were available to be matched (the sample is described below), and these 11 were the top 10 percent of the matches.

[17] County business patterns data show no large jump in apparel employment in Miami in 1984 or in any prior year after the boatlift.

Other industry groups (shown in Figures 2 – 4) also suggest a small apparent impact of the boatlift, apart from the third industry group – comprised of industries that tend to respond negatively to the availability of dropouts – which appears to go into steady decline a few years after the boatlift. This may be related to the flight of homeowners, who are more likely to be skilled workers, from the Miami labor market following the boatlift (Saiz (2003)).

Table 3 summarizes all of the estimated linear trends. The even columns in this table show the trend break models plotted in the figures. The odd columns allow also for an intercept shift at 1980. Such an intercept shift would uncover any immediate impact of the boatlift. Although the estimated overall post-1980 coefficient is significantly negative in the first and second industry groups, the interaction with Miami provides no evidence of a relative shift in Miami. In addition, including the "post" dummy does not affect the estimates of primary interest, namely the post-boatlift relative trend breaks in Miami, which are shown in the last row of the table. Only the estimate for the second industry group is statistically different than zero, though consistent with the figures, the point estimate is positive for apparel, and negative for the third industry group. [18]

Robustness

The estimates in Table 3 are on average positive (recall that each sector is an approximately equal-sized employer of pre-Mariel Cubans) which might suggest some modest accommodation of the Mariel immigration event through the mix of manufacturing

[18] OLS standard errors are likely to be understated because they do not take account of the high level of serial correlation in the data. See Bertrand, Duflo and Mullainathan (2003).

industries. However, another pattern emerges in Table 3: trend differences before the boatlift (line 4) are similar in magnitude to the estimated trend breaks. For example, Figure 3 reveals that the positive estimate for group 2 is driven by the relative decline in Miami *before* 1980; after 1980 the trends are nearly parallel in Miami and the comparison cities. This is problematic, as it is not necessarily the case that prior trend differences would have continued after 1980 in the absence of the boatlift. In general, one could ask the question whether smaller trend break estimates are obtained by using comparison regions that more exactly match Miami's trends before the boatlift.

This turns out to be the case. Figure 5 uses each of 108 large immigrant-receiving metropolitan areas as separate control regions. It plots, for the apparel sector, the estimated trend break against the estimated trend differences before 1980.[19] In other words, each of the points in this graph represents a metropolitan area other than Miami; the x-axis measures Miami's pre-1980 difference in trend from this metropolitan area, and the y-axis measures the estimated relative trend break after 1980. What is shown is that there is a systematic negative linear relationship between the two: the larger the relative decline in Miami's apparel sector, the larger the estimated "recovery" we obtain. In fact, the tradeoff is about 1 for 1: the estimated line through these points (which weights each city by its 1980 population) has a slope statistically indistinguishable from minus 1. In addition, cities that experienced

[19]I estimate trend-break models without intercept shift (like the odd columns of Table 3). The 108 metropolitan areas are each: (1) Among the top 100 receivers of (working-age) immigrants during the 1980s, or having at least 1 percent of 1990 population foreign-born arrivals from the 1980s *and* (2) had at least one plant in each of the four industry groups in the ASM sample in each of the years 1972-1996. The 179 metropolitan areas used in the construction of the industry groups meet criteria (1). (2) is essentially a restriction on size.

similar declines to Miami saw similar recoveries in the 1980s: the intercept is near 0. What this says is that estimates different than 0 are driven primarily by prior difference in trend.[20]

Figures 6 shows the same kind of comparisons for each of the other three industry groups, and again cities that are matched to Miami in prior trends show similar trends after the boatlift. The results are summarized in Table 4, which shows the slope of an estimated line through the points for each industry group. Only the third ("skilled") industry group provides some evidence of an impact: the intercept is statistically significant and negative, though small, which might be related to the loss of skilled labor as mentioned above. Another feature of these data evident in the figures, however, is that a lot the potential comparison cities are clustered around 0 anyway – that is, it is hard to find evidence of any impact no matter which city you compare to Miami.

While one cannot rule out that some of the cities that differ from Miami in pre-1980 trends are a good comparison group, that all of the large estimates come from cities that differed substantially from Miami before the boatlift does not provide much support for the contention that the Mariel boatlift had an impact on Miami's manufacturing mix.

Another robustness issue is whether these results are particular to the output data. In this regard, it is possible to replicate all of the empirical methods used so far using employment

[20] If observed prior differences in trend from Miami were driven mainly by classical measurement error, this would tend to produce a slope estimate of -1, though not necessarily an intercept of 0, in this relationship.

data.[21] Using employment data also does not produce evidence that the Mariel immigrants were accommodated by a change in Miami's manufacturing mix.

Taken together, the results suggest it is unlikely that the Mariel boatlift affected the industry mix of Miami's manufacturing sector – the observed changes are likely to have occurred even in the absence of the boatlift.

4. Changes in Labor and Computer Use

What Happened to the Mariel Immigrants?

It might be fruitful to examine non-manufacturing sectors for their role in adjusting to the Mariel boatlift. On the other hand, there are few traded sectors outside of manufacturing that are major employers of less-educated workers in Miami. Instead I will ask the alternative question: In which industries did Mariel immigrants actually find employment after the boatlift? As in Table 2, here I use the 1990 Census as my post-boatlift observation, and define "Mariel" immigrants as those Cuban immigrants who report having arrived in the US in 1980 or 1981.[22,23] Comparing them to the employment patterns of Cuban immigrants who arrived just before them (1975-80), I find that the boatlift increased the presence of Cuban workers in most of Miami's industries.[24]

---

[21] It is also possible to use capital stock to measure industry mix, though the series is noisier and only available in census years after 1985. The trends in the capital series behave similarly to the output data.

[22] This should be a good approximate identifier of the Mariel immigrants. INS statistics on immigrants admitted as permanent residents to the US report only 10,858 Cuban arrivals in 1981 (US Department of Justice (1989)), a factor of ten smaller than the size of the boatlift. (It is worth noting, however, that INS statistics do not capture the boatlift – they report only 15,000 Cuban immigrants for 1980!)

[23] I have also limited the analysis to those Cubans aged 26-64 in 1990, i.e. those who could have been of working age when they arrived in the US.

[24] In this exercise there is no attempt to control for the counterfactual growth in the Cuban share of employment; it is merely done as a visual accounting exercise.

This is seen in Figure 7. Each point in this figure represents by how much the Cuban share of employment grew in a particular industry after the boatlift on the base of the Cuban immigrants who arrived in Miami between 1975 and 1980. This is plotted against the share of the 1975-80 Cuban cohort employed in that industry in 1980, a measure of that industry's importance for Cuban employment before the boatlift. If the Mariel immigrants were employed in 1990 in exactly the same industries as the Cubans were before the boatlift, then all of the points would be on the horizontal line representing the growth in the Cuban share of the labor force.

By 1990 it appears that almost all industries took on additional Cuban employment, with a majority of industries more than doubling their Cuban employment share, not surprising given that the Mariel boatlift appears to have tripled the Cuban workforce on this base. In fact, these within-industry changes appear to be able to account for the vast majority of the supply increase. So Miami appears to have absorbed the Mariel immigrants within industry.

Computer Use

After the boatlift the Miami labor market experienced an expansion of less-skilled employment without major cuts in less-skilled relative wages and with little change in industry mix. This pattern is similar to the rise in the relative employment of skilled workers during the 1980s – very little of which can be accounted for by changes in industry mix (e.g. Berman, Bound and Griliches (1994), Bound and Johnson(1992)) – at the same time as their relative wages went up. Some researchers believe an exogenous demand shock for skill driven by the introduction of new skill-complementary technologies, such as computers, was

responsible for this (Autor, Katz and Krueger (1998)). Acemoglu (2002) argued that the introduction of the new technology was not exogenous but the response of the market to a larger pool of skilled workers who would experience productivity benefits from such technology. Beaudry and Green (2000, 2003) use data on multiple countries to argue that the degree to which the new technology was used was *endogenous* to the availability of skilled labor. They show that skilled wages do not decline as skill supply increases.

