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# Facing Uncertainty

August 2019

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Small Business Cash Flow  
Patterns in 25 U.S. Cities



JPMORGAN CHASE & Co.

INSTITUTE

# Abstract

Observers of the small business sector have argued that cash flow management is an important issue for small businesses and their owners, but existing data sources provide a limited empirical view of the cash flow patterns of individual small firms. We use de-identified transaction data from the deposit accounts of small firms located in 25 U.S. cities to identify seven distinct cash flow patterns, four of which correspond to relatively regular cash flows, and three of which correspond to irregular cash flows. We show that small firms with regular cash flow patterns are more likely to survive and experience revenue growth. Among firms with irregular cash flow patterns, we show that firms with erratically

timed revenues and expenses are most prevalent and least likely to survive, but firms with sporadic revenues experienced the greatest revenue declines. We also show that firms with limited cash buffers and irregular cash flows were the most likely to exit. Finally, we provide initial evidence that cash flow outcomes may vary meaningfully within cities, perhaps more so than between cities. Our findings suggest that policymakers might usefully target programs based on the specific kinds of cash flow challenges individual small businesses face, and that opportunities may exist to target programs to the specific communities where these challenges are most prevalent.

## About the Institute

The JPMorgan Chase Institute is harnessing the scale and scope of one of the world's leading firms to explain the global economy as it truly exists. Drawing on JPMorgan Chase's unique proprietary data, expertise, and market access, the Institute

develops analyses and insights on the inner workings of the economy, frames critical problems, and convenes stakeholders and leading thinkers.

The mission of the JPMorgan Chase Institute is to help decision makers—policymakers, businesses, and

nonprofit leaders—appreciate the scale, granularity, diversity, and interconnectedness of the global economic system and use timely data and thoughtful analysis to make more informed decisions that advance prosperity for all.

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# Executive Summary

Diana Farrell  
Christopher Wheat  
Carlos Grandet

Small businesses are a key pillar of the U.S. economy, providing income for millions of families and contributing to the commercial vibrancy of communities in cities.

Researchers, small business service providers, policymakers, and small business owners alike observe that cash flow management challenges are pervasive in the sector, but empirical assessment of cash flow challenges and their effects on small firm performance have been elusive.

This report builds on prior research by the JPMorgan Chase Institute and uses high-frequency administrative data to classify small business cash flow patterns. We analyze the effects of regular and irregular cash flow patterns on the survival and growth of small firms in and across cities.

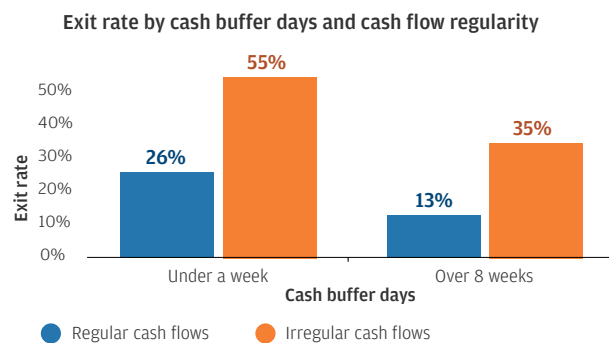
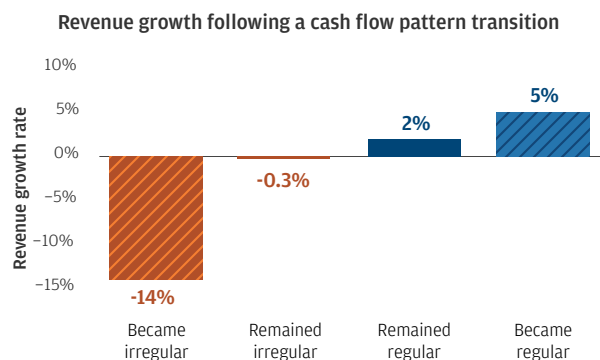
## Our findings are three-fold:

**Finding 1:** Across cities, firms with irregular cash flows were more likely to exit and had slower revenue growth.

**Finding 2:** Firms with erratically timed revenues and expenses were most common among firms with irregular cash flows and most likely to exit, but firms with sporadic revenues had the largest revenue declines.

**Finding 3:** Firms with limited cash buffers and irregular cash flows were the least likely to survive.

These findings suggest that cash flow patterns may be as important as liquidity and access to capital as determinants of small business survival and growth. In addition, small businesses can face qualitatively different kinds of cash flow challenges. Policymakers, product designers, and other decision makers who support small businesses might be most effective not only by targeting their efforts to these distinct challenges, but also by targeting their efforts to the cities and communities where these specific challenges are most often present.



Source: JPMorgan Chase Institute

# Introduction

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Uncertainty about the timing and levels of revenues and expenses is a key challenge to small business owners. A firm cannot survive if it does not manage its cash flow sufficiently well to pay its cash obligations to suppliers, employees, and lenders. While larger businesses might have a more regular cadence of revenues and expenses, small businesses often have less control of the timing or volatility of their sales (Kale and Arditi, 1998). Additionally, their size makes them more vulnerable to unanticipated expenses as they often do not have a professional team of accountants or financial advisors to help them manage revenues and expenses. These cash flow management challenges are among the key determinants of small business performance and survival (Hall, 1992; Ebben and Johnson, 2011).

Despite the importance of cash flow management for small business survival, it has received relatively little

attention at the academic and policy level, particularly when compared to the widely discussed issue of small business access to capital. The ability to attract capital is fundamental for small business operations, and can provide businesses with the liquidity needed to manage cash timing challenges. However, increased access to capital may not fully help small business owners manage cash flow uncertainty—a given level of working capital can always be overwhelmed if revenues and expenses are sufficiently irregular or mismatched in time. An increased emphasis on policies that help small businesses manage their cash flow could potentially help them survive and grow.

Improved small business cash flow management could be particularly impactful for the vitality of the small business sector in cities. Many cities strive to create a vibrant small business sector and often

direct federal and local resources towards supporting small businesses. However, a particular challenge when implementing these policies is the lack of evidence that informs the nature of the cash flow management problems. In this report we leverage high-frequency cash flow transactional data and observe cash flow patterns for firms in 25 large cities in the United States. We use these data to empirically characterize firms into seven regular and irregular patterns and provide a framework that draws attention to the different types of irregular cash flows as well as the policies associated with them. We find that firms with irregular cash flows are more likely to exit and have falling revenues. Finally, we highlight the relationship between liquidity and regularity and find that small businesses in some communities may not have a sufficiently large cash buffer to weather irregular cash flows.

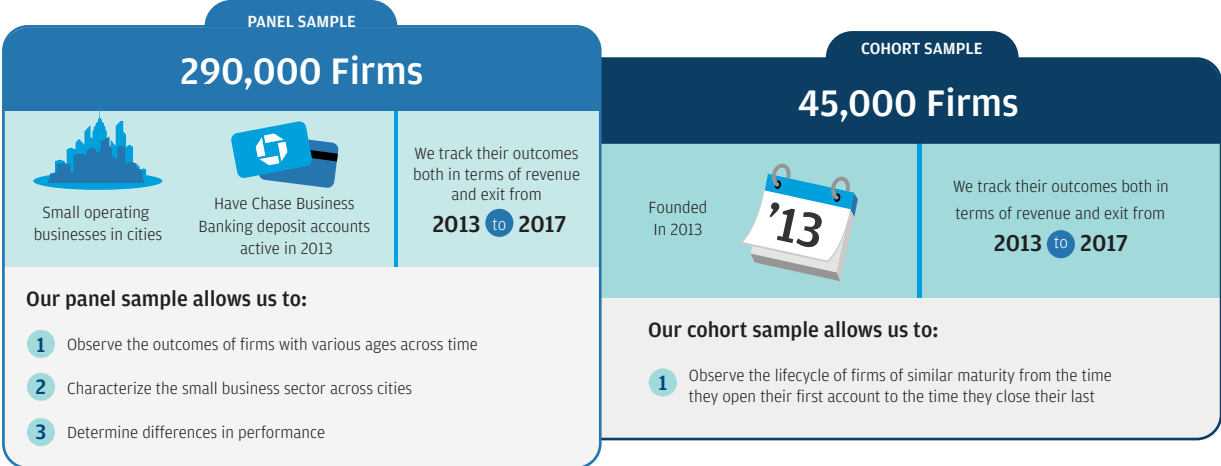
# Data Asset

This report leverages two samples to generate insights—a panel sample of small businesses of any age active in 2013, and a cohort sample of small businesses founded in 2013. The panel sample consists of 290,000 firms that have Chase Business Banking deposit accounts located in 25 large cities in the U.S. We track their outcomes both in terms of revenue and exit (see Glossary for definitions) from 2013 to 2017. This panel sample allows us to observe the outcomes of firms of various ages across time in order to characterize the small business sector across cities and determine differences in performance. Within this panel sample, we also identified a cohort sample of 45,000 firms founded in 2013 and tracked their outcomes over the same period of time. This cohort sample allowed us to observe the first

four years of the lifecycle of firms from the time they opened their first account, and in some cases to the time they closed their last.

These samples are based on business deposit accounts and not on employment records, which allow our data to provide insights on the vast majority of small businesses that do not have paid employees. Only 2.5 percent of nonemployers become employers in their first year of operations and the rate of transition to employment declines as they mature (Farrell et al., 2018). While most firms in our sample are nonemployers, they are nevertheless sufficiently formal to have business banking accounts. We do not capture informal businesses that operate only through cash or personal deposit accounts.

Finally, our selection of cities is based on a prior report that characterized the growth and vitality of the overall small business sector (Farrell et al., 2018). That report selected the top 25 metropolitan areas with the highest number of firms in our sample to provide a geographical lens to our analysis. Since our sample is restricted to cities where Chase operated branches in 2013, some large metropolitan areas are absent from our sample. One of the motivations behind this report was to build upon this prior report and further explore the trends in growth and vitality of the small business sector in “central cities.” We define a central city as the most populous city in a metropolitan area.



Source: JPMorgan Chase Institute

Our focus on central cities aims to address the issue of multiple jurisdictions that may be responsible for outcomes within metropolitan areas. For example, the Los Angeles

metropolitan area encompasses around sixty different cities. Central cities have clearer administrative boundaries, usually with only one administrative body at the local level

responsible for policy and regulation, which allows an easier comparison of economic outcomes and a better understanding of the policies impacting the small business sector.

