Regional Economic Growth and Firm Performance

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Abstract

Changes in local economic conditions can have important impacts on the performance and investment decisions of firms operating there. The spatial distribution of firms' current assets can therefore be a determinant of overall firm outcomes. I use a sample of 285 publicly traded retail, restaurant, hotel, and entertainment service chains from 1997 to 2016 to study the effect of quarterly state-level income growth on firms, exploring variation in the geographic location of stores. I find that firms with more stores in high-growth states have higher sales growth contemporaneously and higher predictable stock returns subsequently. In addition, firm expansion is positively associated with past state-level income growth. While higher investment sensitivity to positive past local income growth does not lead to higher future revenue growth, it is associated with a small increase in profitability. The results suggest that regional economic conditions are important for firm performance, but are under-weighted by investors and managers.

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1 Introduction

Fluctuations in local economic conditions can have important impacts on the performance and investment decisions of firms. These impacts may be heterogeneous given firms' different current assets in place. A recent literature has studied how local economic shocks are related to aggregate outcomes through firms' internal networks (e.g. Barrot and Sauvagnat (2016), Giroud and Mueller (2017), Bernile et al. (2012)). In this paper, I use data on store location distributions of publicly traded brick-and-mortar retail chains, as well as restaurant, hotel, and entertainment services chains, to study the impact of regional income growth on the performance and subsequent investment decisions of these firms.

Store-level sales growth depends on the demand for goods and services from customers visiting the stores. Therefore, firms with more stores located in high demand growth regions should expect to earn higher revenue. Intuitively, if consumption growth is positively associated with store-level sales growth, then a firm with multiple locations is essentially holding a "portfolio of local economic conditions," with the respective weight being the number of stores in each region. This weight — or the number of stores in a state — is usually costly to adjust, as it involves investments that are irreversible in the short run, i.e. opening new stores or closing existing stores. It also often takes a considerable amount of time to execute such investment decisions given the logistics involved. As a result, a firm's revenue may be closely related to regional economic condition fluctuations based on its current relative exposure to these changes.

Building on this idea, in this paper I construct a firm-level measure of regional income growth at the quarterly frequency, and name it *Firm Local Growth*. It is defined as a weighted average of state-level income growth for each firm and year, with the weights being the numbers of stores operated by the firm in each state. I then study how *Firm Local Growth* is correlated with firm performance in the contemporaneous quarter and stock returns in the subsequent quarter.

First, I establish that *Firm Local Growth* is strongly and positively correlated with firm's same-quarter sales growth and earnings per share (EPS) growth. Specifically, a 1 percentage point higher *Firm Local Growth* (which is similar to the standard deviation of 1.11 ppt) is associated with 0.5 to 0.8 percentage points higher quarterly sales growth and about 4.2 to 5.5 percentage points higher EPS growth contemporaneously.

Given that firms with higher *Firm Local Growth* tend to have higher sales and earnings growth in the same quarter, it is then natural to examine whether the better performance metrics translate into higher stock returns in the subsequent quarter, in which performance is made public through quarterly filings or press releases. Indeed, I find that a 1 percentage point higher *Firm Local Growth* is associated with 76-78 basis points higher monthly stock returns in the subsequent quarter. Results are more pronounced in industries that are more likely to rely on store traffic as opposed to e-commerce, such as restaurants and entertainment service firms. For these firms, a 1 percentage point higher *Firm Local Growth* is associated with 101 to 106 basis points higher monthly stock returns in the subsequent quarter.

A long-short portfolio that goes long with the top decile of *Firm Local Growth* and shorts the stocks with the bottom decile of *Firm Local Growth* can earn about 70 basis points monthly equal-weighted abnormal returns (t-stats range from 2.05 to 2.10), or 8.4% annually. The corresponding value-weighted portfolio can yield 130 basis points monthly abnormal returns (t-stats range from 2.93 to 3.03), or 15.6% annually.

The fact that the value-weighted portfolio returns are higher than the equal-weighted portfolio may be due to investors' limited capacity with analyzing more complicated firms, measured by the number of stores of a chain.[1] In particular, when looking at firms with over 1,000 store locations versus those with below 1,000 locations, same-quarter sales growth is not found to be impacted differently by *Firm Local Growth*, whereas monthly stock returns in the subsequent quarter are more sensitive to *Firm Local Growth* for firms with over 1,000 stores. This suggests that for firms with more locations, information contained in regional economic conditions may be incorporated in stock prices more slowly.

It is somewhat challenging to actually implement the trading strategy by exploiting differences in *Firm Local Growth* in each quarter, because quarterly state-level income growth

[1] For example, Nguyen (2017) and Cohen and Lou (2012) find the link between complexity of firms to predictable returns.

data is usually published by the Bureau of Economic Analysis(BEA) with a lag of at least one quarter. By combining a few additional data sources, I construct a timely updated series of quarterly state-level earnings growth in major private non-farm industries, and use it to predict quarterly income growth. Analogously to *Firm Local Growth*, I then construct *Predicted Firm Local Growth* using these predicted income growth numbers. The details of the method will be elaborated in Section 2. A similarly constructed long-short portfolio with the top and bottom deciles of *Predicted Firm Local Growth* yields about 64 to 71 basis points equal-weighted monthly abnormal returns in the subsequent quarter (t-stats range from 1.86 to 2.07), or 7.7% to 8.5% annually; the value-weighted portfolio yields about 84 to 87 basis points value-weighted monthly abnormal returns (t-stats range from 2.04 to 2.11), or 10.1% to 10.4% annually.

In examining the timing of these predictable returns, I find no evidence of either actual or predicted *Firm Local Growth* being a significant predictor of quarterly earnings surprise benchmarked to consensus analysts forecast, or significant cumulative abnormal returns around earnings announcement days. These results imply that firms may have channels to communicate quarterly performance other than quarterly filings. For example, many retailers voluntarily report sales in monthly press releases (Yang (2007)).

In the last part of this paper, I examine whether past regional income growth plays any role in firm's investment decisions in terms of expansion and contraction in different areas. To accommodate the fact that building new stores and closing existing stores require a considerable amount of time in their planning and execution, I use lagged 3-year state-level income growth as my proxy for past regional growth.

First, I find that past 3-year state-level income growth is not positively associated with future growth, i.e. state-level growth trends do not seem to be persistent over a multi-year horizon. Nonetheless, I find that firms tend to incur positive net investment in response to higher past growth trend in a state. This relationship is only pronounced in states where a firm has prior presence, as opposed to firms expanding into new regions.

Next, I employ a two-stage method and examine whether firms that are more likely to adjust their numbers of stores in a state in response to past growth in that state tend to perform better or worse in the future. I find that firms with investment decisions more responsive to past 3-year state-level income growth do not achieve higher subsequent 3-year sales growth.[2] However, firms with higher investment sensitivity to positive past growth tend to have small increases in profitability, measured as 3-year changes in EBITDA-to-asset ratio. The results provide some evidence that expanding into high-growth regions may lead to more efficient operation.

This paper is related to several strands of literature. First, it relates to the studies on the role of investor inattention and firm complexity in security pricing. For example, Nguyen (2017) documents the predictable link between foreign country-level indices returns and stock returns of US firms with foreign segments. Cohen and Lou (2012) show substantial return predictability from the set of easy-to-analyze firms to their more complicated peers. Hirshleifer et al. (2017) show that complexity involved in evaluating patent originality leads to predictable stock returns.

Second, this paper also contributes to the understanding of firm growth, investment and subsequent performance. Previous studies have established a negative relationship between firm expansion and subsequent stock returns. For example, Cooper et al. (2008) find that firm asset growth rates strongly and negatively predict stock returns with a lag. Titman et al. (2004) show a significant negative relationship between the relative level of corporate capital investment and subsequent stock returns, and conclude that the results are indicative of the tendency for corporate managers to engage in empire-building strategies. Different from the prior literature, this paper investigates firms' investment decisions following positive growth trends, which could suggest the positive role of richer information on individual store performance observed by managers. This also poses a contrast to the literature on manager over-reaction to recent events. For example, Greenwood and Hanson (2015) show that firms over-react to recent observations of ship prices in making investment decisions, and fail to account for the fluctuation of prices and competitors' responses. Chen (2017) demonstrates how managers over-react to recent changes in local economic conditions near

[2] Details with the construction of this measure are elaborated in Section 5.

firm headquarters, and adjust firm's capital investment accordingly. Admittedly, results found in this paper does not further disentangle the tendency of over-extrapolation and efficient use of richer insider information, but are presented as a *net* effect.

Lastly, this paper also adds to a recent literature on the relationship between local economic shocks and aggregate outcomes operating through firms' internal networks (e.g. Barrot and Sauvagnat (2016), Giroud and Mueller (2017), Bernile et al. (2012)). This literature considers the implications of local economic shocks for firm production, and does not associate with the stock returns of the firms studied.

The rest of the paper is organized as follows. Section 2 introduces the various data sources used in this paper, as well as the construction of *Firm Local Growth*. Section 3 examines the link between firm exposure to different regional income growth and the aggregate quarterly sales growth, retained earnings growth, as well as subsequent stock returns. Section 4 introduces a simple way to construct *Predicted Firm Shock* with timely published data sources ahead of time, and take advantage of the cross-sectional stock return implications. Section 5 examines the role of past regional income growth in firm's investment decisions in terms of expansion and construction, and its impact on firms future operational performance. Lastly, Section 6 concludes.

2 Data

2.1 Sample selection and store locations data

To investigate the relationship between regional economic growth and firm performance, it is essential that in-store sales must contribute to a significant portion of revenue for the firms under consideration. Simply selecting firms in the non-tradable sectors (NAICS 44-45 (retail) and 72 (restaurant and accommodation)) may include firms that fail to meet this criterion. For example, Amazon.com, Inc. and Barnes & Noble, Inc. both have primary NAICS code of 4512 (book stores), but since Amazon's sales transactions are primarily completed online, heterogeneous economic conditions across regions are unlikely to be an important driver in its performance. To obtain an appropriate sample for analysis, I manually collected a list of firms that are publicly traded chain stores.[3] The list includes restaurant chains (e.g. Cheesecake Factory, Inc.), apparel stores (e.g. Ralph Lauren, Inc.), department stores (e.g. Macy's, Inc.), drug stores (e.g. CVS Pharmacy), accessories stores (e.g. Coach, Inc.), specialty retails (e.g. Barnes & Noble, Inc.), home improvement stores (e.g. Home Depot, Inc.), hotels (e.g. Marriott International, Inc.), and entertainment companies (e.g. AMC Theaters).

I obtain store location data from Infogroup Historical Business Database, a database that records and updates all business locations in the United States from 1997 to 2016. Infogroup makes millions of phone calls to business establishments to verify the name and status of the businesses every year. Establishment-level identifier is linked to a parent firm identifier for firms operating as chains, and I rely on this link to connect store locations to their parent companies. The dataset consists of snapshots of business location information as of December of each year.[4] Infogroup further links parent company identifiers to stock ticker for many public companies. Combining this information with manual matching, I obtain a sample of 285 publicly traded firms and the annual location data on all of their stores between 1997 and 2016.[5] More details of the Infogroup data and the matching process can be found in Appendix A.

To have a better overview of the sample, I group the firms into three major categories. There are 196 unique retail companies, 72 restaurant chains, and 17 other companies (hospitality and entertainment). The evolution of the numbers of firms in these categories over the sample period is shown in Figure 1. Overall the numbers of restaurants and other firms did not change much over this sample period. There is a visible increase in the number of retail firms from 1997 to 2009, followed by a plateau from 2009 to 2012 and a slight decrease

[3]I referred to various online sources in the process, such as Investsnip.com, theBalance.com, MarketWatch.com and wikipedia.org.