Miami may have adjusted to the boatlift in a manner similar to what is suggested by Beaudry and Green. In this view, less-skilled wages did not fall in Miami after the boatlift because the influx of unskilled labor induced producers to adopt skill-complementary technologies at a slower rate. To provide some suggestive evidence supporting this interpretation, I examine Miami's use of the canonical skill-biased technology, computers. Recent work suggests that computers may serve to replace unskilled labor (Autor, Levy and Murnane (2003)). However, measuring skill-biased technological change with computer use has caveats. DiNardo and Pishke (1997) revealed the potential dubiousness of Krueger's (1993) interpretation of the correlation of computer use and wages as evidence of skill demand: skilled workers are more likely to be in occupations that use computers.[25] Similarly, if Miami has a low rate of computer use after the boatlift, it might simply reflect the lower tendency of unskilled Mariel immigrants *individually* to be at jobs that use a computer. To account for this, I will attempt to regression adjust computer use by Miami workers for individual influences.

[25] Krashinsky (2004) has also shown that controlling for a family fixed effect in a sample of twins makes the effect of computer use on wages go away.

The data come from the October 1984 Current Population Survey (CPS), which asked respondents "Do you use a computer directly at work?" Table 4 estimates linear probability models comparing computer-use rates in Miami and comparison cities. The comparison cities here include nine of the eleven metropolitan areas from the first set of comparison cities above (Richmond and Nashville are not observed in the 1984 CPS) plus the four cities used in the Card (1990) paper. Having both sets of comparison cities is useful because they were chosen to match on prior trends in different outcome variables – the former set is matched on prior trends in manufacturing mix and the latter on prior trends in labor market outcomes.[26]

Column (1) of Table 5 gives the baseline specification with no controls. The intercept shows that 23 percent of workers used computers in Miami in 1984, several percentage points below each set of comparison cities (as indicated by the positive coefficient on the location dummies).[27] To insure that this lower rate of computer use in Miami was not simply the direct effect of Mariel immigrants themselves having low computer-use rates, in column (2) I drop all Cubans from the regression, which diminishes the computer-use gap. The comparison may still not be valid: even among non-Cubans, Miami has more foreign-born residents than do the comparison cities, and these residents may be less skilled than US natives in ways that are not completely measurable with the variables in the CPS (such as education, which is controlled for below). Immigrant status is not observed in the CPS, so instead in column (3) I drop all Hispanics from the regression with the idea that Miami's

[26] In order to account for the fact that there is no individual-level variation in the location dummies, I cluster at this level in the regressions.

[27] The share of workers using a computer at work in the comparison cities in 1984: Chicago – 29%, Cincinnati – 24%, Cleveland – 23%, Greensboro – 23%, Minnesota – 32%, Nassau-Suffolk – 32%, Pittsburgh – 27%, Riverside – 23%, Rochester – 32%, Atlanta – 29%, Houston – 36%, Los Angeles – 28%, Tampa – 30%.

immigrants are mostly Hispanic (though not all Hispanics are immigrants). This further reduces Miami's computer-use gap with the first set of cities, but not with the Card (1990) cities, which include two major Hispanic-immigrant destinations (Houston and Los Angeles).

Did the observed gap in computer use arise as a result of the boatlift or were there differences in computer use before the boatlift? Unfortunately, there are no comparable estimates of computer use before the 1984 October CPS. I proxy for pre-boatlift computer use with the share of workers in a respondent's metropolitan area in 1980 employed in computer and peripheral technical support occupations (measured in the 1980 Census of Population).[28] This control is added in column (4). Note that this is highly correlated with computer use in 1984, but its inclusion as a control has little effect on estimates of the gap in computer use, reflecting the fact that a similar share of the work force was employed in these occupations in Miami and the comparison cities in 1980.[29]

Even among non-Hispanics, Miami may differ in skill mix from the comparison cities. To account for this, a very general function of age and education, fully interacted with gender, is controlled for in column (5) (see footnote in table for details). These controls are highly significant (education has the most explanatory power) and their inclusion makes the gap with the first set of cities negative, and eliminates much, but not all, of the gap with the second set of cities. Column (6) adds detailed occupation controls (full set of 3-digit

[28] In other words, I use the metropolitan area level variation in this, rather than just at the treatment/control groups level variation. This variable therefore takes on 14 different values (1+9+4).

[29] The fraction of workers were in these occupations in 1980 was 0.53 in Miami, 0.49 in the nine comparison cities, and 0.57 in the Card (1990) comparison cities. The standard error on the difference between Miami and each set of comparison cities is 0.04 percent.

dummies), and interestingly the gap reasserts itself. This says Miami has a *higher* share of its work force employed in the occupations that tend to use computers than the comparison cities, but once you control for that, the share of workers actually using a computer (i.e. the share of workers using a computer within a given occupation) is lower. This suggests, consistent with the story being told, that Miami may have substituted manpower in certain jobs for what was being done elsewhere by computers. The last column of the table adds 3-digit industry controls, which has little impact on the gap: the difference in computer use is almost entirely *within* industry, also important for a story about induced technological change. With the caveat that computer use is at best a proxy for other forms of factor-biased technological change, these regressions are suggestive evidence that Miami adapted to the boatlift by adopting less new technology than they might have without the boatlift.[30]

5. Conclusion

This paper tries to explain the surprising fact that the Mariel boatlift had little impact on the labor market outcomes of Miami's workers. Since the Heckscher-Ohlin theory predicts the insensitivity of relative wages to local factor supply shocks, this paper looks for evidence that the relative output of unskilled intensive manufacturing sectors went up in Miami after the boatlift and finds little evidence that it did. Miami's trends in manufacturing output mix after the boatlift were quite similar to other metropolitan areas that shared its trends before the boatlift. There is, in particular, little evidence that apparel production rose significantly as a result of the boatlift, though some skilled manufacturing may have left Miami (along with workers who it might have employed).

[30] Miami also has more blacks than either set of comparison cities, and blacks have lower computer use rates. After everything else in Table 4 is controlled for, however, neither a black dummy nor its interaction with other controls is significant, and its inclusion reduces the computer-use gap only slightly.

Finding convincing ways to evaluate trade theory is difficult, as conditions in the real world may deviate substantially from the theory, and few "experiments" exist. Miami's adjustment to the boatlift comes closer to the conditions needed to test the HO theory than do cross-sectional studies between countries or between large states within a country, the approach taken by previous research evaluating HO. The fact that there is little evidence to support HO in the present context suggests that at least in its simplest form, it may not be a very relevant theory (as Bowen et al. (1987) concluded).

This paper points out that HO misses an important feature of the world: technology may not be the same in all locations, and furthermore, production technology may be systematically chosen to accommodate worker mix.[31] In this case, it appears abundant less-skilled labor in Miami may have been accommodated by the use of less skill-intensive modes of production. But this idea potentially also explains why wages and employment rates of natives are generally found to be insensitive to local immigration shocks (Borjas (1994), Friedberg and Hunt (1995)). Though case study evidence always carries the caveat of potentially being of limited general value, other evidence indicates that a more representative set of US metropolitan areas adapted their production technology to changes in worker mix during the 1980s (Lewis (2003)).[32] The evidence here is only suggestive – computers appear to have been adopted more slowly in Miami after the boatlift than by similar workers in

[31] Trefler (1993) reminded us that there may be factor specific productivity differences across locations. He showed that once factors were adjusted for local productivity differences (converted to "effective" supplies) net exports from countries were predicted by factor supply mix as HO says it should be. However, this does little to rescue HO as a true theory of trade because how these local productivity differences arise is uncertain.

[32] One reason why the case of the boatlift might be special is that the event fortuitously occurred near the beginning of the PC revolution. Also, forgoing new technologies may be an easier adjustment to make than implementing them more rapidly.

other markets – but fits with this view. Future research might therefore incorporate the choice of technology into models of trade.

References

Acemoglu, Daron (1998). "Why Do New Technologies Complement Skills? Directed Technical Change and Wage Inequality." *Quarterly Journal of Economics* 113(4): November 1998, p. 1055-89.

---- (2002). "Technical Change, Inequality and the Labor Market," *Journal of Economic Literature* 40(1): March 2002, p. 7-72.

Altonji, Joseph and David Card (1991). "The Effects of Immigration on the Labor Market Outcomes of Less-Skilled Natives." in John Abowd and Richard Freeman, eds. *Immigration, Trade and the Labor Market*. Chicago: University of Chicago Press, 1991.

Autor, David H., Lawrence F. Katz and Alan B. Kreuger (1998). "Computing Inequality: Have Computers Changed the Labor Market?" *Quarterly Journal of Economics* 113(4): November 1998, p. 1169-1213.