**Figure 1:** Central cities in our samples



Source: JPMorgan Chase Institute

# Measuring the Regularity of Cash Flows


Small businesses often face challenges managing their cash flows (Dodge, Fullerton, and Robbins, 1994). Ineffective management of working capital is prevalent in small firms (Ebben and Johnson, 2011; Dunn and Cheatham, 1993; Berryman, 1983), and the typical small business has less than one month of cash buffer days (Farrell and Wheat, 2016). That is, it only has enough cash on hand to cover less than a month of expenses in the event of a total disruption in revenues. Additionally, small businesses with volatile expenses or inconsistent revenues are more likely to exit, suggesting that large and perhaps unexpected expenses or sporadic revenues could be especially difficult to manage (Farrell et al., 2018).

Every business must manage expenses in accordance with revenues, but this task may be even more crucial for small businesses, which may have more limited access to lines of credit than larger ones. The risks and costs associated with small business lending may make external financing more difficult as compared with lending to larger and more established firms (Cassar, 2004; Levenson and Willard, 2000). These financial constraints, coupled with other size-based limitations and financial management challenges, lead to high failure rates among small firms (Forbes and Milliken, 1999; Pissarides, 1999; Cooper et al., 1994; Chandler and Hanks, 1994). While programs to support small businesses are often targeted at providing financial assistance, programs that provide technical assistance and training to improve the financial and operational management of a small business may be equally if not more important. To this end, recent survey research sheds some light on the struggles small businesses face in managing expenses and revenues:

- A survey by accounting software provider CCH found that 61 percent of small and medium enterprise operators said small businesses failed because of an inability to manage costs, 50 percent said inexperienced management, 50 percent said poorly designed business models or no business plan, 49 percent said insufficient capital, 37 percent said poor or insufficient marketing, and 35 percent said insufficient time managing the books.
- Almost two-thirds of small business owners are “regularly stressed or have anxiety due to cash-flow concerns,” according to a recent survey of more than 500 entrepreneurs from small business lender, Kabbage. More than a quarter of them said that they have gone as long as six months without receiving a paycheck.
- Six in ten small businesses regularly struggle with cash flow, according to the QuickBooks State of Cash Flow Report. As a result, 32 percent of those small business owners have been unable to pay themselves, employee payrolls, vendors, or loans within the last year.
- The QuickBooks State of Cash Flow Report also observes that small businesses average \$53,399 in outstanding receivables. Nearly a third (31 percent) of small business owners estimate it takes more than thirty days to get paid by customers, clients, vendors, or banks. The average wait is twenty-nine days.

These concerns notwithstanding, there have been few efforts to define and quantify the nature of these cash flow management challenges, particularly

related to variations in two key dimensions: cash flow timing and cash flow levels. In principle, a firm could exist that had exactly the same level of cash inflows and outflows every single day, arriving at a perfectly timed cadence. A firm with such a cash flow pattern would effectively have no uncertainty about its cash flows, and as long as revenues exceeded expenses, would have no need for financial management, cash buffers, or external financing.



There have been few efforts to define and quantify the nature of cash flow management challenges.

In practice, it is very rare for a small business even to approximate such perfectly regular cash flows. Still, some small businesses have relatively more regular cash flow patterns than others. To characterize the ways in which small business cash flow patterns might diverge from this perfectly regular ideal, Figure 2 presents a framework that is based on the observed daily cash flows of actual operating small businesses. This framework uses a methodology that takes advantage of high-frequency cash flow transactional data to characterize the timing and levels of revenues and expenses. It also accounts for the utilization of external financing, and distinguishes between four relatively more regular patterns and three relatively more irregular patterns.



**Figure 2:** Framework for measuring cash flow regularity in the small business sector

More regular patterns

- 1 Regular weekly**  
Larger revenues and expenses occur with weekly frequency, with little deviation in amount or timing.
- 2 Regular weekly + financing**  
Very similar to pattern 1, only with high utilization of financing.
- 3 Semimonthly revenues**  
Larger revenues occur about twice a month, while expenses are paid about weekly.
- 4 Semimonthly revenues + financing**  
Very similar to pattern 3, only with high utilization of financing.

Less regular patterns

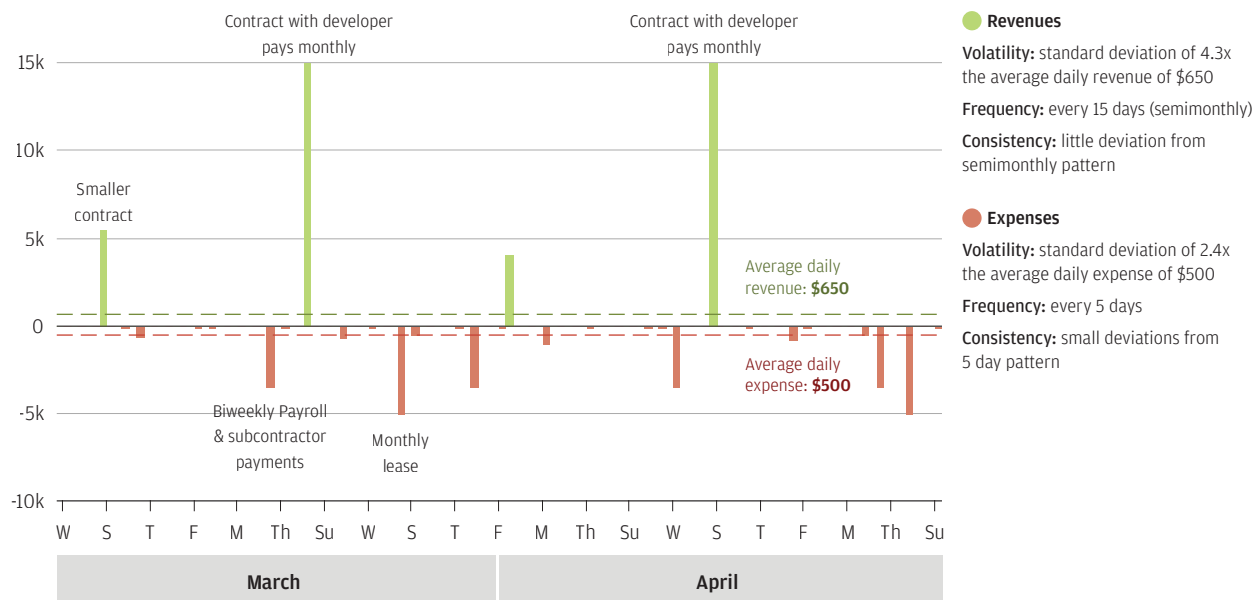
- 5 Erratic timing**  
Although the cash flow amounts do not show particular volatility, their timing is very inconsistent.
- 6 Volatile expenses**  
Expenses are more volatile than revenues, while the reverse is true for most other firms.
- 7 Sporadic revenues**  
Revenues are particularly infrequent, about once every seven weeks, and the amount varies greatly. Financing is heavily utilized.

The left side of Figure 2 lists four cash flow patterns that are relatively closer to the conceptual idea of perfect cash flow regularity. As their titles suggest, these patterns are largely distinguished by two dimensions—first, whether the general cadence of revenues is weekly or semimonthly, and second, whether the firm meaningfully utilizes external financing. While these patterns are relatively more regular, they still characterize firms that experience a meaningful degree of inconsistency in the timing and volatility in the levels of their revenues and expenses. This often means that their expenses will not be perfectly synchronized to their revenues, and that sales levels and timing might vary, but not necessarily to an extent that would significantly impact the operations and viability of the business.

To illustrate a relatively more regular cash flow pattern in practice, Figure 3 depicts two months of stylized cash flows for Everyday Commercial Contractor, a fictional firm that would be classified as having semimonthly revenues without financing. The timing of revenues of this firm is relatively regular—it receives payments nominally on a twice-a-month basis. These are driven by a combination of payments from the firm’s largest client, a developer that pays every month, and from occasional payments from smaller contracts. While the firm bills its clients promptly, customers typically have up to thirty days to pay, so it is not always clear when it will collect payments even though it expects and plans to receive certain amounts of revenue when the contracts are negotiated. As a contracting firm, the daily levels of revenue are relatively

volatile even though the timing is relatively consistent. The firm has annual revenue of about \$240,000, which implies average daily revenues of about \$650—most days payments are significantly lower or higher than this average. As compared to revenue, the firm has expenses that are more frequent, less consistent in their timing, and less volatile in their levels. The largest expenses are a \$5,000 monthly office lease, biweekly payroll and subcontracting costs of \$3,500, and utility payments of varying amounts. Other miscellaneous expenses are also paid throughout the month; most weeks, there is at least one bill to pay. The subcontracting bill is lower when business is slow, but the firm must make the lease and payroll payments for the office manager regardless of the contracts.

**Figure 3: Two months of cash flows for “Everyday Commercial Contractor”**



Source: JPMorgan Chase Institute

The right side of Figure 2 lists three comparatively irregular cash flow patterns. Each of these patterns illustrates a different type of irregularity as reflected in the timing and levels of revenues and expenses. While these three patterns are less regular than the four patterns on the left side of Figure 2, there is not a clear way to rank the three of them from most regular to least regular—the three patterns reflect qualitatively different ways that cash flow patterns might diverge from perfectly regular cash

flows. For instance, firms exhibiting the sporadic revenues pattern have infrequent sales with high volatility and may compensate with a higher proportion of external financing than any other cash flow pattern. Firms exhibiting the volatile expenses pattern usually have a few extraordinary expenses that are significantly larger in volume than the trend. These expenses can either represent investment in a fixed asset or an unusually high payment. Finally, firms exhibiting the erratic timing pattern appear to have

difficulties establishing a rhythm in both their revenues and expenses. While these firms typically do not experience high volatility in cash flow levels, their timing is not consistent and they could require assistance improving the synchronization between revenues and expenses. To illustrate these qualitative differences, Box 1 presents narrative accounts and cash flow trajectories for hypothetical firms expressing each of the three irregular cash flow patterns.