[4]Therefore, the location information is not perfectly accurate. For example, if Infogroup verified a store in March 2001, and the store subsequently closed in June 2001, then the record would still be in the 2001 archive. However, I don't consider this as a major issue, as the number of stores is typically slow to adjust.

[5]Infogroup typically does not assign a stock ticker to a parent number if the firm had been delisted as of 2016. I manually complete the matching process by linking parent numbers and the corresponding stock tickers if the firms are on the pre-collected list. This process greatly alleviates the concerns of survivorship bias.

after 2013.

Panel A of Table 1 provides additional information on the sample. The mean and median number of states a public firm operates in throughout the sample period are 32 and 35, respectively, and the standard deviation is 16. In addition, the mean and median number of a firm's stores per state are 36 and 9, respectively, and the standard deviation is 91. This suggests that the distribution of the number of stores of a firm per state is very skewed, and there is not as much variation in the number of states in which firms operate.

2.2 Income growth data

Quarterly data on state-level income growth is obtained from the Bureau of Economic Analysis (BEA). Due to the lag in data publication by the BEA, in Section 4, I employ two additional data sources to obtain timely updated quarterly employment growth rates in each state to construct predicted income growth. The two data sources are Quarterly Census of Employment and Wages (QCEW) and Current Employment Statistics (CES), both published by the Bureau of Labor Statistics (BLS). Details on the method of prediction is explained in Section 4.

2.3 Financial data

I obtain firms balance sheet data from the Compustat-CRSP Merged Database, and monthly stock returns from CRSP (share code = 10 or 11). Monthly market returns, risk-free rates, and the size, value and momentum factors are retrieved from Kenneth French's website.[6] Earnings announcement days are obtained by combining report date information from Compustat with I\B\E\S data, following the method used in DellaVigna and Pollet (2009).

[6]http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

3 Firm Local Growth, Firm Performance and Subsequent Stock Returns

In this section, I investigate whether higher state-level income growth corresponds to higher sales and retained earnings growth for firms with higher fraction of stores in those states, and moreover, whether it leads to higher stock returns in the subsequent quarter. I begin with construction of a quarterly firm-level aggregate of regional income growth, which I name *Firm Local Growth*.

3.1 Construction of *Firm Local Growth*

For each firm in year y and quarter q, I first calculate its "weight" in each state s as the fraction of store counts in the state to the total number of stores in all states using Infogroup's data archive for year $y-1$. I then combine this with state level income growth data from BEA in quarter q of year y. The variable *Firm Local Growth* is then calculated as the weighted average of quarterly income growth in all states a firm operates. That is,

$$FirmLocalGrowth_{i,y,q} = \sum \frac{Stores_{i,s,y-1}}{Stores_{i,y-1}} * IncomeGrowth_{s,q,y}. \tag{1}$$

Over the sample period, the mean of *Firm Local Growth* is 1.05%, and the standard deviation is 1.11%. The mean of quarterly state income growth is 1.06%, and the standard deviation is 1.32% in this period. If we focus on within-year comparisons, variance of *Firm Local Growth* can be significantly lower. For example, the standard deviations of state-level income growth and *Firm Local Growth* in 2005 is 1.2% and 0.6%, respectively.

The time-series persistence in state-level income growth also implies persistence in *Firm Local Growth*. Table B.2 shows a strong positive autocorrelation between *Firm Local Growth* and its lagged value.

3.2 Quarterly sales and earnings growth

I first evaluate the contemporaneous relationship between *Firm Local Growth* and quarterly sales growth. For each firm i in year y quarter q, I estimate the following model,

$$SalesGrowth_{i,q,y} = \beta FirmLocalGrowth_{i,q,y} + \delta X_{i,y-1} + \theta_i + \gamma_y + \eta NationalGrowth_{q,y} + \epsilon_{i,q,y}, \quad (2)$$

where $SalesGrowth_{i,q,y}$ is the quarterly sales growth relative to the previous quarter. $X_{i,y-1}$ denotes various firm-level characteristics obtained from the firm's annual financial reports in the previous year. θ_i denotes firm fixed effects that capture persistent but unobservable firm characteristics. γ_y denotes year fixed effect, which are used to control for time-varying changes in overall economic conditions that may be a common factor driving firm performance. Lastly, $NationalGrowth_{q,y}$ denotes national income growth. To address concerns with time-series correlation in a firm's sales growth, lagged sales growth is included in all specifications.

Panel A of Table 2 shows that *Firm Local Growth* is significantly associated with quarterly sales growth, even after controlling for additional firm characteristics such as firm size and lagged profitability. Specifically, 1 ppt higher *Firm Local Growth* measure is associated with about 0.44-0.92 percentage points higher sales growth in the same quarter, or 12% to 25% higher compared to the mean of 3.7%. However, the magnitudes are small compared to the standard deviation of 22 percentage points.

Panel B of Table 2 presents the results of the regressions of quarterly earnings per share (EPS) growth on *Firm Local Growth*:

$$EPSGrowth_{i,q,y} = \beta FirmLocalGrowth_{i,q,y} + \delta X_{i,y-1} + \theta_i + \gamma_y + \eta NationalGrowth_{q,y} + \epsilon_{i,q,y} \quad (3)$$

for firm i in year y quarter q. Similarly, *Firm Local Growth* is a significant explanatory variable for quarterly EPS growth even after controlling for firm characteristics and firm or/and year fixed effects. Specifically, 1 ppt higher *Firm Local Growth* measure is associated with about 4.8 to 7.8 percentage points higher EPS growth in the same quarter. The relationship is less statistically significant once national growth is added as a control variable, suggesting that aggregate growth is an important driver to EPS growth.

Firms in retail, restaurant, hospitality and entertainment industries often have significant seasonal patterns in their revenues. For example, restaurants tend to gain higher revenues in warm months, while department stores tend to have greater sales during holiday seasons. In Table B.1 in Appendix B, I repeat the analysis above using same-quarter sales growth and retained earnings growth, i.e. sales and retained earnings growth are now calculated relative to the same quarter in the previous year. All results are qualitatively similar — the point estimates tend to be greater in magnitude and very statistically significant.

3.3 Firm Local Growth and monthly stock returns

Next, I try to relate *Firm Local Growth* to monthly excess stock returns in the subsequent quarter. Intuitively, since a higher *Firm Local Growth* in a quarter leads to higher revenue and earnings growth, one would expect positive price reactions in the quarter that follows, often during which the firm's performance is revealed to the market in the quarterly filing or press release.

Table 3 presents the results of firm-level monthly excess stock return regressions. The left-hand side variable is the unadjusted monthly firm-level stock returns minus the risk-free rates, and the right-hand side variables include log firm size, log book-to-market, leverage from the previous year, as well as lagged 1 month excess stock return and returns during the past year except for the most recent month. All specifications include month fixed effect, and standard errors are clustered by month.

We can see from Table 3 that a 1 ppt higher *Firm Local Growth* is associated with 76 to 78 basis points higher monthly excess returns, or about 10% annually. The coefficient is also statistically significant, with t-statistics between 2.6 and 2.7. These results also confirm that firms with relatively more presence in high-growth states tend to have better performance.

Since quarterly *Firm Local Growth* is strongly correlated with its lagged value, the unexpected component in *Firm Local Growth* may be more strongly associated with subsequent stock returns. While the model for forecasting *Firm Local Growth* may be different across firm and time, in this part I naively use the autocorrelation coefficient obtained in Column

2 of Table B.2 and construct innovations in *Firm Local Growth* as:

$$Innovation_{i,q} = FirmLocalGrowth_{i,q} - 0.164 * FirmLocalGrowth_{i,q-1}.$$

The innovations measure have a lower mean of 0.86% and a slightly lower standard deviation of 1.09%.

First of all, results from Table B.3 suggest similar magnitude of the relationship between quarterly sales and EPS growth and innovations in *Firm Local Growth*. Moreover, as shown in Table B.4, one standard deviation higher in the innovations is associated with slightly higher returns in the cross-section, and the relationship is more statistically significant. This provides evidence that the unexpected component in *Firm Local Growth* is more positively and strongly associated with stock returns in the subsequent quarter.[7] However, I do not attempt to construct investment portfolios based on the innovations, given that the forecast model here is estimated *ex post*.

3.4 The effect of firm local growth and firm complexity

Many prior studies have shown that firm complexity can lead to slow incorporation of information, due to investors' limited attention or capability to analyze complicated firms (e.g. Nguyen (2017), Cohen and Lou (2012)). In the context of store location distributions and regional economic growth, it is possible that firms with more locations tend to be more difficult to analyze in a timely fashion, leading to higher subsequent stock returns. I investigate this hypothesis in this subsection.

I define "complicated firms" as those having at least 1,000 locations as of the end of the previous year, and estimate the following model:

$$\begin{aligned} SalesGrowth_{i,q,y} = \beta_1 FirmShock_{i,q,y} + \beta_2 \mathbb{1}\{Stores \geq 1000\}_{i,y-1} \\ + \beta_3 FirmShock_{i,q,y} * \mathbb{1}\{Stores \geq 1000\}_{i,y-1} + \gamma X_{i,y-1} + \theta_i + \eta_y + \epsilon_{i,q,y}. \end{aligned}$$

[7] Using more lags do not have significant impact on the results.

The main coefficient of interest is β_3, and Table 4 presents the results. We can see from Panel A that, although being a more complicated firm is associated with lower quarterly sales growth on average, it does not imply any differential impact of *Firm Local Growth* — the coefficient on the interaction term is not statistically or economically significant in all specifications.

Panel B of Table 4 presents the results from a similar regression model as above, but replace the left-hand side variable with subsequent quarter monthly excess stock returns, and include month fixed effects. We can see that being a more complicated firm is still associated with lower monthly excess stock returns on average, but at the same time, the effect of *Firm Local Growth* is larger — a 1 ppt higher *Firm Local Growth* is associated with 50 to 54 basis points higher monthly returns for the more complicated firms. The differential effect is also statistically significant, with t-statistics being between 2.2 and 2.3. Take Column 4 as an example, the combined coefficient on *Firm Local Growth* is 1.27 (t-stat = 2.97) for firms with at least 1,000 locations.[8] These results suggest that it is more difficult to take regional economic growth into account when evaluating its impact on a firm's performance if the firm has too many store locations.

3.5 Discussion of measurement issues

In this section, I briefly discuss some finer points regarding the construction of *Firm Local Growth* — the measure of firm-level aggregate of regional income growth, as well as its relationship with firm performance.

Alternative weighting. The *Firm Local Growth* variable used in this paper gives equal weight to each store location. However, one would expect that exposure to regional economic conditions is proportional to store size. Due to data limitations, a size-weighted firm-level aggregate of regional growth cannot be calculated correctly.[9] With richer data on store sizes of each firm, a more accurate proxy could be attained.

Franchised locations. Many firms in the sample studied have franchised locations, espe-

[8] Using other cutoffs, such as the mean and the 75th percentile yields similar results.

[9] See Appendix A1 for more details.

cially in casual restaurant and hospitality industries. By randomly reviewing some of these firms' 10-K filings, I find that all of the franchise rules involve different degrees of profit sharing. The details of a contract, such as initial franchising cost and percentage of profit sharing, is likely to differ across firms. Since franchised stores only contribute partial revenue, including all these locations in the analysis introduces a bias in the variable *Firm Local Growth*. However, this bias can be viewed as of similar importance as the one resulted from the lack of store size information.

The impact of e-commerce. The popularity of e-commerce in the 21st century has revolutionized the retail industry. With more consumers choosing to shop online, physical stores become less important. Admittedly, this fact would likely weaken the relationship between *Firm Local Growth* and a firm's revenue growth and stock prices. This concern would be alleviated if consumers from different states do not systematically differ in their propensity to consume in physical stores. In recent years, some firms start to provide services that allow customers to buy online and pick up in store. For this type of online transactions, the presence of physical stores in a local area is still essential. Moreover, operating physical stores is a result of profit-maximizing problem within firms. The dynamic adjustment made by firms may also imply that the physical stores have certain importance, either by direct sales, service offering, or as an advertisement.