Autor, David H., Frank Levy and Richard J. Murnane (2003). "The Skill Content of Recent Technological Change: An Empirical Exploration." *Quarterly Journal of Economics* 118 (4): November 2003, p. 1279-1334.

Beaudry, Paul and David A. Green (2000). "What is Driving US and Canadian Wages: Exogenous Technical Change or Endogenous Choice of Technique?" University of British Columbia Mimeo, January 2000.

---- (2003). "Wages and Employment in the United States and Germany: What Explains the Differences?" *American Economic Review* 93(3): June 2003, p. 573-602.

Berman, Eli, John Bound and Zvi Griliches (1994). "Changes in the Demand for Skilled Labor Within US Manufacturing: Evidence from the Annual Survey of Manufacturers." *Quarterly Journal of Economics* 109 (2): May 1994, p 367-397.

Bernard, Andrew B., and J. Bradford Jensen (2002). "The Deaths of Manufacturing Plants." National Bureau of Economic Research Working Paper #9026. Cambridge, MA: NBER, June 2002.

Bernard, Andrew B., Stephen Redding, Peter K. Schott, Helen Simpson (2002). "Factor Price Equalization in the UK?" National Bureau of Economics Research Working Paper #9052. Cambridge, MA: NBER, July 2002.

Bertrand, Marianne, Esther Duflo and Sendhil Mullainathan (2003). "How Much Should We Trust Difference-in-Differences Estimates?" Forthcoming in *Quarterly Journal of Economics*, 2003.

Booth, William (1998). "A White Migration North from Miami." *Washington Post*, November 9, 1998, p. A01.

Borjas, George, J. (2003). "The Labor Demand Curve *is* Downward Sloping: Reexamining the Impact of Immigration on the Labor Market." Forthcoming in *Quarterly Journal of Economics*, 2003.

---- (1994). "The Economics of Immigration." *Journal of Economic Literature* 32: December 1994, p 1667-1717.

Borjas, George J., Richard Freeman and Lawrence Katz (1996). "Searching for the Effect of Immigration on the Labor Market." *American Economic Review* 86 (2): May 1996, p 246-51.

Borjas, George J., Richard Freeman and Lawrence Katz (1997). "How Much Do Immigration and Trade Affect Labor Market Outcomes?" *Brookings Papers on Economic Activity* 1997(1): 1997, p. 1-67.

Bound, John and George Johnson (1992). "Changes in the Structure of Wages in the 1980s: An Evaluation of Alternative Explanations." *American Economic Review* 82 (3): June 1992, p. 371-392.

Bowen, Harry P., Edward E. Leamer and Leo Sveikauskas (1987). "Multicountry, Multifactor Tests of the Factor Abundance Theory." *American Economic Review* 77(5): December 1987, p. 791-809.

Card, David (1989). "The Impact of the Mariel Boatlift on the Miami Labor Market." National Bureau of Economic Research Working Paper #3069. Cambridge, MA: NBER, August 1989.

---- (1990). "The Impact of the Mariel Boatlift on the Miami Labor Market." *Industrial and Labor Relations Review* 43 (2): January 1990, p. 245-257.

---- (2001). "Immigrant Inflows, Native Outflows, and the Local Labor Market Impacts of Higher Immigration." *Journal of Labor Economics* 19(1): January 2001, p. 22-64.

Card, David and John DiNardo (2000). "Immigrant Inflows Lead to Native Outflows?" *American Economic Review* 90(2): May 2000, p. 360-67

Davis, Steve J., John Haltiwanger, and Scott Schuh (1991). "Published versus Sample Statisics from the ASM: Implications for the LRD." Bureau of the Census Center for Economic Studies Working Paper 91-1. Washington, DC: CES, January 1991.

Davis, Donald R., David E. Weinstein, Scott C. Bradford and Kazushige Shimpo (1997). "Using International and Japanese Regional Data to Determine When the Factor Abundance Theory of Trade Works," *American Economic Review* 87(3): June 1997, p. 421-446.

Deaton, Angus and Darren Lubotsky (2003). "Mortality, Inequality and Race in American Cities and States." *Social Science and Medicine* 56(6): March 2003, p. 1139-1153.

DiNardo, John, and Jorn-Steffen Pischke (1997). "The Returns to Computer Use Revisited: Have Pencils Changed the Wage Structure, Too?" *Quarterly Journal of Economics* 112(1): February 1997, p. 291-303.

Doms, Mark, Timothy Dunne and Kenneth R. Troske (1997). "Workers, Wages and Technology." *Quarterly Journal of Technology* 62(1): February 1997.

Ethier, Wilfred J. (1972). "Nontraded Goods and the Heckscher-Ohlin Model." *International Economic Review* 13(1): February 1972, p 132-147.

---- (1984). "Higher Dimensional Issues in Trade Theory," in RW Jones and PB. Kenen, eds. *Handbook of International Trade*. Amsterdam, North-Holland: 1984, p. 131-84

Filer, Randall K. (1992). "The Effect of Immigrant Arrivals on Migratory Patterns of Native Workers," in George Borjas and Richard Freeman, Eds. *Immigration and the Work Force*. Chicago: University of Chicago Press, 1992.

Frey, William H. (1995). "Immigration and Internal Migration Flight: A California Case Study." *Population and Environment* 16(4): 1995, p. 353-375.

---- (1996). "Immigration, Domestic Migration, and Demographic Balkanization in America: New Evidence for the 1990s." *Population and Development Review* 22(4): December 1996, p. 741-763.

Friedberg, Rachel M. and Jennifer Hunt (1995). "The Impact of Immigrants on Host Country Wages, Employment and Growth," *Journal of Economic Persepctives* 9(2): Spring 1995, p. 23-44.

Habakkuk, H.J. (1962). *American and British Technology in the Nineteenth Century: The Search for Labor-Saving Inventions*. London: Cambridge University Press, 1962.

Hamermesh, Daniel S. (1993). *Labor Demand*. Princeton, NJ: Princeton University Press, 1993.

Hanson, Gordon H. and Matthew J. Slaughter (2002). "Labor-Market Adjustments in Open Economies: Evidence from US States," *Journal of International Economics* 57(1): June 2002, p. 3-29.

Hanson, Gordon H., Matthew J. Slaughter and Neil Gandal (2002). "Technology, Trade and Adjustment to Immigration in Israel." Forthcoming in *European Economic Review*, 2002.

Jaeger, David A, Susanna Loeb, Sarah E. Turner and John Bound (1998). "Coding Geographic Areas Across Census Years: Creating Consistent Definitions of Metropolitan Areas." National Bureau of Economic Research Working Paper #6772. Cambridge, MA: NBER, October 1998.

Johnson, George and Frank Stafford (1999). "The Labor Market Implications of International Trade" in O. Ashenfelter and D. Card, eds. *Handbook of Labor Economics* Vol. 3 and 4. Amsterdam, North-Holland 1999.

Katz, Lawrence and Kevin Murphy (1992). "Changes in Relative Wages, 1963-1987: Supply and Demand Factors." *Quarterly Journal of Economics* 112: 1992, p 291-303.

Komiya, Ryutaro (1967). "Non Traded Goods and the Pure Theory of International Trade." *International Economic Review* 8(2): June 1967, p. 132-152.

Krashinsky, Harry A. (2004). "Do Marital Status and Computer Use Really Change the Wage Structure?" Forthcoming in *Journal of Human Resources*, 2004.

Krueger, Alan (1993). "How Computers Have Changed the Wage Structure: Evidence from Microdata 1984-1989." *Quarterly Journal of Economics* 108(1): 1993, p. 33-60.

Leamer, Edward E (1984). *Sources of International Comparative Advantage.* Cambridge, MA: The MIT Press, 1984.

---- (1987). "Theory and Evidence of Immigrant Enclaves." Mimeo, 1987.

---- (1995). *The Heckscher-Ohlin Model in Theory and Practice*. Princeton Studies in International Finance vol 77. Princeton, NJ: International Finance Section, 1995.

---- (1997). "Evidence of Ricardian and Heckscher-Ohlin Effects in OECD Specialization Patterns," in Maskus, Kieth et al., eds. *Quiet Pioneering.* Ann Arbor: University of Michigan Press, 1997.

Leamer, Edward E. and James Levinsohn (1995). "International Trade Theory: The Evidence," in G. Grossman and K. Rogoff, eds. *Handbook of International Economics*, Volume III. Amsterdam, North-Holland: 1995, p. 1339-94.

