Comment

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1 Introduction

The work of Davis, Haltiwanger, Jarmin, and Miranda (henceforth, DHJM) is a very informative piece of work that brings new and more comprehensive data to the active research area of business volatility. Just last year at the Macroeconomics Annual, Comin and Phillipon (henceforth, CP) were examining the change in business volatility that took place in recent decades and its relation to the change in aggregate volatility. DHJM confirm the findings of CP that the volatility of publicly-held firms increased recently, but show that the features of the COMPUSTAT data used by CP do not generalize to all firms, since there are important differences in the business volatility trend of publicly-traded versus privately-held firms.

To show just how exhaustive the LBD data DHJM use are, in table 2.6, I compare the employment numbers from the Current Employment Statistics, the Bureau of Labor Statistics' most comprehensive survey of payroll employment in private nonfarm industries, for 1980, 1990, and 2000, with the employment numbers for the same segment of the economy from the LBD. As can be seen, in all years, the LBD covers essentially all employment in private nonfarm industries, of which only a little over a quarter takes places in publicly-traded firms.

I view the DHJM piece as the beginning of an exciting new research program using the rich data available in the LBD. In my discussion, I would like to offer some suggestions as to how one might use these data to address questions that are at the core of macroeconomic research today. First, I discuss whether the distinction between publicly-traded versus privately-held businesses matters for macroeconomics and whether the LBD data are well-suited to study this distinction further. Second, I discuss the macroeconomic implications of the decline in
Table 2.6
Comparison of Private Nonfarm Employment in All Firms and in Publicly-Traded Firms for Selected Years from the Current Employment Statistics and the Longitudinal Business Database

<table>
<thead>
<tr>
<th>Year</th>
<th>CES Private Nonfarm Employment</th>
<th>LBD as Fraction of CES</th>
<th>Publicly-Traded LBD As Fraction of CES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>74,695,000</td>
<td>97.3%</td>
<td>28.2%</td>
</tr>
<tr>
<td>1990</td>
<td>91,324,000</td>
<td>100.6%</td>
<td>25.1%</td>
</tr>
<tr>
<td>2000</td>
<td>110,644,000</td>
<td>102.4%</td>
<td>26.6%</td>
</tr>
</tbody>
</table>

Source: CES from Bureau of Labor Statistics, LBD from DHJM.

business volatility and relate it to the decline in aggregate volatility that has taken place recently. Finally, I offer some thoughts on how one might interpret the decline in business volatility observed in the LBD data.

2 Ownership Structure: Should Macroeconomists Care?

DHJM repeatedly stress in their paper the difference in the volatility trends of publicly-traded versus privately-held firms. For example, in their table 2.2, DHJM document that the volatility of employment growth in publicly-traded firms and in privately-held firms has shown very different trends between 1978 and 2001: The first increased by 55.5 percent while the second declined by 33.4 percent. Given the predominance of privately-held businesses, the overall volatility of business growth rates has also declined over the same period by 22.9 percent.

At an elementary level, these divergent trends mean that there has been a change in the way publicly-traded businesses are selected from the universe of all businesses. This phenomenon has received considerable attention lately in the finance literature. Campbell, Lettau, Malkiel, and Xu (2001) document a more than two-fold rise in the idiosyncratic variance of stock returns between 1962 and 1997 and speculate that some of this increase could have been due to the replacement of conglomerates with companies focused on a single economic activity and the tendency of firms to issue stocks earlier in their life-cycle. Fama and French (2004) provide evidence that not only did new listings become more numerous since 1980, but their profitability became progressively more left skewed and their growth became more right skewed.

This change in selection can have important macroeconomic consequences. For example, if the nature of financing affects investment
decisions, then the easier access of younger and smaller businesses to public financing could impact aggregate investment activity. Or, if the nature of financing affects innovation and thereby productivity growth at the firm level, then easier access to public financing would affect aggregate productivity growth. While these are interesting hypotheses to entertain, a limitation of the LBD data used by DHJM is that they do not contain information on the investment or innovation activity of businesses, only on their employment and payroll. So macroeconomists have many potential reasons to care about the changing ownership structure, but it is not clear that the LBD data are well-suited to study these issues further.

