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Sclerosis and Large Volatilities: Two Sides of the Same Coin

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Sclerosis and Large Volatilities: Two Sides of the Same Coin

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Abstract

Although the German labor market is very sclerotic (i.e., the average labor market flows are much smaller than in the United States), it is very volatile. Specifically, the standard deviations of the cyclical components of unemployment and the job-finding rate are 18 and 12 times larger than the standard deviation of productivity (i.e., about twice as large as in the United States). We show in the context of a labor-selection model that sclerosis can be expected to generate larger labor market volatilities.

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1 Introduction

It is well known for the United States that the standard deviation of the cyclical component of labor market variables (e.g., the job-finding rate, vacancies, and unemployment) is much larger than the standard deviation of the cyclical component of labor productivity (see Shimer, 2005). So far, there is no comprehensive evidence on this issue for European countries.[1] We close this gap by constructing labor market time series for Europe's largest economy, Germany, based on register data provided by the German Federal Employment Agency. Interestingly, and maybe surprisingly at first sight, the standard deviation of unemployment, vacancies and the job-finding rate is larger than in the United States (both in absolute terms and relative to productivity).

We identify the low labor market flow rates (very often dubbed as "sclerosis") as reason for the large labor market volatilities. In particular, we show in a labor-selection model[2] that smaller separation rates generate larger labor market volatilities. When the expected job duration is longer, autocorrelated aggregate shocks generate a larger change in the present value of firms' profits. Thus, a given aggregate shock changes a firms vacancy posting and recruitment behavior more if the expected job durations are longer.

The paper is organized as follows. Section 2 briefly describes the used data and shows labor market flow rates and labor market volatilities for Germany and the United States. Section 3 sets up a model that is able to explain the volatility differences between Germany and the United States.

[1] This is partly related to data availability or construction problems. Eurozone data can, for example, only be constructed synthetically using country-specific datasets. Christoffel et al. (2009) provide some evidence for the eurozone. However, their sample period is shorter than ours and they do not show any evidence for some important variables, such as the job-finding rate or the separation rate.

[2] The term was introduced by Brown et al. (2010).

Table 1: Summary Statistics and Correlation Matrix for West-Germany 1980-2004

	u	v	v/u	η	ϕ	a
Standard deviation	0.234	0.349	0.649	0.159	0.153	0.013
Relative to prod.	17.878	26.618	49.565	12.122	11.664	1.000
Autocorrelation	0.927	0.963	0.972	0.819	0.890	0.770
			correlation			
u Unemployment	1	-0.833	-0.831	-0.846	0.744	-0.042
v Vacancies		1	0.984	0.853	-0.814	0.163
v/u			1	0.861	-0.813	0.188
η Job-Finding Rate				1	-0.753	0.216
ϕ Separation Rate					1	-0.012
a Labor Productivity						1

Notes: Quarterly data, seasonally adjusted using censusX12, log deviation from HP-trend with $\lambda = 10^5$, $log(X/X_{hp})$. 1980 to 2004; unemployment, u, according to ILO; vacancies, v, were provided by the German Federal Employment Agency; the job-finding rate, η, is computed as exits from unemployment divided by the unemployment; the separation rate, ϕ, are entries into unemployment divided by employment; labor productivity per worker, a, is without farming and public and social services provided by the Federal Statistical Office.

2 The Labor Market in Germany and in the United States

Labor market flows in Germany are a lot smaller than in the United States. During our sample period (1980-2004)[3], the average separation rate is 2 percent *per quarter* in Germany and 4 percent *per month* in the United States. A similar order of magnitude holds for the job-finding rate in Germany vis-à-vis the United States. This is the reason why European labor markets have been called "eurosclerotic" by various authors (see Giersch, 1985, and Blanchard and Summers, 1986).

Table 1 shows that the standard deviation of unemployment in Germany is 18 times larger and the standard deviation of vacancies is 27 times larger than the standard deviation of productivity (calculated as output per worker). The standard deviation of the labor market tightness (i.e., the vacancy to unem-

[3] For a precise description of the used data, see Appendix.

Table 2: Summary Statistics and Correlation Matrix for US 1980-2004

	u	v	v/u	η	ϕ	a
Standard deviation	0.155	0.205	0.356	0.112	0.052	0.016
Relative to prod.	9.479	12.595	21.859	6.883	3.184	1.000
Autocorrelation	0.958	0.953	0.958	0.932	0.639	0.88
			correlation			
u Unemployment	1	-0.895	-0.960	-0.962	0.418	-0.123
v Vacancies		1	0.983	0.907	-0.378	0.073
v/u			1	0.951	-0.410	0.084
η Job-Finding Rate				1	-0.233	0.043
ϕ Separation Rate					1	-0.539
a Labor Productivity						1

Notes: Quarterly average of monthly data, seasonally adjusted using censusX12, log deviation from HP-trend with $\lambda = 10^5$, $log(X/X_{hp})$. Unemployment, u, and output per worker, a, (non-farm business sector) are taken from the BLS, vacancies, v, are the help-wanted advertising index, the job-finding rate, η, and separation rate, ϕ, were constructed by Robert Shimer. For additional details, see Shimer (2007) and `http://sites.google.com/site/robertshimer/research/flows`.

ployment ratio) is almost 50 times larger than the standard deviation of labor productivity.