Lewis, Ethan Gatewood (2003). "Local, Open Economies Within the US: How Do Industries Respond to Immigration?" in *Essays in Labor and Trade*, Ph.D. Dissertation UC Berkeley, 2003.

McGuckin, Robert H. Mary L. Streitwieser and Mark Doms. "The Effect of Technology Use on Productivity Growth." *Economics of Innovation and New Technology* 7(1): 1998, p. 1-26.

Moretti, Enrico (2002). "Human Capital Spillovers in Manufacturing: Evidence from Plant-Level Production Functions." *NBER Working Paper #9316*: November 2002.

---- (2003). "Estimating the Social Return to Higher Education: Evidence from Longitudinal and Repeated Cross-Section Data." Forthcoming in *Journal of Econometrics*, 2003.

Quispe-Agnoli, Myriam and Madeline Zavodny (2002). "The Effect of Immigration on Output Mix, Capital and Productivity." Federal Reserve Bank of Atlanta *Economic Review*: First Quarter, 2002, p. 1-11.

Saad-Lessler, Joelle (2003). "Do Local Relative Factor Supplies Affect Local Relative Factor Prices?" In *Essays in International Trade and Labor*, Ph.D. Dissertation, Columbia University (2003).

Saiz, Albert (2003). "Room in the Kitchen for the Melting Pot: Immigration and Rental Prices." *Review of Economics and Statistics* 85(3): August 2003, p. 502-521.

Schoeni, Robert (1996). "The Effect of Immigrants on the Employment and Wages of Native Workers: Evidence from the 1970s and 1980s." Santa Monica: RAND Corporation Unpublished paper, Feb. 1996.

Trefler, Daniel (1993). "International Factor Price Differences: Leontief Was Right!" *Journal of Political Economy* 101(6): 1993, p. 961-987.

U.S. Dept. of Commerce, Bureau of the Census (1985). "Intercensal Estimates of the Population of Counties by Age, Sex, and Race (United States): 1970-1980 [Computer file]." Inter-University Consortium for Political and Social Research file #8384. Ann Arbor, MI: ICPSR, 1985.

---- (1993). "Revised Estimates of the Population of Counties by Age, Sex, and Race (United States): 1980-1989 [Computer file]." Inter-University Consortium for Political and Social Research file #6031. Ann Arbor, MI: ICPSR, 1993.

---- (1998). "Estimates of the Population of Counties by Age, Sex, and Race (United States): 1990-1996 [Computer file]." Inter-University Consortium for Political and Social Research file #2372. Ann Arbor, MI: ICPSR, 1998.

---- (2002). "Statistics for Industry Groups and Industries: 2000, Annual Survey of Manufactures." Washington, DC: U.S. Department of Commerce, Feb 2002.

US Department of Commerce, Bureau of the Census, Center for Economic Studies (1999). "Longitudinal Research Database, Technical Documentation Manual 1999: PRELIMINARY DRAFT." Washington, DC: Mimeo, 1999.

US Department of Justice, Immigration and Naturalization Service (1989). "Immigrants Admitted to the United States, 1981 [Computer file]." University of Michigan: Inter-

University Consortium for Political and Social Research file #8961. Ann Arbor, MI: ICPSR, 1989.

Table 1

1980-1990 Growth in Labor Force Attributes, Miami and Comaprison Region

Variable	Miami	Comp Region	Differ-ence
Labor Force/Capita			
Cubans	0.13	-0.04	0.17 *
High School Dropouts	0.08	-0.28	0.36 *
High School Graduates	-0.26	-0.19	-0.07 *
Some College	0.30	0.50	-0.21 *
College Graduates	0.13	0.30	-0.17 *
Employment Rates			
Black	0.00	0.06	-0.06 *
Non-Cuban Hispanic	0.03	0.09	-0.06 *
All…			
High School Dropouts	-0.01	0.02	-0.03 *
High School Graduates	0.01	0.03	-0.02 *
Some College	0.03	0.03	0.00
College Graduates	0.02	0.02	0.00
Black…			
High School Dropouts	-0.03	0.01	-0.04 *
High School Graduates	0.00	0.02	-0.02
Non-Cuban Hispanic…			
High School Dropouts	0.03	0.08	-0.05 *
High School Graduates	0.01	0.03	-0.03
Hourly Wages (CPI-deflated)			
Black	-0.10	-0.07	-0.03
Non-Cuban Hispanic	-0.13	0.07	-0.20
High School Dropouts	-0.12	-0.12	0.00
Black…			
High School Dropouts	-0.17	-0.24	0.08
Non-Cuban Hispanic…			
High School Dropouts	-0.21	-0.13	-0.09

Source: 1980, 1990 5% PUMS. *Significanlty different from 0 at the 5% level.

Table 2
The Education and Manufacturing Industries of Pre-Mariel and Mariel Immigrants

	1975-80 (Pre-Mariel) Cuban Arrivals, 1980		"Mariel" Immigrants 1990	
	All	Miami	All	Miami
Education Shares				
<9th Grade	0.353	0.378	0.391	0.405
<12th Grade	0.541	0.576	0.631	0.642
12th Grade	0.217	0.199	0.169	0.158
Some College	0.118	0.115	0.133	0.130
College+	0.124	0.110	0.067	0.071
Employment Shares				
Manufacturing	*0.286*	*0.290*	*0.208*	*0.199*
Apparel	0.061	0.068	0.037	0.047
Group 1	0.073	0.078	0.068	0.059
Group 2	0.072	0.068	0.043	0.041
Group 3	0.080	0.076	0.060	0.052
N	1,243	790	4,814	2,692
Share in Miami….		0.636		0.559

Source: 1980, 1990 5% PUMS. "Mariel" Immigrants defined as Cuban immigrants arriving in 1980-81 who were aged 16-55 in 1980.

Table 3

Linear Trends In Output Per Capita (1972-79=1.00) in Miami and Comparison Cities, by Industry Group

	Apparel		Group 1		Group 2		Group 3	
	Unrestric-ted	Trend Break Only	Unrestric-ted	Trend Break Only	Unrestric-ted	Trend Break Only	Unrestric-ted	Trend Break Only
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	0.60	0.65	1.05	0.83	1.00	0.86	1.02	0.94
	(0.11)	(0.06)	(0.09)	(0.06)	(0.08)	(0.05)	(0.07)	(0.04)
Miami	-0.08	-0.07	0.05	-0.05	-0.11	-0.21	0.02	-0.05
	(0.15)	(0.08)	(0.13)	(0.09)	(0.11)	(0.07)	(0.09)	(0.06)
Trend	-0.09	-0.08	0.01	-0.03	0.00	-0.02	0.00	-0.01
	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Trend*Miami	-0.02	-0.02	0.01	-0.01	-0.02	-0.04	0.00	-0.01
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)
Post 1980	0.07		-0.32		-0.21		-0.11	
	(0.13)		(0.11)		(0.09)		(0.08)	
Post 1980 * Miami	0.01		-0.14		-0.15		-0.10	
	(0.18)		(0.15)		(0.13)		(0.11)	
Post 1980*Trend	0.06	0.05	-0.01	0.02	0.01	0.03	0.00	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Post 1980*Trend * Miami	0.04	0.03	0.00	0.01	0.03	0.05	-0.03	-0.02
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
R^2	0.847	0.845	0.601	0.324	0.690	0.536	0.830	0.796

Source: US Census Bureau, CES, Annual Survey of Manufacturers data. Time is measured as years after 1980 (e.g., 1979 = -1). Annual data from 1972-1996, 1980 data point excluded.

Table 4

Regression of Post-1980 Trend Break on Pre-1980 Trend Difference

Coeffcient	Apparel	Group 1	Group 2	Group 3
Intercept	**-0.01**	**0.00**	**-0.01**	**-0.02**
	(0.01)	**(0.00)**	**(0.01)**	**(0.00)**
Pre-1980	-1.03	-1.08	-1.28	-1.04
Trend Diff	(0.07)	(0.09)	(0.18)	(0.11)
R^2	0.67	0.59	0.33	0.45
N Cities	108	108	108	108

Source: US Census Bureau, CES, Annual Survey of Manufacturers.
Regressions of pre-1980 trend difference on post-1980 trend break.
Each comparison city weighted by 1980 population.