To further disentangle the possible effect of e-commerce, in Table B.5 separately estimate the relationship between *Firm Local Growth* and monthly stock returns in the subsequent quarter. Specifically, Column 1-3 include all retail firms that are more likely to have customers substitute shopping in physical stores with online shopping, whereas Column 4-6 include restaurants, hotels, entertainment, as well as auto dealer and service firms. The results indeed indicate that *Firm Local Growth* is associated with slightly higher stock returns for firms with less exposure to e-commerce.

Taken together, the link between firm-level aggregate of regional economic conditions and firm performance studied in this paper can be imperfect due to measurement issues. Nonetheless, the results in this section suggest that heterogeneity in firms' location distribution, combined with local economic condition data, could be an important factor of firm performance and a good predictor of stock returns in the short run.

4 Predicted Firm Local Growth and Cross-Sectional Stock Returns

As explained in the previous section, calculating *Firm Local Growth* relies on quarterly data on state-level economic growth. However, there is typically a lag of about 3 months from the end of a quarter to the official data publication by the BEA. Hence, timely updated regional economic data is essential in constructing a portfolio based on the lead-lag relationship between *Firm Local Growth* and stock returns.

In this section, I present a simple method of predicting state-level income growth from wage and salary growth in major private non-farm sectors, and show that a firm-level aggregate of predicted state income growth — *Predicted Firm Local Growth* — does a fairly good job in predicting cross-sectional stock returns.

First, it is important to note that even without a comprehensive database like Infogroup, store location information is often directly communicated with customers and investors, and is relatively easy to access. Some companies tabulate the number of stores by state in their annual filings. For example, Macy's Inc. posts both store list and regional maps online (Figure 2). Moreover, for firms that do not have such detailed disclosure in their annual reports, it is in general easy to obtain store locations by using store locators often directly provided by the firms, or third-party tools such as Google Maps.

4.1 Predicting the firm local growth measure

BEA's income data aggregates several sources of personal income. According to the past BEA news release archives, the major income categories are non-farm wage and salary earnings, farm income, government transfer receipt, and property income. Unfortunately, data for all of these categories is published with a significant lag since a quarter ends.[10] Therefore,

[10] State-level farm income and government transfer receipt data is only published at annual frequency with a time lag of about a year.

trying to forecast state-level income growth with public data is somewhat challenging.

Here, I combine two data sources to obtain timely updated quarterly wage and salary earnings growth rates in each state, and propose a simple way to predict state-level income growth before the data is officially published. Non-farm wage and salary earnings make up the largest component of income. Specificially, it accounts for 50.8% of all income in 2016 (BEA (2017)). Therefore, wage and salary earnings growth may explain much variation in income growth.

First, the Quarterly Census of Employment and Wages (QCEW) published by the Bureau of Labor Statistics (BLS) since 1990 tabulates the number of people employed and their aggregate wage in different industries in every state, and the detailed data is published within two quarters after a quarter ends. Taking this delay into account, for each state s and quarter q, I obtain the composition of total wage and salary earnings in different industries from QCEW data for state s and quarter $q-3$, and I denote the fraction of wage in industry j, state s and quarter q as $w_{j,s,q-3}$.

Second, I obtain monthly updated employment data for various private non-farm industries from the Current Employment Statistics (CES). CES publishes employment data by industry within two days after a month ends. I can then construct a timely updated series of quarterly employment growth for the different industries as $g_{j,q}$. The total quarterly wage and salary growth for each state is then calculated as a weighted average of industry-level employment growth, with the weights being the total wage and salary of these industries in a state as of three quarters ago:

$$WageGr_{s,q} = \sum w_{j,s,q-3} * g_{j,q}. \tag{4}$$

The correlation coefficient between $WageGr_{s,q}$ and $IncGr_{s,q}$ is 0.37 from 1990 to 2016, and is 0.42 from 1998 to 2016. Figure 3 plots this relationship from 1990 to 2016.[11] To use state-level wage and salary growth for forecasting income growth, I run the following rolling

[11] Note that the wage growth measure constructed here only captures the growth from job creation. Unfortunately, quarterly state-level data on wage increase for same jobs is not available to complete this calculation.

regressions in an 8-year window ($y-8$ to $y-1$):

$$IncGr_{s,q} = \alpha + \beta WageGr_{s,q} + \epsilon_{s,q}, \tag{5}$$

and predict quarterly income growth $\widehat{IncGr}_{s,q}$ for state s in year y. The variable $WageGr_{s,q}$ is one-quarter wage and salary earnings growth in state s. The out-of-sample mean squared error from this prediction is 1.40, and the correlation between the actual and the predicted growth rates is 0.43. Figure 4 plots the relationship between the actual versus the predicted state-level income growth rates. Specifically, the black (or darker) line represents a linear fit between the predicted and the actual values, and the green (or lighter) line is the 45 degree line. The two lines almost overlap each other. We can see that the predicted values are more centered around the mean as expected, and this prediction performs worse for more extreme actual income growth values. One possibility is that the more extreme values are results of other idiosyncratic regional economic shocks such as farm income or property income that are not captured by wage and salary earnings growth.

4.2 Predicted Firm Local Growth and stock returns

I test whether a zero portfolio based on the spreads of firm exposure to predicted regional income growth produces positive risk-adjusted alphas, and how it performs relative to a portfolio formed by sorting on actual *Firm Local Growth*. Specifically, for each quarter, I sort firms into deciles based on the actual and predicted *Firm Local Growth* in the previous quarter, and form a portfolio by holding stocks in the top decile while selling short stocks in the bottom decile. Table 5 presents raw and risk adjusted returns of both the equal-weighted and value-weighted portfolios.

We can see that using the predicted measure, the zero-investment portfolio produces monthly risk-adjusted equal-weighted returns of 64 to 71 basis points (with t-statistics between 1.87 and 2.10), or 7.7% to 8.5% annually. The value-weighted portfolio yields monthly risk-adjusted returns of 84 to 87 basis points (with t-statistics between 2.04 and 2.12), or about 10% annually. Benchmarked against the market portfolio and adjust for the relative risk to that of the market portfolio, the Modigliani risk-adjusted performance (Modigliani (1997)) is 80 and 90 basis points per month for the equal-weighted and value-weighted portfolios using *Predicted Firm Local Growth*, respectively, which are 22-32 basis points higher than the market returns in this period.

The results are not as strong as forming portfolio with sorting on actual *Firm Local Growth*, but it provides evidence that the market has not fully incorporated the differential impact of regional economic conditions on firms given their relative exposure to these conditions, i.e. the relative number of stores firms operate in these regions. The prediction accuracy may be significantly improved by employing more advanced prediction methods and richer data. However, the goal here is to demonstrate that firms' spatial distribution of stores combined with local economic data can provide a profitable trading strategy, even with a very simple prediction method.

It is worth noting that whether we sort on actual or predicted *Firm Local Growth*, the value-weighted portfolio always leads to higher abnormal returns. As we have seen in the Subsection 3.4, firms with more locations tend to be more difficult to analyze, leading to higher impact of *Firm Local Growth* on their stock returns. Since the number of locations is positively correlated with firm size (correlation coefficient = 0.57), *Firm Local Growth* also tends to have a greater impact on larger firms. As a result, for stocks in the top and bottom deciles of *Firm Local Growth*, the spread of returns is greater for larger firms, leading to higher value-weighted portfolio returns.

The idea of using geo-location data in equity pricing is not new. Technology advances have enabled both the collection and the analysis of large and complicated data. For example, finance practitioners may use satellite images of various stores' parking lots to estimate the foot traffic of each location every day. Some data providers, such as Placed, Inc. and StreetLight Data, Inc., track consumer locations via their smartphones to measure foot traffic at a business location. These higher-frequency data can be very useful in measuring store-level performance, and hence firm-level aggregate performance. Combining more precise measures of consumer behaviors with local economic conditions may further improve the return predictions.

4.3 Predicted Firm Local Growth and earnings surprise

We have seen that the predicted measure of firm exposure to state-level income growth positively predicts stock returns in the cross-section. However, so far it is unclear how the positive information is communicated. In this subsection, I investigate the relationship between earnings surprises and both actual and predicted *Firm Local Growth*, and whether the higher stock returns associated with higher *Firm Local Growth* is concentrated around earnings announcement days.

I use two measures of unexpected earnings news. The first one is an accounting measure — quarterly Standardized Unexpected Earnings (SUE), which is defined as

$$SUE_{i,q} = \frac{EPS_{i,q} - EPS_{i,q-4}}{ClosingPrice_{i,q-4}} \tag{6}$$

for firm i in quarter q. The second measure is based on deviations of actual EPS from analyst consensus estimates. Specifically, *Earnings Surprise* is defined as

$$EarningsSurprise_{i,q} = \frac{EPS_{i,q} - MedianForecast_{i,q}}{StockPrice_i} \tag{7}$$

where $StockPrice_i$ is the closing stock price five days prior to the earnings announcement (therefore a non-negative scale factor). For both measure, earnings announcement days are determined by combining Compustat and IBES data. If an earnings announcement is recorded in both data sets but the two records are inconsistent, then it is excluded from the analysis. The specific rules are detailed in DellaVigna and Pollet (2009).

I then estimate the relationship between *Firm Local Growth* and the same-quarter SUE and earnings surprise, which usually becomes public information in the quarter that follows. Panel A and B in Table 6 presents the results for actual and predicted *Firm Local Growth*, respectively. We can see that higher *Firm Local Growth* is associated with higher quarterly SUE, and the relationship is statistically significant but economically small in magnitude.

On average, a one ppt increase in *Firm Local Growth* is associated with 8 to 9 basis points higher SUE, which is not very economically significant compared to the standard deviation of SUE of 1.82%. In addition, a one ppt increase in *Predicted Firm Local Growth* is associated with 30 to 32 basis points higher SUE and the relationship is also statistically significant but economically small.

On the other hand, neither actual or predicted *Firm Local Growth* seems to predict earnings surprise benchmarked to analyst forecast. In fact, the sign of the point estimates is negative for Column 3 and 4 in both panels. Moreover, the relationship between *Firm Local Growth* and the 3-day CAR around earnings days is also noisy and negative.

These results show that both actual and predicted *Firm Local Growth* are positively associated with same-quarter SUE, which is an accounting-based measure. This can be interpreted as higher *Firm Local Growth* having a positive impact on EPS growth. However, the noisy and negative relationships between both actual and predicted *Firm Local Growth* and earnings surprises benchmarked to analyst forecast and the 3-day CAR around announcement days mean that the positive earnings news has likely been communicated to investors prior to the actual earnings announcements. For example, some retailers and restaurant chains voluntarily report their aggregate and same-store sales growth in monthly press releases (Yang (2007)), hence some revenue information may be disclosed before the quarterly filings.

5 Past Regional Growth and Firm Investment

The results in Section 3 suggest that firm exposure to higher state-level economic growth is positively associated with firm performance, both in terms of aggregate sales and earnings growth and subsequent stock returns. Therefore, it is possible that regional economic growth plays a role in corporate investment decisions. In this section, I investigate whether past state-level income growth has an impact on firms expansion and contraction decisions, and moreover, the implications on their future performance.

Factors that drive retail chain dynamics in terms of expansion and contraction are often complicated in nature given firms' different target consumers and competition with rivals. Past studies have attempted to address some of these forces. For example, the industrial organization literature often analyzes a small number of firms which offer similar products and services, and study the firms' strategic decisions to enter or exit a local market, taking competitor strategies into account (e.g. Blevins et al. (2015), Zheng (2016)).