To calculate the job-finding and the separation rate, we used the IAB-Employment Sample (IABS). The IABS is a 2 percent sample of all employees subject to social security as well as unemployed benefit recipients. We calculated the job-finding rate as exits from unemployment divided by the stock of unemployment, which is in line with Shimer (2005). The standard deviation of the job-finding rate is 12 times larger than the standard deviation of labor productivity. The separation rate is defined as new entries into unemployment divided by employment and has a similar volatility as the job-finding rate.

Table 2 shows that standard deviations for the respective labor market variables in the United States. Interestingly, they are smaller than in Germany, both in absolute terms and relative to productivity. How reliable are these findings, given that the German and U.S. data is not completely comparable? First, we have chosen the data as comparable as possible (e.g., we have used the unemployment definition of the ILO instead of registered unemployed). Second, we have performed several robustness checks. Some examples: When we start our observation period in 1977 instead of 1980[4], the standard deviation for the job-finding rate even increases; all other results remain unaffected. When we use registered unemployment instead of survey unemployment, the standard deviation of unemployment drops somewhat but it is still larger than in the United States. When we correct our vacancy time series for cyclical reporting biases (since not all vacancies are reported to the German Federal Employment Agency), the standard deviation of vacancies changes only marginally. These and further performed robustness check show that the larger German labor market volatilities is a robust finding.

This section has identified two distinctive features of the German labor market vis-à-vis the U.S. labor market, namely, low labor market flows (i.e., sclerosis) and large labor market volatility. In the next section, we will argue that these two features are the two sides of the same coin.

3 Theoretical Explanation

We use a labor-selection model[5] to analyze the potential connection between sclerosis and the large volatilities. In our model, each unemployed worker can only apply at one particular firm per discrete time period. Each worker-firm pair draws a productivity realization from an idiosyncratic shock distribution (i.e., the pair finds out whether there is match suitability or not). If the realization of the idiosyncratic shock is sufficiently bad, there is no profit to be made for the firm. In this case, the worker will not obtain a job offer and she will choose a new

[4] Data before 1977 is not reliable. During the time from 1977 to 1980 the transition into employment were larger than the number of unemployed (yielding job-finding rates larger than 100%). This is the reason why we excluded this time period in the first place.

[5] See Brown et al. (2010) and Lechthaler et al. (2010).

firm during the next period,[6] drawing a new idiosyncratic shock realization. For simplicity and for comparability with the standard search and matching model, we assume an exogenous separation rate, ϕ.[7]

The sequence of decisions is the following: First, the aggregate shock is revealed. Second, workers randomly apply at firms and the idiosyncratic productivity shock is revealed. Finally, workers and firms determine the wage and firms decide whether to make a job offer to a particular worker (depending on the shock realization). We will show these steps in inverse order below.[8]

The framework can be closed by different wage formation assumptions. For simplicity and in order to exclude that our results are driven by a wage rigidity (but without loss of generality), we assume a simple wage formation mechanism, namely, wages are a proportional share of productivity.

3.1 The Model

Wages: We assume that wages, w, are a constant share, α, of productivity ($w_t = \alpha a_t$). This wage dynamics is in line with the empirical evidence Haefke et al. (2008) and can be rationalized by theory. Our assumption ensures that wages are as volatile as productivity.

Selection stage: Once worker-firm pairs have been established, firms decide whether to hire a particular worker or not. There is a random worker-firm specific productivity shock, ε_t, iid across workers and time, with a cumulative distribution $F(\varepsilon_t)$. ε_t is observed by the firms and can be interpreted as an idiosyncratic productivity shock. Thus, the expected discounted profit, π_t^E, of

[6] This assumption is comparable to the search and matching models, where it also takes time to find a new employer.

[7] To make the model analytically tractable, only unemployed workers are subject to idiosyncratic productivity shocks. It can be shown numerically that all the analytical results that are derived below also hold for a model with endogenous firing decisions.

[8] The framework can be extended by vacancy posting and could generate a negative correlation between unemployment and vacancies. However, we omit vacancy posting, as it is irrelevant for our issue.

hiring an unemployed worker is equal to the current productivity minus the current wage, w_t, minus the idiosyncratic productivity shock, ε_t, plus the expected discounted future profits:

$$\pi_t^E = a_t - w_t - \varepsilon_t + \delta E_t (\pi_{t+1}), \tag{1}$$

with

$$E_t (\pi_{t+1}) = (1 - \phi) E_t (a_{t+1} - w_{t+1} + \delta \pi_{t+2}). \tag{2}$$

The firm hires an unemployed worker whenever the expected discounted profits of this worker is larger than the linear hiring costs, h, i.e., $\pi_t^E > h$. All other workers who are below this threshold are not hired.