3 Macro Effects of the Business Volatility Decline

As is well-known by now, there has been a considerable decline in the volatility of most aggregate variables in recent decades (often referred to as the “Great Moderation”), though there is disagreement about the exact timing and nature of this decline (McConnell and Perez-Quiros 2000, Stock and Watson 2002, and Blanchard and Simon 2001). I document the decline in the volatility of the growth of private nonfarm employment—the most relevant aggregate measure for the LBD data—in figure 2.18. Panel a) plots the 12-month growth rate of private nonfarm employment and panel b) shows the standard deviation of the 12-month growth rate using a ten-year moving window. Clearly, the volatility of private nonfarm employment has declined from the 1940s to the 1960s, picked up in the 1970s and then declined again since 1980.

How does this aggregate trend relate to the trend in idiosyncratic volatility? To clarify ideas, let us consider the simplest model of business growth rate and assume that firm $j$’s growth rate at time $t$ is determined by an aggregate growth shock, $Z_t$, with variance $\sigma^2_{Z,t}$, and an idiosyncratic growth shock, $\varepsilon_t$, with variance $\sigma^2_{\varepsilon,t}$, that is independent across firms and of the aggregate shock:

$$\gamma_t = \beta_t Z_t + \varepsilon_t.$$  

(1)

Assuming that there are $N$ firms in the economy, the aggregate growth rate is

$$\gamma_t = \sum_{j=1}^{N} \alpha_j \gamma_j = \beta_t Z_t + \sum_{j=1}^{N} \alpha_j \varepsilon_j.$$  

(2)
a) 12-month growth rate of private nonfarm employment between 1940 and 2006.

![Graph showing 12-month growth rate of private nonfarm employment between 1940 and 2006.]


![Graph showing standard deviation of the 12-month growth rate of private nonfarm employment using a 10-year moving window between 1945 and 2001.]

Figure 2.18
Volatility of the Growth Rate of Private Nonfarm Employment
where \( \alpha_j \) is the share of firm \( j \) in total employment. The variance of the aggregate growth rate then is

\[
\text{var}(\gamma_t) = \beta^2 \sigma_{z_t}^2 + \left( \sum_{j=1}^{N} \alpha_j^2 \right) \sigma_{\beta}^2.
\]  

(3)

The role of idiosyncratic variability in influencing aggregate variability is thus determined by the size of the term \( \sum_{j=1}^{N} \alpha_j^2 \). If all businesses are of the same size, then \( \sum_{j=1}^{N} \alpha_j^2 = 1/N \). With close to 5,000,000 firms in the economy, the term \( \sum_{j=1}^{N} \alpha_j^2 \) vanishes and

\[
\text{var}(\gamma_t) = \beta^2 \sigma_{z_t}^2,
\]

(4)

so that idiosyncratic shocks play no role in determining the variability of the aggregate growth rate.

Of course, not all firms in the economy are of the same size, and the presence of large firms could influence the above calculations, as argued by Gabaix (2005). A simple back-of-the-envelope calculation based on the 50 largest U.S. private employers as reported by Fortune 500 implies, however, that even if one accounts for large employers, the term \( \left( \sum_{j=1}^{N} \alpha_j^2 \right) \sigma_{\beta}^2 \) contributes at most 10 percent to the variance of aggregate employment growth. So, to understand changes in aggregate volatility, it is critical to understand the part of aggregate volatility that comes from aggregate disturbances.

In the context of the present paper, though, isolating aggregate disturbances is not straightforward to do, since DHJM measure weighted mean firm-level volatility, which in the above framework can be expressed as

\[
\sum_{j=1}^{N} \alpha_j \text{var}(\gamma_j) = \beta^2 \sigma_{z_t}^2 + \sigma_{\beta}^2.
\]

(5)

Thus the DHJM measure is a sum of the idiosyncratic risk term \( \sigma_{\beta}^2 \), which has limited influence on aggregate volatility, and of the aggregate disturbance term, \( \beta^2 \sigma_{z_t}^2 \). To isolate the aggregate component (or more generally comovement among firms in an industry, or region), a possible econometric specification could be

\[
\gamma_t = f(d_f, d_t, X_t, \gamma_{t-n}, e_t),
\]

(6)

where \( d_f \) is a firm fixed effect, \( d_t \) is a time effect identifying time trends in growth rates common across firms, and \( X_t \) are time-varying firm characteristics, such as size and age.
With the rich data available in the LBD, by extracting a common component across different industries and studying its volatility, one could answer many interesting questions relating to the Great Moderation (GM). For example, was there a GM in all segments of economy? When did the GM start? Did it start at the same time in all segments of economy? Is the GM related to jobless recoveries as hypothesized by Koenders and Rogerson (2005)? Was the GM due to falling correlation between segments of the economy?

