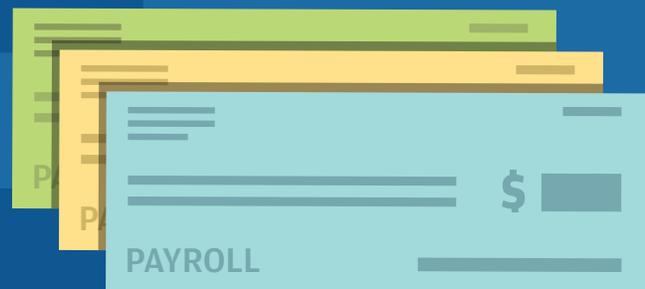


# The Ups and Downs of Small Business Employment

Big Data on Payroll Growth and Volatility



# About the Institute

The global economy has never been more complex, more interconnected, or faster moving. Yet economists, businesses, nonprofit leaders, and policy makers have lacked access to real-time data and the analytic tools to provide a comprehensive perspective. The results—made painfully clear by the Global Financial Crisis and its aftermath—have been unrealized potential, inequitable growth, and preventable market failures.

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. Its mission is to help decision-makers—policymakers, businesses, and nonprofit leaders—appreciate the scale, granularity, diversity, and interconnectedness of the global economic system and use better facts, timely data, and thoughtful analysis to make smarter decisions to advance global prosperity. Drawing on JPMorgan Chase's unique proprietary data, expertise, and market access, the Institute develops analyses and insights on the inner workings of the global economy, frames critical problems, and convenes stakeholders and leading thinkers.

The JPMorgan Chase Institute is a global think tank dedicated to delivering data-rich analyses and expert insights for the public good.

## Acknowledgments

We thank our research team, including Derek Bekebrede and Andreas Weber, for their hard work and contribution to this report.

We would like to acknowledge Jamie Dimon, CEO of JPMorgan Chase & Co., for his vision and leadership in establishing the Institute and enabling the ongoing research agenda. Along with support from across the firm—notably from Peter Scher, Len Laufer, Max Neukirchen, Joyce Chang, Matt Zames, Judy Miller, and Alexis Bataillon—the Institute has had the resources and support to pioneer a new approach to contribute to global economic analysis and insight.

We would also like to acknowledge the contribution of our other researchers, specifically Kanav Bhagat, Chenna Cotla, Fiona Greig, Drew Pinta, Jessica Wu, Kerry Zhang and Chen Zhao. We especially want to thank Jenn Piepszak and the Chase Business Banking team for their support, and other experts within JPMorgan Chase, including Bori Cox, Sally Durdan, Brian Haney, Anmol Karnad, Adam Nelson, Brent Reinhard, Mary Jane Rogers, Sam Saperstein, and David Spyra. This effort would not have been possible without the critical support of the JPMorgan Chase Intelligent Solutions team of data experts, including Joe Bimmerle, Steve Farrell, Jay Galloway, Shannon Kim, Stella Ng, Michael Solovay, and Tony Wimmer, and JPMorgan Chase Institute team members Kelly Benoit, Kathryn Kulp, Natalie Holmes, and Gena Stern.

Finally, we would like to acknowledge with gratitude the invaluable input of small business experts who provided thoughtful commentary, including John Haltiwanger, Brian Headd, Ron Jarmin, Raymond Keating, Kausar Hamdani, Nick Maduros, Claire Kramer Mills, Karen Mills, Jonathan Parker, Arthur Plews, and Scott Shane. For their generosity of time, insight, and support, we are deeply grateful.

# The Ups and Downs of Small Business Employment

## Big Data on Payroll Growth and Volatility

Diana Farrell  
Chris Wheat

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# Executive Summary

Small businesses, defined as businesses with fewer than 500 employees, play a critical role in the US economy. They provide work for nearly half (48 percent) of all employees in the US and are credited with creating 52 percent of net job growth.<sup>1</sup> Small businesses also account for a significant share of personal income, given their average annual payroll of \$45,000 per employee. Despite its importance, relatively little is known about the underlying dynamics of employment growth and volatility at the individual small business level. In particular, publicly available aggregate data provide an incomplete view of the ways in which employment in the sector shapes the financial well-being of small business owners and their employees.

As part of a broader research agenda on the small business sector, the JPMorgan Chase Institute constructed a sample of over 45,000 small business customers that had electronic payroll outflows for each of the nine non-holiday months of 2015. These individual small business payroll outflows provide an important lens on the contributions of small business sector employment to the US economy. Many public data sources that speak to the contribution of employment from the small business sector only provide data on job counts often measured only once per year. While payroll outflows are driven in part by job counts, they also provide a more granular and high-frequency view of employment and wages. Our unique dataset provides a granular view of payroll growth and volatility and their impact on employment at the individual business level.

## Data

We created a sample of 45,260 small businesses who hold Chase Business Banking deposit accounts and meet our criteria for small, core metropolitan employer businesses. We then used their combined 65 million transactions to produce a view of daily cash inflows, payroll and other cash outflows, and end-of-day balances over the nine non-holiday months from February 2015 to October 2015.

### Small businesses

-  Hold Chase Business Banking accounts
-  End-of-day combined balances do not exceed \$20 million each day
-  Do not identify with more than a single address and/or a single industry

### Core metropolitan employer businesses

We define core businesses as those businesses that have financial activity that indicates they are not seasonal businesses, hobby businesses, small office/home office businesses (SOHOs), micro businesses, etc.

-  For at least five of nine months, at least \$500 in outflows and 10 transactions
-  At least one inflow and outflow in each month
-  At least one and fewer than 500 employees in each payroll period
-  Are located in Metropolitan Areas where Chase has a representative footprint

### Selected key industries

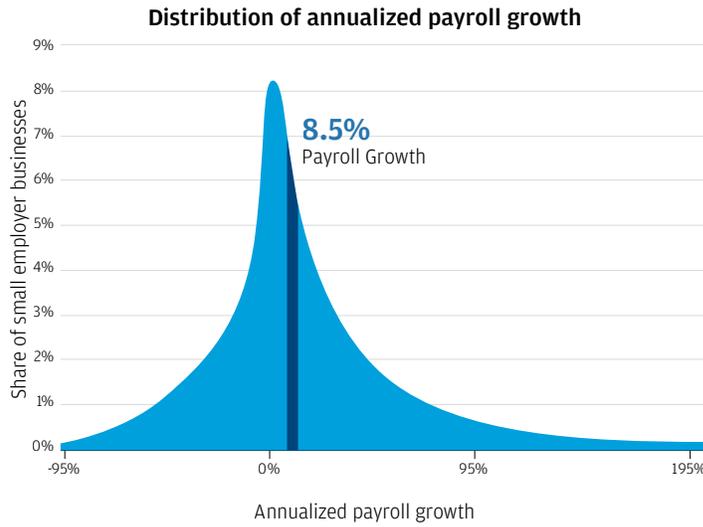
The businesses we study are part of 12 selected key industries that comprise key elements of the small business sector:

- |   |  |
|---|--|
|  Construction                |  Personal Services    |
|  Health Care Services        |  Real Estate          |
|  High-Tech Manufacturing     |  Repair & Maintenance |
|  High-Tech Services          |  Restaurants          |
|  Metal & Machinery           |  Retail               |
|  Other Professional Services |  Wholesalers          |

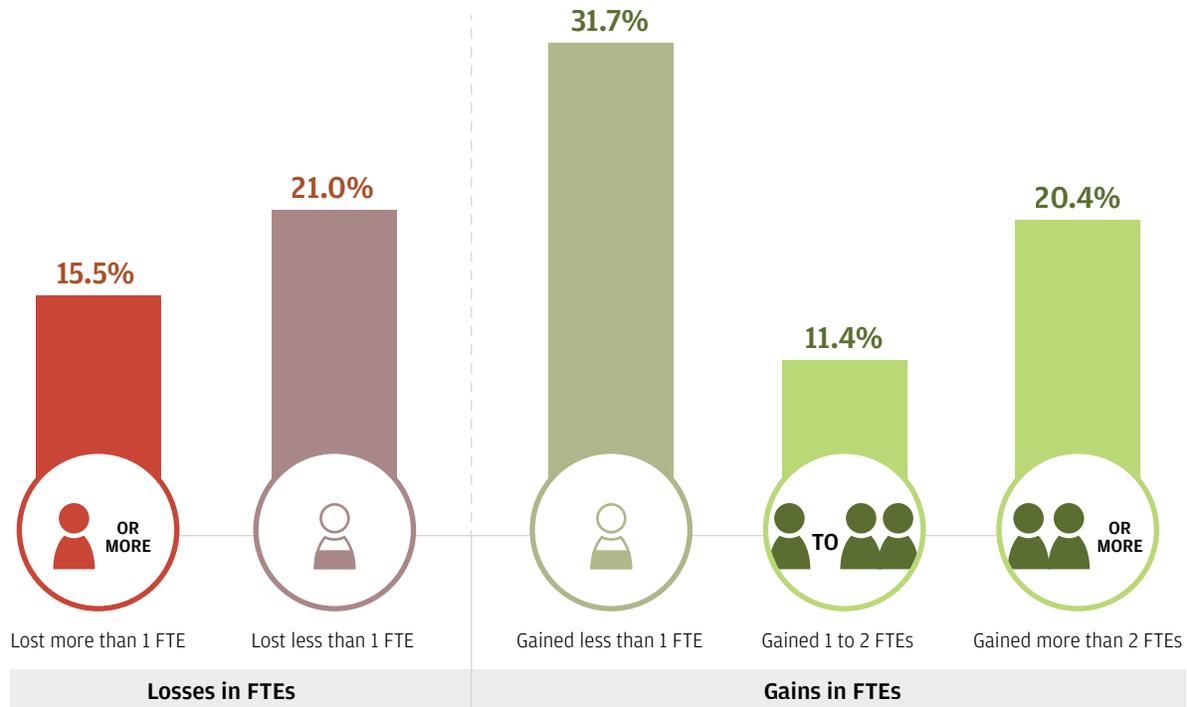
Together, these 12 industries capture 73 percent of for-profit employer small firms and 65 percent of for-profit small business employment.

**Finding One**

Payroll for most small employer businesses grew by less than the equivalent of one full-time employee in a calendar year, with median annualized payroll growth of 8.5 percent.



Monthly payroll payments from the median small employer business in our sample grew at an annualized rate of 8.5 percent per year. This growth rate corresponded to the addition of less than one full-time equivalent (FTE). Moreover, 36.5 percent of these firms experienced declining payroll outflows, consistent with the loss of at least a partial FTE. In contrast, 31.8 percent of small businesses experienced growth in payroll outflows consistent with the addition of one or more FTEs.



Note: We calculated annual full-time equivalent (FTE) wages for a firm by dividing the total annual payroll for its 6-digit NAICS industry by the total number of employees in that industry. We identify FTE changes by comparing annualized payroll growth to this annual FTE wage measure. Annual payroll and employee data are from the US Census Statistics of US Businesses.

# Finding Two

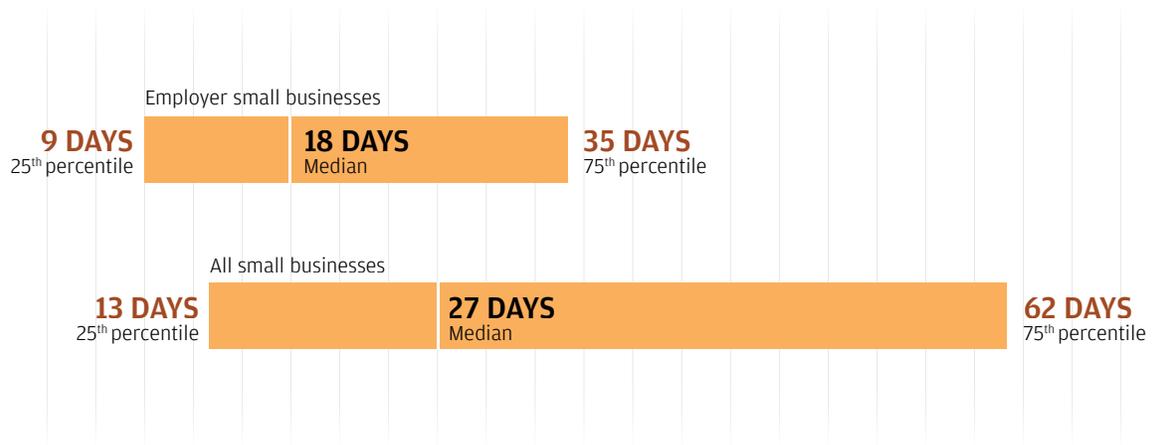
## Payroll expenses were a material outflow for employer small businesses, which held fewer cash buffer days than nonemployer small businesses.

The typical employer small business had payroll outflows of \$18,700, or 18 percent of all outflows.



Large payroll outflows can pose significant challenges to small businesses with limited liquidity. We found that across employers and nonemployers, the typical small business only carried 27 cash buffer days. Moreover, the typical employer small business had only 18 cash buffer days, significantly fewer than 27. The size and volatility of payroll expenses may put substantial stress on the relatively limited cash reserves of these employer small businesses.

**Cash buffer days** are the number of days of cash outflows a business could pay out of its cash balance if its inflows were to stop. We estimate cash buffer days for a business by computing the ratio of its average daily cash balances to its average daily cash outflows.