Local demographics and general corporate strategies can also be important determinants in retail firms expansion and contraction. For example, a news article (Nassauer (2018)) published in the Wall Street Journal reports that Sam's Club, a large warehouse retailer chain, plans to transform its business and "to target a single demographic: families with children and annual incomes between $75,000 and $125,000." Therefore, while acknowledging the complexity behind these firms expansion and contraction decisions, in this section I only attempt to study whether past regional growth is, if at all, a potential common factor that drives such decisions.

I proxy for expansion and contraction using changes in the number of stores in each state. Building a new store or closing an existing store usually takes a long time due to the logistics involved. For example, building new stores often requires purchase or rental of properties, construction, and hiring, while closing existing stores often involves a long liquidation process. Therefore, throughout this section, I use past three-year state-level income growth to study the relationship between corporate investment and past regional economic conditions.

5.1 Persistence of state-level income growth

It is important to first examine whether state-level income growth is persistent over multi-year horizons. If it is indeed persistent, then a investment strategy following past income growth trend is sensible. Specifically, I examine the correlation between a state's past 3-year income growth and its future 1, 3, and 5-year income growth from 1998 to 2016.

The results are presented in Table 7. Column 1 suggests that past 3-year state-level income growth is positively associated with future 1-year income growth. The relationship is statistically significant, but economically negligible – a one standard deviation (or 6.76) increase in past 3-year income growth is associated with about 0.27 percentage points higher subsequent 1-year income growth, which is economically insignificant compared with the mean 1-year income growth of 4.42. Column 3 and 5 present the relationship between past 3-year income growth and subsequent 3 and 5-year income growth. We can see that it's neither economically nor statistically significant.

Column 2, 4, and 6 focus on within state variations. The results suggest that within state, there is a small and negative relationship between past 3-year income growth and future income growth. A one standard deviation (6.76) increase in past 3-year income growth is associated with about -0.35, -1.89, and -2.43 percentage points lower 1-, 3-, and 5-year future income growth. While the magnitudes are not particularly large compared to the average of 4.42, 13.83, and 23.64 percentage points, the results suggest a statistically significant mean reversion relationship in state-level income growth over a longer horizon.

These results imply that state-level income growth is not, or even negatively, related to future growth over a multi-year horizon, and suggest that it might not be sensible to extrapolate future regional economic conditions simply based on past growth trend. In addition, some shocks to income growth could be completely unexpected. For example, Gilje (2018) documents unexpected income windfall from shale discoveries, while Pierce and Schott (2017) document negative regional income shocks associated with Chinese import penetration.

5.2 Past 3-year state-level income growth and firm investment

Given the weak or negative autocorrelation in state-level income growth over multi-year horizons, I examine whether a firm's investment — in terms of changes in the number of stores in a state — is related to the state's past income growth trend. As mentioned above, I use past 3-year state income growth as my measure of regional income growth to accommodate the fact that it may take more than one year for a planned store to be built up or for complete liquidation of an existing store. I then estimate the following:

$$\Delta Store_{isy} = \alpha + \beta Lagged3YearIncomeGrowth_{sy} + X_{i,y-1} + \epsilon_{isy}.$$

That is, I study the relationship between the 3-year state-level income growth from year $y-4$ to $y-1$ and changes in the number of stores from year $y-1$ to year y. Control variables includes firm size and Tobin's Q, both calculated from the fiscal-year end data as of the previous year.

The model above is estimated on three subsamples. The first subsample includes only new entries to a state. That is, it only considers changes in the number of stores in a state where the firm did not have presence before. By definition, $\Delta Store$ is positive in this case. The second subsample includes all changes in the number of stores that are not new entries, i.e. where firms had previous presence. The third subsample takes the second one and further conditions on firms having non-zero changes in the number of stores. Details regarding the calculation of the changes in the number of stores can be found in Appendix A4.

Panel A of Table 8 presents the results. Column 1 and 2 show that new entry to a state is not associated with the state's past income growth trend. On the other hand, Column 3 to 6 suggest that past state-level income growth is positively associated with changes in the number of stores in that state, and the relationship is statistically significant (t-stats are between 3.9 and 4.5). Specifically, a one standard deviation higher lagged 3-year income growth is associated with about 0.2 new stores in the state during the next year, or about 17% compared to the mean of 1.2. If we further restrict to the non-zero changes, then the number becomes about 0.45.

Overall, the results suggest that past state-level growth trend encourages investment, but only if the firm has previous exposure in that state. In other words, "experiencing" the past growth trend is more important than "observing."

Since income growth can be approximately decomposed into population growth and income per capita growth, I then examine whether firms respond differently to the two components. Panel B of Table 8 presents the results. Column 1 and 2 again suggest that neither component is significantly associated with firm's entry decision into a state. On the other hand, both components are positively associated with changes in the number of stores for states where a firm has previous presence. Use estimates from Column 4 as an example to compare the relative magnitudes, a one standard deviation (2.34) increase in past 3-year population growth is associated with 0.25 more stores in a state, while a one standard deviation (5.85) increase in past 3-year growth of income per capita is associated with 0.12 more stores.

Panel C of Table 8 presents results of another decomposition — by whether past income growth is positive or negative. This would allow me to separately study firm's likelihood to expand in response to positive growth, or to disinvest after seeing negative growth. The results in Column 1-4 very similar to Panel A, due to the relatively few occurrence of negative 3-year state income growth. Column 5 and 6 only yield noisy estimates for the relationship between past negative income growth and changes in the number of stores. However, the point estimates are very large — a 1 ppt lower 3-year state-level income growth is associated with about 0.8 fewer stores. These are likely to be concentrated liquidation during significant economic down times.

5.3 Firm investment sensitivity and future operational performance

So far in this section, we have seen that past state-level income growth does not positively predict future growth over multi-year horizons. Nonetheless, firms with stores in a state that experienced higher growth in the past tend to add more stores in that state. This points to a question of whether managers over-extrapolate past regional growth trend in forming investment strategies, and how it impacts firms' future sales and profitability.

To examine the relationship between the tendency to expand or contract in response to past growth trend and a firm's future performance, I first construct a measure — *Firm Expansion Sensitivity* — from past correlations between *positive* state-level income growth and changes in the number of stores in the state for each firm. I then use this as a proxy for manager's trend-chasing behavior following positive experience in local growth, and evaluate how firm's future performance is related to it. While a firm's tendency to disinvest following negative local growth is also an important factor for its future performance, a similar measure for negative state income growth could not be reliably constructed due to the few observations.

Formally, I run the following regression for positive past 3-year income growth separately for each firm i on 2- to 5-year rolling windows:

$$\Delta Store_{iys} = \alpha_{iy} + \beta_{iy} Lagged3YearIncomeGrowth_{ys} + \epsilon_{iys}. \quad (8)$$

I keep the coefficients β_{iy} as the measure of *Firm Expansion Sensitivity* for each firm i in year y. To exclude noisy estimates, I replace the coefficients β_{iy} to zero if it is not statistically significant (p-value > 0.1).

Panel A of Table 9 shows that higher firm investment sensitivity to past state-level income growth is associated with lower future sales growth, but only statistically significantly so when the sensitivity measure is calculated from the 2-year rolling regressions. The control variables in Panel A include current annual sales growth, as well as other firm characteristics(firm size, market-to-book ratio, leverage, and profitability, all in year $y-1$). In particular, the current sales growth variable proxies for the stage of firm growth. The point estimate in Column 1 suggests that controlling for firm's position in its growth stage and other firm characteristics, a one standard deviation (about 0.11) higher *Firm Expansion Sensitivity* leads to 2 percentage points lower future 3-year sales growth in the cross-section, or about 9% lower compared to the average. The results are consistent with the fact that since state income growth predicts no or slightly lower future growth, and firms expanding following positive past growth do not obtain higher future sales growth.

Although firms with higher expansion sensitivity to past growth do not obtain higher sales growth, the relatively small correlation between past and future growth over a long horizon suggests the possibility of firms becoming more profitable. The reason is that places experienced faster growth in the past are now likely to have a higher *level* of income. If cost of expansion in these high-growth states, e.g. wage and property rents, do not adjust quickly, then it is possible that firms with high expansion sensitivity can become more profitable by correctly identifying such places.

To test this, I run similar regressions as Panel A of Table 9, but replace the outcome to changes in future 3-year profitability, measured as differences in EBITDA-to-asset ratio.

The results are shown in Panel B. For measures of expansion sensitivity calculated from 2- to 4-year rolling regressions, a one standard deviation higher *Firm Expansion Sensitivity* is associated with about 0.35 to 0.42 percentage point higher profitability in the cross-section. The effects are economically small compared with the standard deviation of 3-year profitability change of 9% in this period, but are statistically significant. With sensitivity calculated with 5-year rolling regressions (Column 4), the effect becomes noisy, but the point estimate remains positive.

These results provide some evidence that firms that tend to expand in response to positive past regional growth trend may obtain disappointing sales growth in the future, given the low persistence in state-level income growth. However, such behavior also suggests that managers may take advantage of richer information in local store growth trends, and invest in places with higher income levels, leading to an increase in profitability.

In Appendix B, I separately examine the relationship between firm expansion sensitivity for positive and negative values of sensitivity. In order to keep a large enough sample, I keep all sensitivity measured from Equation 8, including all coefficients that are not statistically significant. Table B.6 and B.7 present results for future sales growth and profitability change, respectively. While the results are very noisy, they suggest that when firms expand following positive growth, their sales do not grow faster in the future, but profitability may be higher. In contrast, when firms tend to disinvest following positive past growth, their future sales growth can be a little higher, but their profitability changes are more negative. The results further suggest that firms expanding following higher past growth may achieve more efficient operation, and that managers may have under-weighted regional economic conditions in investment decisions.

6 Conclusion

In this paper, I investigate the heterogeneous impact of regional economic growth on firms, given their different distributions of locations in these regions. I construct a firm-level aggregate of quarterly state-level income growth, *Firm Local Growth*, and show that it is strongly and positively associated with sales and EPS growth in the same quarter, as well as monthly excess stock returns in the subsequent quarter. Moreover, the impact on stock returns appear to be higher for firms as large chains, suggesting that the complexity involved in analyzing larger chains may result in slower information incorporation in stock prices.

I then combine quarterly wage and timely updated employment data to obtain predictions of state-level income growth, and analogously predicted firm-level aggregate of such predicted regional growth. A long-short strategy with the top and bottom deciles of the *Predicted Firm Local Growth* yields predictable abnormal returns.

Lastly, I examine the relationship between past 3-year state-level income growth and firms' expansion and contraction in those states. I find that, although past state-level income growth does not associate with future income growth positively over multi-year horizons, firms have a tendency to incur positive net investment in response to higher past growth trend. Moreover, firms that exhibit higher tendency to do so experience lower future sales growth but higher profitability, suggesting that managers may achieve more efficient operations by expanding in high-growth regions.

7 Bibliography

Barrot, J.-N. and J. Sauvagnat (2016): "Input Specificity and the Propagation of Idiosyncratic Shocks in Production Networks," *Quarterly Journal of Economics*, 131.

BEA (2017): *State Personal Income and Employment: Concepts, Data Sources, and Statistical Methods*, The Bureau of Economic Analysis.

Bernile, G., S. Delikouras, G. M. Korniotis, and A. Kumar (2012): "Geography of Firms and Propagation of Local Economic Shocks," .

Blevins, J. R., A. Khwaja, and N. Yang. (2015): "Firm Expansion, Size Spillovers and Market Dominance in Retail Chain Dynamics," *Management Science*, Forthcoming.

Carhart, M. M. (1997): "On Persistence in Mutual Fund Performance," *Journal of Finance*, 52, 57–82.