Table 5
Explaining 1984 Computer Use in Miami and Comparison Cities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
In Comparison City†	**0.047**	**0.023**	**0.003**	**0.010**	**-0.013**	**0.010**	**0.009**
	(0.023)	**(0.028)**	**(0.031)**	**(0.002)**	**(0.001)**	**(0.005)**	**(0.007)**
In Card (1990) Comp-arison City‡	**0.075**	**0.052**	**0.058**	**0.051**	**0.022**	**0.042**	**0.041**
	(0.024)	**(0.028)**	**(0.032)**	**(0.002)**	**(0.002)**	**(0.003)**	**(0.006)**
Pre-Mariel (1980) Share Computer Ops, this MA				19.079	11.715	7.832	8.954
				(5.743)	(4.836)	(3.552)	(3.706)
Constant	**0.231**	**0.256**	**0.282**	0.181	-2.295	-0.939	-0.515
	(0.022)	**(0.027)**	**(0.030)**	(0.030)	(0.224)	(0.301)	(0.260)
Cubans Excluded?	NO	YES	YES	YES	YES	YES	YES
Other Hispanics Excluded?	NO	NO	YES	YES	YES	YES	YES
Ed, Age, Gender Controls?§	NO	NO	NO	NO	YES	YES	YES
Occupation Dummies?	NO	NO	NO	NO	NO	YES	YES
Industry Dummies?	NO	NO	NO	NO	NO	NO	YES
R^2	0.002	0.001	0.003	0.005	0.107	0.330	0.379
N	8,592	8,451	7,634	7,634	7,634	7,634	7,634

Source: 1984 October CPS and 1980 Census of Population (PUMS). Standard errors in columns (4) - (7) take account error correlation among observations in the same city group (Miami and each of the two comparison groups). †Cincinnati, Cleveland, Minneapolis, Rochester, Pittsburgh, Greensboro, Nassau-Suffolk, Riverside, Chicago. ‡Atlanta, Houston, Tampa, Los Angeles. §Fully interacted by gender: dummies for 1-18 years of education, quartic in age, and an interaction of years of education and quadratic in age. Results are robust to other specifications.