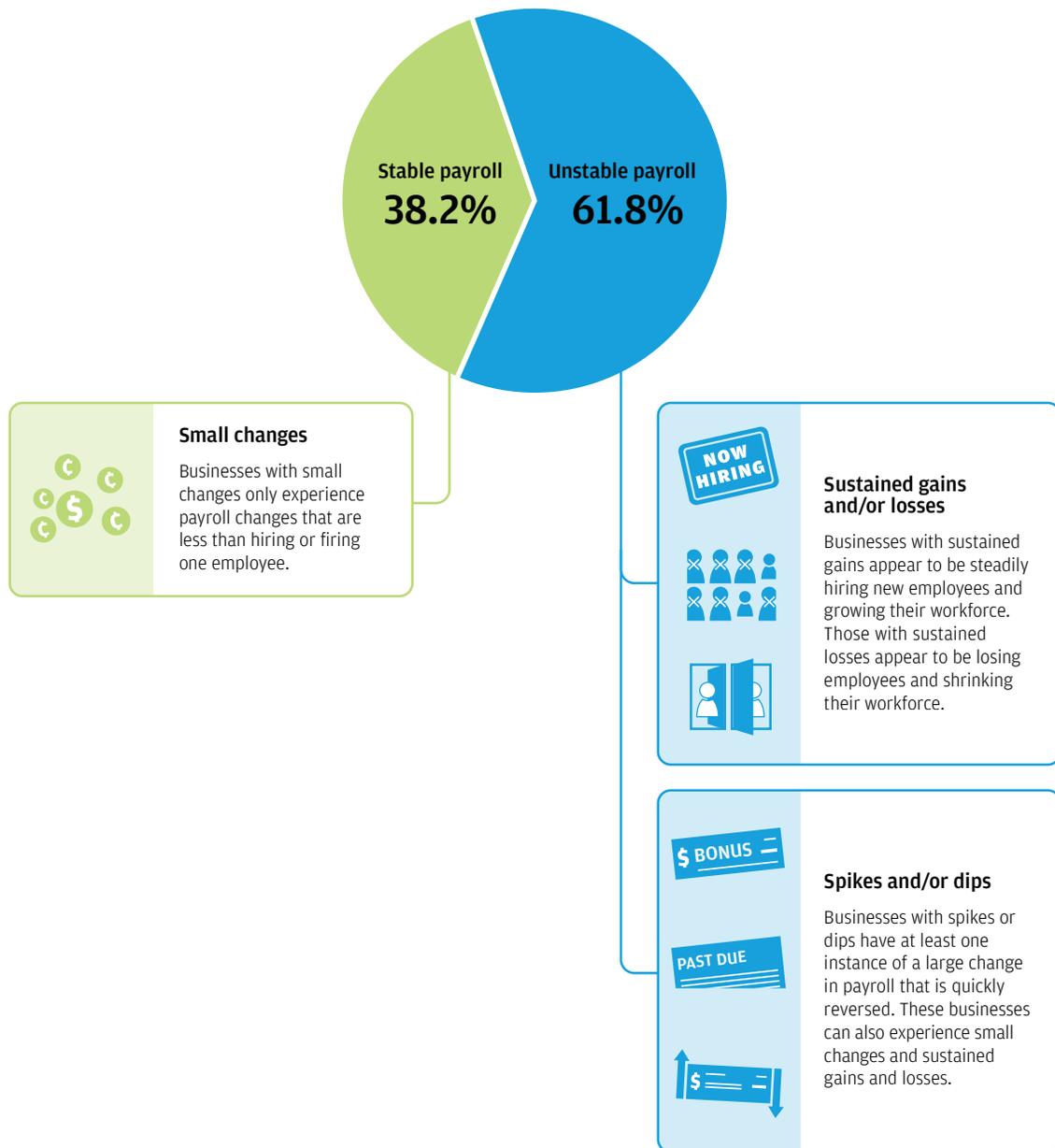


## Finding Three

Most small employer businesses experienced unstable payroll and employment volatility including job gains and losses and other spikes and dips in payroll.

61.8% of small employer businesses experienced unstable sustained gains and/or losses, spikes, dips, or spikes and dips.

### Share of employer small businesses



# Finding Four

The typical small employer business experienced substantial volatility in payroll outflows, and volatility was highest for younger small employer businesses.

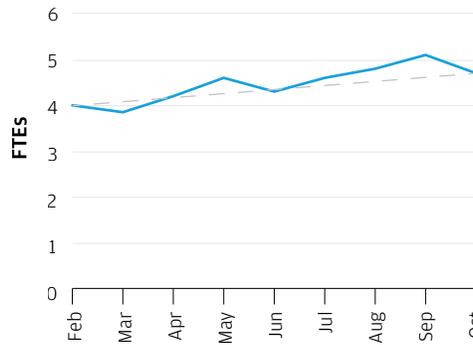
While small business payroll grew by less than the equivalent of one FTE over the course of a year, growth was rarely smooth.



## LOW VOLATILITY

### Small changes

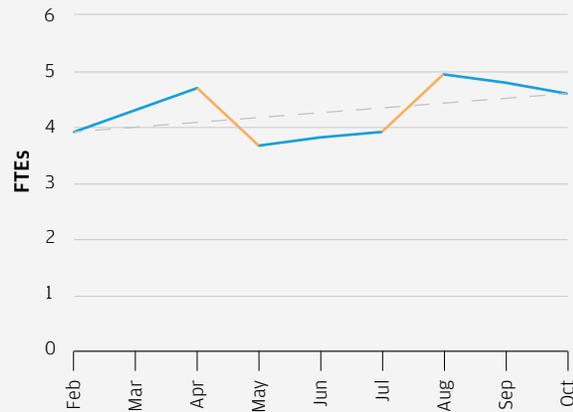
25 percent of small businesses experienced payroll changes no more volatile than the small changes pattern.



## TYPICAL VOLATILITY

### Gains and losses

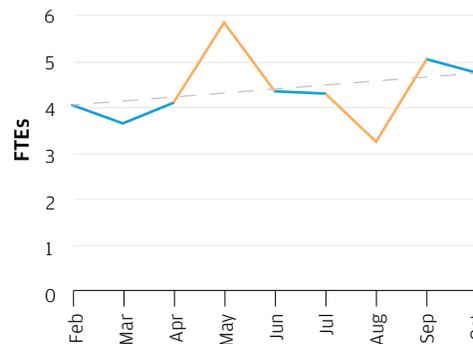
Most small businesses experienced payroll changes similar to the gains and losses pattern.



## HIGH VOLATILITY

### Spikes and dips

25 percent of small businesses experienced payroll changes at least as volatile as the spikes and dips pattern.



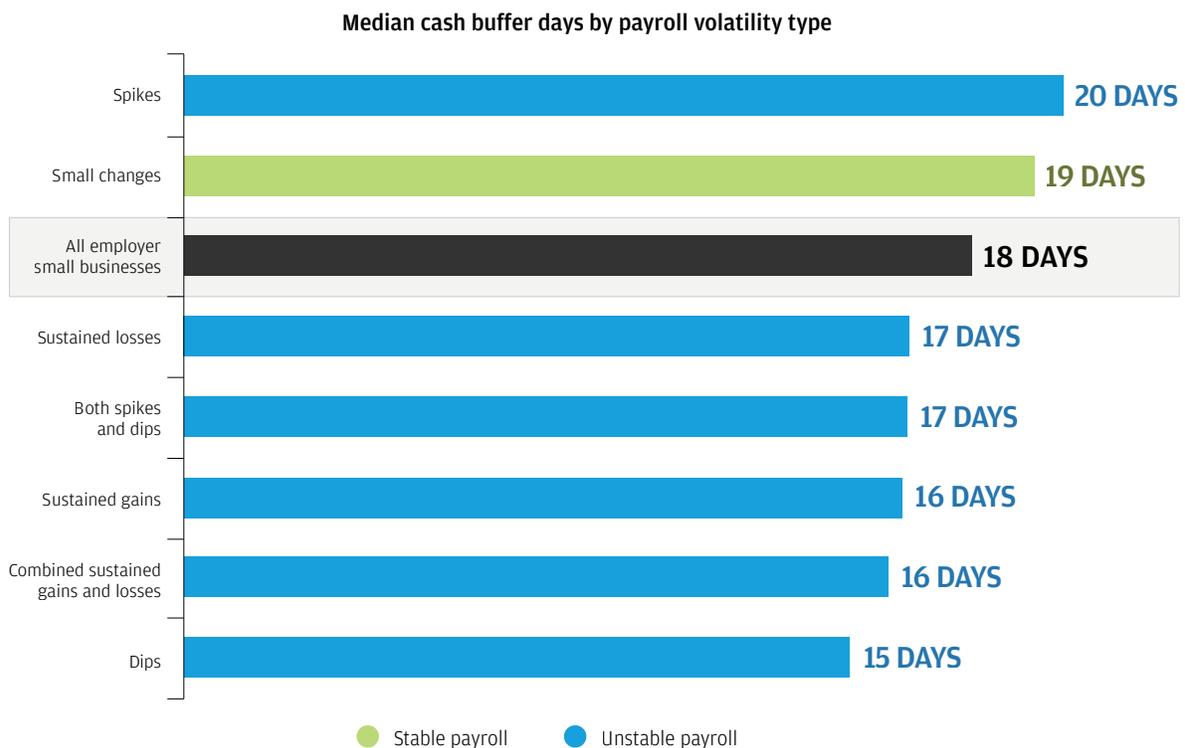
— Small change (<1 FTE)    — Large change (1+ FTE)

## Finding Five

Small employer businesses with more volatile payroll patterns tended to have fewer cash buffer days.

The median small employer business with dips, combined sustained gains and losses, and sustained gains had the fewest cash buffer days.

- Small employer businesses with spikes were one exception to this rule, which may reflect businesses that pay bonuses or commissions with growing revenues



## Conclusion

The findings in this report are relevant for policy makers, advocates, and private-sector partners alike. These findings suggest that those who seek to help small businesses should focus not only on new business creation but specifically on minimizing payroll volatility, which can benefit both small business owners and employees. Moreover, they shed light on trade-offs inherent in policies that improve wages of small business employees but impose costs on small business owners.

# Findings

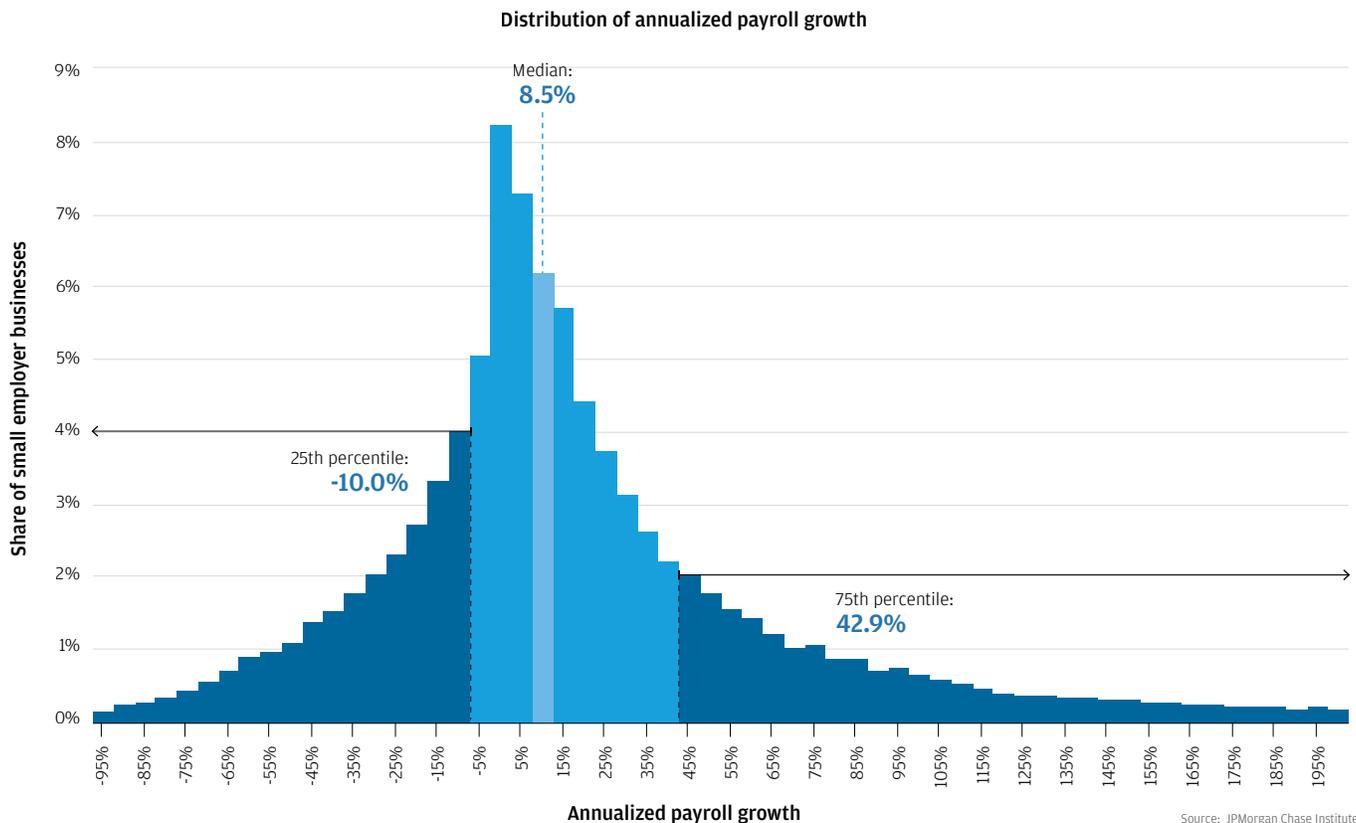
## Finding One

Payroll for most small employer businesses grew by less than the equivalent of one full-time employee in a calendar year, with median annualized payroll growth of 8.5 percent.

Payroll growth can be a sign of a healthy business that is growing, providing increasing income for its employees, and potentially increasing the economic well-being of its owners. In contrast, declining payroll can be a sign that a small business is facing an economic downturn and eliminating jobs.