Chen, B. (2017): "Seeing is Believing: The Impact of Local Economic Conditions on Firm Expectations, Employment and Investment," .

Cohen, L. and D. Lou (2012): "Complicated Firms," *Journal of Financial Economics*, 104.

Cooper, M. J., H. Gulen, and M. J. Schill (2008): "Asset Growth and the Cross-Section of Stock Returns," *Journal of Finance*, LXIII, 1609–1651.

DellaVigna, S. and J. Pollet (2009): "Investor Inattention and Friday Earnings Announcements," *Journal of Finance*, 64, 709–749.

Fama, E. and K. R. French (1993): "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics*, 33, 3–56.

Gilje, E. P. (2018): "Does Local Access To Finance Matter? Evidence from U.S. Oil and Natural Gas Shale Booms," .

Giroud, X. and H. M. Mueller (2017): "Firms' Internal Networks and Local Economic Shocks," .

Greenwood, R. and S. G. Hanson (2015): "Waves in Ship Prices and Investment," *Quarterly Journal of Economics*, 130, 55–109.

Hirshleifer, D., P.-H. Hsu, and D. Li (2017): "Innovative Originality, Profitability, and Stock Returns," *Review of Financial Studies*, Forthcoming.

Modigliani, F. (1997): "Risk-Adjusted Performance," *Journal of Portfolio Management*, Winter, 45–54.

Nassauer, S. (2018): "By Shrinking, Can Sam's Club Keep Up With Costco?" Wall Street Journal, January 28, 2018.

Nguyen, Q. H. (2017): "Does Investor Attention Stop at the Water's Edge? The Predictability of Multinational Firms' Returns," .

Pierce, J. R. and P. K. Schott (2017): "Trade Liberalization and Mortality: Evidence from U.S. Counties," .

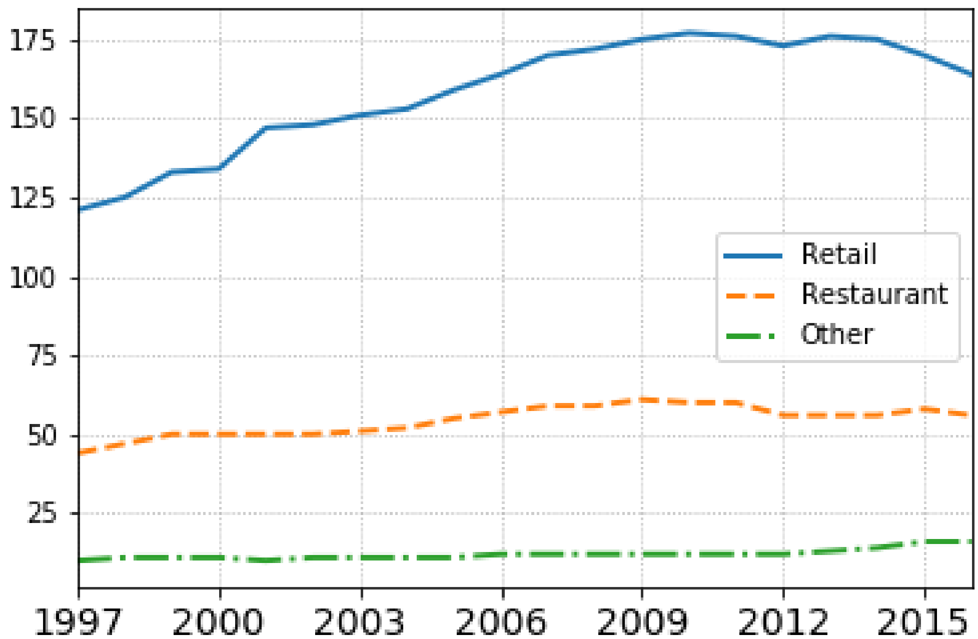
Titman, S., J. Wei, and F. Xie (2004): "Capital investments and stock returns," *Journal of Financial and Quantitative Analysis*, 677–700.

Yang, H. (2007): "Do Industry-Specific Performance Measures Predict Returns? The Case of Same-Store Sales," .

Zheng, F. (2016): "Spatial Competition and Preemptive Entry in the Discount Retail Industry," .

Figures and Tables

Figure 1: Number of Firms by Category (1997-2016)



Notes: Figure 1 plots the total number of unique firms by category from 1997 to 2016. Category "Retail" includes a wide range of retailers such as grocery, department store, brandname apparel and accessories retailers, home improvement, etc. Category "Restaurant" includes fast food chains as well as full-service restaurant brandnames. Category "Other" includes firms in hospitality and entertainment industries.

Figure 2: Part of Store Lists and Regional Maps of Macy's Inc.

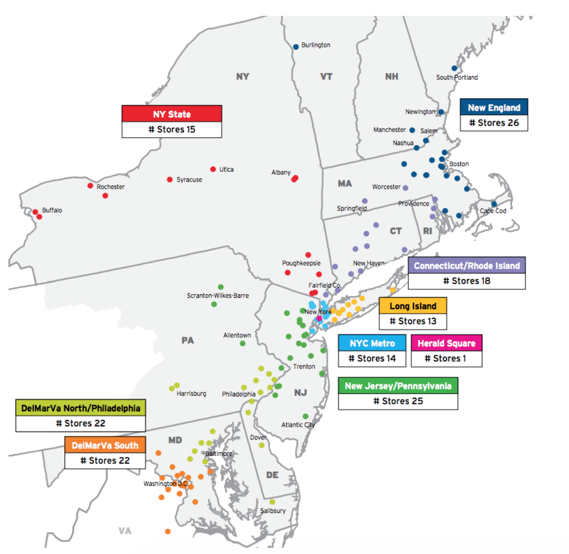
Macy's Store Locations*

METROPOLITAN AREA	MALL/ LOCATION	CITY	YEAR OPENED	GROSS SQ. FT (in 000s)
Alabama				
SOUTH REGION				
Birmingham	Brookwood Village	Birmingham	1974	244
Birmingham	Riverchase Galleria	Hoover	1986	226
Arizona				
SOUTHWEST REGION				
Phoenix	Arrowhead Towne Center	Glendale	1993	200
Phoenix	Biltmore Fashion Park	Phoenix	1968	213
Phoenix	Chandler Fashion Center	Chandler	2001	201
Phoenix	Paradise Valley Mall	Phoenix	1980	153
Phoenix	San Tan Village	Gilbert	2009	122
Phoenix	Scottsdale Fashion Square	Scottsdale	2002	251
Phoenix	Superstition Springs Center	Mesa	1994	155
Tucson	Park Place	Tucson	1974	153
Tucson	Tucson Mall	Tucson	1991	147
California				
NORTHWEST				
Fairfield	Solano	Fairfield	1985	160
Fresno	Fashion Fair	Fresno	1983	182
Fresno	Fashion Fair K/M	Fresno	1970	76
Fresno	Fresno Furniture	Fresno	2000	73
San Francisco-Oakland	Hillsdale Shopping Center	San Mateo	1954	252
San Francisco-Oakland	Hilltop	Richmond	1976	201
San Francisco-Oakland	Mall at Northgate	San Rafael	1964	266
San Francisco-Oakland	NewPark Mall	Newark	1980	196
San Francisco-Oakland	Novato Furniture	Novato	1992	50
San Francisco-Oakland	Pleasanton Furniture	Pleasanton	1994	48
San Francisco-Oakland	Serramonte	Daly City	1968	233
San Francisco-Oakland	Southland Mall	Hayward	1983	179
San Francisco-Oakland	Stoneridge Shopping Center	Pleasanton	1980	197
San Francisco-Oakland	Stoneridge Shopping Center F/H/K/M	Pleasanton	1980	174
San Francisco-Oakland	Stonestown Galleria	San Francisco	1952	280
San Francisco-Oakland	Sunvalley Shopping Center	Concord	1967	206
San Francisco-Oakland	Sunvalley Shopping Center H/M	Concord	1981	183
San Francisco-Oakland	Union City Furniture Clearance	Union City	1997	63
San Francisco-Oakland	Union Square	San Francisco	1866	934
San Francisco-Oakland	Union Square H/M	San Francisco	1866	248
San Francisco-Oakland	Village at Corte Madera	Corte Madera	1985	117
San José	Eastridge	San José	1971	187
San José	Oakridge	San José	1978	236
San José	Stanford Shopping Center	Palo Alto	1961	223
San José	Stanford Shopping Center M	Palo Alto	1961	96
San José	Sunnyvale Town Center	Sunnyvale	1979	178
San José	Valley Fair	Santa Clara	1956	396

(A) An example of store list by location (2017)

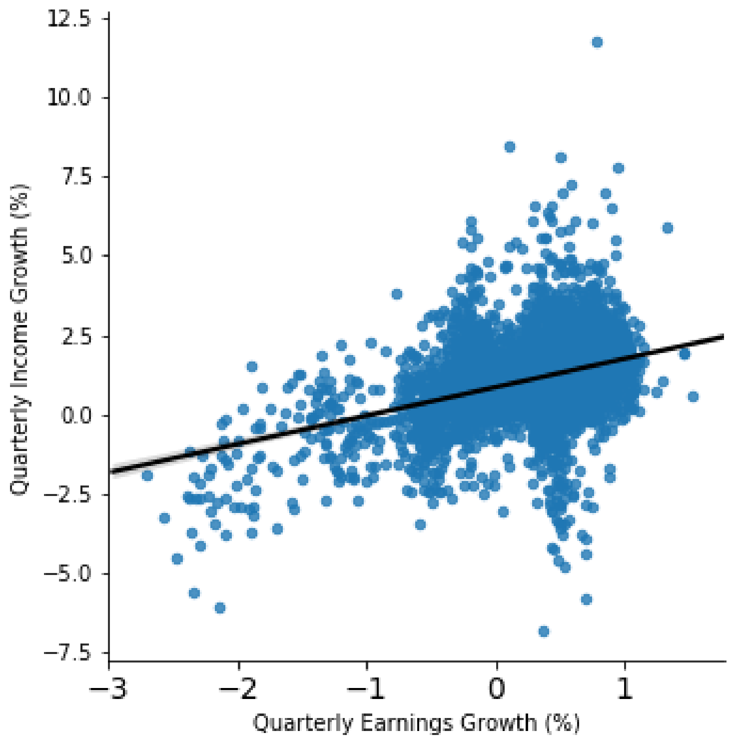
Macy's Northeast Region

 # Districts: 9 | # Stores: 156



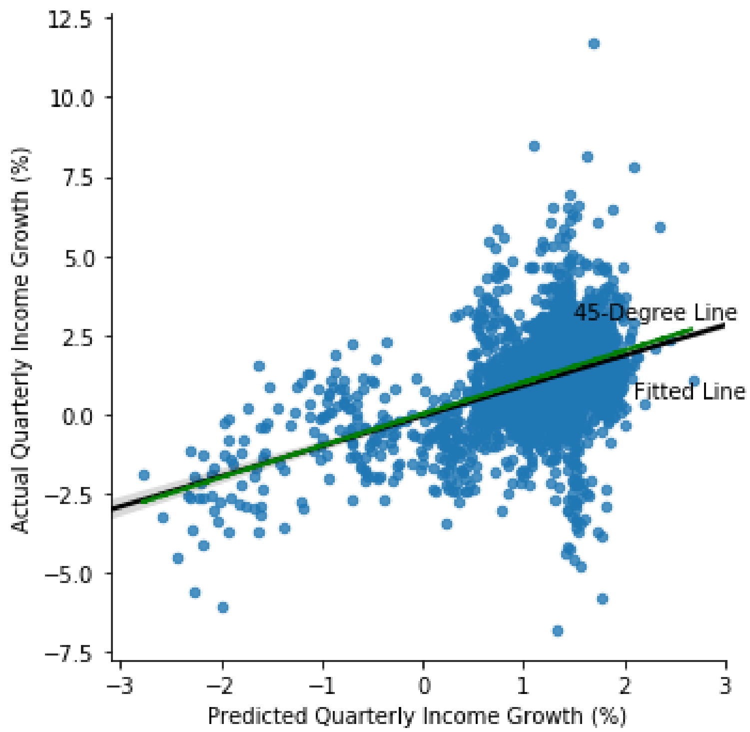
(B) Maps of store locations in the Northeast Region (2017)

Figure 3: Quarterly State-Level Income Growth and Estimated Wage and Salary Earnings Growth



Notes: Figure 3 plots the relationship between quarterly state-level income growth and the estimated wage and salary earnings growth from 1990 to 2016. Wage and salary earnings growth rates are calculated by combining state-level wage earnings by industry as of three quarters ago from QCEW and national employment growth rates by industry in the current quarter from CES. The figure shows both the raw scatter plot as well as the linear fit.