Figure 1

Real Value Added Per Capita Relative to 1972-79, Apparel Industry

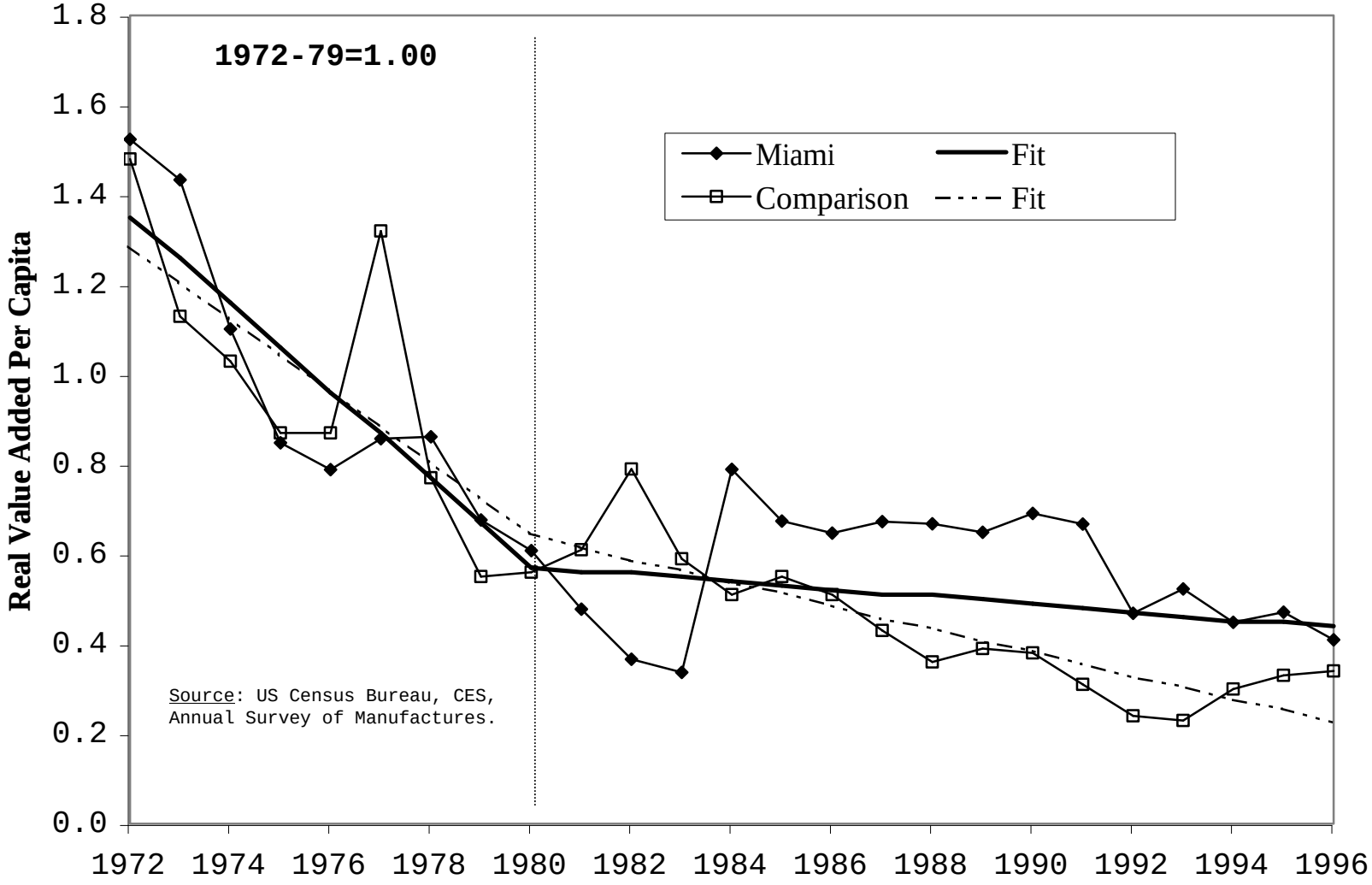


Figure 2

Value Added Per Capita Relative to 1972-79, Industry Group 1

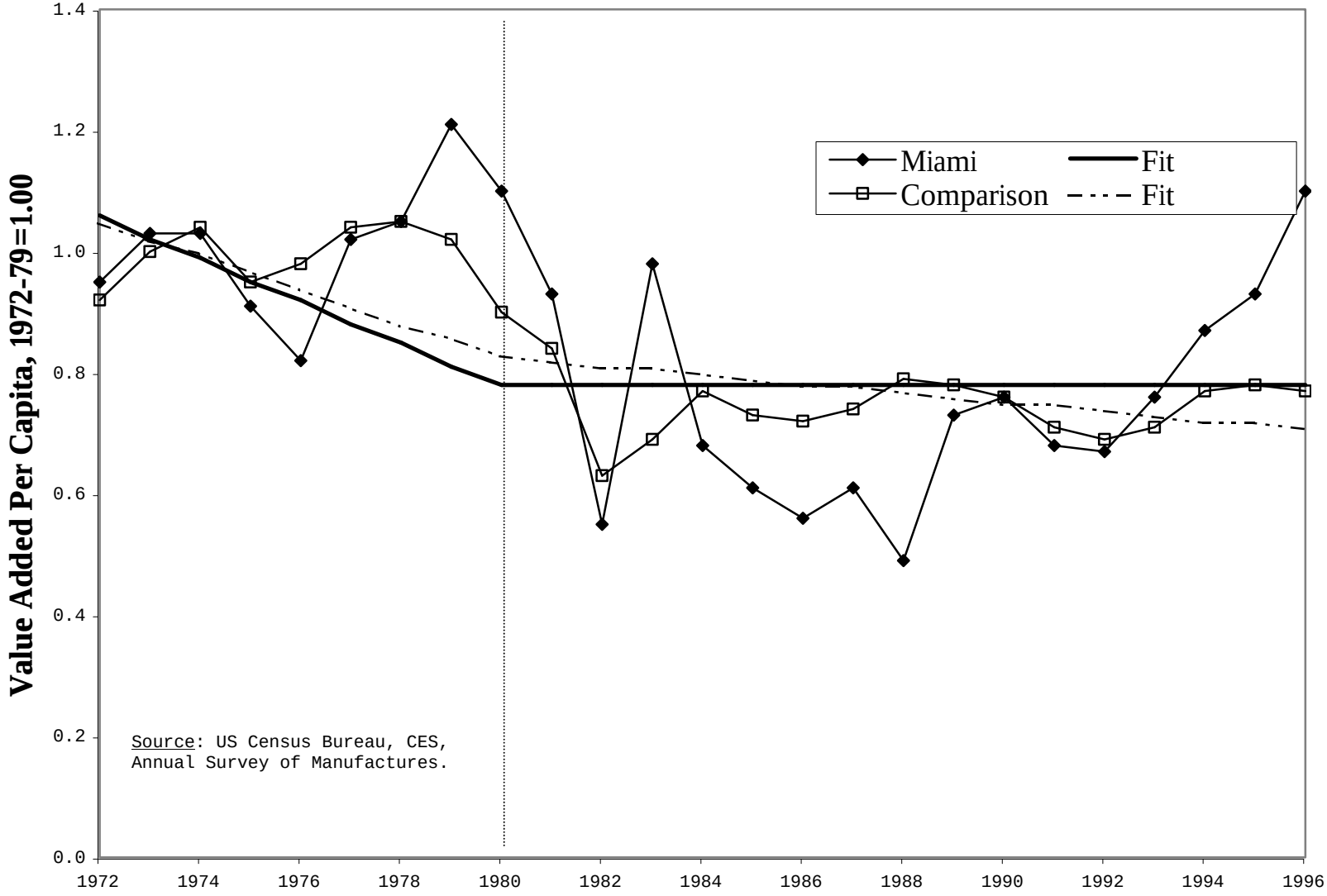


Figure 3

Value Added Per Capita Relative to 1972-79, Industry Group 2

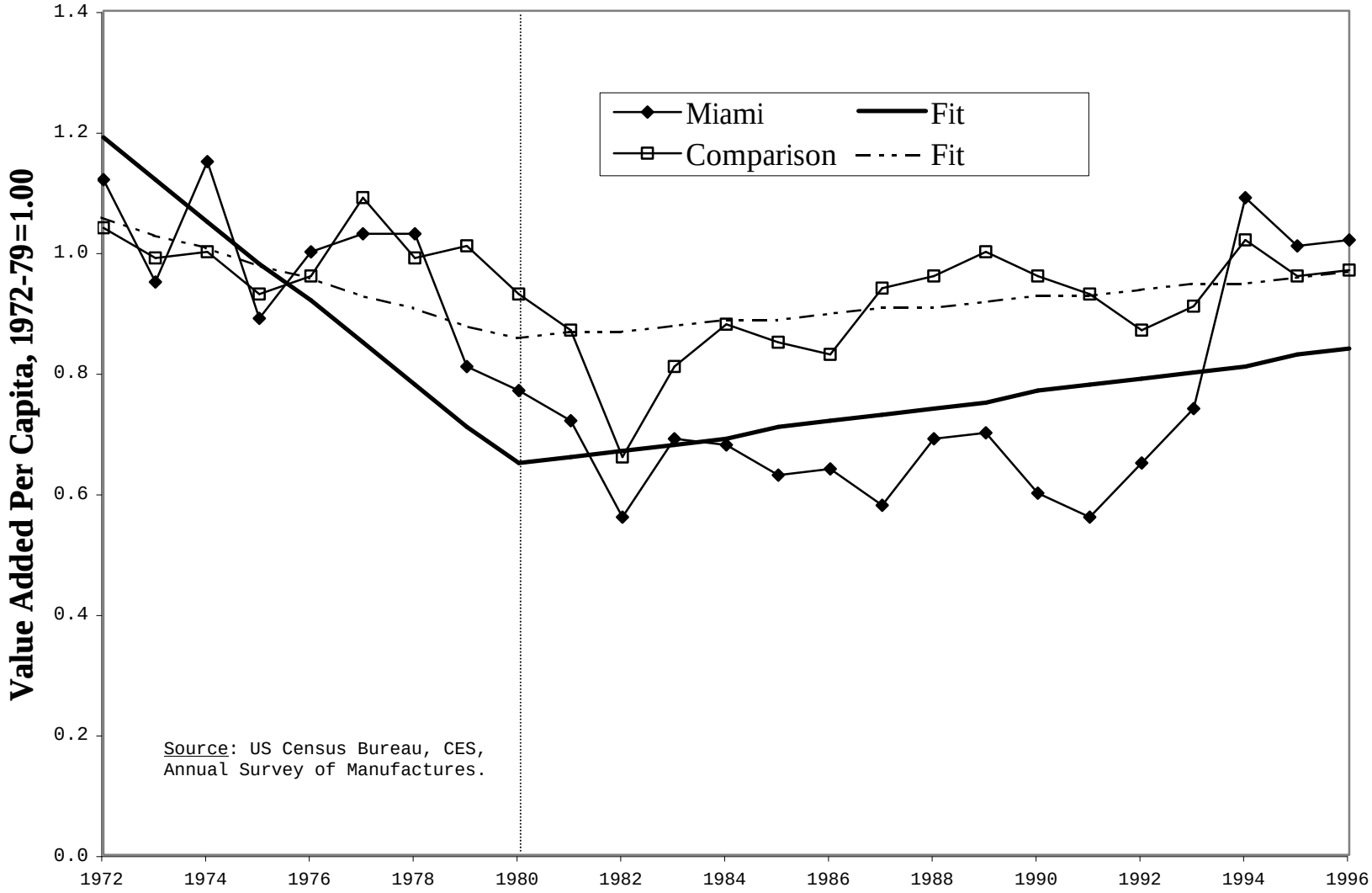