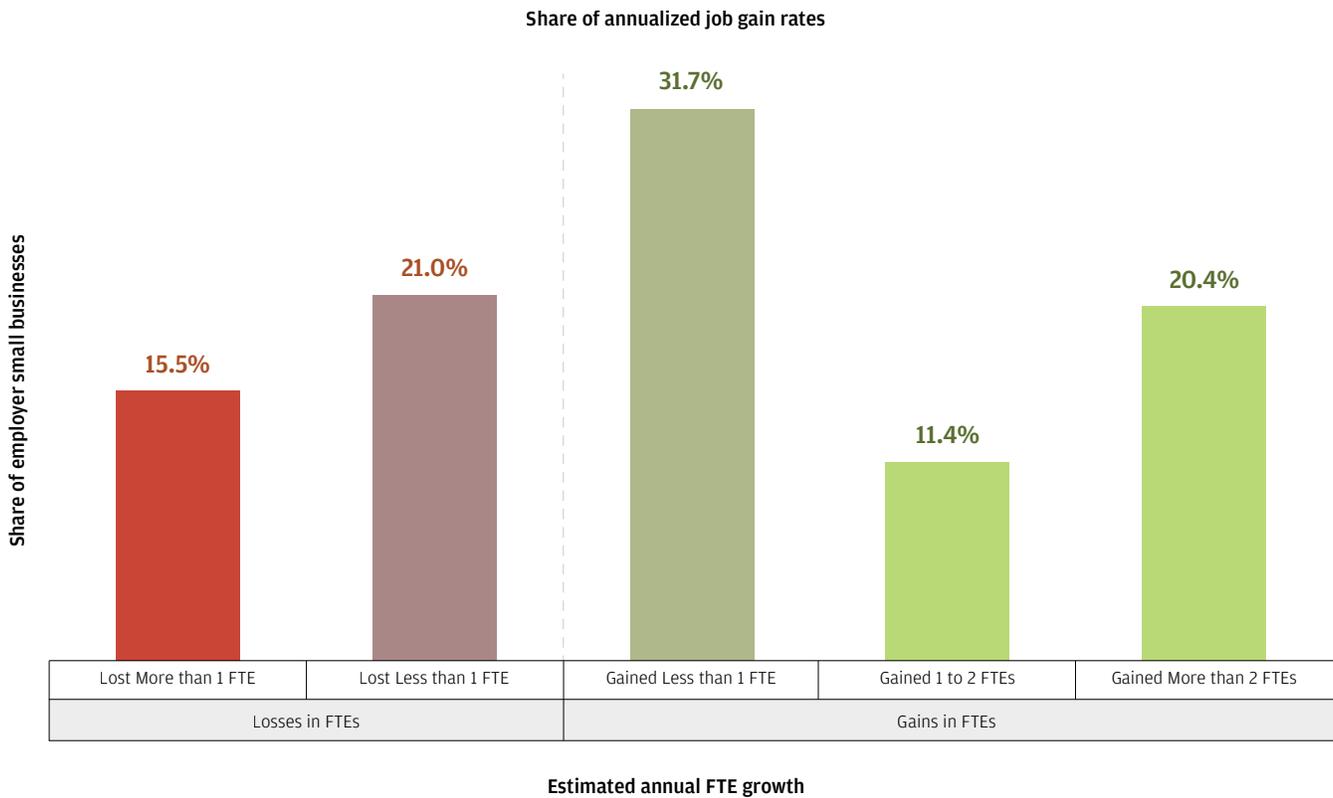
The median small employer business in our sample had payroll growth of 8.5 percent on an annualized basis, with wide variation in payroll growth across all businesses, as shown in Figure 1. At the lower end, 25 percent of small employer businesses had payroll that contracted at a rate greater than 10 percent, while on the upper end, 25 percent of small employer businesses had payroll that grew at a rate of greater than 42.9 percent. Moreover, we found that 13 percent of our sample had payroll that more than doubled during 2015.

Figure 1: Payroll Grows at 8.5 percent per Year in the Median Small Employer Business



To relate this wide range of payroll growth rates to employment changes, we converted changes in dollars of payroll outflow to changes in full-time equivalents (FTEs). To do this conversion, we first estimated the typical monthly payment associated with an FTE in a given industry.<sup>2</sup> This allowed us to estimate the number of employees for each firm at the beginning of our time window in February and at the end of our window in October. We used these observations to estimate the number of additional FTEs each firm would have hired (or lost) in a full calendar year. For example, an increase in payroll of 10 percent could correspond to two new full-time jobs for a small firm with 20 employees, while corresponding to a part-time employee or an increase in hours for a small firm with 5 employees. Figure 2 presents the distribution of these changes for the firms in our sample.

**Figure 2: Most Small Employer Businesses Gained Less than a Full-Time Equivalent in a Year**



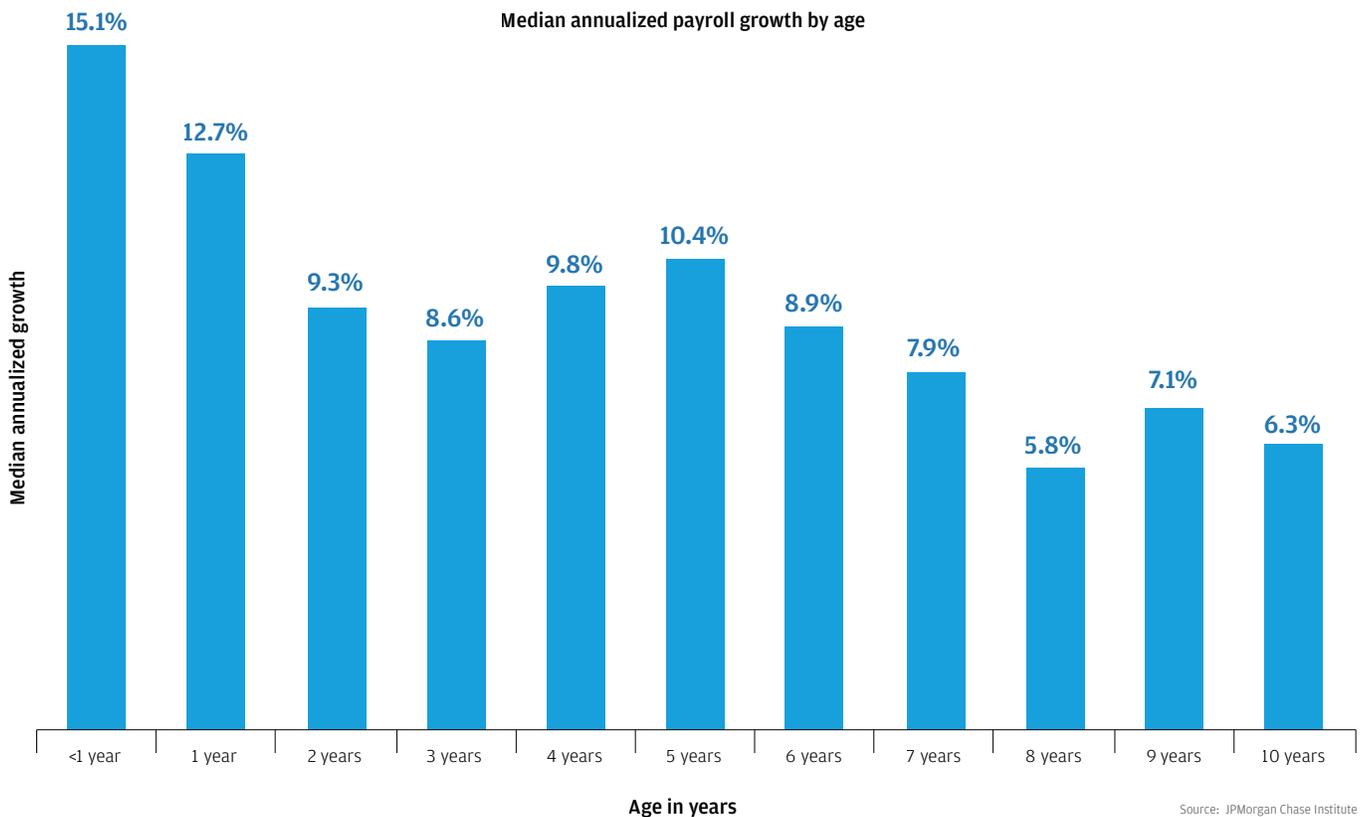
Source: JPMorgan Chase Institute

Across all firms in our sample, 36.5 percent of firms experienced declining payroll outflows, consistent with partial or full job reductions, including 15.5 percent that lost more than an FTE. An additional 31.7 percent experienced payroll growth consistent with less than one full-time hire. In total, most of the small employer businesses—68.2 percent—either lost jobs or added less than a single job in a calendar year. Some firms do experience more significant job growth—11.4 percent of firms saw increases consistent with one to two new employees, and 20.4 percent of firms saw increases consistent with two or more new employees.<sup>3</sup>

## Payroll growth of younger firms

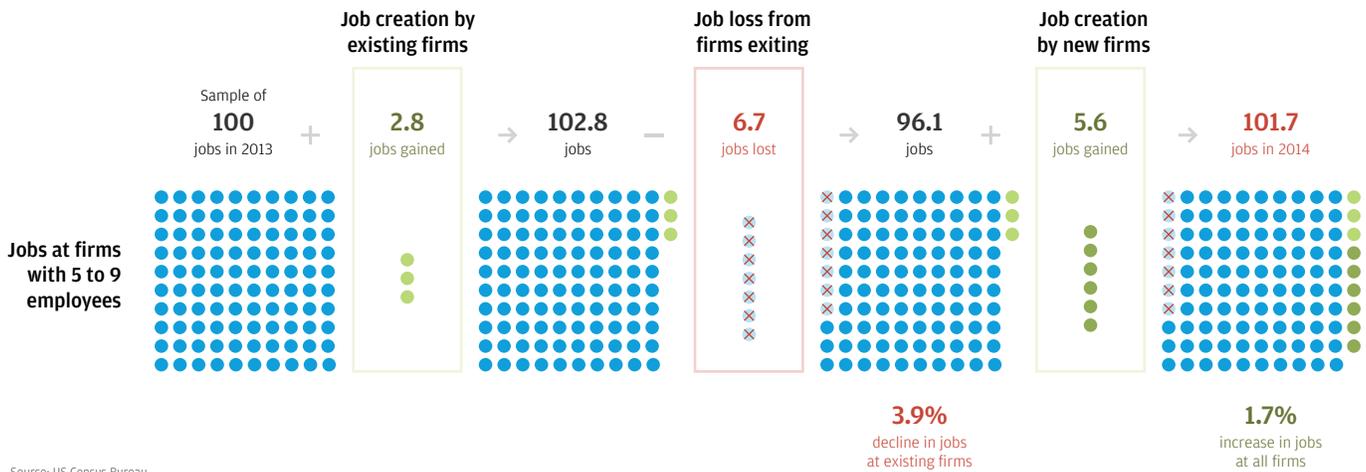
Notably, we also found that the payroll outflows of younger firms grow more quickly than those of older firms, particularly in their first two years. Figure 3 displays the median annualized payroll outflow growth rate by the age of the business.<sup>4</sup> In our sample, firms less than two years old experienced payroll growth substantially higher than those older than two years. The median firm in its first year saw payroll outflows grow at an annualized rate of 15.1 percent, while the median firm in its second year saw payroll grow at 12.7 percent per year. Older firms saw decidedly lower growth rates—the median 10-year-old firm only saw payroll outflows grow at 6.3 percent per year.

Figure 3: Payroll Growth is Strongest in the First Two Years



The high payroll growth we observed among young firms potentially sheds light on an often underreported characteristic of small business employment—the net job loss among existing small businesses. Small businesses are frequently noted for their contribution to net job creation (Birch, 1981). However, recent scholarship has highlighted the importance of new rather than small businesses in creating US jobs (Haltiwanger, et al., 2013). By definition, all newly founded businesses create jobs—all newly founded firms had no employees in the prior year. In contrast, data from the US Census show that job losses from small businesses that exit (cease operations) exceed job creation by existing small businesses. Figure 4 illustrates the contributions of new and existing small businesses to job creation from March 12, 2013 to March 12, 2014.

Figure 4: While All Small Firms Added Net Jobs, Existing Small Firms Lost Net Jobs in 2013



In order to map most closely to the median-sized firm in our sample, we focus our analysis on the universe of small firms with five to nine employees. Small firms of this size that survived from 2013 to 2014 did, in fact, create jobs. These firms created 2.8 new net jobs for every 100 employees—a positive growth rate consistent with the positive growth rate of payroll we observe among the firms that survive the nine months of our study. However, those firms that did not survive the full year were responsible for 6.7 lost jobs. After a year, only 96.1 employees were still employed by the small firms that existed at the beginning of the year, a net loss of 3.9 jobs. In contrast, newly founded small firms created 5.6 jobs for each of the original 100 employees. In combination, this produced 101.7 employees at small firms for every 100 employees of the original firms, or a 1.7 percent net gain in jobs. Notably, larger firms with 500 or more employees also created net jobs, even excluding jobs created by new large firms.<sup>5</sup>

This result sheds light on the fragility of job growth for smaller businesses. While new small businesses drive positive job creation for the sector as a whole, existing small businesses lose net jobs because of firm failure. Existing data provide a clear view of the jobs added or lost by these firms from one year to the next, but little insight into the process during the intervening months that may have contributed to their fragility. Findings 3 through 5 offer a view of high-frequency payroll variation to better inform this process.

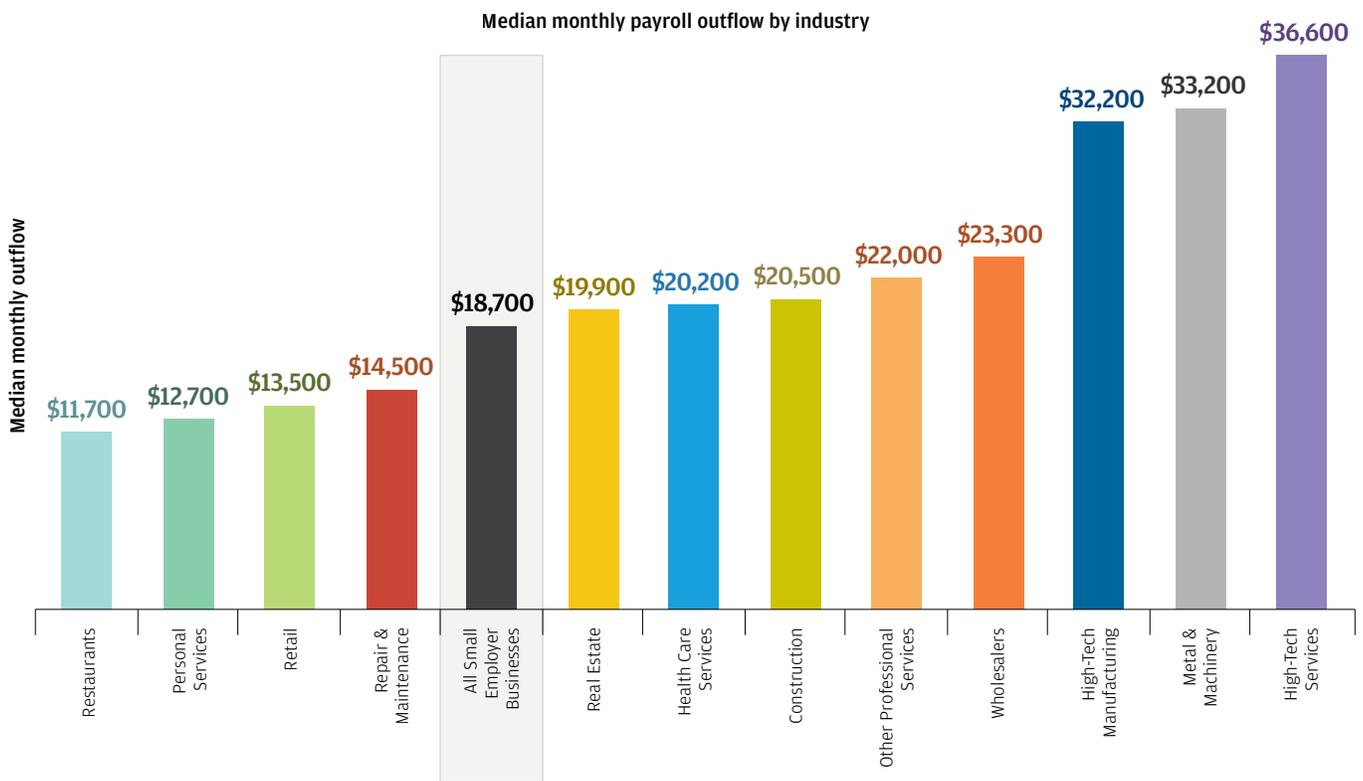
While new small businesses drive positive job creation, existing small businesses lose net jobs because of firm failure.