Thus, the job-offer rate (which is equal to the job-finding rate) is given by:

$$\eta_t = P (\varepsilon_t < a_t - w_t + \delta E_t (\pi_{t+1}) - h). \tag{3}$$

The higher the expected discounted profits of a worker, the higher the job-finding rate will be (i.e., also less productive workers will be hired). The exact job-finding rate is determined by the distribution of the idiosyncratic productivity shock.[9]

3.2 Inspecting the Mechanism Analytically

We calculate an analytical expression for the elasticity of the of the job-finding rate with respect to changes in productivity. To be able to make comparative static exercises, we assume in this subsection that the aggregate productivity is deterministic and that it has the same value in each period (i.e., when it changes, this affects the current and all future periods). Thus, we can drop the

[9] The model follows the standard employment dynamics equation $n_t = (1 - \eta_t - \phi) n_{t-1} + \eta_t$, where n is the employment rate.

expectation terms and the job-finding rate becomes equal to

$$\eta_t = P(\varepsilon < e), \tag{4}$$

where e is the hiring threshold, i.e., the point in the distribution of ε where firms are indifferent between hiring and not hiring. The hiring threshold can be expressed as

$$e = a - w - h + \delta(1-\phi)(a-w) + \delta^2(1-\phi)^2(a-w) + ..., \tag{5}$$

and using our assumption that $w = \alpha a$, we obtain

$$e = \frac{(1-\alpha)a}{1-\delta(1-\phi)} - h. \tag{6}$$

To illustrate our point further, we assume that the idiosyncratic productivity shock, ε, follows a uniform distribution with $E(\varepsilon)$ normalized to zero and with lower support $-z$ and upper support z. Then, the job-finding rate can be expressed as

$$\eta = \frac{\frac{(1-\alpha)a}{1-\delta(1-\phi)} - h + z}{2z}, \tag{7}$$

for $e \in (-z, +z)$.

After some algebra, we obtain the following elasticity of the job-finding rate with respect to productivity

$$\frac{d\log\eta}{d\log a} = \frac{(1-\alpha)a}{2(1-\delta(1-\phi))z\eta}. \tag{8}$$

The equation shows that the smaller is the separation rate, ϕ, the larger the elasticity of the job-finding rate is. Intuitively, a smaller separation rate means that the expected average job duration is longer. With a longer expected job duration, a persistent or permanent aggregate productivity shock will affect the firms' present value of profits by more and the job-finding rate will show a larger elasticity with respect to productivity changes. To illustrate this point further, imagine a spot market with one period worker-firm relationships. In this case, an aggregate productivity shock would only affect the contemporaneous output of a new worker. By contrast, in a market with long-term relationships, the future output of a worker would also be relevant for the firm's behavior.

Our model was derived to show analytical expressions. More realism to the model is added in the working paper version, Gartner et al., 2009 (e.g., vacancy posting and a normal instead of a uniform idiosyncratic distribution). We show that this richer model is both able to generate strong amplification effects and to explain the quantitative differences in labor market volatilities between Germany and the United States.

4 Conclusion

This paper shows that the standard deviations of labor market variables (unemployment, vacancies, market tightness, job-finding rate) in Germany are larger than in the United States (both in absolute terms and relative to productivity). These large volatilities can be rationalized by the sclerotic German labor market (i.e., low labor market flows).

5 Appendix

Unemployment according to the ILO definition exists for Western Germany up to 1991. From 1992 on, we weighted the ILO-unemployment for eastern and western Germany with the share of registered unemployment in western Germany.

Vacancies are based on the administrative data of the German Federal Employment Agency. While there is an advertising index for the United States, there is an official monthly time series for vacancies in western Germany after 1950. The German Federal Employment Agency provides information on vacancies reported by firms. Not all vacancies are reported to the Employment Agency by the firm. We corrected for this bias in the working paper version (Gartner et al., 2009) and only found minor quantitative differences. Shimer (2005) argues that the job advertising index in the United States reflects the underlying dynamics of the actual vacancies fairly well. Therefore, it is legitimate to compare the German and the U.S. measures.

Job-finding and separation rates calculated with administrative IABS data. For every person in the dataset, we determined the main employment status (employed, unemployed, or out of labor force) in January, April, July, and October.[10] Every change in employment status between these dates was considered as an exit from one status and an entry into another status. As the labor market flows are small in Germany, a further disaggregation to the monthly level would not change our results much.

[10] 10th day of the month.

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