Figure 4

Value Added Per Capita Relative to 1972-79, Industry Group 3

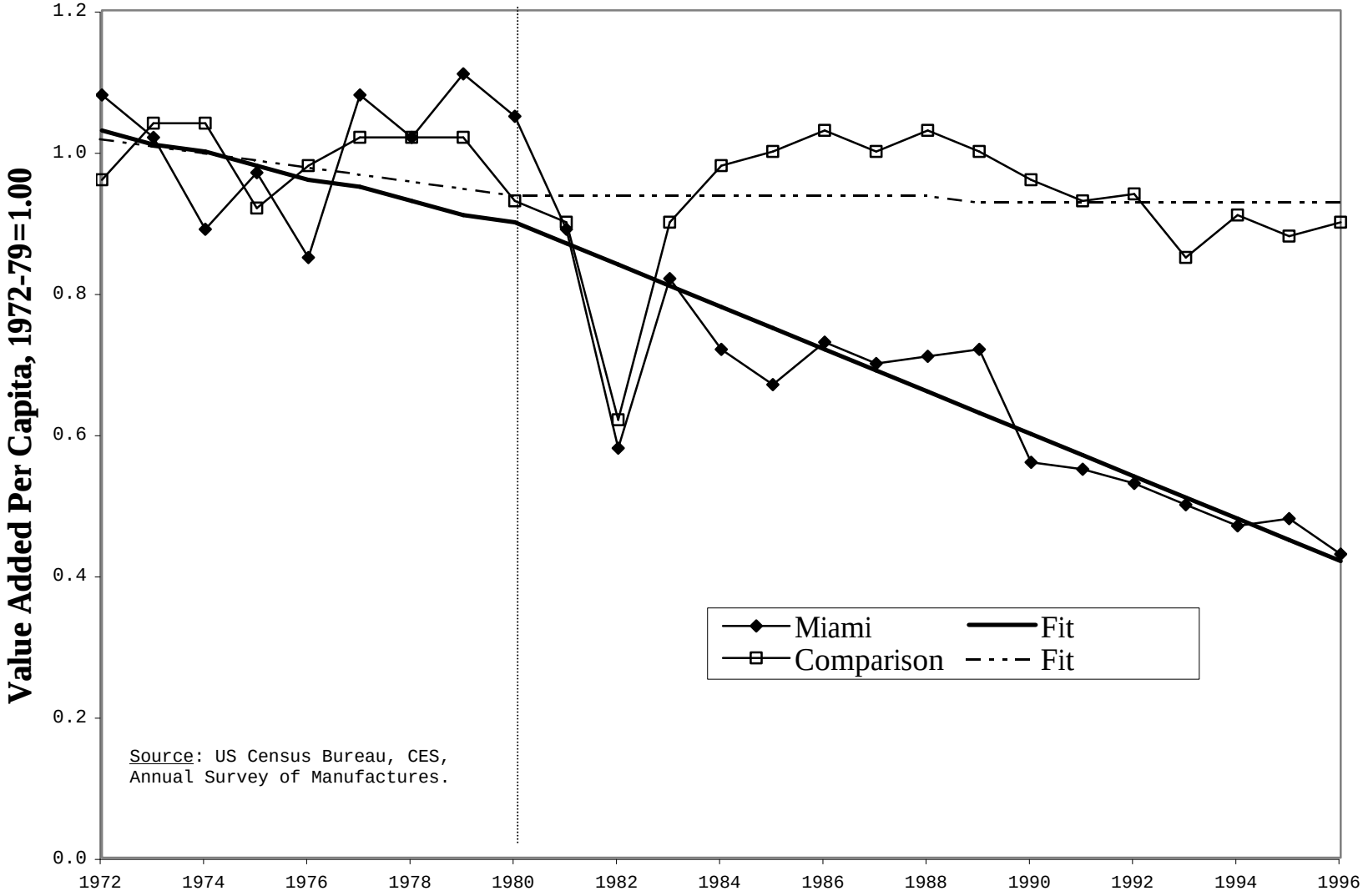


Figure 5
Post-1980 Change in Trend on Pre-1980 Trend in Output per Capita, in Miami Relative to Each Metro Area, Apparel Industry

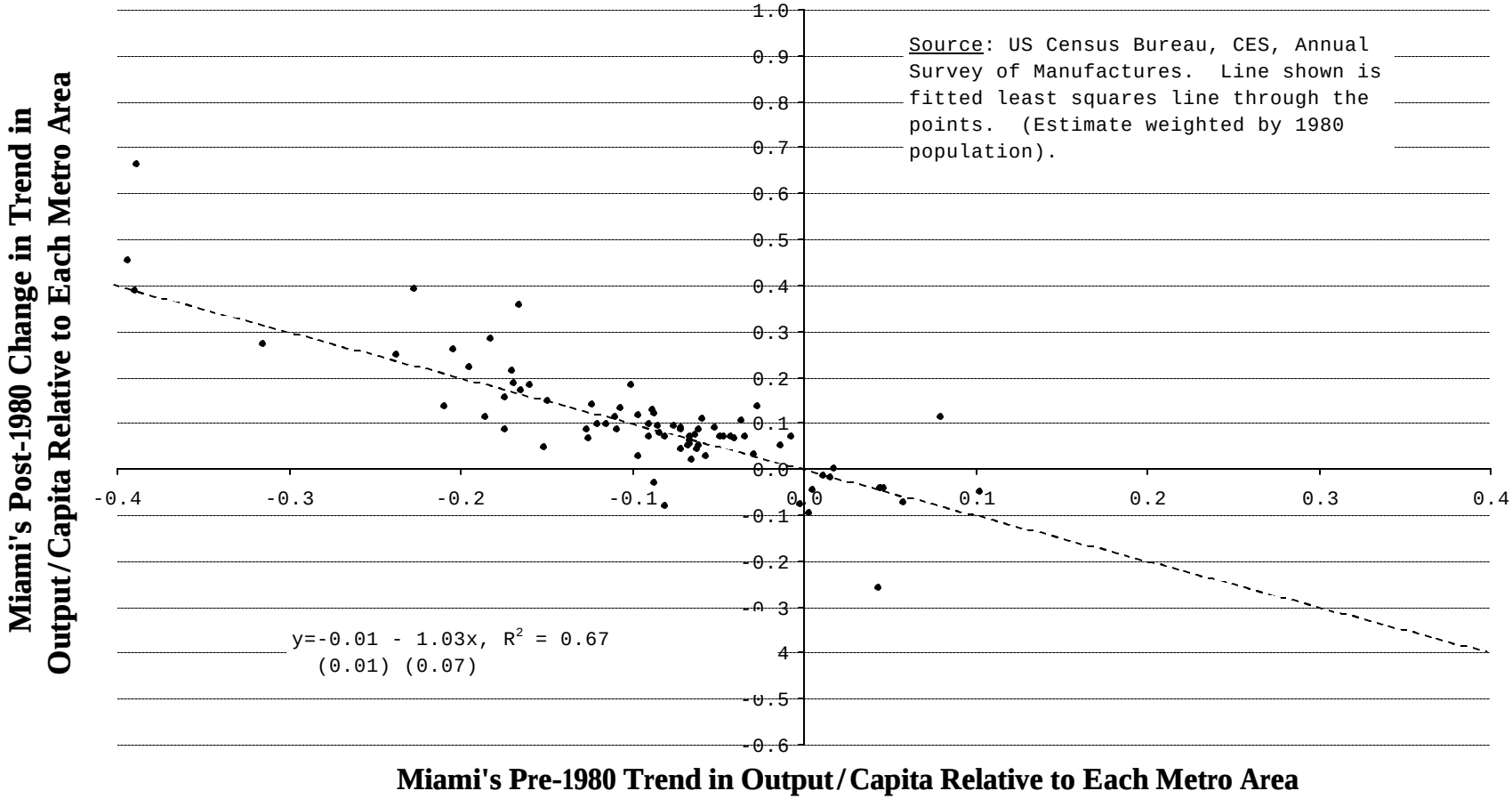
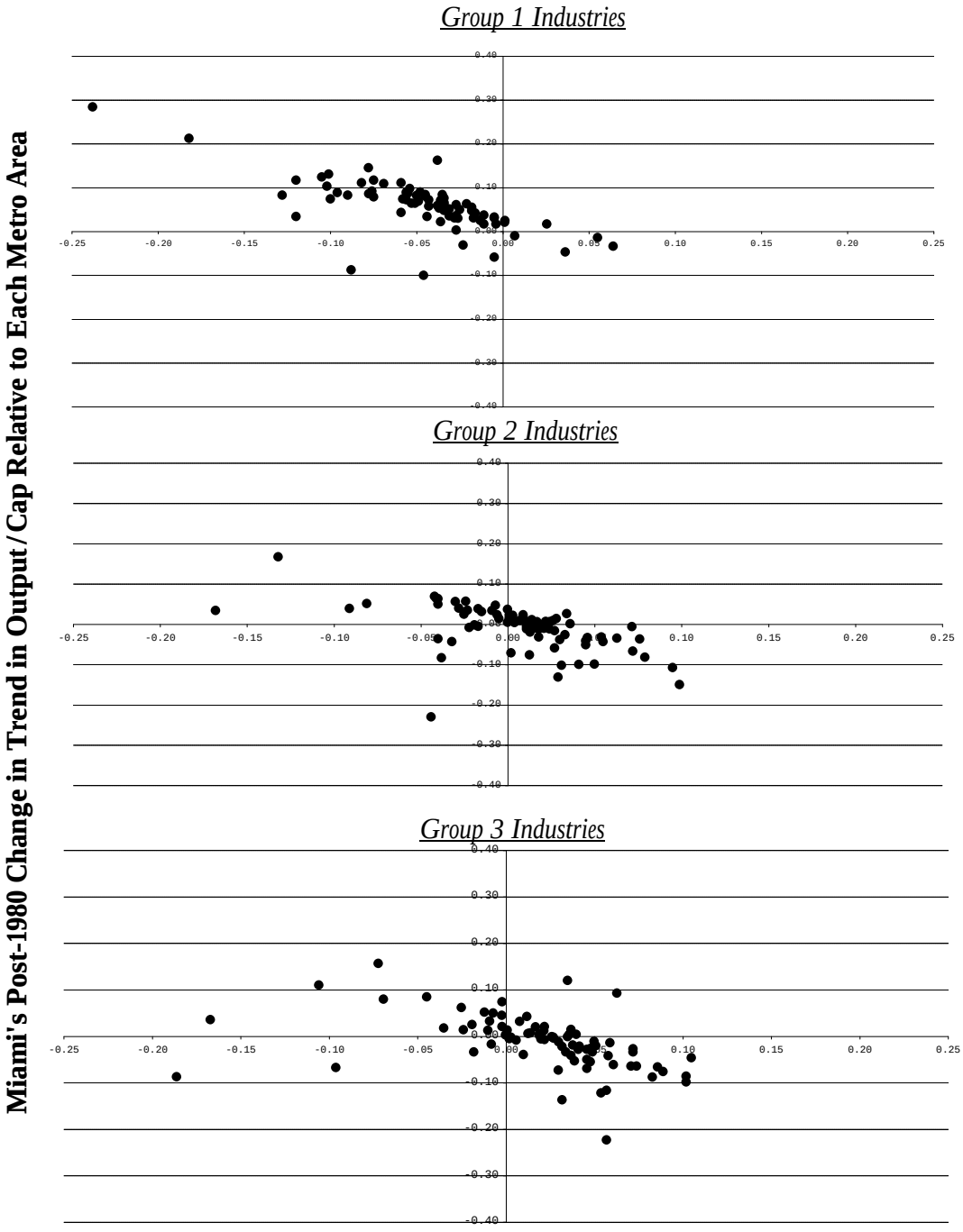