## Finding Two

Payroll expenses were a material outflow for small employer businesses, which held fewer cash buffer days than nonemployer small businesses.

Cash flows related to employment expenses were a major component of overall cash flow for these small employer businesses, with heterogeneity across industries, as shown in Figure 5. The typical small business in our sample had \$18,700 in payroll expenses. Payroll outflows varied from a median of \$11,700 per month in the Restaurant industry to a median of \$36,600 per month in the High-Tech Services industry.

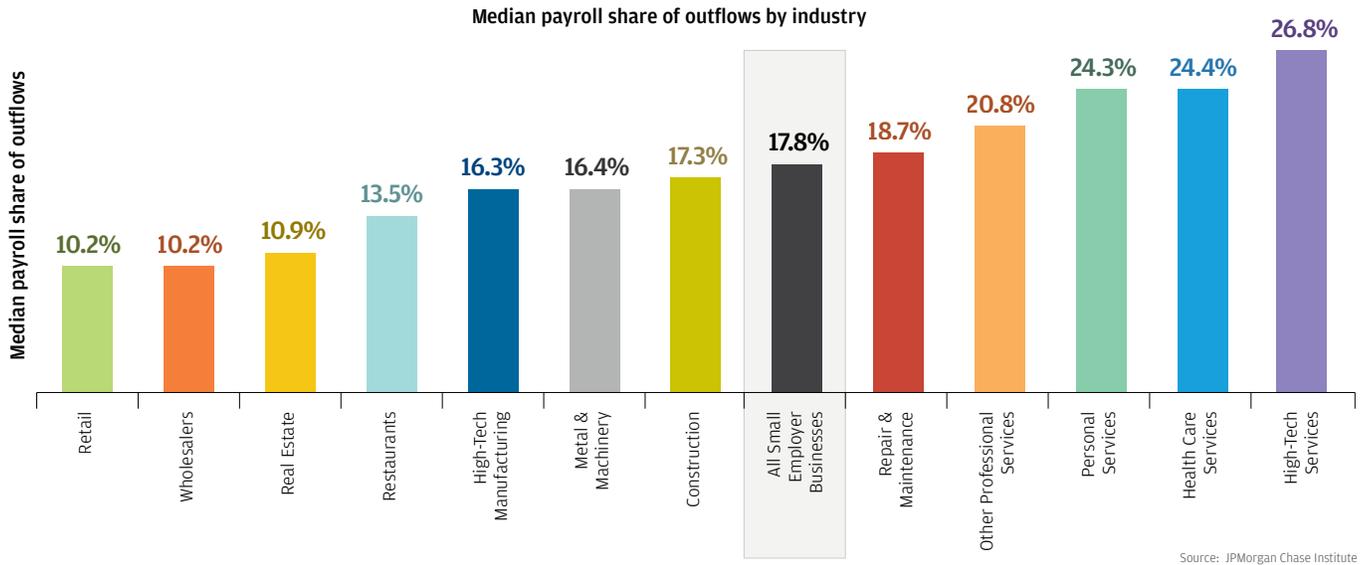
Figure 5: Median Monthly Payroll Outflows Vary Widely by Industry



Source: JPMorgan Chase Institute

These payroll expenses comprised a significant fraction of the total outflows we observe among small employer businesses over the non-holiday months of 2015, as illustrated in Figure 6. For the median small employer business in our sample, payroll comprised 18 percent of observed outflows. This percentage varies substantially across industries—payroll only comprised 10 percent of the outflows of wholesalers and retailers, but 27 percent of the outflows of High-Tech Services firms.

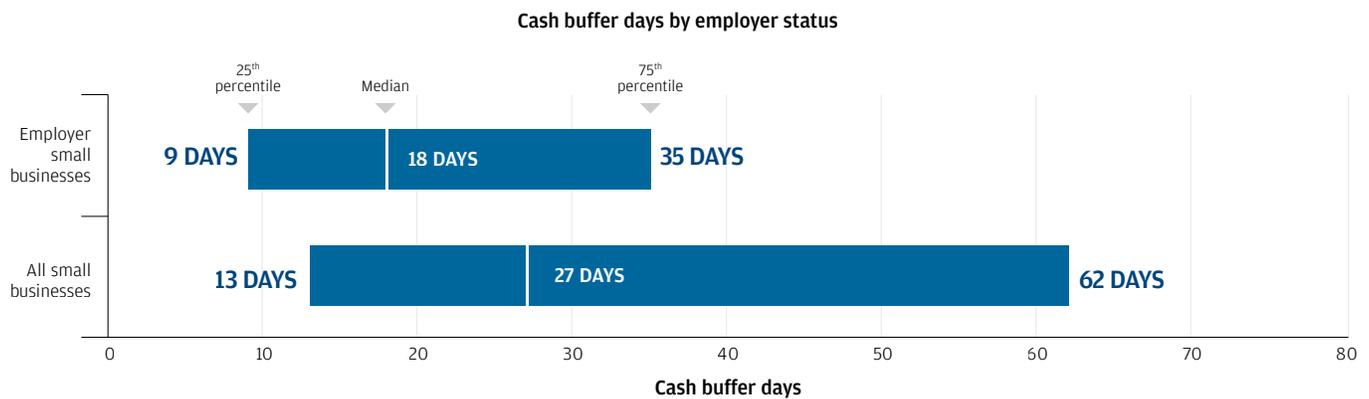
Figure 6: Payroll as a Share of Outflows Varies Widely by Industry



Notably, our window on payroll outflows only captures the cash flows that correspond to small business employee take-home pay. We also examined a subset of employers in our sample for which we could observe electronic payments for both take-home pay and employment-related taxes. For these employers, tax payment outflows were an additional 23.1 percent of take-home pay. This suggests that the full set of employment-related expenses including wage and tax payments was likely 22 percent of outflows for the median employer and over 30 percent in industries such as Personal Services, Health Care Services, and High-Tech Services.

To the extent that these large payroll outflows are volatile, they could pose significant challenges to small businesses with limited liquidity. In *Cash is King: Flows, Balances, and Buffer Days*, we found that across all small businesses (both employers and nonemployers), the typical small business in the US only holds balances equivalent to 27 cash buffer days. In other words, these businesses carried a cash balance only large enough to sustain 27 days of cash outflows if their inflows were to cease (Farrell and Wheat, 2016). As Figure 7 shows, employer small businesses are likely to have even smaller cash buffers than nonemployer small businesses—the median employer small business only held 18 cash buffer days. Employment is a major expense for many small businesses, so payroll volatility may put substantial stress on limited cash reserves.

Figure 7: Employer Small Businesses Have Smaller Cash Buffers



Note: Cash buffer days are the number of days of cash outflows a business could pay out of its cash balance if its inflows were 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.

Source: JPMorgan Chase Institute

# Finding Three

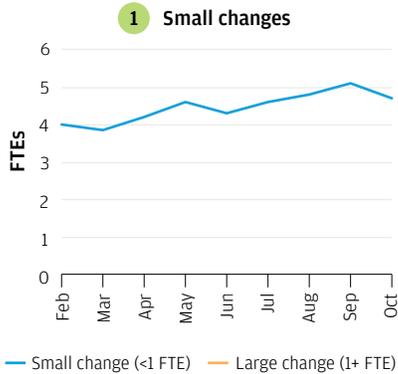
## Most small employer businesses experienced unstable payroll and employment volatility, including job gains and losses and other spikes and dips in payroll.

Volatile changes in payroll can adversely affect a small business. All else equal, a small business that experiences a given level of average payroll growth is likely more able to manage that growth if it occurs in smooth predictable increments than if it achieves that same growth in widely variant changes over time.

In order to make the underlying growth and volatility in the payroll of small businesses concrete, we first explore seven distinct patterns of payroll volatility. These patterns are based on our analyses of FTE-level changes in month-to-month payroll outflows described in the previous finding. Specifically, we first categorize changes in payroll as small (less than one FTE) or large (greater than one FTE) and then identify specific sequences of month-to-month changes in payroll outflows that map to qualitatively different types of payroll volatility.

First, we consider firms that have no month-to-month absolute changes in payroll outflow larger than one FTE, as illustrated in Figure 8.<sup>6</sup> In each month, payroll for this hypothetical firm changes by less than the average monthly payroll per employee for firms in its industry. A small business that grows or shrinks its workforce principally through part-time hires, that increases or decreases the hours of its existing employees, or that increases or decreases the wages of its employees would show this pattern of outflows.<sup>7</sup>

Figure 8: Illustrative Example of Small Changes



Note: We define a full-time equivalent (FTE) as a payroll outflow equivalent to the mean monthly wages per employee for small firms in the same 6-digit NAICS industry as a firm in our sample.

Source: JPMorgan Chase Institute

Figure 9: Illustrative Examples of Sustained Gains and Losses

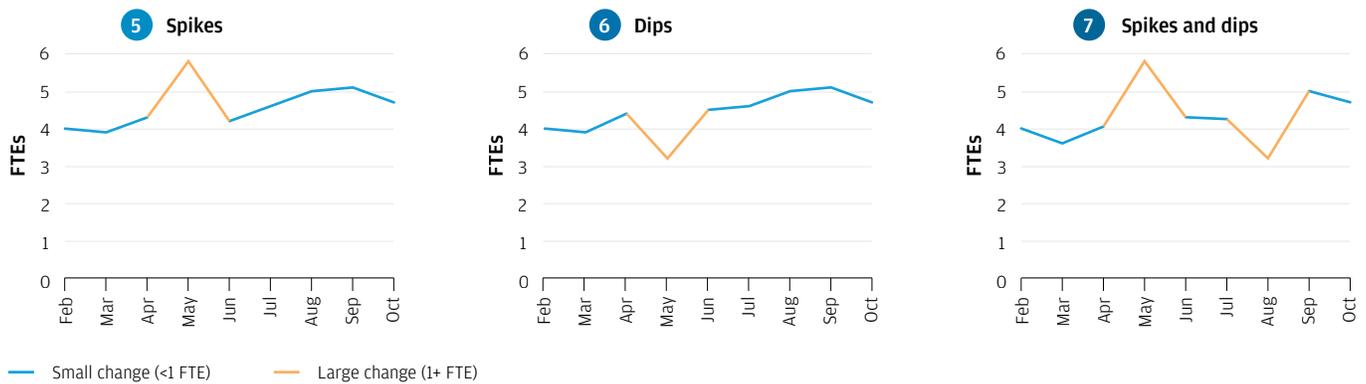


Note: We define a full-time equivalent (FTE) as a payroll outflow equivalent to the mean monthly wages per employee for small firms in the same 6-digit NAICS industry as a firm in our sample.

Source: JPMorgan Chase Institute

All other firms had at least one month in which payroll changed by more than one FTE from the prior month. Of these, we first consider firms that have a change in payroll greater than one FTE in one month that sustain the gain or loss for at least one additional month. Figure 9 illustrates three patterns of payroll outflows that include large sustained gains or losses. A small business that hires a single employee who stays with the firm might have a pattern of payroll outflows consistent with the first graph in Figure 9. Likewise, a small business that loses a single employee without replacing her might have a pattern of payroll outflows consistent with the second graph in Figure 9. A firm that has a combination of sustained gains and losses might have a pattern of payroll outflows consistent with the last graph.

Figure 10: Illustrative Examples of Spikes and Dips



Note: We define a full-time equivalent (FTE) as a payroll outflow equivalent to the mean monthly wages per employee for small firms in the same 6-digit NAICS industry as a firm in our sample.

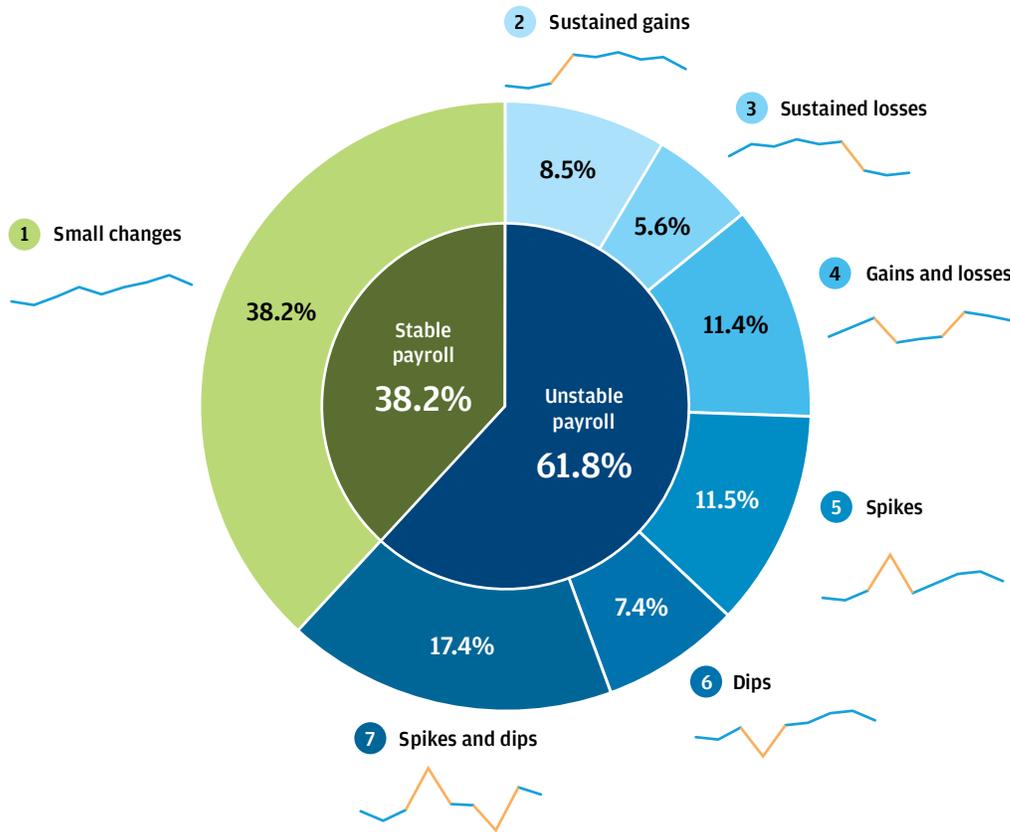
Source: JPMorgan Chase Institute

The remaining small businesses in our sample had at least one large change greater than one FTE that was immediately reversed in the following month—a spike or a dip.<sup>8</sup> The three examples in Figure 10 illustrate these patterns of payroll outflows. The first example illustrates a spike—a gain of at least one estimated FTE followed by a similarly large decrease in the next month. The second example illustrates a dip—a loss of at least one estimated FTE followed by a similarly large increase in payroll outflows in the next month. The last example illustrates a combination of spikes and dips. A one-time bonus payment by a small business to one or more employees could appear as a spike, while a completely missed payroll payment would appear as a dip.