## Box 1: Hypothetical examples of firms with irregular cash flow patterns

### Karla's Kupcakes: Erratic Timing

**Typical revenues:**

Payments from customers

**Key expenses:**

Rent, raw materials

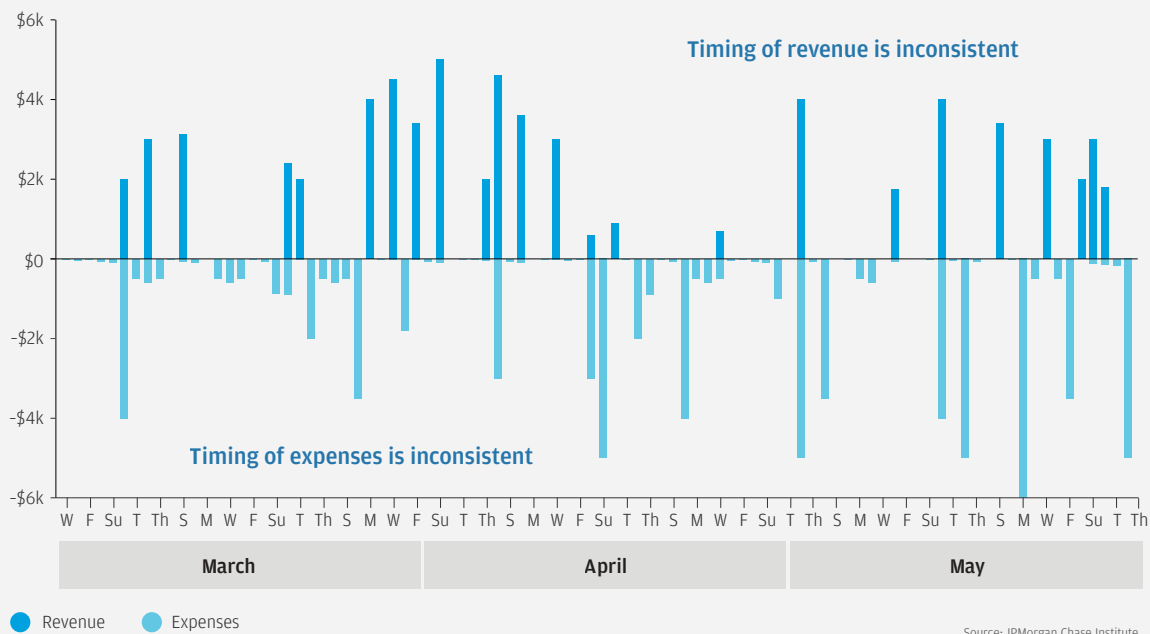
**External finance:**

Negligible

Karla Bruno founded Karla's Kupcakes after friends and family members encouraged her to "share her delicious baked goods with the world." Her firm principally makes cupcakes, cakes, and other baked goods for weddings and events. She operates out of a rented commercial kitchen space, and typically meets

customers in their workplaces or homes to take their orders. In order to lower her costs, Karla typically purchases ingredients in bulk. In order to deliver goods in time for events, she often purchases non-perishable ingredients in larger amounts ahead of time, rather than waiting to be paid for an order.

**Figure 4a:** Cash flows for a hypothetical firm with the Erratic Timing cash flow pattern



## Everyday Cleaners: Volatile Expenses

### Typical revenues:

Cash deposits every two to three weeks

### Key expenses:

Large and varying expenses for equipment

### External finance:

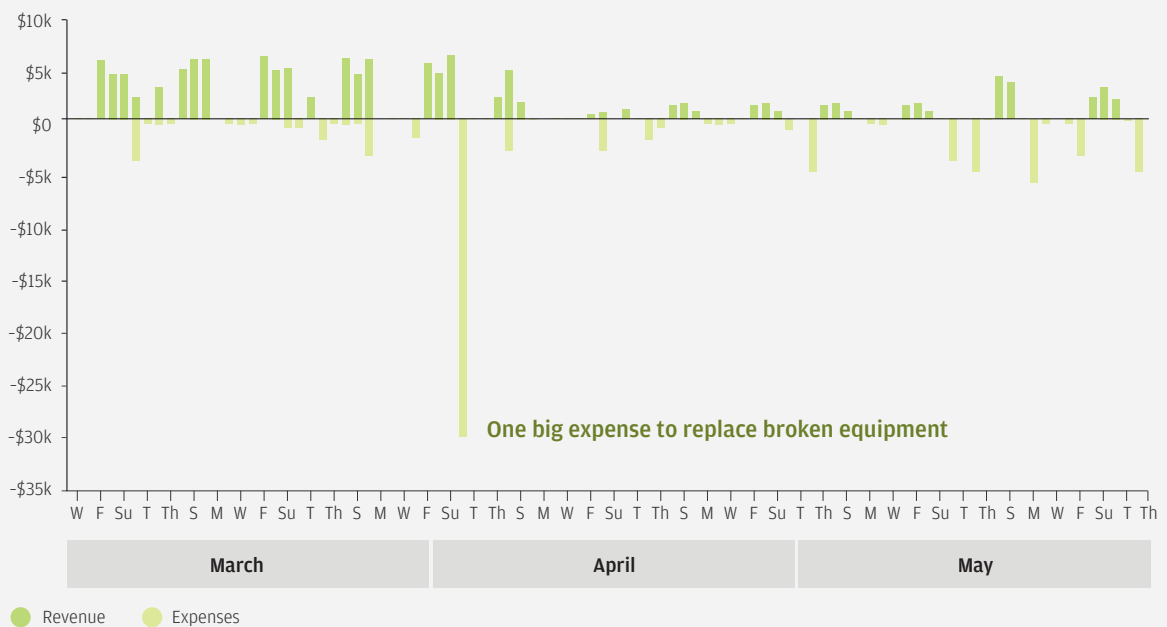
Transfers from personal accounts

Janine and Harold Kostner founded Everyday Dry Cleaners in 2013. Mr. and Mrs. Kostner opened their dry cleaners a few blocks from their local commuter train station in a small cluster of retail storefronts in an otherwise residential neighborhood.

By 2016, the Kostners had developed a relatively steady flow of customers. While demand was higher in some months than others, they generally

received payments corresponding to a weekly pattern. However, in late March, one of their commercial dry cleaning machines failed and had to be replaced. While waiting for a new machine to arrive, customer wait times increased, and the Kostners lost several of their repeat customers. Eventually they began to rebuild their reputation and customer base.

**Figure 4b:** Cash flows for a hypothetical firm with the Volatile Expenses cash flow pattern



Source: JPMorgan Chase Institute

## Overseas Importers: Sporadic Revenues

### 2013

#### Typical revenues:

None

#### Key expenses:

Administrative staff payments

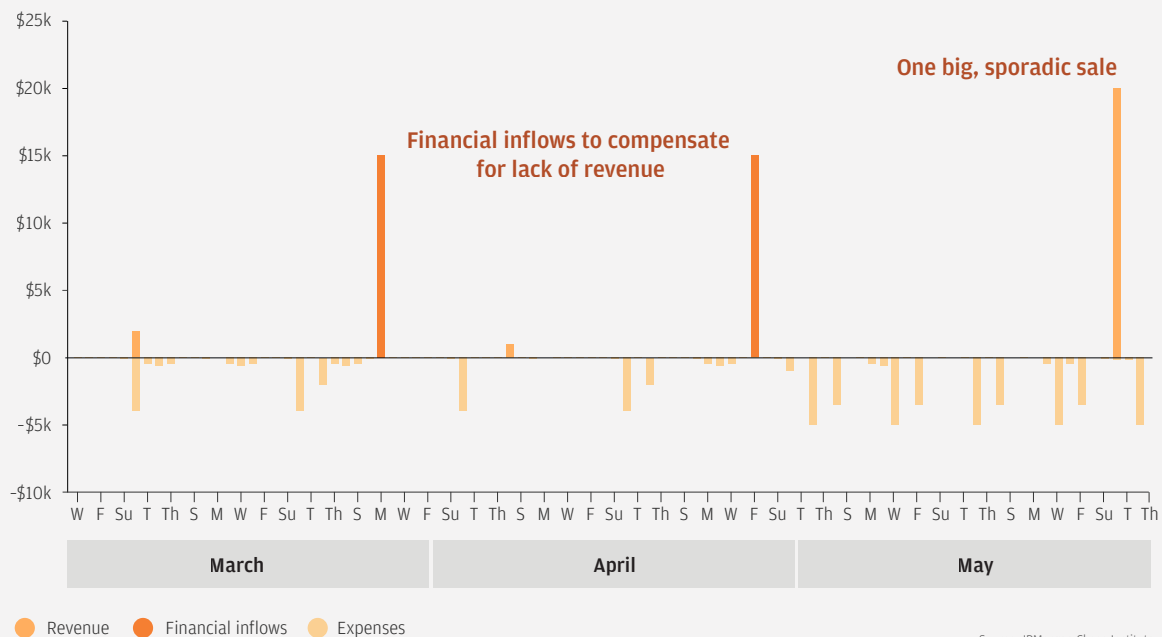
#### External finance:

Equity investments from friends and family

For most of 2013, the Overseas Importers founding team barely generated any sales. As part of an effort to become the main wholesaler of avocado oil in the region, they used their resources in marketing and building relationships with clients, and attracted the attention of future investors. The founders spent much of their time exhibiting their product at trade expos, fairs, and catering

events targeted at higher net worth customers. While these events generated some revenues, they needed financial transfers from their venture capital partners in order to pay expenses. Eventually, they landed a big contract with a regional chain store to distribute their product in more than twenty locations and were paid a first installment.

