

Thomas P. Triebs and Justin Tumlinson Learning to Forecast Business Conditions – Evidence from German Reunification¹



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Economic decisions involving firm production or investment hinge, implicitly or explicitly, on the assumption that firms can predict future business conditions, e.g., they know or can predict factor prices, production technology, demand, and competitor behavior in the next period – for firm decisions today depend critically on (estimates of) these variables tomorrow. But neither managers nor firms are likely to be born with the ability to accurately forecast future business conditions. Our research asks, do they learn to forecast? How long does this learning take? How do market dynamics, and especially various types of uncertainty, affect forecast quality and learning?

At first blush, one might naively assume that simply measuring a positive correlation between firm age and forecast quality would suffice to establish that firms learn to forecast over time. And indeed, we show that as firms age, they forecast future business conditions better. Nevertheless, firm age correlates with many confounding and often unobservable factors besides experience that could affect forecast quality – young firms are smaller, their employees tend to be younger, their markets tend to be newer, and so on. To establish a causal link between experience and learning, an ideal experiment would randomly place a cross-section of firms into a new market environment alongside otherwise similar counterparts that are very experienced in the market and compare the evolution of their forecasts of subsequently shared market conditions. German reunification was such an event.²

Our analysis builds on the firm-level data of the widely cited ifo Business Climate Survey (Geschäftsklimaindex), which provides business condition forecasts and realizations for German firms. Every month since 1949, the survey has collected the near-term expectations and assessment of business conditions for numerous German manufacturing firms. This data allows us to construct firm-level forecast errors – the difference between expectations and realizations – and to analyze firms' learning of business condition forecasting under the quasi-experiment of German reunification. Relatively homogeneous Germany was abruptly divided in 1949, and for four decades firms in

East Germany operated under a master-planned, communist economy. For these firms of all sizes, maturities, and across the spectrum of industries, market states were dictated, not predicted. Then suddenly, and quite unexpectedly, with German reunification in 1990, these firms were thrust into the free market economy of the West. Uniquely among transition countries, East Germany immediately received developed country institutions (e.g., legal system, property rights, social welfare) as well as full global market access. Nevertheless, Eastern managers recognized a deficiency in their understanding of market economies. In 1991, West German firms hosted East German managers as interns. About 70 percent of these interns self-reported having a poor knowledge of market economics; more than 85 percent of their Western hosts shared that assessment.

However, there is a worry that reunification left Eastern firms not only with different understandings of the market, but altogether different market conditions than Western ones. Here we provide evidence that changes in market states did not differ fundamentally between East and West. Differences in forecast errors stem from differences in expectations, not realizations. First, previous research suggests that after reunification, Eastern firms did not sell into different markets, but rather Eastern firms swiftly reoriented their exports from planned to market economies. After 1990 most transition countries underwent severe recessions and demand for East German firms' products collapsed. Furthermore, these countries suddenly had to pay for their imports from former East Germany in deutschmarks, which they could not afford. Whereas in 1991 sales to former West Germany roughly doubled, sales to Eastern Europe and the former USSR roughly halved. In any case, Eastern firms mostly sold domestically. Around reunification just under 60 percent of Eastern firms' sales were domestic. Eastern firms in 1987 made only 7 percent of their revenue from exports to Eastern Europe. By 1992 the number had fallen to 1.6 percent. Second, our data also indicates that the market states did not differ substantially between the two regions. Figure 1 plots the time series for the correlation coefficients between Eastern and Western aggregate realizations and expectations respectively. The correlation between Eastern and Western aggregate realizations rises rapidly above 0.8 almost immediately after reunification and increases only slightly thereafter. Correlations between aggregate expectations reach similar strength only after 1997. This suggests that markets between regions homogenized quickly, and the convergence in forecast errors does not come from alignment of actual market conditions but rather expectations, which took longer to converge.