Figure 6

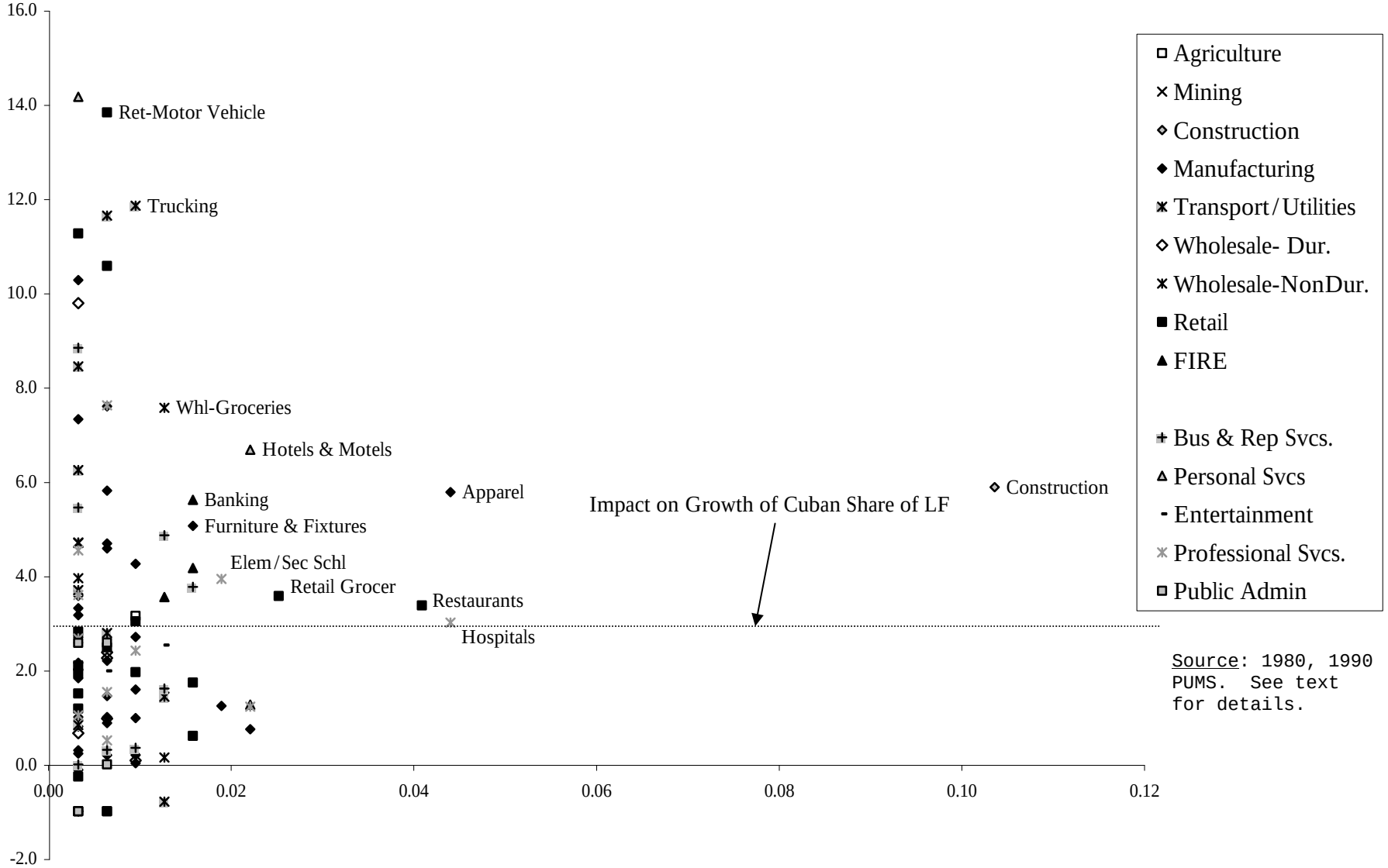
Post-1980 Change in Trend on Pre-1980 Trend in Output per Capita, Miami Relative to Each Metro Area



Source: US Census Bureau, Annual Survey of Manufactures

Figure 7

Impact of Mariel Boatlift on Growth of Cuban Share of Employment, by Industry, Miami



Appendix Table: Census of Population Industies in Each Industry Group

and 1980 Share of Pre-Mariel (1975-80 arrival cohort) Cuban Employment in Each Industry

Apparel	
Apparel/Accessories, Ex Knit	0.061
Group 1 -- Positive Response to Dropouts	
Meat Products	0.002
Bakery Products	0.005
Misc. Food Preparation	
Knitting Mills	0.004
Yarn, Thread, Fabric Mills	0.010
Misc. Fabricated Textile	0.005
Industrial/Misc. Chemicals	0.001
Footwear, Ex Rubber & Plastic	0.012
Blast Furnaces/Steelwrks/roll & fin	0.004
Engines & Turbines	0.001
Metalworking Machinery	0.001
Machinery, Except Electrical	0.005
Electr Machinery, Eq & Supplies	0.010
Guided Missles/Spce Vh/Parts	
Scientific & Controlling Insts	
Cycles & Misc. Trsport Equip	
Health Services Supplies	0.002
Photographic Equip/Supplies	0.001
Misc. Manuf	0.009
Group2 -- Little Response to Dropouts	
Misc Wood Products	0.002
Glass & Glass Pdts.	0.005
Misc. Nonmet Mineral/Stone	0.004
Paperboard Containers, Boxes	0.001

Group 2	
(continued)	
Petroleum Refining	
Dairy Products	0.004
Pottery & Related Products	
Railrd Locomotives/Equipment	
Office & Accounting Machines	
Grain Mill Products	0.004
Canned/Preserved Fruits/Veg	0.001
OthRubber/Plastics Ftwr/Belt	0.001
Tires & Inner Tubes	
Misc. Petroleum/Coal Pdts.	
Household Appliances	0.001
Ship/Boat Building/Repairing	0.006
Cmnt/Concrete/Gypsum/Plaster	
Sugar and Confect Pdts	0.007
Other Primary Metal	0.006
Floor Cover, Ex Hard Surface	0.001
Leather Pdts, Ex Footwear	0.005
Paints/Varnishes	0.001
Misc. Paper & Pulp Products	0.004
Misc. Plastics Products	0.005
Ordnance	0.001
Leather Tanning & Finishing	
Beverage Industries	0.005
Iron & Steel Foundries	
Structural Clay Products	0.001
Plastics/Synthetics/Resins	0.005
Misc textile Mill Products	0.001

Group 2	
(continued)	
Watches/Clocks/Clock Op Dvcs	
Wood Buildings/Mobile Homes	
Construction/Mat Handl Mach	
Agricultural Chemicals	0.001
Dye/Fnsh Text, Ex Wool, Knit	
Group 3 -- Negative Response to Dropouts	
Farm Machinery & Equipment	0.004
Drugs	0.002
Pulp, Paper & Paperbd Mills	
Metal Forgings, Stampings	
Soaps & Cosmetics	0.002
Screw Machine Products	0.001
Primary Aluminum	0.002
Fabiricated Structural Metal	0.006
Pub/Print Except Newspaper	0.014
Logging	
Newspaper Pub/Print	0.005
Sawmills/Planing/Millwork	0.004
Furniture & Fixtures	0.011
Radio/TV/Communication Eq	0.004
Motor Vehicles/Equip	0.006
Cutlery/Handtls/Oth Hrdwr	
Misc. Fabricated Metal	0.001
Tobacco Manufacturers	0.002
Toys/Amusement/Sprting Gds	0.006
Electr Computing Equipment	0.001
Aircraft & Parts	0.006

Source: 1980 PUMS. Blank cells have no pre-Mariel Cuban employment in the 1980 Census.