Figure 4: Quarterly State-Level Income Growth and Estimated Wage and Salary Earnings Growth



Notes: Figure 4 plots the relationship between the predicted and the actual quarterly state-level income growth from 1998 to 2016. In each year, predicted quarterly income growth rates are obtained from eight-year rolling linear regressions of actual quarterly income growth on wage and salary earnings growth from the previous eight years. The figure shows both the raw scatter plot as well as the linear fit (the black line). The green (lighter) line is the 45 degree line.

Table 1: Summary Statistics

Panel A: Store Locations Overview

Variable	Mean	Std. Dev	p10	p25	p50	p75	p90	N
Number of States with Operation (1997-2016)	32	16	8	18	35	47	51	4,490
Number of Stores per State (1997-2016)	36	91	1	3	9	40	88	143,558
Change in Number of Stores per Firm-State – New Entry (1998-2016)	1.8	2.7	1	1	1	2	3	2,806
Change in Number of Stores per Firm-State – Not New Entry (1998-2016)	1.2	8.1	-1	0	0	1	4	115,790

Panel B: State-Level Growth and Firm Local Growth

Variable	Mean	Std. Dev	p10	p25	p50	p75	p90	N
Quarterly State Income Growth (%) (1998-2016)	1.06	1.32	-0.37	0.46	1.08	1.68	2.48	3,876
Quarterly State Earnings Growth (%) (1998-2016)	0.26	0.51	-0.35	0.12	0.42	0.57	0.71	3,876
Predicted Quarterly State Income Growth (%) (1998-2016)	1.19	0.59	0.69	1.07	1.34	1.46	1.67	3,876
Firm Local Growth (%) (1998-2016)	1.05	1.11	-0.07	0.68	1.12	1.58	2.15	12,871
Innovations in Firm Local Growth (%) (1998-2016)	0.86	1.09	-0.21	0.52	0.97	1.35	1.92	12,637
Predicted Firm Local Growth (%) (1998-2016)	1.25	0.37	0.93	1.18	1.34	1.44	1.56	12,871
Lagged 3-Year State Income Growth (%) (1998-2016)	14.80	6.76	6.16	9.69	14.82	18.98	23.39	969
Lagged 3-Year State Population Growth (%) (1998-2016)	2.78	2.34	0.45	1.26	2.35	3.81	5.67	969
Lagged 3-Year State Income per capita Growth (%) (1998-2016)	11.68	5.85	4.28	7.62	12.06	15.50	18.26	969
1-Year State Income Growth (%) (1998-2016)	4.42	3.11	0.79	2.62	4.45	6.35	7.94	969
3-Year State Income Growth (%) (1998-2014)	13.83	6.67	5.94	9.17	13.28	17.79	22.48	867
5-Year State Income Growth (%) (1998-2012)	23.65	9.06	13.36	17.08	22.86	29.04	34.91	765

Panel C: Other Variables

Variable	Mean	Std. Dev	p10	p25	p50	p75	p90	N
Quarterly Sales Growth (%) (1998-2016)	3.7	22.1	-21.8	-7.3	1.6	11.6	29.5	12,684
Quarterly EPS Growth (%) (1998-2016)	25.0	240.2	-111.4	-46.0	0.0	60.9	183.3	12,425
Log Size (1997-2015)	6.8	1.9	4.3	5.6	6.8	8.0	9.3	3,361
Log B/M (%) (1997-2015)	-0.8	0.8	-1.8	-1.3	-0.8	-0.2	0.2	3,342
Leverage (1997-2015)	0.5	0.7	0	0.1	0.2	0.6	1.2	3,381
EBITDA/Asset (%) (1997-2015)	16.3	10.7	6.2	11.0	16.0	21.1	27.8	3,346
Tobin Q (1997-2015)	2.0	1.4	0.9	1.2	1.6	2.3	3.5	3,347
Firm Expansion Sensitivity (5-Year) (2003-2014)	0.02	0.13	0	0	0	0.02	0.12	2,037
3-Year Sales Growth (%) (2003-2014)	22.5	33.2	-14.6	0.5	17.2	37.0	64.8	2,115
3-Year Profitability Change (%) (2003-2014)	-0.54	9.05	-9.2	-4.0	-0.05	3.3	7.8	2,114

Table 2: Quarterly Sales and Earnings Growth and Firm Local Growth

Panel A: Quarterly Sales Growth (%) and Firm Local Growth

	Quarterly Sales Growth (%)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Firm Local Growth	0.922***	0.657***	0.472***	0.446***	0.478***	0.446***	0.464**	0.442**
	(7.87)	(5.75)	(2.84)	(2.72)	(2.88)	(2.73)	(2.59)	(2.49)
Lagged Dep. Var	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level Controls	N	Y	N	Y	N	Y	N	Y
National Growth	N	N	N	N	N	N	Y	Y
FE	Firm	Firm	Year	Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year
R-sq	0.182	0.191	0.150	0.153	0.189	0.194	0.189	0.194
N	12371	12282	12371	12282	12371	12282	12371	12282

Panel B: Quarterly EPS Growth (%) and Firm Local Growth

	Quarterly EPS Growth (%)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Firm Local Growth	7.809***	6.310***	4.909**	5.036**	6.325**	6.289**	4.913*	4.796*
	(3.63)	(2.99)	(2.05)	(2.09)	(2.59)	(2.56)	(1.88)	(1.83)
Lagged Dep. Var	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level Controls	N	Y	N	Y	N	Y	N	Y
National Growth	N	N	N	N	N	N	Y	Y
FE	Firm	Firm	Year	Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year
R-sq	0.0929	0.0969	0.0282	0.0301	0.0966	0.0999	0.0967	0.100
N	11881	11796	11881	11796	11881	11796	11881	11796

Notes: Table 2 reports results from estimating the following:

$$SalesGrowth_{i,q,y} = \beta FirmLocalGrowth_{i,q,y} + \Gamma' X_{i,y-1} + \theta_i + \delta_y + \eta NationalGrowth_{q,y} + \epsilon_{i,q,y},$$

Panel A displays the regressions of quarterly sales growth (%) on *Firm Local Growth*, and Panel B presents the regressions of quarterly EPS growth (%) on *Firm Local Growth*. Both dependent variables are defined as one-quarter growth rates, and are winsorized at the 1st and 99th percentiles. Column 1-2 include firm fixed effects, Column 3-4 include year fixed effects, Column 5-6 include both, and Column 7-8 further control for national income growth. Standard errors are clustered by firm. Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Monthly Stock Returns and Firm Local Growth

	Monthly Stock Returns		
	(1)	(2)	(3)
Firm Local Growth	0.790***	0.753**	0.766**
	(2.70)	(2.57)	(2.57)
Accounting Controls	N	Y	Y
Return Controls	N	N	Y
FE	Month	Month	Month
R-sq	0.196	0.197	0.198
N	37835	37585	37517

Notes: This table presents the results from the following model:

$$RET_{i,m,q,y} = \beta FirmLocalGrowth_{i,q-1,y} + \Gamma_1' X_{i,m,y-1} + \Gamma_2' X_{i,m-1,y} + \delta_m + \epsilon_{i,m,q,y},$$

regressions of monthly stock returns on *Firm Local Growth* of the previous quarter. Dependent variable is monthly stock returns in the quarter after the one where *Firm Local Growth* is calculated. Accounting controls include log firm size, log B/M, and leverage from the previous year. Return controls include monthly stock returns in the previous month, as well as the stock returns over the past year, except for the most recent month. Standard errors are clustered by month. Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Firm Complexity and Firm Local Growth

Panel A: Quarterly sales growth, firm complexity, and firm local growth

	Quarterly Sales Growth (%)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Firm Local Growth	0.946***	0.680***	0.498***	0.461**	0.517***	0.468***	0.502**	0.463**
	(6.82)	(5.04)	(2.70)	(2.54)	(2.82)	(2.60)	(2.55)	(2.38)
1(>1000 Stores)	-3.387***	-0.715	-1.423***	-1.698**	-1.068	-0.0770	-1.067	-0.0767
	(-4.60)	(-0.96)	(-2.59)	(-2.44)	(-1.43)	(-0.11)	(-1.43)	(-0.11)
1(>1000 Stores) × Firm Local Growth	-0.180	-0.0999	-0.127	-0.0800	-0.158	-0.0889	-0.159	-0.0891
	(-0.67)	(-0.38)	(-0.49)	(-0.31)	(-0.59)	(-0.34)	(-0.60)	(-0.34)
Lagged Dep. Var	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level Controls	N	Y	N	Y	N	Y	N	Y
National Growth	N	N	N	N	N	N	Y	Y
FE	Firm	Firm	Year	Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year
R-sq	0.182	0.191	0.151	0.154	0.189	0.194	0.189	0.194
N	12371	12282	12371	12282	12371	12282	12371	12282

Panel B: Monthly stock returns, firm complexity, and firm local growth

	Monthly Stock Returns		
	(1)	(2)	(3)
Firm Local Growth	0.758***	0.736**	0.748**
	(2.62)	(2.53)	(2.53)
1(>1000 Stores)	-0.840**	-0.464*	-0.489*
	(-2.57)	(-1.67)	(-1.73)
1(>1000 Stores) × Firm Local Growth	0.492**	0.484**	0.497**
	(2.23)	(2.18)	(2.22)
Accounting Controls	N	Y	Y
Return Controls	N	N	Y
FE	Month	Month	Month
R-sq	0.196	0.197	0.198
N	37835	37585	37517

Notes: This table shows differential effect of *Firm Local Growth* on same-quarter sales growth and next-quarter stock returns for firms with more than 1000 locations as of the previous year. Dependent variable is quarterly sales growth in Panel A, and monthly excess stock returns in Panel B. Panel A estimates the following model:

$$\begin{aligned} SalesGrowth_{i,q,y} &= \beta_1 FirmShock_{i,q,y} + \beta_2 \mathbb{1}\{Stores \geq 1000\}_{i,y-1} \\ &+ \beta_3 FirmShock_{i,q,y} * \mathbb{1}\{Stores \geq 1000\}_{i,y-1} + \Gamma' X_{i,y-1} + \theta_i + \delta_y + \epsilon_{i,q,y}, \end{aligned}$$

and Panel B estimates a similar model with monthly stock returns as the outcome variable. *1(≥ 1000 Stores)* is a dummy variable indicating that a firm has 1000 or more locations as of the previous year. Panel A controls for lagged quarterly sales growth in all columns, and firm-level controls include log firm size, log B/M, leverage, and profitability from the previous year. Standard errors are clustered at firm level. In Panel B, accounting controls include log firm size, log B/M, and leverage from the previous year. Return controls include monthly stock returns in the previous month, as well as the stock returns over the past year, except for the most recent month. Standard errors are clustered by month. Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Tests of Portfolio Returns

	(%)	Raw Returns	CAPM Alpha	Fama-French Alpha	Carhart Alpha
Actual Firm Local Growth	Equal-weighted	0.69	0.69	0.68	0.71
	(t-stat)	(2.11)	(2.08)	(2.05)	(2.10)
	Value-weighted	1.31	1.32	1.29	1.34
	(t-stat)	(2.98)	(2.98)	(2.93)	(3.03)
Predicted Firm Local Growth	Equal-weighted	0.66	0.64	0.64	0.71
	(t-stat)	(1.95)	(1.87)	(1.86)	(2.07)
	Value-weighted	0.92	0.85	0.84	0.87
	(t-stat)	(2.25)	(2.08)	(2.04)	(2.11)

Notes: This table presents results of the portfolio tests for both actual and predicted *Firm Local Growth*. At the beginning of each quarter, stocks are sorted into deciles based on actual or predicted firm shocks. A portfolio is formed by going long with the top decile and shorting the bottom decile. Raw returns and risk-adjusted abnormal returns are shown in the table. The explanatory variables are the monthly market excess returns, returns of mimicking portfolios as in Fama and French (1993), and the momentum factor in Carhart (1997). T-statistics are reported in parentheses.