This map of payroll volatility types gives us a framework with which to categorize the kinds of payroll volatility that small businesses in our sample encountered over our study period, as shown in Figure 11.

A majority of small businesses experienced changes in payroll outflows consistent with job gains or losses, or spikes and dips in payroll outflows.

**Figure 11: 61.8 percent of small employer businesses experienced unstable payroll and employment volatility from job gains or losses, or from spikes and dips in outflows**



Source: JPMorgan Chase Institute

We found that 38.2 percent of small businesses experienced only small changes in payroll outflows. In contrast, a significant majority of small businesses—61.8 percent—experienced changes in payroll outflows consistent with different combinations of job gains or losses, or spikes and dips in payroll payments, indicating some measure of employment changes that would detract from the stability of a small business. 8.5 percent of firms experienced sustained gains. While this may correspond to healthy job growth, the time and effort spent identifying and onboarding a single full-time employee can still be meaningfully disruptive to a business with only two or three other employees. In addition, a total of 5.6 percent of small businesses experienced sustained losses. Like a new hire, losing a single employee can correspond to a substantial disruption in cash flow for a very small business, particularly if the job loss induces a loss in revenue. An even larger share of small businesses—11.4 percent—experienced both large sustained increases and sustained decreases over the nine-month study period. Whether gains and losses are expected due to known seasonality or correspond to unexpected turnover, frequent increases and decreases in employees can pose both operational and cash flow challenges to small businesses.

In our sample, 11.5 percent of the firms experienced one or more spikes, 7.4 percent experienced one or more dips, and 17.4 percent experienced a combination of spikes and dips. For larger firms in particular, this pattern could also correspond to short-term changes at the FTE level—for instance, when a small business is unable to quickly replace a worker who unexpectedly leaves, or when a new employee overlaps for a month with the person she was brought in to replace.

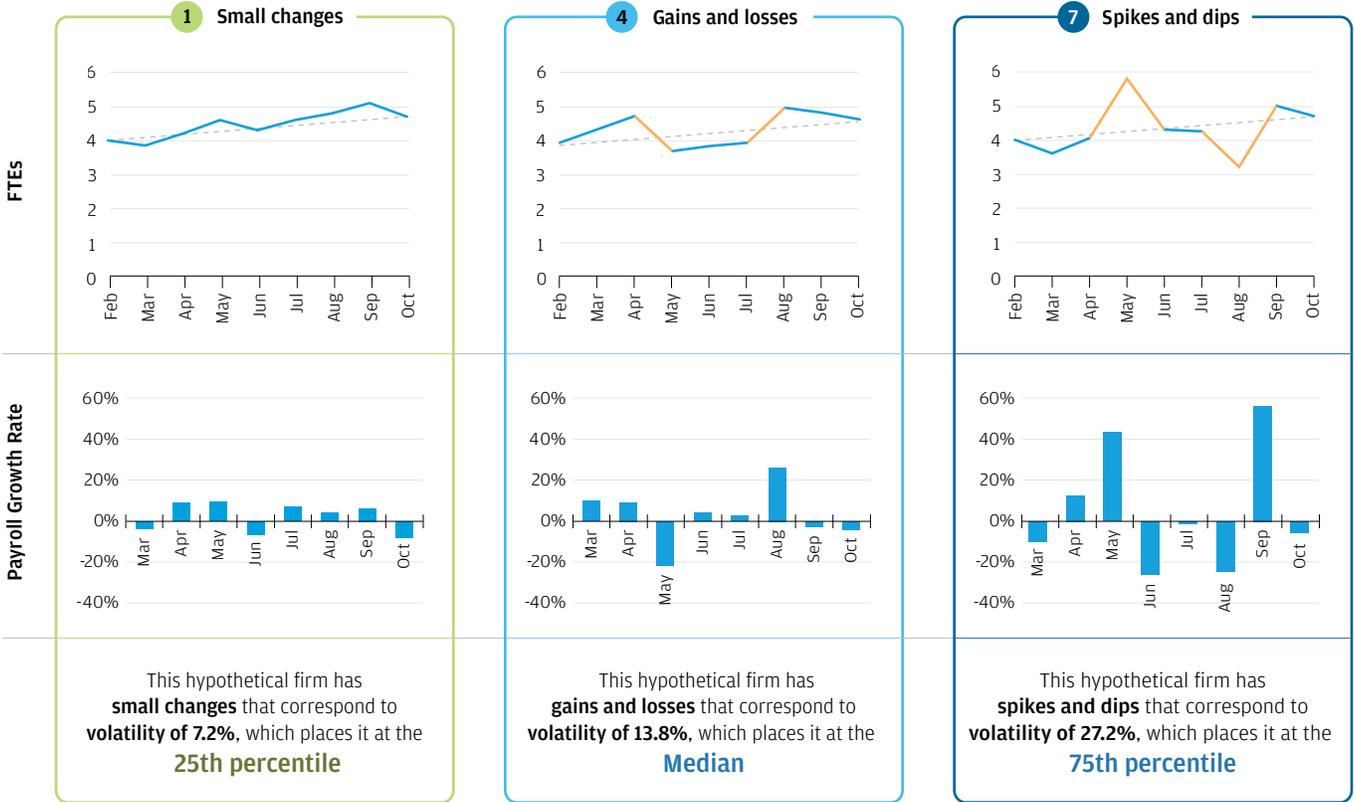
Notably, month-to-month changes in payroll outflows did not correspond to month-to-month changes in cash inflows.<sup>9</sup> Across our sample, in a given month, payroll outflows only correlated with total inflows at 0.13. This suggests that our observed patterns of volatility are not driven by small business employers who ramp employment up and down in response to predictable or expected changes in revenue.

**Finding  
Four**

The typical small employer business experienced substantial volatility in payroll outflows, and volatility was highest for younger small employer businesses.

The seven patterns of payroll volatility we describe above help to substantively differentiate the ways in which small employer businesses experience payroll outflows. As noted above, volatile changes in payroll outflows can adversely affect a small business, independently of whether its payroll grows or declines at a given rate on average. To compare the amount of payroll volatility experienced by one small business to another, we now develop a single measure of payroll volatility.

Figure 12: Different Types of Volatility Correspond to Different Amounts of Volatility around Baseline Growth



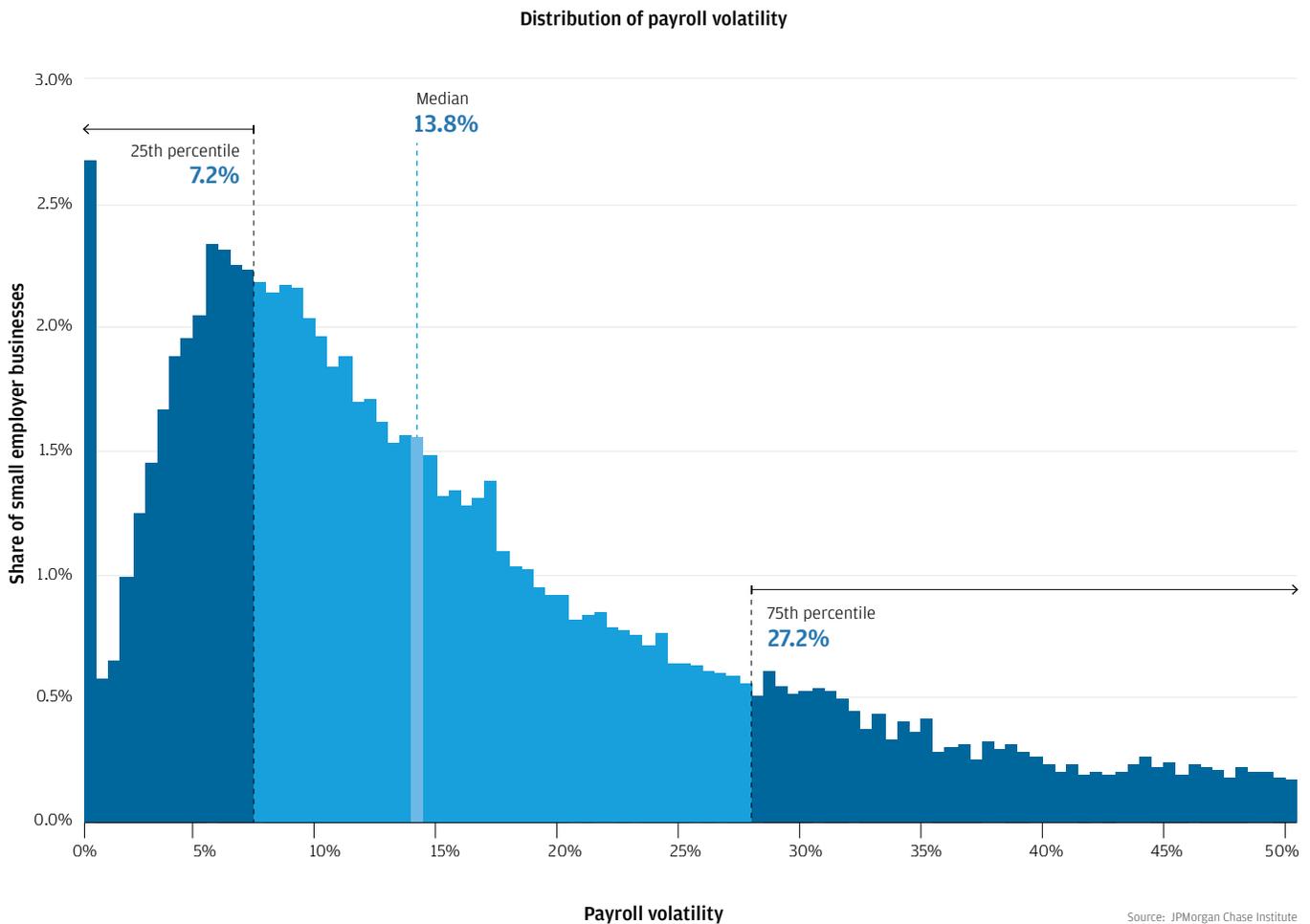
Source: JPMorgan Chase Institute

To provide an intuition for our proposed measure, the top panel of Figure 12 reprises the payroll outflows associated with three of the volatility type examples presented in Figures 8 through 10. In each case, the hypothetical business has payroll outflows equivalent to 4 FTEs in February, and payroll outflows of 4.7 FTEs in October—corresponding to annualized payroll growth of 24 percent. The black dotted line in each graph illustrates the progression of payroll payments each firm would have paid had it experienced perfectly stable payroll growth of 2 percent per month or 24 percent per year.

The main difference between the three hypothetical firms is their experienced month-to-month changes in payroll outflows around the underlying annualized growth rate depicted by the black dotted line. Intuitively, it appears that the firm with only small changes has less volatile payroll outflows than the firm with combined sustained gains and losses, which in turn has less volatile outflows than the firm with a combination of spikes and dips. The three graphs at the bottom of Figure 12 make this intuition explicit by depicting the month-to-month growth rates of payroll outflows. In fact, the firm with only small changes has the least variability, with month-to-month growth rates ranging from -7.8 percent to 9.5 percent. The firm with combined sustained gains and losses has somewhat higher variability, with month-to-month growth rates ranging from -21.9 percent to 26.3 percent. Finally, the firm with both spikes and dips has the highest variability, with month-to-month growth rates ranging from -25.9 percent to 56.3 percent. Notably, even the firm with only small payroll outflow changes has growth rates that diverge substantially from the 2 percent month-to-month rate corresponding to even growth.

With these examples in mind, we define the payroll volatility of a firm as the variation in its month-to-month growth rates, measured as the standard deviation in monthly growth rates.<sup>10</sup> Figure 13 illustrates the distribution of payroll volatility across our sample.

Figure 13: The Median Small Employer Business Experiences Significant Payroll Volatility



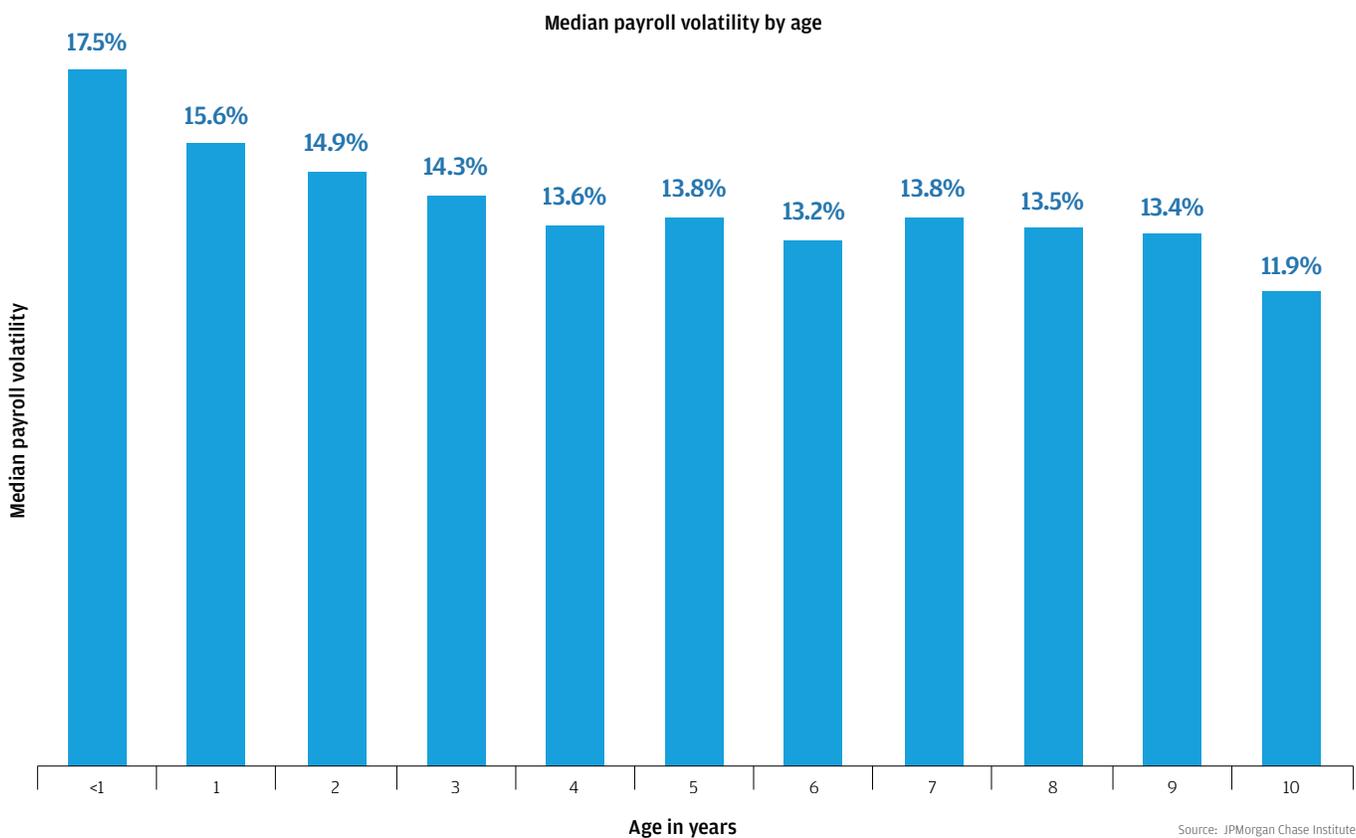
A large majority of small businesses do not experience constant or smoothly growing payroll, but rather see payroll levels and growth rates that swing substantially from one payroll period to the next. Small business payroll very rarely grows smoothly over the course of a year, consistent with the distribution we found in our qualitative typology. We found that only 1.3 percent of small businesses had zero payroll volatility (precisely the same growth rate each payroll period over the 9 non-holiday months of 2015), and only 3.3 percent of small businesses had volatility less than one percent.