**Figure 4c:** Cash flows for a hypothetical firm with the Sporadic Revenues cash flow pattern



Source: JPMorgan Chase Institute

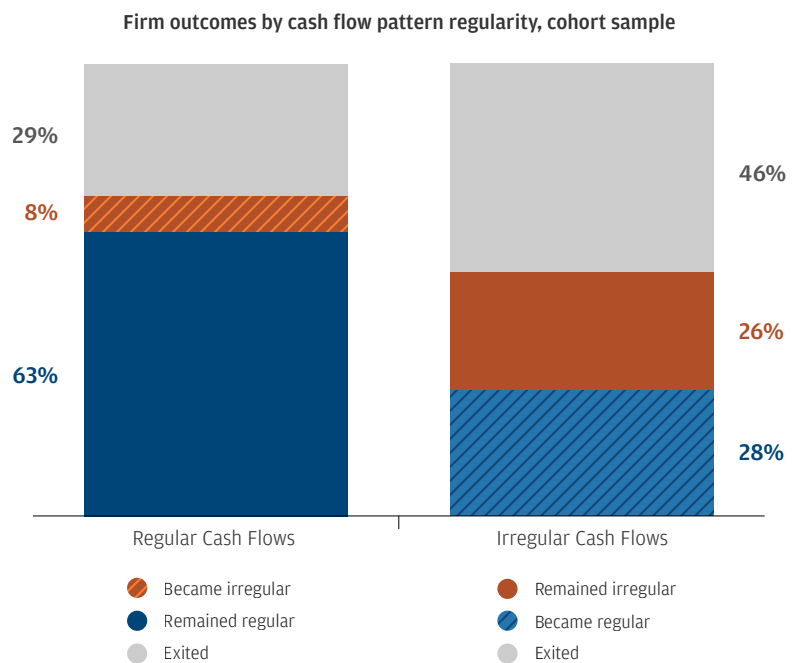


# Finding One

Across cities, firms with irregular cash flows were more likely to exit and had slower revenue growth.

The regularity of cash flows is an important correlate of firm performance, measured either by survival or by revenue growth rates, especially among younger firms. A first indication of the relevance of cash flow patterns for small firm performance concerns the distribution of outcomes that follow a period of regular or irregular cash flows. Figure 5 displays the share of small firms from our sample that either exited, maintained a similar pattern of cash flows, or transitioned to a very different pattern of cash flows, by the regularity of cash flows in their second year. Among firms with regular cash flows, only 29 percent exited by the end of their fourth year, while 63 percent continued to have regular cash flows. In contrast, among firms with irregular cash flows, 46 percent exited by the end of their fourth year—firms with irregular cash flows in their second year were nearly twice as likely to exit as firms with regular cash flows. Notably, 28 percent of firms with irregular cash flows in their second year had transitioned to a regular cash flow pattern by their fourth year.

**Figure 5:** Firms with irregular cash flows are nearly twice as likely to exit than those with regular cash flows

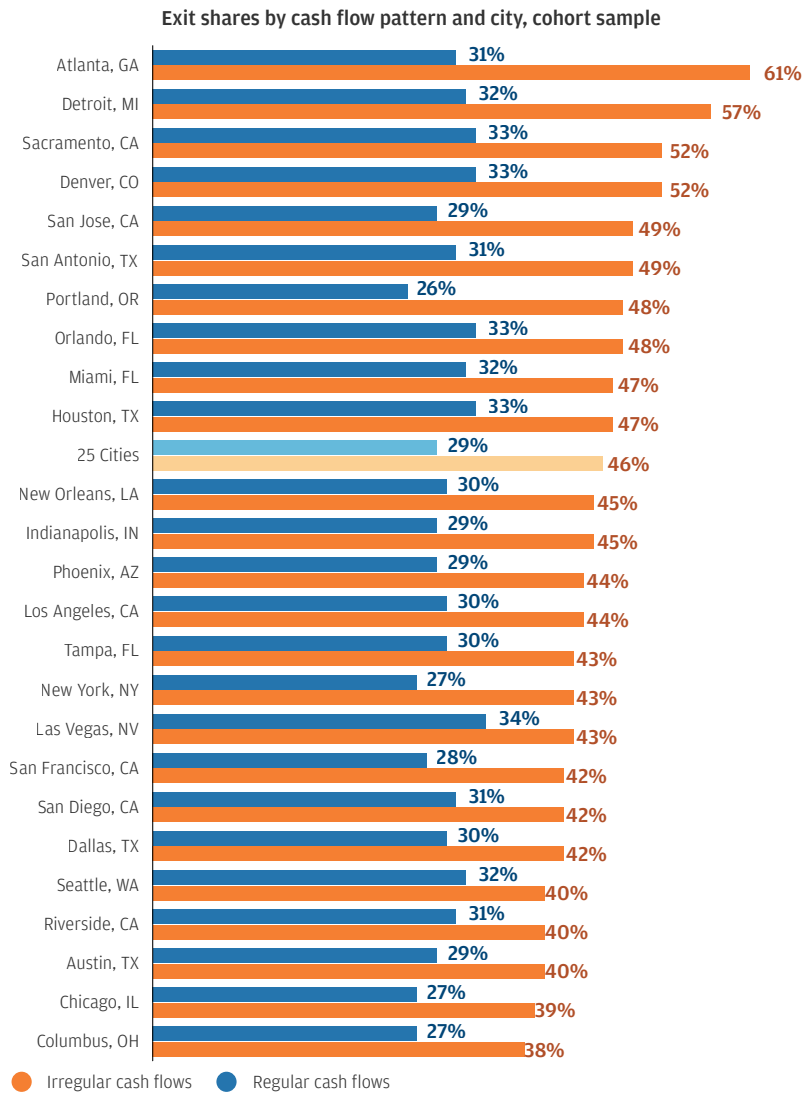


Note: Cash flow pattern and industry measured in year two and firm outcome measured in year four. Sample includes all firms founded in 2013.

Source: JPMorgan Chase Institute

The large difference in exit rates we observed between firms by cash flow pattern regularity overall varied widely across cities. Figure 6 presents the share of exits for firms with irregular and regular cash flow patterns in their second year for each of the 25 cities in our sample. In all cities, firms with irregular cash flows exited at a higher rate than those with regular cash flows. However, while the exit rates for firms with regular cash flows were relatively consistent across cities, exit rates varied substantially by city for firms with irregular cash flows. In all cities, between a quarter and a third of small businesses with regular cash flows exited by the end of their fourth year. However, among firms with irregular cash flows, nearly six out of ten small businesses exited in Atlanta and Detroit, as compared to fewer than four in ten in Chicago and Columbus.

**Figure 6:** Across cities, exit rates vary more for firms with irregular cash flows than for firms with regular cash flows



Note: Cash flow pattern transition measured from year two to three; revenue growth rate measured from year three to year four. Sample includes all firms founded in 2013.

Source: JPMorgan Chase Institute

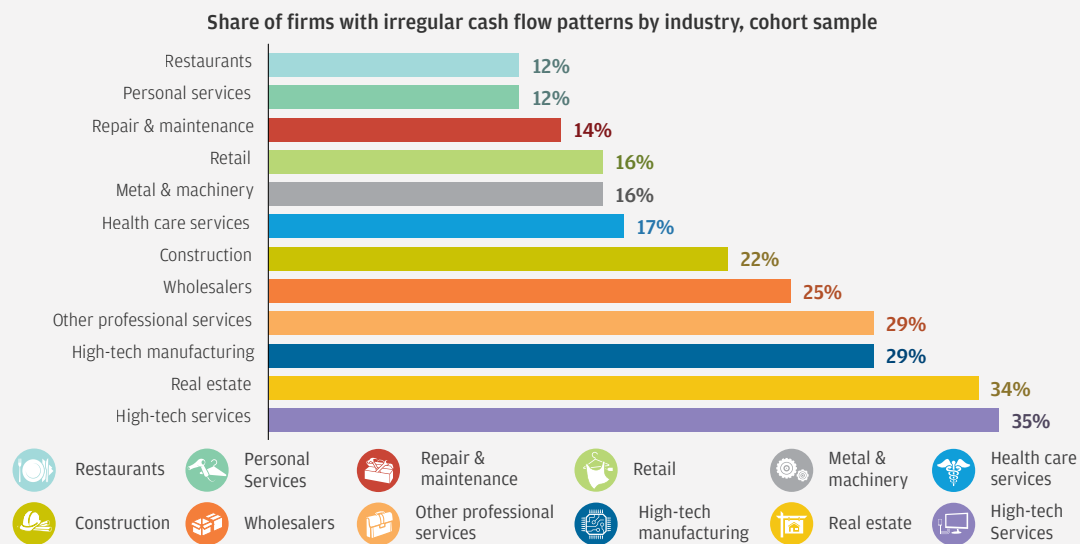
## Box 2: Cash Flow Regularity by Industry

While cash flow regularity may be affected by financial management practices of small business owners or payment behaviors of suppliers and customers, as well as potential differences in the economic environment across cities, regularity is also

meaningfully influenced by industry. Industries in which firms receive payments from customers or clients at a high frequency like restaurants or retail tend to have businesses with more regular cash flows, as there is more consistency on

the timing and volume of sales. On the other hand, industries like real estate and professional services tend to have firms with more irregular cash flows, potentially as a result of a diminished ability to forecast the timing of sales and payments.

**Figure 7:** The prevalence of regular cash flow patterns is strongly shaped by industry factors



Note: Cash flow pattern and industry measured in year two. Sample includes all firms founded in 2013.