The last question of falling correlations among segments of the economy is all the more relevant, since not only could this account for the fall in aggregate volatility, but there is also evidence supporting its empirical validity. Assume that the aggregate growth shock, $Z_t$, in the above framework is composed of two separate fundamental shocks:

$$Z_t = \beta_1 Z_{1t} + \beta_2 Z_{2t},$$

(7)

Then

$$\sigma_{Z_{12}}^2 = \beta_1^2 \text{var}(Z_{1t}) + \beta_2^2 \text{var}(Z_{2t}) + 2\beta_1\beta_2 \text{covar}(Z_{1t}, Z_{2t}),$$

(8)

so a fall in the correlation of the two shocks would immediately imply a fall in the variance of the aggregate component.

The empirical relevance of this falling correlation is suggested by the fact that the correlation among the eight major private nonfarm sectors has fallen since the early 1980s, exactly the same period that aggregate volatility has fallen. To show this, in figure 2.19, I plot the average pairwise correlation between the 12-month growth rate of employment in eight major private nonfarm sectors using a ten-year moving window, both weighted by sectoral employment and unweighted.

Of course, the most important outstanding question about the Great Moderation is whether it was due to a change in the size of the shocks, i.e., a result of smaller exogenous or policy shocks, or to a change in the transmission mechanism from shocks to outcomes that took place due to a shift from goods to services, to better inventory management, to innovations in financial markets, or to a changing composition of the workforce. Putting this question into the context of the above simple model, did $\text{var}(\gamma_i)$ decline because $\sigma_{Z_{12}}^2$ declined or because $\beta_i$ declined?

With regards to this question, it is not immediately clear how the microdata of the LBD can help, since just as the aggregate data, they
contain a joint $\beta^2_{i} \sigma^2_{z_i}$ term. In fact, due to the lack of identification, there is no purely statistical method that allows one to disentangle the effects of smaller shocks and of changing transmission, so one needs to look at the data through the lens of a theoretical model to make identification possible. Nonetheless, a better understanding of the time path and nature of the Great Moderation by using micro data could be very informative in shaping our thinking about this important macroeconomic question.

4 Interpreting the Decline in Business Volatility

DHJM state that in their paper they are giving "empirical indicators for the intensity of idiosyncratic shocks." This is one possible interpretation of their results. Even if one accepts that the overall decline is not simply a result of a change in the composition of observables among U.S. businesses, the decline in the volatility of the growth rate of an individual producer could be due to a decline in the shocks that affect this producer or to a change in the producer's environment and/or behavior. This is the same issue of shocks versus transmission that arises with regards to aggregate volatility.
To demonstrate this distinction and to highlight the usefulness of looking at the data through the lens of a theory, let us consider a simple model. To be able to talk about employment determination and employment volatility at the firm level, one needs a model of employment determination with frictions. One such model is due to Bentolila and Bertola (1990), where the frictions take the simple form of adjustment costs.

Assume that there is a monopolist firm that maximizes its discounted profits using discount rate \( r \) and at each instant faces a downward-sloping demand function, \( Q_t = Z_t P_t^{-1/(1-\mu)} \), where \( 0 < \mu < 1 \), \( Q_t \) is the firm’s output at time \( t \), \( P_t \) is the price it charges at time \( t \), and \( Z_t \) is a stochastic demand shock, where \( Z_t \) follows a geometric Brownian motion, \( dZ_t = \theta Z_t dt + \sigma Z_t dW_t \). Assume that output is linear in labor, the only input into production, which has a fixed flow cost of \( w \).

There is exogenous worker attrition at rate \( \delta \). In addition to this attrition (for which the firm pays no adjustment cost), the firm can decide to hire or fire workers. If the firm fires workers, then it has to pay a firing cost of \( c_f \) per unit of labor. If the firm hires workers, then it has to pay a hiring cost of \( c_h \) per unit of labor.