In contrast, we found that small business payroll volatility was consistent with the stylized distribution illustrated in Figure 12. Half of small businesses experienced payroll volatility of 13.8 percent or greater—the same level of payroll volatility illustrated in the middle panel. A quarter of small businesses experienced higher payroll volatility than that depicted in the right panel, and a quarter experienced payroll volatility less significant than that depicted in the left panel.

### Differences in payroll volatility by business age

Younger businesses were most likely to have volatile payroll outflows. Figure 14 shows the median payroll volatility for firms of different ages in our sample. Payroll volatility was substantially higher for firms less than two years old. We found that the median small business in its first year experienced payroll volatility of 17.5 percent, higher than the overall sample median payroll volatility of 13.8 percent, and much higher than the median payroll volatility of a ten-year-old small business of only 11.9 percent.

Figure 14: Payroll Volatility Declines with Age

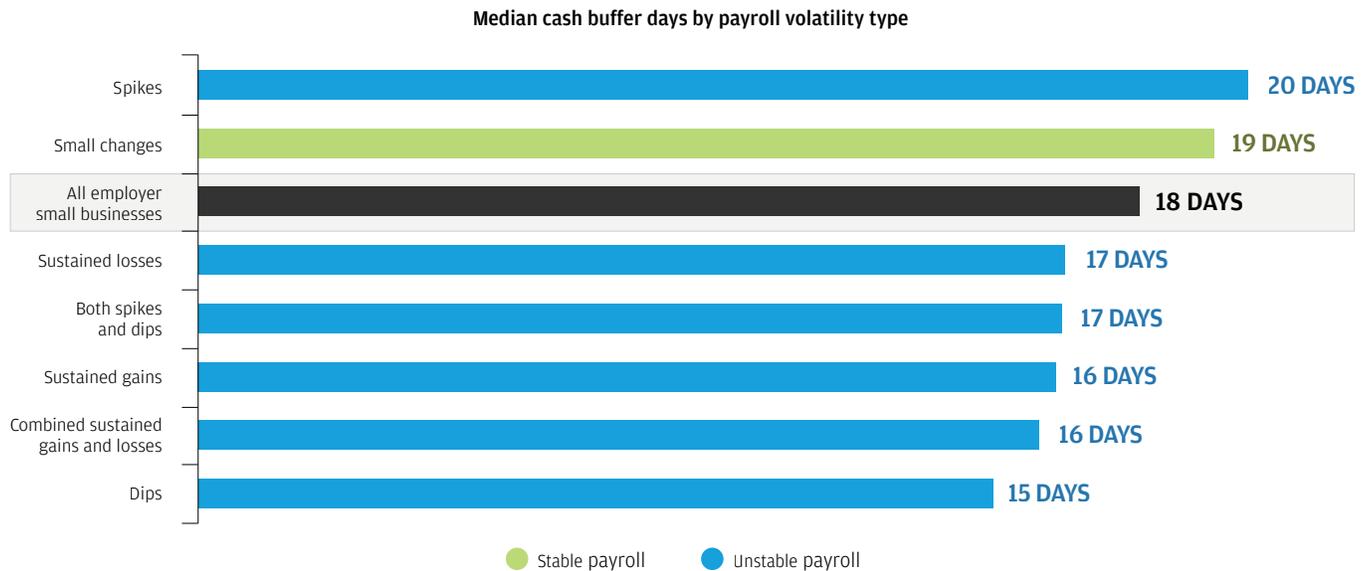


## Finding Five

### Small businesses with more volatile payroll patterns tended to have fewer cash buffer days.

Finally, we explored the relationship between the seven substantive types of payroll volatility we identified earlier and small business cash liquidity. We summarize this relationship in Figure 15. The small businesses with the most stable payroll had substantially more cash liquidity than those with larger month-to-month changes. Small businesses with no large changes in payroll had relatively high cash liquidity—the median business in this group carried 19 cash buffer days. The median small business among those that only experienced a spike carried slightly more cash buffer days at 20, consistent with the view that these spikes might represent predictable payments corresponding to increases in revenue. In contrast, the median small business in the group that experienced combined larger gains and losses only had 16 cash buffer days. The median small business among those that experienced dips without spikes carried only 15 cash buffer days. These small businesses had the least cash liquidity, and would as such be the most exposed to any adverse conditions implied by this pattern of payroll changes.

Figure 15: Small Employer Businesses with Dips and Combined Gains/Losses Held the Fewest Cash Buffer Days



Note: Cash buffer days are the number of days of cash outflows a business could pay out of its cash balance if its inflows were 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.

Source: JPMorgan Chase Institute

The volatility types that correspond to changes greater than a full-time employee may reflect meaningful levels of volatility for the small employer businesses in our sample. We compared the minimum observed daily cash balance for each firm in our sample to the average payroll for firms in its industry. We found that 47 percent of employer small businesses had at least one day with a cash balance lower than a semi-monthly paycheck for a single employee and that 37 percent had at least one day with a cash balance lower than a weekly paycheck. In combination with the low correlation between payroll and cash inflows, this suggests that many small employer businesses do not always have the cash liquidity to manage volatility from employment expenses.

# Conclusion and Implications

Small businesses are responsible for approximately half of all job creation in the United States and are therefore a critical element of the US economy. This report provides a new lens on typical small business payroll outflows, their growth, and their volatility. We summarize key conclusions and implications here:

- **New small businesses create new net job; existing small businesses do not.** While policy makers have historically focused on the contributions of small businesses to job creation (Birch, 1981), recent research has emphasized the impact of young firms on net job creation (Haltiwanger, et al., 2013; Decker, et al., 2014). In fact, after their first year of employment, existing small businesses lose more jobs than they create, principally through firm failure. For every 100 small business jobs that existed in 2013, new small businesses created 5.6 new jobs, while existing small businesses lost 3.9 jobs—mostly due to losses from the exit of these small businesses. Policy makers, advocates, and private-sector partners should focus on the incentives and sustainability of the new small businesses that create these jobs. This is especially concerning in light of the overall decline in startup rates, which have fallen from 17.1 percent in 1977 to 10 percent in 2014.<sup>11</sup>
- **Employment-related costs are a substantial share of expenses for a typical small business.** Job creation is a central element of economic growth, but it requires small business owners to make significant investments. This report focused on the amounts employers spend on their employees' take-home pay—these expenses alone represent 18 percent of all employer outflows, and are higher than 25 percent in many industries. Moreover, after adjusting for likely tax payments, we found that these employment costs likely account for 22 percent of outflows for most employers and over 30 percent in many industries.
- **In addition to generating a significant share of small business expenses, employment also is a source of substantial cash flow volatility and impacts liquidity.** In *Cash is King: Flows, Balances, and Buffer Days*, we found that the median small business only has enough cash on hand to weather 27 days without any inflows. Employer small businesses have an even smaller cash buffer of just 18 days. Those employer small businesses that suffer from large dips or large gains and losses in payroll have even fewer cash buffer days in reserve.
- **Small and especially young businesses are particularly vulnerable to payroll volatility.** Prior research has illustrated the significant role that young rather than small businesses play in creating jobs in the US economy (Haltiwanger, et al., 2013). We observe a similar pattern of growth among young businesses. The median small business less than two years in age sees faster payroll growth than the median small business over two years in age, suggesting that younger small businesses that survive a full year are creating new jobs by hiring new employees, creating better jobs by offering more hours to their existing employees, or paying their employees higher wages or salaries.

While these young small businesses play a key role in job creation, they are also quite vulnerable. Nearly one-third of businesses exit the market within their first two years.<sup>12</sup> Job losses due to firm exit detract significantly from the net job creation rate, particularly among young and small firms. These two factors combine and contribute to the consistent net job destruction by existing small businesses.



While young small businesses play a key role in job creation, they are also quite vulnerable.

Our findings provide a preliminary lens that reconciles job creation by young businesses with their instability and contributions to job loss. While many young small businesses have growing payroll outflows consistent with job creation, young small businesses also have the most volatile payroll growth. Future research should explore whether the very factors that contribute to job growth among young and small firms also contribute to volatility and whether these volatile cash flows combine with limited cash liquidity to contribute to firm failure. Armed with this information, policy makers, advocates, and private-sector partners can take care to ensure that policies aimed at supporting small business job creation do not inadvertently contribute to the failure of young small businesses.

- **Payroll volatility has adverse implications for small business employees as well as small business owners.** This report offers new data and insights on the extent of payroll volatility among small businesses and the impact of this volatility on small business owners. However, payroll volatility also has the potential to significantly impact small businesses employees. The small business sector employs nearly half of the US workforce, which exposes a significant fraction of US households to the economic outcomes of small businesses. In *Paychecks, Paydays, and the Online Platform Economy*, the JPMorgan Chase Institute found that 53 percent of income volatility was derived from labor sources and that 86 percent of variation in take-home-pay came from variation when a worker stayed with the same employer (Farrell and Greig, 2016). For those workers employed by small businesses, the results presented here provide an employer-side lens on this same phenomenon. To the extent that policy makers can design interventions that minimize payroll volatility for small businesses, they can also limit the take-home-pay volatility of the small business employees.
- **Policy makers also frequently face a tension between improving the conditions and wages of employees and imposing costs on their employers.** Given that payroll expenses are a large share of outflows for small employer business owners, policy makers should take special care to ensure that these rules are tailored to meet the specific needs of small businesses. With the median employer small business having only 18 cash buffer days on hand, these businesses are already living on a less than month-to-month basis. Increasing the cost of employment could lead many of them to face the costly choice between cutting payroll expenses or increasing their vulnerability to liquidity shocks.

# Data Asset

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In this report, the JPMorgan Chase Institute seeks to inform the public debate on the financial lives of employer small businesses in the US. To draw conclusions about payroll outcomes, we adapted the firm's internal data on US small business accounts into a secure groundbreaking data asset. As the first financial institution to channel this wealth of information for the benefit of the public good, JPMorgan Chase put strong guardrails and strict privacy policy protocols in place to protect personal information throughout the creation and analysis of this data asset.

## Data Privacy

The JPMorgan Chase Institute has adopted rigorous security protocols and checks and balances to ensure all customer data are kept confidential and secure. Our strict protocols are informed by statistical standards employed by government agencies and our work with technology, data privacy, and security experts who are helping us maintain industry-leading standards.

There are several key steps the Institute takes to ensure customer data are safe, secure and anonymous:

- Before the Institute receives the data, all unique identifiable information—including names, account numbers, addresses, dates of birth, Social Security numbers, and Employer Identification Numbers (EIN)—is removed.
- The Institute has put in place privacy protocols for its researchers, including requiring them to undergo rigorous background checks and enter into strict confidentiality agreements. Researchers are contractually obligated to use the data solely for approved research and are contractually obligated not to re-identify any individual represented in the data.
- The Institute does not allow the publication of any information about an individual consumer or business. Any data point included in any publication based on the Institute's data may only reflect aggregate information.
- The data are stored on a secure server and can be accessed only under strict security procedures. The data cannot be exported outside of JPMorgan Chase's systems. The data are stored on systems that prevent them from being exported to other drives or sent to outside email addresses. These systems comply with all JPMorgan Chase Information Technology Risk Management requirements for the monitoring and security of data.

The Institute provides valuable insights to policy makers, businesses, and nonprofit leaders. But these insights cannot come at the expense of customer privacy. We take precautions to ensure the confidence and security of our account holders' private information.

## Constructing our samples

**Payroll in 2015 Non-Holiday Months** – We chose to focus exclusively on transaction data from the calendar year 2015. This allowed us to compare the payroll characteristics of a set of small businesses that faced a largely stable macroeconomic environment.

Moreover, many small businesses experience substantial changes in their payroll outflows during the holiday season and at the change of a calendar year. In particular, many businesses may pay bonuses or have other payments during these months that are not typical of their pattern of payroll during the rest of the year. In this report, we chose to focus on these months in order to characterize the volatility that comes from more typical periods of business. To the extent that small businesses experience substantial changes in payroll during the holiday and change-of-year months of November, December, and January, the findings we report here likely reflect a conservative view of the payroll volatility these small businesses face. Moreover, by focusing on these months, we align with our earlier work on small business cash liquidity.