Source: JPMorgan Chase Institute

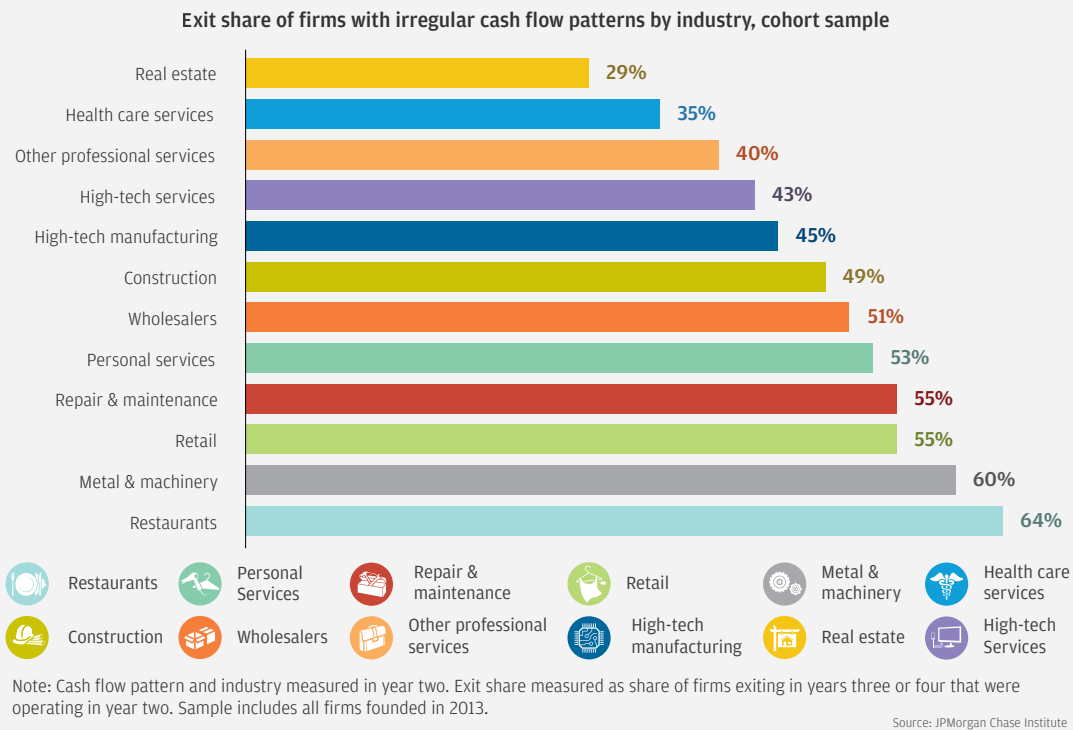
Figure 7 illustrates these differences by showing the share of irregular firms in each of the twelve industries. It shows a wide variation in the prevalence of irregular cash flows across industries. Firms with irregular cash flows comprise only 12 percent of restaurants and personal services firms. In contrast, firms with irregular cash flows comprise over a third of real estate and high-tech services firms. The difference in the share of regular firms among industries

is a reflection of the cash flow characteristics of each industry and may help illustrate the nature of their challenges.

Moreover, the impact of irregular cash flows on the probability of exit also varies across industries. Figure 8 shows the share of firms that exited in each industry in their third or fourth year, conditional on having irregular cash flows in their second year. Differences across industries were substantial. Nearly two-thirds of small metal and

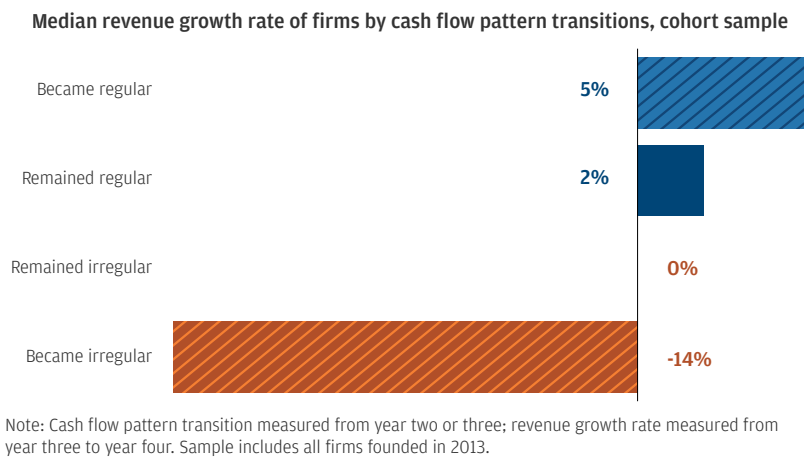
machinery manufacturers with irregular cash flows exited in the next two years. In contrast, only about a third of real estate and health care services firms exited under the same conditions. While industry is not the sole determinant of cash flow patterns or the relationship between irregular cash flow and survival, it is an important factor in explaining differences in cash flow patterns across firms in the small business sector.

**Figure 8:** The survival of firms with irregular cash flows vary by industry



Furthermore, firms that transitioned from regular to irregular patterns decreased their revenue growth. Figure 9 shows that firms with irregular cash flows during their second year that transitioned to regular cash flows in their third year saw revenue grow 5 percent in the following year. In contrast, firms with regular cash flows that transitioned to irregular cash flows in their third year saw revenues decrease 14 percent.

**Figure 9:** Firms that transition to regular cash flow patterns have faster revenue growth



# Finding Two

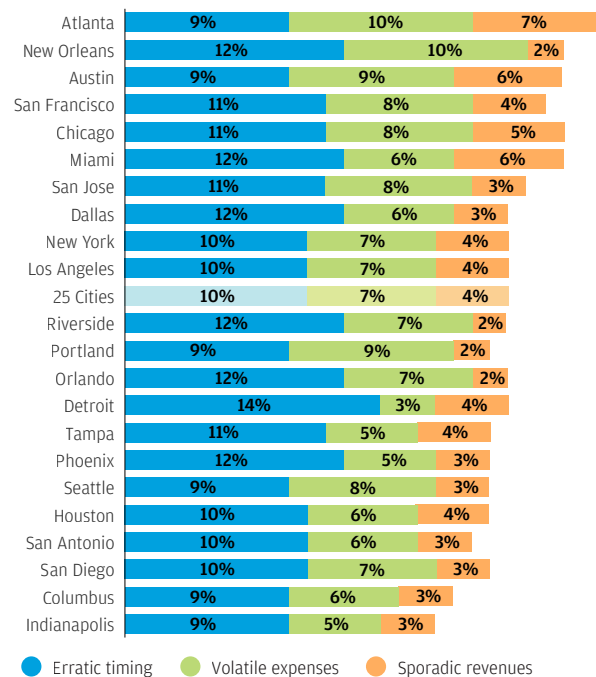
Firms with erratically timed revenues and expenses were most common among firms with irregular cash flows and most likely to exit, but firms with sporadic revenues had the largest revenue declines.

The previous finding established that small firms with irregular cash flows were more likely to exit and have lower revenue growth, both overall and across cities. In addition to this overall difference, there were also meaningful variations in outcomes between small firms with different irregular cash flow patterns.

A first difference concerns the overall prevalence of the three irregular cash flow patterns, particularly among younger firms. Figure 10 shows the share of firms that have each of the three relatively irregular cash flow patterns for each of the 25 cities in our sample. In all cities, firms with irregular cash flows were most likely to have the erratic timing cash flow pattern. This pattern potentially reflects the challenges small businesses face establishing a regular and well-managed stream of revenues. Although erratic timing is the most common irregular cash flow pattern in each city, there are nevertheless cities that have a significant share of the other two irregular patterns. For example, Atlanta and New Orleans had at least 10 percent of small businesses with volatile expenses, and Atlanta, Miami and Austin all had over 5 percent of small businesses with sporadic revenues.

**Figure 10:** All cities have substantial shares of firms with irregular cash flows, with erratic timing as the most prevalent pattern

### Share of firms with irregular cash flow patterns, cohort sample



Note: No cash flow pattern measured in year two. Sample includes all firms founded in 2013.

Source: JPMorgan Chase Institute



### Box 3: Irregular cash flow patterns within a city

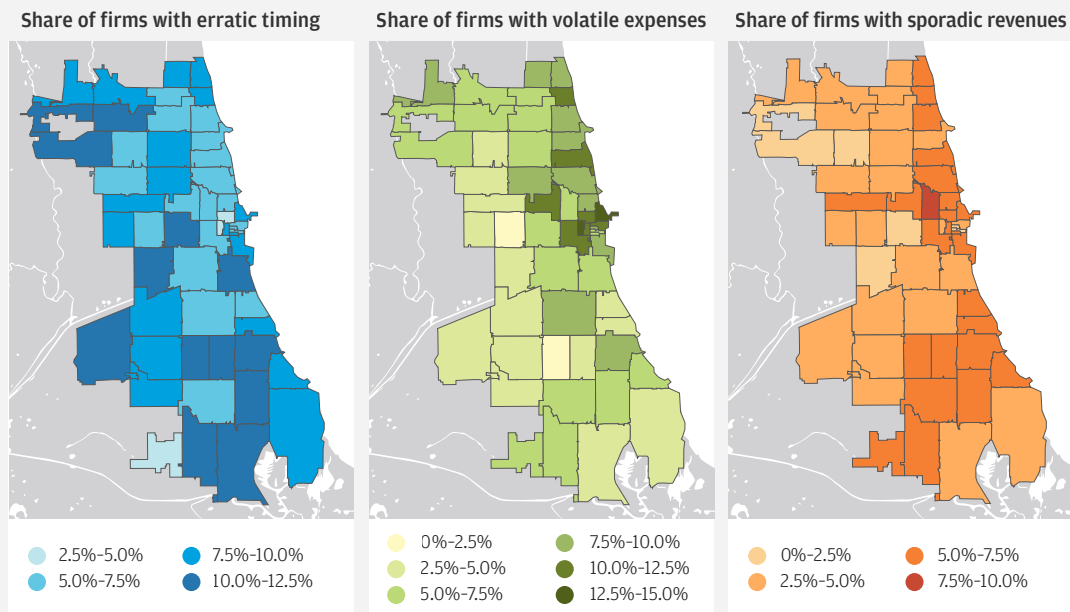
While the overall distribution of cash flow patterns is relatively consistent across cities, it may vary substantially within cities. Using Chicago as an example of the different experiences that small businesses face across communities, we find meaningful variation in the share of firms with erratic timing, volatile expenses, and sporadic revenues. Figure 11 depicts the share of firms of all ages with each of these cash flow patterns in our panel sample. Notably, the overall share of firms with irregular cash flow patterns is lower in Figure 11 than in previous figures—irregular cash flow patterns are less common among older surviving firms than they are among new firms (see

Appendix for details of cash flow pattern transitions). Still, the geographic patterning provides some insights into the correlates of irregular cash flow patterns that may inform the challenges faced by newer firms in each of these communities.

The clearest differences in irregular cash flows by area of the city were between communities on the South and West Sides where firms with erratic timing were relatively common and those on the North Side and downtown where firms with volatile expenses were more common. Differences in the prevalence of sporadic revenues were less pronounced, with moderate concentrations in areas of

both the North and South Sides. These community-level differences suggest potential correlates if not drivers of these cash flow patterns. Residents of North Side communities often have higher household wealth, home values, and income than South and West Side residents. These differences might correspond to a larger opportunity in North Side communities to start capital-intensive businesses that might incur large and infrequent expenditures consistent with the volatile expenses cash flow pattern, and potentially greater external financial challenges in South Side communities that might generate erratically timed revenues and expenses.