In this environment, it is straightforward to show that the optimal policy of the firm is to keep the ratio \( L_t / Z_t \) in an interval \( \left[ \frac{1}{\delta}, \frac{1}{\mu} \right] \), so that the firm starts hiring if \( L_t \) is to fall below \( \frac{1}{\delta} Z_t \) and starts firing if \( L_t \) is to exceed \( \frac{1}{\mu} Z_t \). For a given set of model parameters, one can then calculate the optimal inaction interval \( \left[ l', l'' \right] \), and simulate the stochastic path of the firm’s employment over time. Performing such a simulation given an annual attrition rate of \( \delta = 0.10 \) and a demand volatility parameter of \( \sigma = 0.15 \) and calculating the DHJM measure of firm-level employment volatility gives a volatility measure of 0.108 as can be seen in the first column of table 2.7.

Now let us assume that we see the volatility of the same firm’s employment decline to 0.084. What could explain such a decline? It turns out that there are several possible explanations. First, as column 2 of table 2.7 shows, the decline in firm-level volatility could be due to a decline in the size of the demand shocks, with \( \sigma \) being reduced from 0.15 to 0.10. This would be a shocks-based explanation. Second, as column 3 of table 2.7 shows, the same decline could be due to a change in \( \delta \), the exogenous attrition rate, from 0.10 to 0.05. Such a decline in the exogenous attrition rate in the 1980s and 1990s could accompany an aging of the workforce that took place as the baby boom generation became older, since it is well-known that older workers have much lower rates.
of exogenous attrition than younger workers. This, of course, would be a transmission-based explanation, since here the change in the firm’s environment led to a decline in firm-level volatility.

So it is clear that the decline in firm-level volatility need not necessarily imply a reduction in the size of the shocks that the firm experiences, rather it could be due to other changes in the firm’s environment. The advantage of having an explicit model is that it can give us ways to disentangle the two possible reasons for the decline in volatility. In particular, in the above simple model, the two sources of the decline in firm-level volatility could be distinguished by looking at the average time between adjustments of the firm’s workforce. In the case of smaller shocks, the average time to adjust declines, since now the firm faces less risk and is willing to take advantage even of small changes in demand (i.e., the region of inactivity shrinks). In the case of lower exogenous attrition due to the baby boomers getting older, the average time to adjust increases, since now the firm needs to do replacement hiring less often.

Of course, these simple calculations are only demonstrative, since they rely on an easily calculable partial-equilibrium model with some restrictive assumptions, but they demonstrate how one might use a theoretical model to think about the rich data studied in DHJM. Campbell and Fisher (2004) develop a dynamic stochastic general equilibrium model with similar features.

### 5 Conclusions

To conclude, it is worth reiterating that the LBD contains great new data to study business dynamics and to guide our thinking about important macro questions. The paper by DHJM presents some very nice and thought-provoking findings and is certainly only the beginning of
an exciting new research program. The finding, in particular, that the volatility trends of all firms do not coincide with the volatility trends of publicly-held firms that have been studied in previous papers certain‐

ably deserves attention, since it changes the basic stylized fact that the growing theoretical literature connecting business-level volatility with aggregate volatility must confront.

One interesting way to push this research agenda forward, especially in its relation to macroeconomics, is to bring more theory to the interpretation of data, since some important questions regarding the source of the decline in aggregate volatility are not possible to answer without it.

Endnote

1. The other parameters are set at annual values of $r = 0.05$, $\theta = 0.012$, $\mu = 0.5$, $w = 1$, $c_i = 0.5$, and $c_y = 0.5$. Details of the calculations and simulations are available upon request.

References


Diego Comin began the discussion by raising several points. He noted that it was entirely possible for time series and cross-sectional measures of firm volatility to behave very differently. While the cross-sectional measures of volatility capture the dispersion of the distribution of firm growth, the time-series measures of volatility get at the changes in a firm’s position within this distribution. He mentioned that in work with Sunil Mulani, he had found that turnover had increased more in the COMPUSTAT sample. Using sales data rather than employment data, they furthermore found a decrease in the cross-sectional measure of volatility in the COMPUSTAT sample. Thomas Philippon remarked that similar trends vis-à-vis the convergence in cross-sectional volatility between private and publicly-traded firms had been observed in French data.