Table 6: Earnings Surprises and Firm Local Growth

Panel A: Earnings Surprises and Actual Firm Local Growth

	SUE		Earnings Surprise		3-Day CAR	
	(1)	(2)	(3)	(4)	(5)	(6)
Firm Local Growth	0.0824***	0.0881***	-0.0231	-0.0111	-0.159	-0.228
	(5.08)	(5.64)	(-0.67)	(-0.33)	(-0.67)	(-0.94)
Controls	N	Y	N	Y	N	Y
FE	Firm	Firm	Firm	Firm	Ann. Month	Ann. Month
R-sq	0.0327	0.0556	0.0563	0.0408	0.0339	0.0362
N	7655	7197	4409	4103	8228	7624

Panel B: Earnings Surprises and Predicted Firm Local Growth

	SUE		Earnings Surprise		3-Day CAR	
	(1)	(2)	(3)	(4)	(5)	(6)
Predicted Firm Local Growth	0.300***	0.322***	-0.201*	-0.135	-1.566	-1.819
	(4.83)	(5.53)	(-1.75)	(-1.19)	(-0.88)	(-0.93)
Controls	N	Y	N	Y	N	Y
FE	Firm	Firm	Firm	Firm	Ann. Month	Ann. Month
R-sq	0.0342	0.0571	0.0612	0.0436	0.0339	0.0362
N	7655	7197	4409	4103	8228	7624

Notes: This table presents the relationship between actual (Panel A) and predicted *Firm Local Growth* (Panel B) with standardized unexpected earnings (SUE), earnings surprises based on IBES, and the 3-day cumulative abnormal returns around earnings announcement days. Earnings announcement days are determined by combining Compustat and IBES reporting day information. Inconsistent data is excluded from the analysis using the rules in DellaVigna and Pollet (2009). *SUE* is defined as changes of EPS relative to four quarters ago as a percentage of the previous quarter's closing stock price. *Earnings Surprise* is defined as deviations of reported EPS relative to the median analyst forecast, as a percentage of stock price 5 trading days ago. *3-Day CAR* is calculated by estimating a market model during days -20 and -2, and calculating cumulative abnormal returns during days [-1,1]. Standard errors in Column 1-4 are clustered by firm, and by announcement months in Column 5-6. Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Persistence of State-Level Income Growth

	1-Year Income Growth		3-Year Income Growth		5-Year Income Growth	
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged 3-Year Income Growth	0.0400***	-0.0527***	-0.00538	-0.279***	0.0656	-0.359***
	(2.79)	(-3.04)	(-0.12)	(-4.75)	(1.04)	(-4.13)
Lagged Log Income	-0.328***	-4.993***	-1.240***	-16.31***	-2.223***	-25.74***
	(-3.36)	(-12.01)	(-3.23)	(-8.23)	(-3.17)	(-7.42)
FE		State		State		State
R-sq	0.0232	0.177	0.0393	0.396	0.0753	0.540
N	969	969	867	867	765	765

Notes: This table presents the relationship between lagged 3-year state-level income growth and 1, 3, and 5-year future income growth from 1998 to 2016. Specifically, *Lagged 3-Year Income Growth* is calculated over year $y-4$ to $y-1$. The dependent variables are calculated over year $y-1$ to y, $y+2$, and $y+4$, respectively. *Log Income[-1]* is logged state-level aggregate income as of year $y-1$. Standard errors are clustered by state. Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Changes in the Number of Stores and Lagged State-Level Growth

Panel A: Δ number of stores and lagged 3-year income growth

	Δ No. of Stores					
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged 3-Year Income Growth	0.0117	0.0123	0.0266***	0.0259***	0.0482***	0.0447***
	(1.27)	(1.22)	(4.25)	(3.88)	(4.54)	(3.97)
Log Firm Size		0.0297		0.108**		0.0774
		(0.34)		(2.26)		(0.94)
Tobin Q		0.0646		0.202***		0.385***
		(1.25)		(5.54)		(6.58)
Having Store in t-1	No	No	Yes	Yes	Yes	Yes
Δ No. of Stores	Positive	Positive	All	All	Non-Zero	Non-Zero
FE	Firm	Firm	Firm × State	Firm × State	Firm × State	Firm × State
R-sq	0.273	0.290	0.207	0.213	0.206	0.212
N	2806	2430	115790	107964	67342	62729

Panel B: Δ number of stores and lagged 3-year population and income per capita growth

	Δ No. of Stores					
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged 3-Year Population Growth	0.0724**	0.0820**	0.0686***	0.105***	0.150***	0.210***
	(2.18)	(2.06)	(3.24)	(3.97)	(3.74)	(4.40)
Lagged 3-Year Income per capita Growth	-0.00345	-0.00254	0.0237***	0.0201***	0.0403***	0.0321**
	(-0.43)	(-0.28)	(3.38)	(2.89)	(3.24)	(2.59)
Log Firm Size		0.0331		0.123**		0.110
		(0.38)		(2.58)		(1.37)
Tobin Q		0.0676		0.203***		0.386***
		(1.32)		(5.60)		(6.66)
Having Store in t-1	No	No	Yes	Yes	Yes	Yes
Δ No. of Stores	Positive	Positive	All	All	Non-Zero	Non-Zero
FE	Firm	Firm	Firm × State	Firm × State	Firm × State	Firm × State
R-sq	0.276	0.294	0.207	0.213	0.206	0.212
N	2806	2430	115790	107964	67342	62729

Panel C: Δ number of stores and lagged 3-year income growth by sign of growth

	Δ No. of Stores					
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged 3-Year Income Growth	0.0123	0.0134	0.0247***	0.0243***	0.795	0.836
	(1.31)	(1.27)	(3.91)	(3.58)	(1.24)	(1.06)
Log Firm Size		0.0275		0.109**		0.125
		(0.32)		(2.29)		(0.12)
Tobin Q		0.0646		0.199***		-0.186
		(1.25)		(5.44)		(-0.23)
Sign of Lagged Growth	Positive	Positive	Positive	Positive	Negative	Negative
Having Store in t-1	No	No	Yes	Yes	Yes	Yes
Δ No. of Stores	Positive	Positive	All	All	All	All
FE	Firm	Firm	Firm × State	Firm × State	Firm × State	Firm × State
R-sq	0.272	0.289	0.209	0.215	0.946	0.947
N	2793	2417	114418	106627	1372	1337

Notes: This table presents the relationship between lagged 3-year state-level growth (from year $y-4$ to $y-1$) and changes in the number of stores for each firm and state in from year $y-1$ to y. Specifically, the results are from estimating the following model:

$$\Delta Store_{isy} = \alpha + \beta Lagged3YearIncomeGrowth_{sy} + \Gamma' X_{i,y-1} + \theta_{i,s} + \epsilon_{isy}.$$

Tobin Q is calculated as (total market value + total liability)/total asset. All items are Compustat fiscal year end data in the previous year. Standard errors are clustered by state. Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Firm Future Performance and Firm Expansion Investment Sensitivity to Past Growth

Panel A: Firm Expansion Sensitivity and Future 3-Year Sales Growth

	Future 3-Year Sales Growth			
	(1)	(2)	(3)	(4)
Firm Expansion Sensitivity (2-Year)	-17.77**			
	(-2.37)			
Firm Expansion Sensitivity (3-Year)		-11.98		
		(-1.61)		
Firm Expansion Sensitivity (4-Year)			-10.65	
			(-1.42)	
Firm Expansion Sensitivity (5-Year)				-8.823
				(-1.16)
Controls	Y	Y	Y	Y
FE	Year	Year	Year	Year
R-sq	0.315	0.291	0.284	0.272
N	2077	2089	2023	1917

Panel B: Firm Expansion Sensitivity and Future 3-Year Profitability Change

	Future 3-Year Profitability Change			
	(1)	(2)	(3)	(4)
Firm Expansion Sensitivity (2-Year)	3.193**			
	(2.19)			
Firm Expansion Sensitivity (3-Year)		3.022**		
		(2.50)		
Firm Expansion Sensitivity (4-Year)			3.218***	
			(2.68)	
Firm Expansion Sensitivity (5-Year)				2.017
				(1.46)
Controls	Y	Y	Y	Y
FE	Year	Year	Year	Year
R-sq	0.190	0.195	0.189	0.177
N	2075	2087	2021	1916

Notes: This table presents the relationship between a firm's 3-year sales growth and its investment sensitivity to regional income growth. *Firm Sensitivity* is estimated as the β coefficient in the 2 to 5-year rolling regressions $\Delta Store_{i,s} = \alpha + \beta_i Past3YearIncomeGrowth_s + \epsilon_{i,s}$ that are significant at 10% level, and the statistically insignificant coefficients are replaced as 0. Standard errors are clustered by firm. Control variables include lagged dependent variable in the current year, log firm size, log B/M, leverage, and lagged level of profitability. Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Appendix A: Infogroup Data Processing

A1. Overview of Infogroup data

Infogroup is a data provider that collects and updates business location data since 1997. They gather information on newly established business locations via various media coverage and utility companies. Every year, Infogroup makes millions of phone calls to verify the status of operation of the existing business establishments on their record and update accordingly. The database is a snapshot of its archive as of the end of each calendar year. Natually, there could be some inaccuracies due to the time lag between verification and data extraction.

Firms are identified by a "parent number," and a business establishment is identified by a business identifier. Natually, many business identifiers are linked to one "parent number" if they belong to the same firm. For a majority of public companies, a "parent number" is also linked with a stock ticker, which is essential for linking business locations to other public company data, such as balance sheet information and stock returns.

Infogroup aims to provide detailed information on all business establishments, including their location, size, and industry classification. However, establishment size, measured by number of employees or total sales is not reliable, especially for public companies, as Infogroup tends to repeat size data from previous years, or simply divide the total amount of sales and number of employees reported by public companies by their total number of stores. Another significant issue with Infogroup data is its selection bias for public firms delisted prior to 2016. For example, if a firm was public between 2000 and 2005, and went private or bankrupted in 2006, then this firm is usally not matched with a stock ticker.

Overall, Infogroup contains rich information on business establishments, and provides potential linkage to other datasets, but there are also imporant issues to consider when using this data for empirical research.

A2. Sample Selection

To avoid selecting only on surviving public firms in Infogroup, I started the construction of the sample by hand-collecting a list of public firms in retail, restaurant, hospitality, and entertainment industries that operate chain stores. I collected this list from various online sources, such as MarketWatch.com, Investnips.com, and Wikipedia.org.