**Figure 11:** Distribution of different types of irregular cash flow patterns in Chicago, panel sample



Note: Cash flow patterns measured in 2014. Sample includes all firms active in 2013.

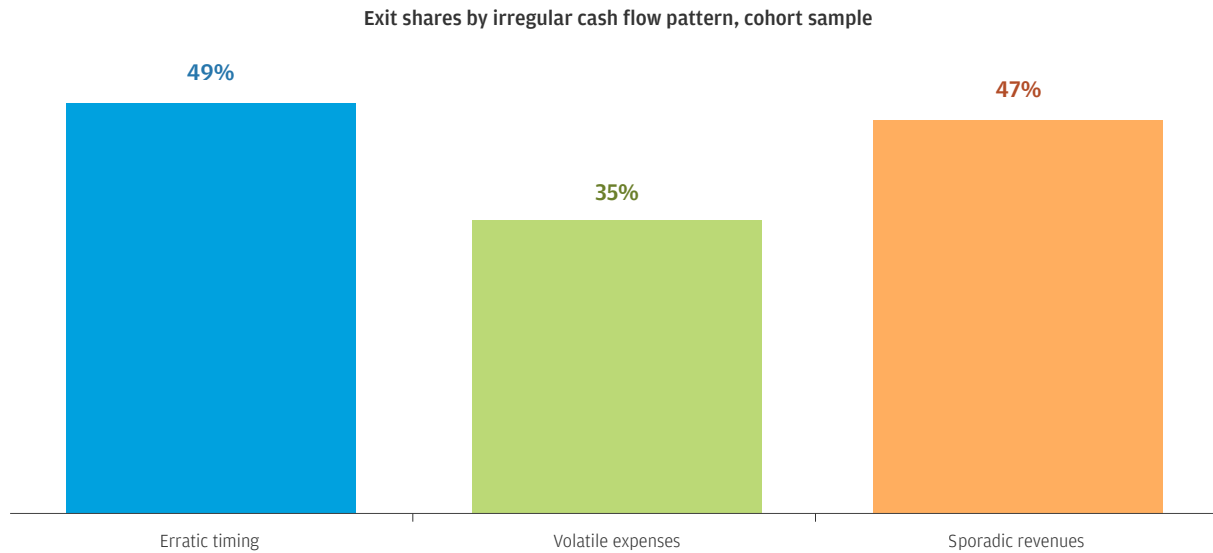
Source: JPMorgan Chase Institute

A second difference among irregular cash flow patterns reflects their impact on small firm survival. Figure 12 shows the exit rate for firms in their second through fourth year, based on

their cash flow pattern in the prior year. Nearly half of small businesses with erratically timed revenues and expenses in their second year exited by the end of their fourth year. Firms

with sporadic revenues were nearly as likely to exit over that same period. In contrast, only just over a third of firms with volatile expenses exited during this time frame.<sup>1</sup>

**Figure 12:** Firms with erratic timing were most likely to exit



Note: Cash flow pattern measured in year two. Exit share measured as share of firms exiting in years three or four that were operating in year two. Sample includes all firms founded in 2013.

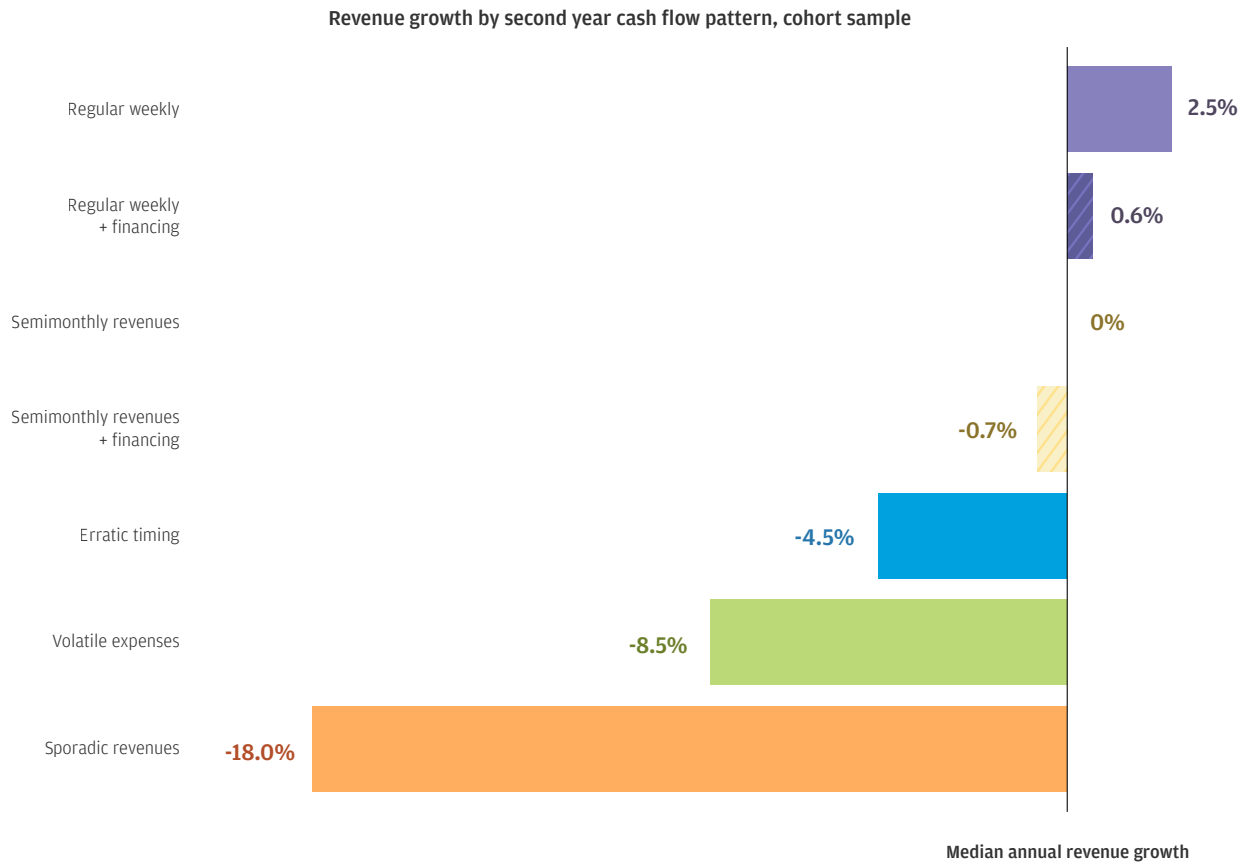
Source: JPMorgan Chase Institute

A third difference among irregular cash flow patterns reflects the impact of irregular cash flows on small firm revenue growth. Figure 13 shows median annual revenue growth in years three and four for small businesses on the basis of their second year cash flow

pattern. Overall, small businesses with sporadic revenues saw substantial revenue declines, with most firms experiencing a revenue decline of 18 percent or more. These large declines may reflect the challenges firms with sporadic revenues face in establishing a

regular stream of revenues. Small businesses with erratic timing and volatile expenses also experienced revenue declines, though less sharp than those with sporadic revenues.

**Figure 13:** Firms with sporadic revenues have the largest revenue declines



Note: Cash flow pattern measured in year two. Revenue growth rate measured from year three to year four. Sample includes all firms founded in 2013.

Source: JPMorgan Chase Institute

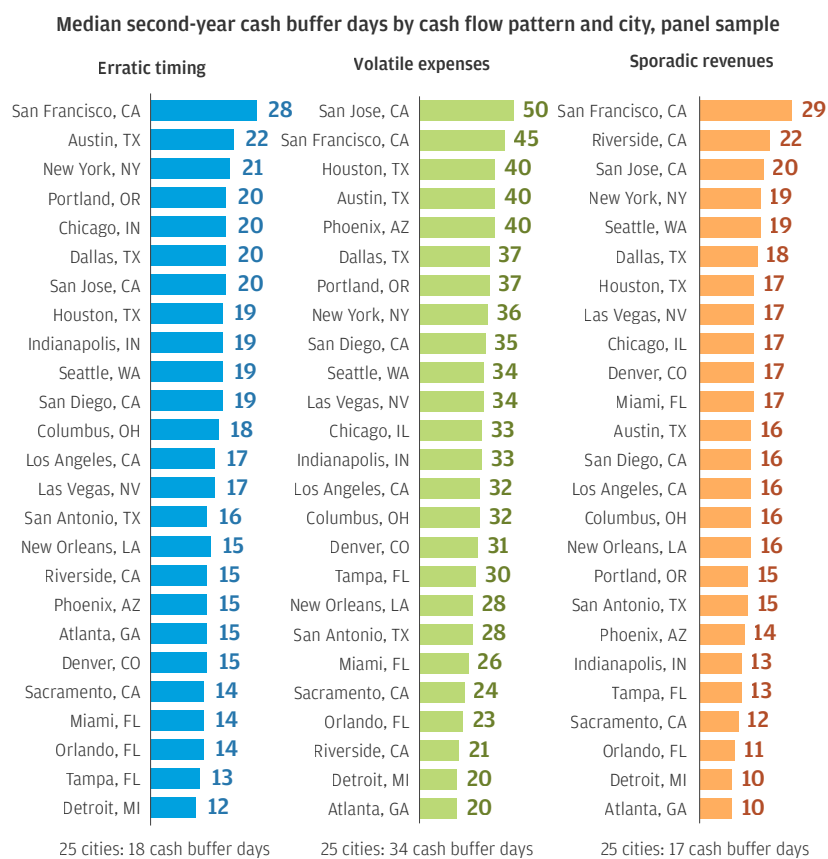
# Finding Three

Firms with limited cash buffers and irregular cash flows are the least likely to survive.

In the short run, firms can manage unusually large expenses, shortfalls in revenue, or other irregular cash flow patterns by holding more cash. Firms can use cash to pay suppliers, cover payroll, and keep the lights on should the business run into unexpected cash flow issues. While many small businesses have irregular cash flows, even more have limited cash liquidity. We measure cash liquidity using cash buffer days—the number of days during which firms could cover expenses in the event of a disruption to revenues. While it is uncommon for businesses to hold large amounts of cash in general, we find that firms with at least some irregular cash flow patterns held more cash than those with relatively regular cash flows.