**Identifying Core Metropolitan Operating Employer Small Businesses** – From the universe of business customers that had active deposit accounts in 2015 in our 12 identified industries, we selected a sample of over 45,000 customers for which we were able to identify electronic payroll outflows in each month among a set of accounts that likely reflects the operating activity of the business. Specifically, we applied six additional screening criteria:

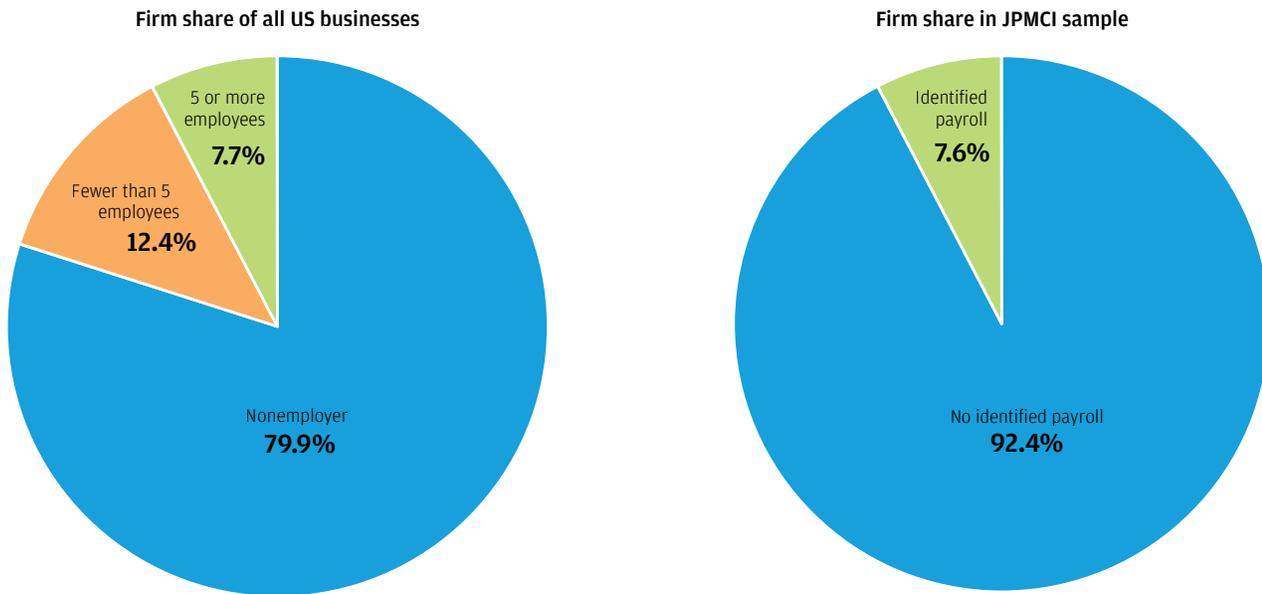
- Each business must be associated with a single geographic location in a metro area and a single industry for each observed month.<sup>13</sup>
- Each business must have both a cash inflow and outflow for each month from February through October 2015.
- For at least five of these nine months, the business must have at least \$500 in outflows and 10 combined inflows and outflows.
- The business must never exceed a combined balance of \$20 million across all of its accounts.
- The business must have continuously identifiable daily balances for each posting day from February through October 2015.
- The business must have observed electronic payroll outflows indicating at least one and less than 500 employees for each payroll period.

In combination, these criteria allow us to identify a population of employer small businesses for which we have a window on the payroll outflows that flow from their Chase Business Banking accounts. In particular, these criteria are intended to screen out larger businesses that might have deposit accounts across multiple banks. While some businesses may engage in cash transactions that do not flow through their bank accounts, our sample criteria identify a set of businesses that are likely to substantially transact through their accounts.

## Representativeness of our sample

The size of our subsample aligns with public data from the Census Bureau, as shown in Figure 16. In 2013, the Census Non-Employer Statistics identified 23 million non-employer businesses, while the Census Statistics of US Businesses only identifies 5.8 million firms with any employees at all. Moreover, over 60 percent of these employer small businesses (3.6 million) have fewer than 5 employees, while fewer than 2.2 million businesses have 5 or more employees. In total, 7.6 percent of Census firms have more than five employees. Out of a sample of approximately 600,000 total operating small businesses, we were able to identify over 45,000 with payroll outflows, or 7.6 percent. In as much as very small businesses with fewer than 5 employees might be less likely to use electronic payroll services, the 7.6 percent of employer firms in our sample is comparable to the 7.6 percent of firms with 5 or more employees in the Census sample.

Figure 16: Payroll Share of JPMCI Sample is Similar to Comparable Employer Share from Census



Sources: JPMorgan Chase Institute; US Census Bureau, Statistics of US Businesses and Nonemployer Statistics, 2013

**Industry Mix** - Figure 17 compares the share of our small business sample in our 12 identified industries to a benchmark of small businesses with fewer than 500 employees in the same 12 industries. With some exceptions, our sample approximates these industry shares closely. Notably, small employer businesses in the Health Care Services industry comprise 22 percent of our data asset but only 12 percent of small employer businesses in the US. In contrast, small employer businesses in the Construction industry only comprise 9 percent of our data asset, but 15 percent of small employer businesses in the US.

Figure 17: Industry Composition of JPMCI Employer Small Business Data Asset

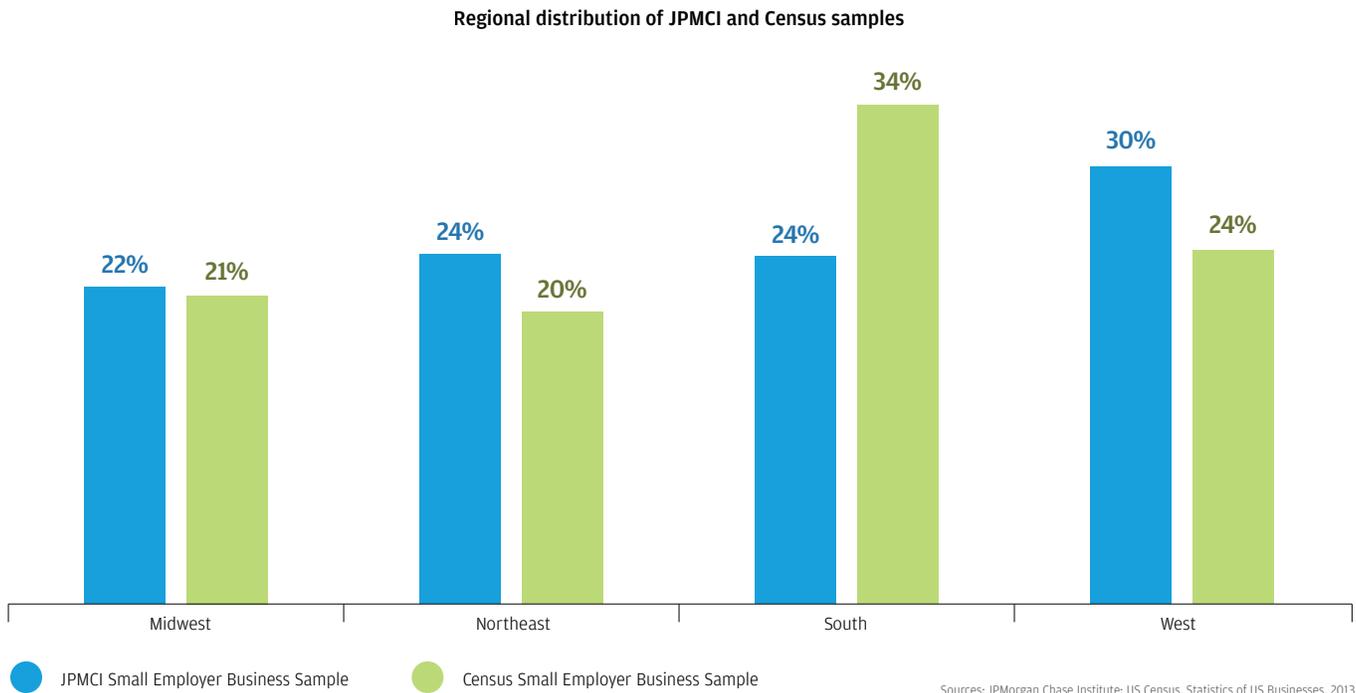
Industry	JPMCI Small Employer Business Sample Share	US Employer Small Business Share
Construction	9%	15%
Health Care Services	22%	12%
High-Tech Manufacturing <sup>14</sup>	1%	0%
High-Tech Services	5%	3%
Metal & Machinery	3%	2%
Other Professional Services	14%	14%
Personal Services	7%	4%
Real Estate	5%	6%
Repair & Maintenance	7%	9%
Restaurants	10%	11%
Retail	12%	16%
Wholesalers	7%	7%

Source: JPMorgan Chase Institute; US Census, Statistics of US Businesses, 2013

**Regional Distribution** – Guided by the Chase footprint, we focus on small businesses in Metropolitan Statistical Areas (MSAs). MSAs consist of core urban areas with a population of 50,000 or more as well as any adjacent counties that have a high degree of social and economic integration with the urban core, as measured by work commuting. While some of these adjacent counties may be rural in nature, our focus on MSAs implies a focus on mostly non-rural areas.

Figure 18 compares the share of our small businesses to the share of all small businesses in the US by region. The figure identifies regions in which we observe significantly larger or smaller shares of employer small businesses than are observed by the Census. The regional differences we observe largely reflect the Chase branch footprint across the US. Our sample offers large numbers of small businesses across all four regions, with stronger coverage in the Northeast and West, and less coverage in the South.

Figure 18: JPMCI Small Businesses are Well-Represented Across US Regions



# Methodology

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## Defining and measuring payroll outflows, growth, and volatility

Within this report, we define payroll as the outflow that small businesses pay directly to employees. We identify these outflows through payments from the small business to electronic payroll processors who then distribute the funds to employees on behalf of the small business. This provides a lens on the funds that go directly to the employees' paychecks; we do not measure payroll-related expenses such as taxes and benefits.

We also followed an approach intended to remove calendar effects from the analysis. In particular, we sought to avoid the impact of "five Friday" months—months that contain five Fridays instead of four. If a small business pays its employees every week or every two weeks, we would observe higher aggregate payroll outflows in months with five Fridays than those with four. This would create changes in month-to-month growth rates that would reflect a misalignment of the calendar with the payroll cycle of the business that might not be meaningful to the economics of the business itself. To avoid this effect, when conducting this analysis, we split our firms into two groups: those who pay employees on a monthly or semi-monthly basis, and those who pay employees on a weekly or biweekly basis. We identified these groups as follows:

- Firms who paid employees on a **monthly** or **semi-monthly** basis should make these payments around the same dates of the month (for instance, the 15th and the 30th). We classify a firm as having monthly or semimonthly payments if we observe 65% or more of the dollar value of its payroll outflows paid out on the same 4 dates within each month. This group represents 26.3% of our sample and 31.1% of all employer small businesses, according to the Bureau of Labor Statistics.<sup>15</sup>
- Firms who paid employees on a **weekly** or **biweekly** basis should make these payments around the same time each week (for instance, each Friday). We classify a firm as having weekly or biweekly payments if we observe 85% or more of the dollar value of its payroll outflows paid out on the same 2 days of the week each week. This group represents 73.7% of our sample and 68.9% of all employer small businesses, according to the Bureau of Labor Statistics.<sup>15</sup>

## Payroll Outflows

For the firms we identified as paying employees on a monthly or semi-monthly, we divided the calendar into nine monthly periods from February to October 2015, and measured payroll outflows  $p_{i,t}$  as the sum of all individual payroll outflows for a firm  $i$  that occurred in a month  $t$ . For firms we identified as paying employees on a weekly or biweekly basis, we divided the calendar into a series of 28-day periods, such that the first began on Monday, February 16, 2015 and ended Sunday, March 15, 2015, the second began on Monday, March 16, 2015 and ended Sunday, April 12th, and the last began Monday, September 28, 2015 and ended on Sunday, October 25, 2015. This produced nine 28-day periods that also occurred within the nine non-holiday months of the year, and guaranteed that each time period included exactly four Fridays (or alternative payroll day-of-week). For these firms, we measured payroll outflows  $p_{i,t}$  as the sum of all individual payroll outflows for a firm  $i$  that occurred in a 28-day period  $t$ .

## Payroll Growth

Our observation window for payroll outflows for firms that paid employees on a monthly or semi-monthly basis extended from February 1 to October 31, while our observation window for firms that paid employees on a weekly or semi-weekly basis only extended from February 16 to October 25. To ensure that this difference in observation windows did not cause us to differently estimate payroll growth for these two groups of firms, and to facilitate comparison to other annual growth rate measures, we estimated an annualized growth rate for both. To facilitate this and our volatility measure, we first measure annualized logarithmic period-to-period payroll growth rates  $ppg_{t,i}$  for each firm  $i$  in each period  $t$ . For firms that pay employees on a monthly or semi-monthly basis, we scale each month-to-month logarithmic growth rate by 12 to compute an annualized measure:

$$ppg_{i,t} = \left( \ln \frac{P_t}{P_{t-1}} \right) \times 12.$$

For firms that pay on a weekly or biweekly basis, we scale the logarithmic growth rate by the number of 28-day periods in the average 365.25 day year:

$$ppg_{i,t} = \left( \ln \frac{P_t}{P_{t-1}} \right) \times \frac{365.25}{28}.$$

To compute our reported annualized payroll growth measure  $pg_j$  for each firm, we exponentiate the average period-to-period annualized growth rate for each firm across our nine payroll periods:

$$ppg_j = e^{\frac{\sum_t ppg_{i,t}}{9}}.$$

## Payroll Volatility

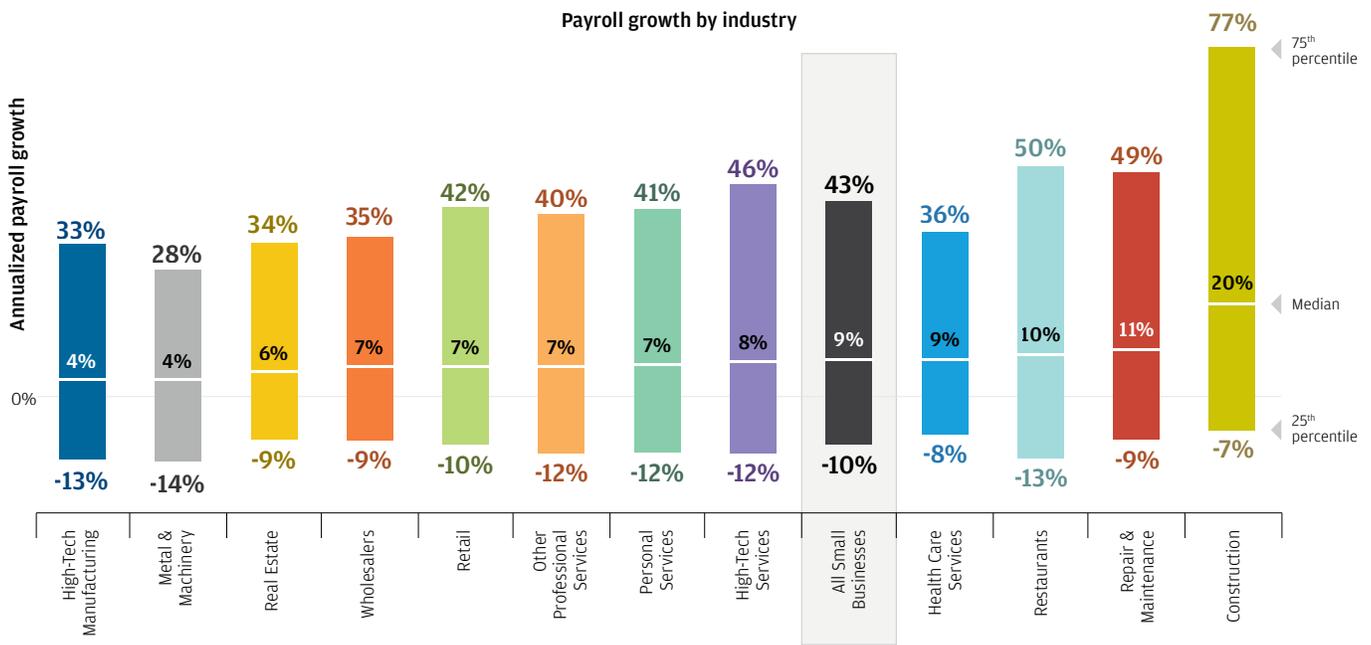
Our quantitative measure of payroll volatility is based on the volatility of growth rates around the average growth rate  $pg_j$  for a firm in our sample. Specifically, we divide the annualized logarithmic period-to-period payroll growth rates  $ppg_{t,i}$  by 12 to create a set of monthly logarithmic period-to-period payroll growth rates. We then exponentiate the standard deviation of those monthly logarithmic growth rates to yield a measure similar to the monthly percent variance in growth rates. We compute this measure  $pv_j$  as:

$$pv_j = e^{\text{std}(ppg_{i,t}/12)}.$$

# Appendix:

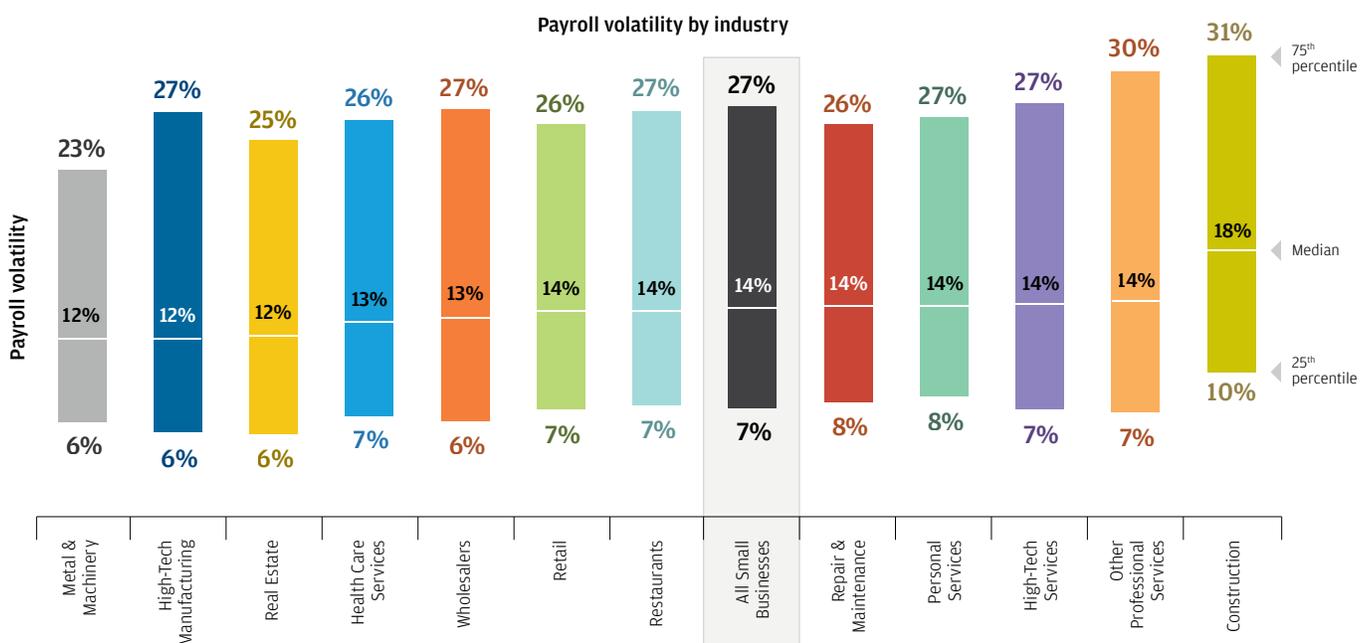
## Payroll Growth and Volatility by Industry and Metro Area

Figure 19: Payroll Growth Varies Substantially Across and Within Industries



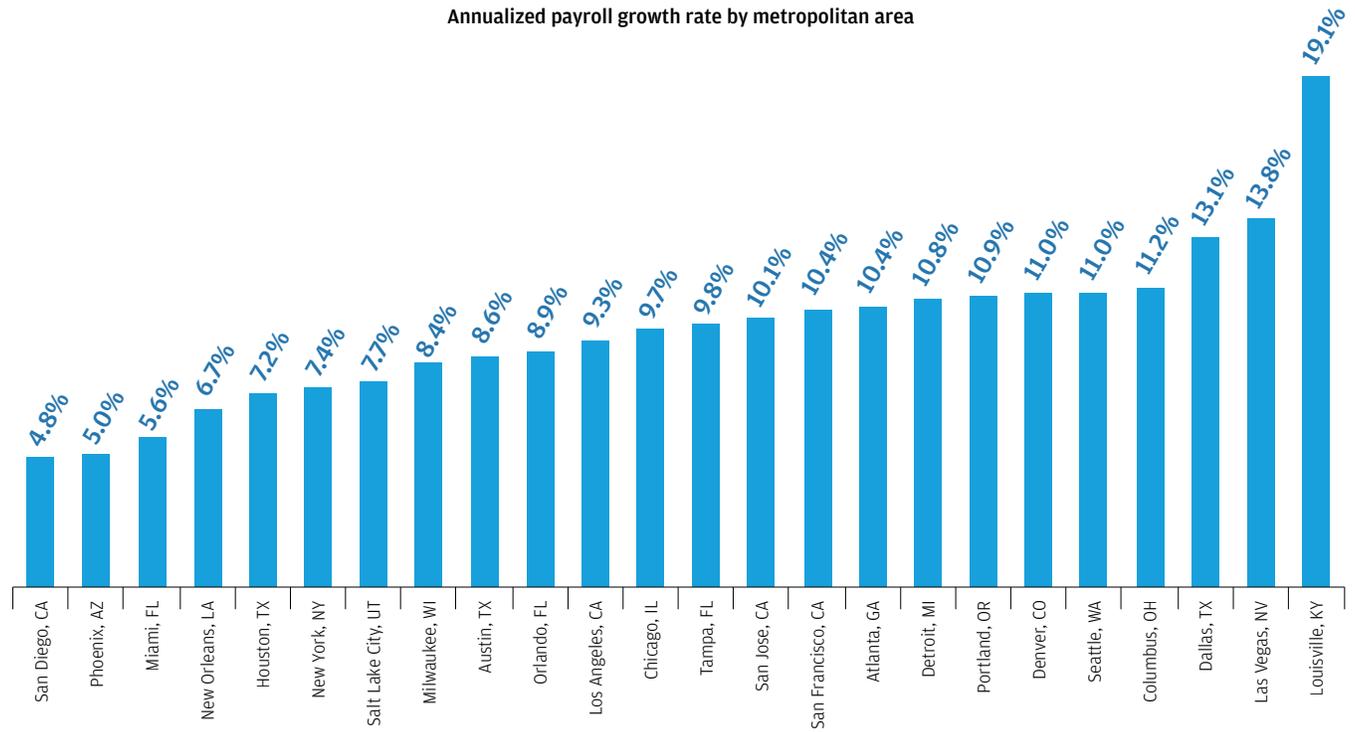
Source: JPMorgan Chase Institute

Figure 20: Payroll Volatility Varies Substantially Across and Within Industries



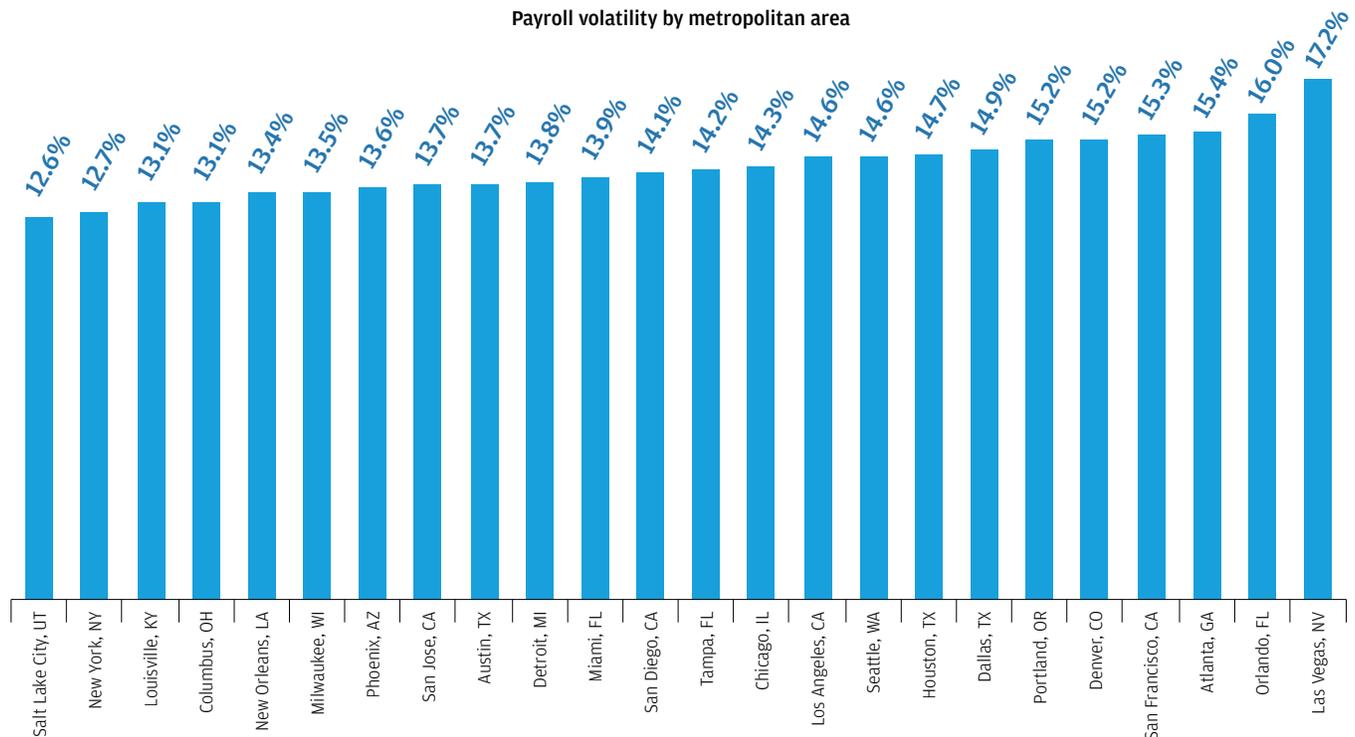
Source: JPMorgan Chase Institute

Figure 21: Payroll Growth by Metropolitan Area



Source: JPMorgan Chase Institute

Figure 22: Payroll Volatility by Metropolitan Area



Source: JPMorgan Chase Institute

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## Suggested citation

Farrell, Diana and Wheat, Christopher. 2017. "Making Payroll: Big Data on Payroll Growth and Volatility." *JPMorgan Chase Institute*. <https://www.jpmorganchase.com/corporate/institute/making-payroll.htm>

# Endnotes

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- 1 Research attempting to identify the specific impact of small businesses on job creation (Davis and Haltiwanger, 1992; Davis et al., 1996) differentiates the gross job creation process by separately identifying job creation and job destruction. Net job creation refers to jobs created less jobs destroyed.
- 2 We calculated annual full-time equivalent wages for a firm by dividing the total annual payroll for its 6-digit NAICS industry by the total number of employees in that industry. We calculated monthly full-time equivalent wages for a firm by dividing its annual full-time equivalent wages by 12. We drew annual payroll and employee numbers from the US Census Statistics of US Businesses data.
- 3 The relatively large share of firms that see an increase equivalent to two or more FTEs is driven in part by firms with higher numbers of employees. Adding two or more employees at a larger firm might still correspond to a relatively low payroll growth rate. Among firms with fewer than 10 estimated employees, we find only 14 percent that add two or more employees. In contrast, 12 percent of firms with fewer than 10 estimated employees add one to two additional employees.
- 4 We measure the age of a business by identifying the opening date of the oldest business deposit account associated with the customer.
- 5 Existing firms with more than 500 employees produced 3.8 new jobs for every 100 existing jobs, and lost 2.1 jobs due to firm exit, resulting in a net job creation rate of 1.7 percent for existing firms. New firms with more than 500 employees created 0.2 new jobs for each of these 100 existing jobs. Overall, larger firms produced net jobs at a rate of 1.9 percent. The non-zero rate of job creation by new firms with more than 500 employees results from the very small number of new legal entity large firms in a given year. For example, of the 403,902 firms that first reported employment in 2014, 72 had 500 or more employees.
- 6 In this study, we separate firms that pay payroll on a weekly or bi-weekly basis from those that pay on a semi-monthly or monthly basis in order to avoid payroll volatility attributable to calendar effects. We report all findings in terms of implied monthly rates. See Methodology section for further details on this process.
- 7 This pattern also could capture businesses that gain or lose a new employee who earns less than the average monthly wage for the industry or who joined/left the firm in the middle of the month.
- 8 Firms we classify as having a dip and/or a spike may also have large sustained job gains and/or losses.
- 9 Cash inflows refer to credit transactions into any business deposit or savings account, such as revenues, owner transfers into the account from private savings, loan funding, or tax rebates.
- 10 Specifically, we measure payroll volatility by first calculating the standard deviation of the natural logarithm of the ratio of payroll outflows in consecutive months or 28-day periods. We then exponentiate this standard deviation to produce a number that roughly corresponds to the standard deviation of month-to-month growth rates in percent terms. See Methodology section for further details.
- 11 We define annual startup rates as the establishment entry rate published in the US Census Bureau, Business Dynamics Statistics series.
- 12 See Bureau of Labor Statistics Business Employment Dynamics, establishment survival data: <http://www.bls.gov/bdm/entrepreneurship/entrepreneurship.htm>.
- 13 We identify a business as being in a metropolitan area if its zip code overlaps with a Census Metropolitan Statistical Area (rather than a Micropolitan Statistical Area).
- 14 Zero value due to rounding.
- 15 Burgess (2014) identifies shares of private employers who pay employees on a weekly, bi-weekly, semi-monthly and monthly basis.



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