A3. Matching and Data cleaning

For the subset of firms for which Infogroup does not provide stock tickers, I manually link their "parent numbers" with historical stock tickers for the years they were public. They are then combined with the firms with Infogroup provided stock tickers to produce the final list of firms.

Data cleaning was done by examining the firms in the sample one by one and manually correcting mistakes. They are mainly four types of special cases to correct. First, some public firms may experience a period where a private firm obtains majority stakes. For most of these cases, Infogroup failes to provide the parent-to-ticker link for those years, and I manully filled in the stock tickers.

Second, Infogroup sometimes classifies a firm's suppliers as its subsidiaries. This is not very common, but I also exclude the supplier firms from those firms' list stores.

Third, for certain types of firms, it does not make a lot of sense to include all of its subsidiaries. For example, the bakery department inside of a Walmart store, is often counted as a separate establishment, even if it shares the same location as the store. Since Walmart's major business is selling groceries and appliances, etc., I drop all Walmart establishments if the busines name indicates that it is a bakery department. The same applies to most other large supermarket chains. The excluded departments are mainly the bakery department, and the florist department.

Lastly, Infogroup not only keeps records of the customer-facing business establishment, but also all supporting facilities, such as corporate accounting, human resource, warehouse, customer service, regional corporate office, etc. They all appear in business names but with various kinds of abbreviations. I manually excluded all of these from the list of a firm's establishment.

In sum, the data cleaning process aims to produce the final data set that best captures a firm's store distributions across the country and throughout the years, by filling in missing links and excluding irrelavant business establishments.

A4. Calculation of changes in the number of stores

In Section 5, I calculate firms' annual changes in the number of stores in all states. There are two major challenges in this calculation. First, I do not wish to include establishments that are new to a firm through acquisition, since acquisition usually involves ownership changes to many stores at the same time, the action is often based on more considerations than regional economic growth. Second, the data set use in previous sections is observations by firm-state-year for all states and years where a firm has at least one establishment. To study firm's expansion decisions, I also wish to calculate the number of news stores in a state where the firm doesn't operate in the previous years.

The algorithm for calculating changes in the number of stores for a firm in a state and year is to separately calculate the newly added and closed stores, and take the difference. The newly added stores are identified by new business identifiers associated with individual business establishments that first appear after the firm's first appearance in the Infogroup universe. This excludes all business locations that existed as another firm's subsidiaries. For example, if Firm A first appears in the Infogroup universe in 2006, and a Firm A's subsidiary Business X's business identifier first appears in 2008, then I classify it as a newly added store. Similarly, a closed store is identified by individual business identifiers that last appear before the last year of the firm's existence in the Infogroup universe. This algorithm is also convenient for identifying firms expanding into new states.

Appendix B

Table B.1: Quarterly Sales and Earnings Growth and Firm Local Growth

Panel A: 4-Quarter Sales Growth (%) and Firm Local Growth

	4-Quarter Sales Growth (%)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Firm Local Growth	2.054***	1.553***	0.869***	0.823***	0.845***	0.783***	0.469***	0.396***
	(13.15)	(10.54)	(6.36)	(6.20)	(6.61)	(6.54)	(3.64)	(3.32)
Lagged Dep. Var	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level Controls	N	Y	N	Y	N	Y	N	Y
National Growth	N	N	N	N	N	N	Y	Y
FE	Firm	Firm	Year	Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year
R-sq	0.200	0.286	0.119	0.160	0.243	0.311	0.246	0.314
N	11413	11331	11413	11331	11413	11331	11413	11331

Panel B: 4-Quarter EPS Growth (%) and Firm Local Growth

	4-Quarter EPS Growth (%)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Firm Local Growth	30.16***	26.85***	29.78***	30.81***	30.43***	31.13***	27.59**	27.90**
	(2.93)	(2.88)	(2.74)	(2.84)	(2.76)	(2.84)	(2.37)	(2.40)
Lagged Dep. Var	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level Controls	N	Y	N	Y	N	Y	N	Y
National Growth		N	N	N	N	N	Y	Y
FE	Firm	Firm	Year	Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year
R-sq	0.0356	0.0415	0.0132	0.0158	0.0451	0.0509	0.0452	0.0511
N	10972	10891	10972	10891	10972	10891	10972	10891

Notes: Panel A displays the regressions of 4-quarter sales growth (%) on *Firm Local Growth*, and Panel B presents the regressions of 4-quarter EPS growth (%) on *Firm Local Growth*. Both dependent variables are defined as four-quarter growth rates, i.e. percentage changes relative to the same quarter in the previous year. Dependent variables are winsorized at the 1st and 99th percentiles. Panel A and B control for lagged dependent variable in all columns, and firm-level controls include log firm size, log B/M, leverage, and profitability from the previous year. Standard errors are clustered by firm. Column 7-8 control for national income growth. Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B.2: Quarterly Sales and Earnings Growth and Firm Local Growth

	Firm Local Growth	
	(1)	(2)
Lagged Firm Local Growth	0.177***	0.164***
	(22.88)	(20.85)
FE		Firm
R-sq	0.0320	0.0444
N	12417	12417

Notes: Table B.2 presents serial correlation of the variable *Firm Local Growth*. Standard errors are clustered by firm. Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B.3: Quarterly Sales and Earnings Growth and Innovations in Firm Local Growth

Panel A: Quarterly Sales Growth (%) and Firm Local Growth

	Quarterly Sales Growth (%)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Innovations in Firm Local Growth	0.927***	0.701***	0.533***	0.514***	0.533***	0.508***	0.520***	0.503***
	(7.57)	(5.87)	(3.40)	(3.31)	(3.41)	(3.30)	(3.14)	(3.06)
Lagged Dep. Var	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level Controls	N	Y	N	Y	N	Y	N	Y
National Growth	N	N	N	N	N	N	Y	Y
FE	Firm	Firm	Year	Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year
R-sq	0.182	0.191	0.150	0.153	0.189	0.194	0.189	0.194
N	12371	12282	12371	12282	12371	12282	12371	12282

Panel B: Quarterly EPS Growth (%) and Firm Local Growth

	Quarterly EPS Growth (%)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Innovations in Firm Local Growth	7.240***	5.999***	4.032*	4.170*	5.193**	5.209**	3.912	3.877
	(3.37)	(2.83)	(1.74)	(1.79)	(2.22)	(2.21)	(1.59)	(1.57)
Lagged Dep. Var	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level Controls	N	Y	N	Y	N	Y	N	Y
National Growth	N	N	N	N	N	N	Y	Y
FE	Firm	Firm	Year	Year	Firm, Year	Firm, Year	Firm, Year	Firm, Year
R-sq	0.0926	0.0968	0.0281	0.0300	0.0964	0.0998	0.0967	0.100
N	11881	11796	11881	11796	11881	11796	11881	11796

Notes: Panel A displays the regressions of quarterly sales growth (%) on the changes in *Firm Local Growth*, and Panel B presents the regressions of quarterly EPS growth (%) on *Firm Local Growth*. Both dependent variables are defined as one-quarter growth rates, and are winsorized at the 1st and 99th percentiles. Column 1-2 include firm fixed effects, Column 3-4 include year fixed effects, and Column 5-6 include both. Column 7-8 also control for national income growth. Standard errors are clustered by firm. Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B.4: Quarterly Changes in Firm Local Growth and Monthly Stock Returns

	Monthly Stock Returns		
	(1)	(2)	(3)
Innovations in Firm Local Growth	0.860***	0.841***	0.868***
	(2.70)	(2.68)	(2.71)
Accounting Controls	N	Y	Y
Return Controls	N	N	Y
FE	Month	Month	Month
R-sq	0.198	0.199	0.199
N	36907	36723	36702

Notes: This table presents the relationship between firm's monthly stock returns and changes in quarterly value of *Firm Local Growth*. Accounting controls include log firm size, log B/M, and leverage from the previous year. Return controls include monthly stock returns in the previous month, as well as the stock returns over the past year, except for the most recent month. Standard errors are clustered by month. Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B.5: Monthly Stock Returns and Firm Local Growth

	Accessible online			Not accessible online		
	(1)	(2)	(3)	(4)	(5)	(6)
Firm Local Growth	0.607*	0.616*	0.605*	1.032**	1.011**	1.058**
	(1.93)	(1.94)	(1.89)	(2.11)	(2.05)	(2.14)
Accounting Controls	N	Y	Y	N	Y	Y
Return Controls	N	N	Y	N	N	Y
FE	Month	Month	Month	Month	Month	Month
R-sq	0.197	0.199	0.199	0.228	0.228	0.232
N	27027	26943	26912	10808	10642	10605

Notes: This table presents the regressions of monthly stock returns on *Firm Local Growth* of the previous quarter. Dependent variable is monthly stock returns in the quarter after the one where *Firm Local Growth* is calculated. Accounting controls include log firm size, log B/M, and leverage from the previous year. Return controls include monthly stock returns in the previous month, as well as the stock returns over the past year, except for the most recent month. Standard errors are clustered by month. Column 1-3 include all the retail firms, and Column 4-6 include all other types (restaurants, hotels, entertainment firms, auto dealers and services). Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B.6: Firm Expansion Sensitivity and Future Sales Growth

Panel A: Positive Sensitivity

	Future 3-Year Sales Growth			
	(1)	(2)	(3)	(4)
Firm Expansion Sensitivity (2-Year)	6.426			
	(0.62)			
Firm Expansion Sensitivity (3-Year)		3.138		
		(0.26)		
Firm Expansion Sensitivity (4-Year)			-0.799	
			(-0.07)	
Firm Expansion Sensitivity (5-Year)				-0.305
				(-0.03)
Controls	Y	Y	Y	Y
FE	Year	Year	Year	Year
R-sq	0.310	0.278	0.279	0.248
N	1241	1275	1268	1207

Panel B: Negative Sensitivity

	Future 3-Year Sales Growth			
	(1)	(2)	(3)	(4)
Firm Expansion Sensitivity (2-Year)	-14.91*			
	(-1.70)			
Firm Expansion Sensitivity (3-Year)		-12.06		
		(-1.41)		
Firm Expansion Sensitivity (4-Year)			-0.463	
			(-0.07)	
Firm Expansion Sensitivity (5-Year)				3.388
				(0.48)
Controls	Y	Y	Y	Y
FE	Year	Year	Year	Year
R-sq	0.346	0.325	0.302	0.318
N	836	814	755	710

Notes: Table B.6 presents the relationship between *Firm Expansion Sensitivity* and future 3-year revenue growth. and Standard errors are clustered by firm. Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B.7: Firm Expansion Sensitivity and Future Profitability Change

Panel A: Positive Sensitivity

	Future 3-Year Profitability Change			
	(1)	(2)	(3)	(4)
Firm Expansion Sensitivity (2-Year)	1.483			
	(0.95)			
Firm Expansion Sensitivity (3-Year)		2.958*		
		(1.87)		
Firm Expansion Sensitivity (4-Year)			2.729*	
			(1.79)	
Firm Expansion Sensitivity (5-Year)				1.745
				(0.96)
Controls	Y	Y	Y	Y
FE	Year	Year	Year	Year
R-sq	0.180	0.202	0.203	0.192
N	1240	1274	1266	1206

Panel B: Negative Sensitivity

	Future 3-Year Profitability Change			
	(1)	(2)	(3)	(4)
Firm Expansion Sensitivity (2-Year)	2.294			
	(1.61)			
Firm Expansion Sensitivity (3-Year)		2.046		
		(1.31)		
Firm Expansion Sensitivity (4-Year)			1.040	
			(0.76)	
Firm Expansion Sensitivity (5-Year)				-0.651
				(-0.37)
Controls	Y	Y	Y	Y
FE	Year	Year	Year	Year
R-sq	0.232	0.209	0.174	0.168
N	835	813	755	710

Notes: Standard errors are clustered by firm. Robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.