Figure 14 illustrates this by showing, overall and for each city, the median cash buffer days for firms with each cash flow pattern during their second year. Two patterns emerge from these results. First, across cities, firms with volatile expenses held more cash buffer days than those with any other cash flow pattern, firms with erratic timing held the next highest level, and firms with sporadic revenues held the

**Figure 14:** Cash liquidity varies substantially across cities for firms with irregular cash flow patterns



Note: Cash flow buffer days are the number of days of cash outflows a business could pay out of its cash balance were its inflows to stop. We estimate cash buffer days for a business by computing the ratio of its average daily cash balance to its average daily cash outflows. Median second-year cash buffer days across cities for all regular cash flow patterns was twelve days. Sample includes all firms active in 2013.

Source: JPMorgan Chase Institute

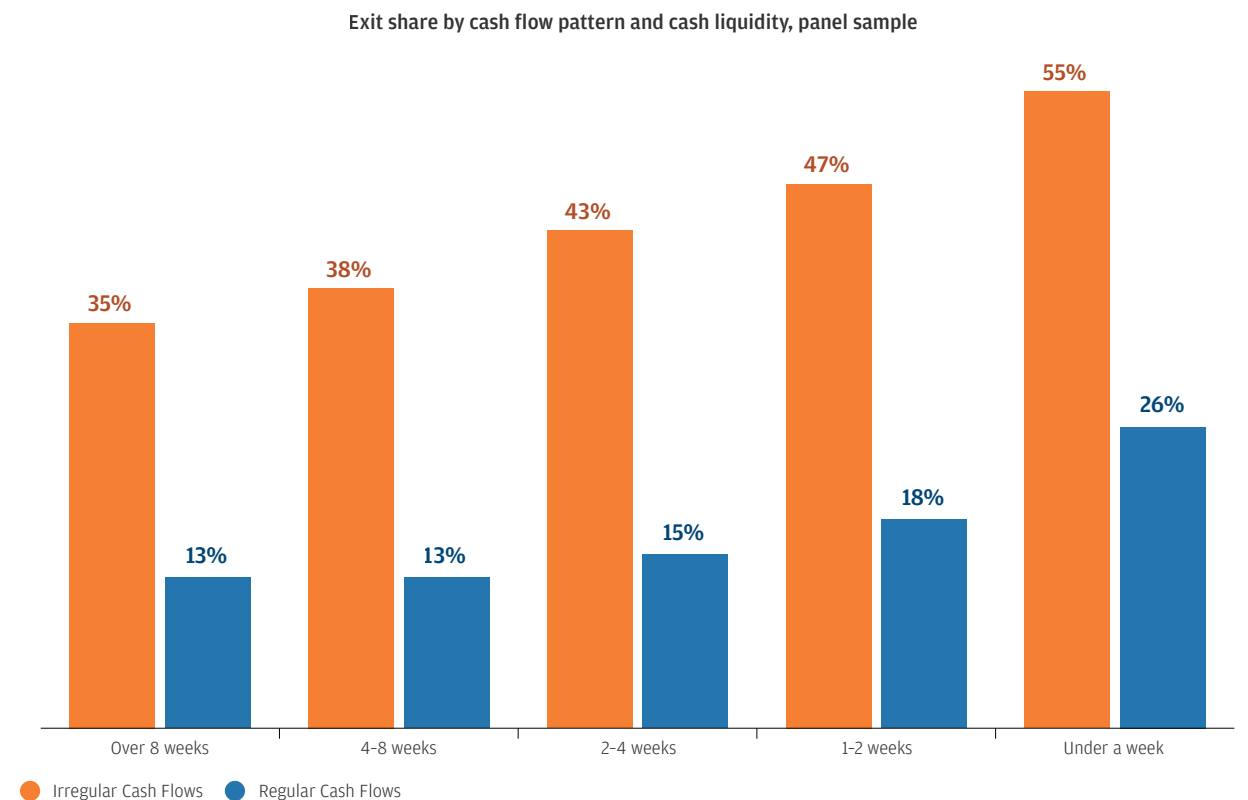
fewest.<sup>2</sup> Second, within irregular cash flow patterns, there are substantial differences across cities in cash buffer days held by firms. The typical small business in cities like San Francisco, San Jose, and Austin consistently had a higher number of cash buffer days. In these cities, irregular firms may have had more cash liquidity with which to buffer their irregular cash flows. In contrast, in cities like Atlanta and Detroit, the typical small business held many fewer cash buffer days for each irregular cash flow pattern. Small firms in these cities may have been less

buffered against each of these types of irregular cash flows.

A combination of relatively thin cash buffers and irregular cash flow patterns could pose a threat to the survival of small businesses. All else equal, small businesses with larger cash buffers are more likely to survive. In the first year, an additional cash buffer day can reduce the likelihood of an exit in the next year (Farrell et al., 2019). However, for the same level of cash buffer days there are significant differences between the survival

probabilities of regular and irregular firms. Figure 15 shows the impact of low cash buffer days on the likelihood of exit for regular and irregular firms. In both cases, firms that have lower cash buffer days exit at a higher rate. For instance, among small firms with irregular cash flows, 55 percent with under a week of cash buffer exited in the next two years, while only 35 percent of those with over two months of cash buffers exited. Smaller cash buffers were associated with higher probabilities of exit.

**Figure 15:** Firms with irregular cash flows exit at much higher rates than those with regular cash flows at all levels of cash liquidity



Note: Cash buffer days are the number of days of outflows a business could pay out of its cash balance were its inflows to stop. We estimate cash buffer days for a business by computing the ratio of its average daily cash balance to its average daily cash outflows. Cash flow pattern measured in year two. Exit share measured as share of firms in years three or four that were operating in year two. Sample includes all firms founded in 2013.

Source: JPMorgan Chase Institute



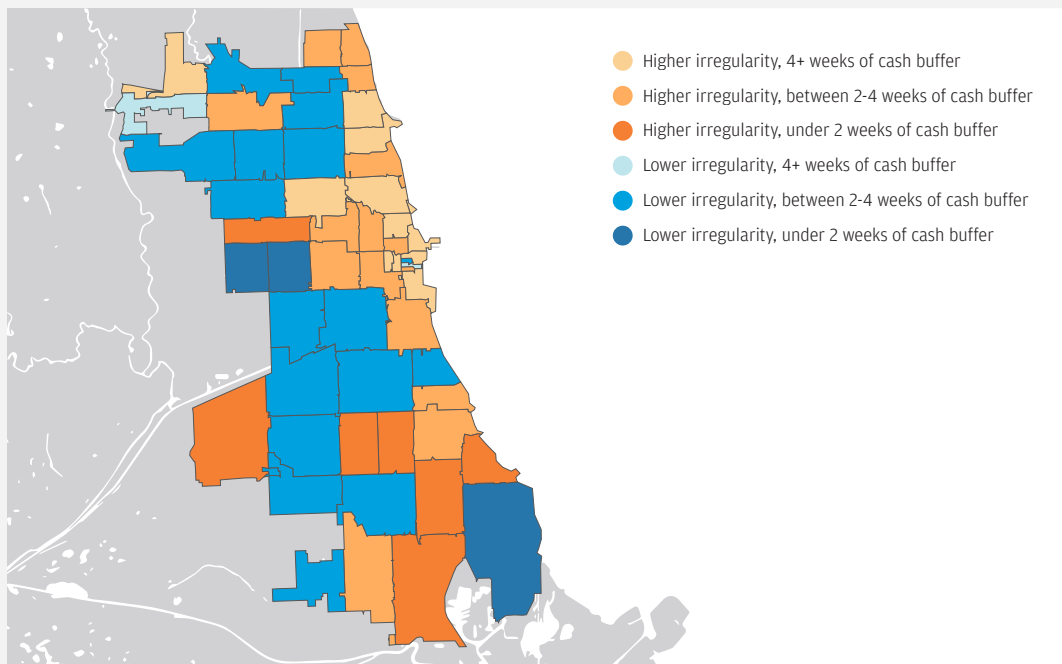
## Box 4: Irregular Cash Flows and Cash Liquidity in Chicago

Like the prevalence of irregular cash flow patterns, cash liquidity may vary more within cities than it does between cities. Prior research examining differences in cash buffer days across communities in the City of Chicago (Farrell and Wheat, 2018) suggests variation along lines similar to those seen in the distribution of irregular cash flow patterns shown in Figure 11. These prior results suggest that businesses in wealthier or higher income communities may have higher levels of cash liquidity with which to

weather periods of irregular cash flows, while businesses in lower income communities may be more sensitive to irregular cash flows. Figure 16 illustrates these dynamics within Chicago by characterizing each community both on the basis of the typical cash buffer held by its small businesses and by the prevalence of irregular cash flows within the community based on data from our panel sample. Communities shaded orange had higher shares of small businesses with irregular cash flows, while communities

shaded blue had lower shares of irregular cash flows. The typical small business in communities with darker shades held fewer cash buffer days, while the typical small business in communities with lighter shades held more cash. Notably, all of the communities with limited cash liquidity and higher shares of firms with irregular cash flows are on the South and West Sides, while all of the communities where most small businesses carry a large cash buffer are downtown or on the North Side.

**Figure 16:** Irregularity and cash buffer days in Chicago, panel sample



Note: Cash buffer days are the number of days of cash outflows a business could pay out of its cash balance were its inflows to stop. We estimate cash buffer days for a business by computing the ratio of its average daily cash balance to its average daily cash outflows. Cash flow pattern and cash buffer days measured in 2014. Sample includes all firms active in 2013.

Source: JPMorgan Chase Institute

# Conclusions and Implications

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While small businesses often cite cash flow management as a barrier to growth and survival, few existing frameworks offer clear guidance on how to distinguish cash flows that are easy to manage from those that are not. To this end, we propose a new definition of cash flow regularity as the ability of a firm to maintain a consistent stream of revenues and expenses, both in timing and volume. Using transaction data from actual small businesses, we used this definition to identify seven cash flow patterns. The three most irregular of these patterns map to distinctive kinds of cash flow irregularities small businesses typically face. Collectively, these patterns provide empirical grounding for the concept of cash flow management, and serve as the basis of a set of findings that illustrate the ways in which cash flow management may be just as important as liquidity to small business growth and survival.