Comin noted that if the authors’ conclusions are correct, they are particularly interesting because they help distinguish between different explanations that have been put forward regarding the upward trend in the volatility of public companies. In particular, he saw the authors’ evidence as supporting Schumpeterian models in which firms that do a disproportionate amount of R&D, such as public firms, experience larger increases in volatility. On the other hand, he saw the authors’ evidence as posing a challenge for models that stress financial frictions.

Comin emphasized the importance of controlling for compositional change by including firm fixed effects in the regressions. He noted that while the results could be driven by compositional change, in his own work on the COMPUSTAT sample, he had found that this was not the case. He noted that his results were also robust to the inclusion of age effects, size effects and to different weighting schemes, and said that he would like to see whether the results in the paper were robust to these effects as well.
Both Comin and Philippon noted that while the firms in the COMPU-STAT sample accounted for only about one-third of total U.S. employment, they accounted for a much larger fraction of value added in the economy. This implied that the weights were very different if firms were weighted by sales rather than employment. John Haltiwanger agreed that it was important to look at measures of activity other than employment. He noted that the LBD data set was particularly good for the employment variable, whereas investigating other measures would require significant additional work to construct these variables. Regarding entry and exit, Haltiwanger said that the results would not change significantly if sales weights were used instead of employment weights.

Daron Acemoglu cautioned against implicitly adopting a steady-state view of the economy when thinking about firm volatility. He noted that the entry of a large retail firm like Wal-mart in a particular local market typically induces a spike in hiring and firing activity, and this non steady-state phenomenon should affect the interpretation given to the empirical results. He also suggested that monotonic selection of less risky firms into public listing was not necessarily a good assumption. In response to an improvement in financial development, he argued that the most risky firms might seek and obtain a public listing since these firms have the biggest need for risk diversification. This would imply that the pool of listed firms would contain both old, low-risk firms and young, high-risk firms. Steven Davis responded that while the logic of Acemoglu’s argument was correct, the quantitative force of this argument was not strong enough to explain the volatility convergence result.

Philippon said that he thought the take-away message from the paper was that economists need to think more about the decision of firms to go public. Two parameters he felt were particularly important in determining which firms go public are the amount of risk and the amount of asymmetric information. Firms should be more likely to go public the more risky they are and the less they are plagued by asymmetric information, other things equal. Philippon emphasized that the asymmetric information in IPOs was a very large phenomenon which led to a large amount of underpricing. In order to explain the large increase in the fraction of firms that go public, he felt that it was important to examine closely the role of improved financial intermediation, such as the rise of venture capital, in reducing asymmetric information problems. John
Haltiwanger agreed with Philippon's point and said that the authors were actively working on integrating the information in the LBD with venture capital data. He noted that with the dataset they had created, they could study the prehistory of firms that go public.

Andrew Levin urged the authors to think about the possible causal links between the trends they observe in firm level volatility and the Great Moderation in macroeconomic volatility since the mid-1980s. He noted that the causation could go either way and that it was even possible that there was no link. It seemed to him, however, that the authors were rather hesitant to draw any link between the Great Moderation and the trends in firm level volatility that they documented. Olivier Blanchard wondered whether the difference in volatility between public and private firms was primarily due to the larger size of public firms.

Responding to the discussants' comments, Haltiwanger noted that it was reassuring that there were now multiple datasets for the U.S. based on different sources from which consistent empirical patterns have emerged. He said that they had emphasized the retail sector in the paper since they were better able to ascertain the reasonableness of their results for this sector than for some other sectors. He however emphasized the pervasiveness of their findings across sectors. He noted that one potential explanation for the results was a shift in the economy towards larger national firms, but that many other explanations likely played a role.

Haltiwanger said that they were confident that the data showed a decline in entry and exit. He noted that in a large class of models with frictions, entry and exit played a very important role. He discussed work that he had done with Steven Davis and Jason Faberman showing that in the JOLTS data, the employment growth distribution has fat tails and that in light of this, entry and exit is particularly important.

Ron Jarmin rounded up the discussion by encouraging researchers to exploit the LBD dataset. He noted that research proposals could be submitted easily to the Census Bureau (via the Bureau's website) for access to the dataset.