Accordingly, policymakers might use these patterns both to structure policies and programs that might assist small businesses with cash flow management, and tailor these policies and programs to the specific challenges faced by different kinds of small businesses. Specifically, our findings lead to four key conclusions and implications for small business decision makers:

**Cash flow regularity is as important as liquidity for small business survival and growth.** While liquidity is a

critical input to small business growth, a firm that acquires capital but cannot properly manage its cash flow is unlikely to successfully grow and contribute to either the aggregate economy or even to the financial well-being of its owner. While many programs aim to increase access to capital, entrepreneurial development programs that help firms achieve and maintain regular cash flows may help small businesses survive and grow. Such efforts may be particularly useful if targeted to new firms that appear more sensitive to irregular cash flow patterns.

**Policies, programs, and individual firm guidance may be most useful if targeted to the specific kinds of cash flow challenges small businesses face.** Our analyses identified three substantively distinct ways in which small businesses may have irregular cash flows. Across cities, the most prevalent of these was erratic timing—a pattern that suggests a firm may be having difficulty managing the rhythm of its operating cash flows. These firms might be best supported by programs that help entrepreneurs better anticipate their expenses, or affordable products that help small businesses buffer the cash flow impact of late payments from customers. The sporadic revenues cash flow pattern suggests a different challenge—infrequent revenues that might increase the amount of time between when a firm incurs expenses and the time it receives corresponding revenues. Local policymakers seeking to support firms

with sporadic revenues might consider accelerated payment programs modeled after those implemented and proposed at the federal level. The volatile expenses cash flow pattern suggests yet a third challenge—large and potentially unexpected expense payments that might overwhelm the thin cash buffers many firms maintain. While firms with this cash flow pattern held larger cash buffers than all other firms, they also had the highest exit rates. To the extent that these expenses are difficult to predict ahead of time, programs, policies, and products that shorten the time to receive external finance may be most important for the survival and growth of these firms.

**Small businesses with irregular cash flows are prevalent in all cities, but small businesses with irregular cash flows have more cash liquidity in some cities than others.** Small businesses with very irregular cash flows comprise between a quarter and a third of all small businesses in the 25 cities in our sample. While there are some compositional differences across cities, the overall pattern is roughly the same, with erratic timing accounting for the majority in nearly every city. In contrast, typical cash buffers for small businesses with irregular cash flows vary widely across cities. Controlling for the specific cash flow pattern, the typical small business in San Francisco, Seattle, or Austin often has twice as large of a cash buffer than the typical small business in Detroit or Atlanta. City-level programs and policies might,

at a minimum, attend to unique features of a city (e.g., home values) that shape overall cash liquidity in the sector.

**Irregular cash flow patterns vary more within cities than they do across cities.** While shares of small businesses with irregular cash flow

patterns are relatively consistent across cities, our initial exploration suggests that they can vary substantially within cities. In particular, firms with the erratic timing cash flow pattern appear to be more prevalent in lower income communities, while firms with the volatile expenses cash flow patterns appear to be concentrated

in more affluent communities. To the extent that local decision makers develop programs, policies, and products intended to solve these distinct cash flow challenges, they might further target these at the specific communities where these challenges are most prevalent.

# Appendix

## Changes in cash flow patterns over time

Firms may experience different cash flow challenges at different points in their lifecycles. For example, firms may initially have less frequent or more unpredictable revenues. As they mature and grow their customer base, their revenues may become increasingly regular. We used our cohort of small businesses founded in 2013 to investigate this evolution by analyzing their cash flow patterns as they matured over four years.

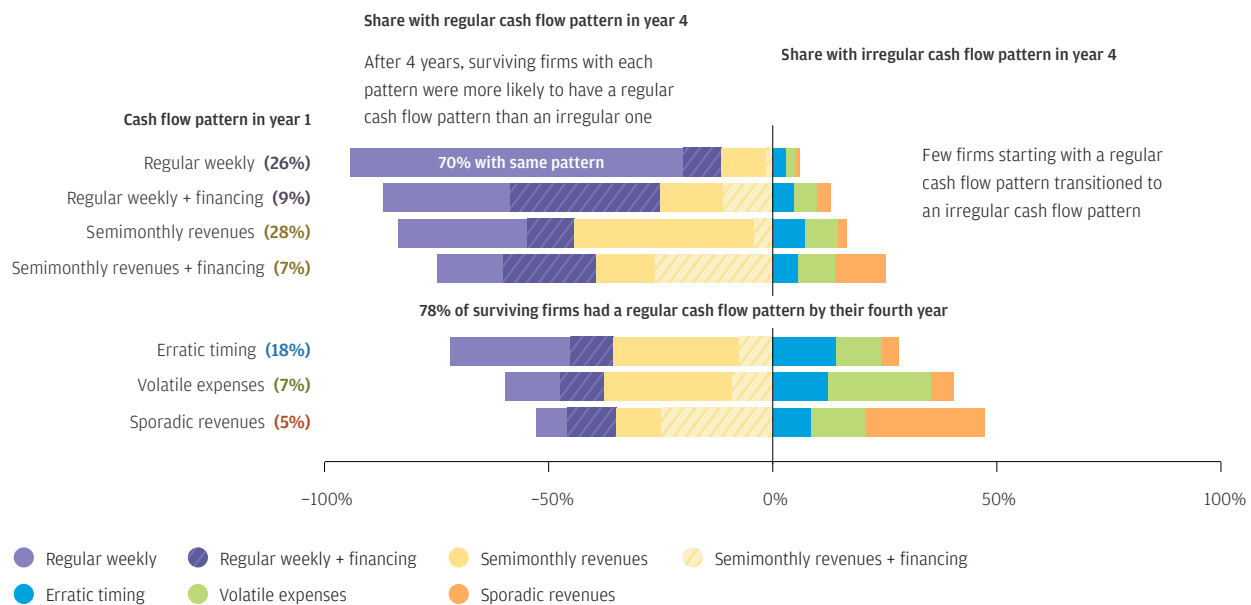
Figure 17 shows how cash flow patterns for individual firms changed from their first year to their fourth in our sample. Each bar represents firms with one

of the seven cash flow patterns in the initial year. The composition of each bar shows the distribution of cash flow patterns in the fourth year for firms from the same initial pattern. For each pattern from the first year, at least half of the firms was in one of the more regular patterns four years later. For example, 5 percent of the cohort was initially in the sporadic revenues pattern. Four years later, 51 percent of the surviving firms were in one of the four more regular patterns four years later. Another 27 percent continued to experience sporadic revenues, and 21 percent moved to a different irregular pattern, either erratic timing or volatile expenses. Firms initially in one of the more regular patterns were relatively

less likely to transition into one of the less regular clusters.

During their first year, 30 percent of firms in this cohort experienced relatively irregular cash flows, compared to 17 percent among firms of all ages in 2017. It is perhaps not unsurprising that new firms are more likely to experience irregular cash flows than firms overall. After four years, cash flows in this cohort become more regular, with 78 percent in the four regular patterns and the remaining 22 percent in relatively irregular patterns.

**Figure 17:** Firms surviving the first four years often transition into more regular cash flow patterns



Note: Sample includes all firms founded in 2013.

Source: JPMorgan Chase Institute

# Glossary

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<b>Cash flow regularity</b>	The extent to which revenues and expenses are stable in their amounts and consistent in their timing.
<b>Cash flow patterns</b>	<p>A framework that describes seven trajectories that vary based on the cash flow regularity and financial utilization of small businesses</p> <ol style="list-style-type: none"><li>1. Regular weekly - Larger revenues and expenses occur with weekly frequency, with little deviation in amount or timing;</li><li>2. Regular weekly + Financing - Very similar to pattern 1, only with high utilization of financing;</li><li>3. Semimonthly revenues - Larger revenues occur about twice a month, while expenses are paid about weekly;</li><li>4. Semimonthly revenues + Financing - Very similar to pattern 3, only with high utilization of financing;</li><li>5. Erratic timing - Although the cash flow amounts do not show particular volatility, their timing is very inconsistent;</li><li>6. Volatile expenses - Expenses are more unpredictable than revenues, while the reverse is true for most other firms;</li><li>7. Sporadic revenues - Revenues are particularly infrequent, about once every seven weeks, and the amount varies greatly. Financing is heavily utilized.</li></ol>
<b>Central city</b>	The most populous city in a metro area, typically governed by a single political entity.
<b>Consistency</b>	Standard deviation of the number of days between local peaks in cash flows, divided by the average number of days between local peaks. Higher values of this measure indicate larger deviations in timing relative to the average timing of peak cash flows.
<b>Employer</b>	A firm that had payroll outflows in at least six out of the past twelve months.
<b>Exit</b>	A firm's closing their deposit account, which we interpret as a firm's closure.
<b>Frequency</b>	1/the average period, in days, between local peaks in cash flows. Larger values of frequency indicate higher frequency occurrences (e.g., weekly).
<b>Firm</b>	Our unit of analysis, one or more Chase Business Banking accounts identified as related businesses.
<b>Metro area</b>	A geographic area that is defined by the Census as Core Based Statistical Area.
<b>Revenue</b>	Defined in our data as all cash inflows less identified financing inflows.
<b>Volatility</b>	Standard deviation of cash flow, divided by the average daily cash flow. Higher values indicate larger deviations in amount relative to the daily average.

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# Endnotes

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- 1 Notably, the order of exit shares by irregular cash flow pattern reported here differs from the earlier findings of Farrell et al. (2018), where firms with volatile expenses were more likely to exit years two through four than those with sporadic revenues or erratic timing. An important difference between the current sample and the former sample is that the current sample is limited to small businesses operating within central city limits, while the former sample included entire metro areas. This suggests that these differences may be due to differences in the relationship of cash flow patterns to exit between central cities and their surrounding areas.
- 2 Across cities, the typical small business with regular cash flow patterns held even fewer cash buffer days, with less variation across cities. Among firms with regular weekly cash flows, the range of median cash buffer days across cities was from seven cash buffer days in Tampa to twelve cash buffer days in Seattle.

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