How long did it take Eastern firms to forecast market conditions as well as their Western peers? Figure 2 plots forecast error magnitudes (no direction) by Western firms since 1980 and Eastern ones after reunification and provides evidence for the impact of reunification on Eastern firms and their subsequent learning. Ini-

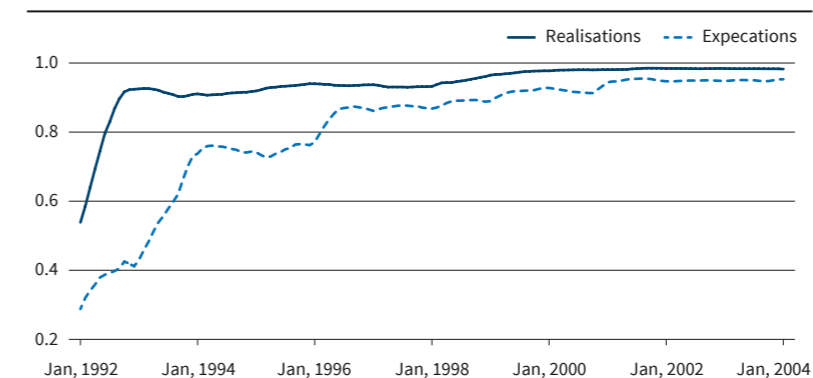
tially, Eastern firms made much larger forecast errors than those in the West. (Note that there is no unusual spike in Western forecast errors, due to the shock of reunification or any other reason, and that we do not explain movements in the forecast error per se but only differences between East and West.) Over time, forecast errors in the East decreased and converged to Western levels. We see that real-world convergence took a decade, despite the fact that formal institutions converged immediately, and business conditions converged very quickly.

The improvement of Eastern firms' forecasts as evidenced in Figure 2 suggests a learning process and we show that, across firms, the rate of learning depends on market uncertainty. We do not explain the technical details of the learning process over uncertainty here, but one can use the following analogy. Suppose one has to predict the weather after relocating from a valley to the mountains. Weather in the mountains is generally more volatile than in valleys and hence harder to predict without specific information. Weather information, or signals, in remote areas may be less frequent or from more distant meteorological stations than in urban settings, also complicating predictions. Finally, though, the longer one lives in the new location, the better one understands the weather patterns and

aggregate information from various sources. Comparing industries, we find evidence that firms learn to forecast business conditions in a new environment consistent with this analogy.

Our study is not without limitations. Although we measure the learning of Eastern firms that lived through reunification, the reasons why firms learn remain somewhat obscure. In particular, given that our natural experiment shocked not just Eastern firms, but the individuals and non-firm institutions, we cannot ultimately disentangle organizational learning from individual learning. Although we have ruled out survival of the fittest at the firm level as a primary driver of the observed improvements, we cannot rule out that better forecasting managers (many Eastern firms replaced top management with Westerners) displace worse ones within firms. Our results stress that firms need to learn to operate in new settings. The lessons of this switch to capitalism, though more drastic than most changes to business environments, may help set realistic expectations for how quickly firms adjust to sweeping market changes like new trade rules, e.g., the departure of Britain from the EU. New formal institutions might be built quickly, but firms need longer to learn how to operate in the new environment.

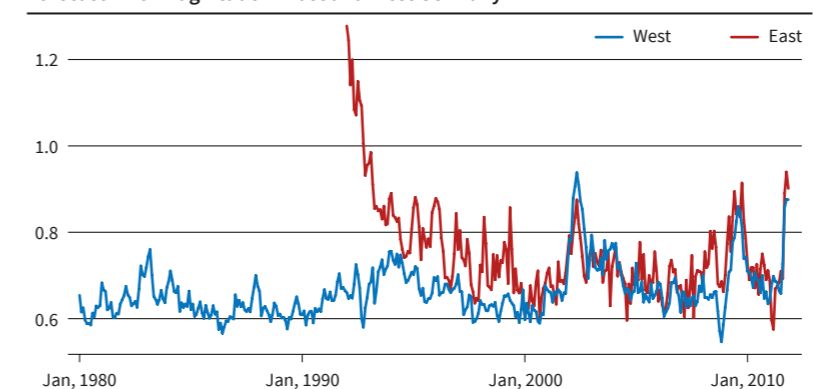
Figure 1
Correlations between East and West



Source: Authors' calculations.

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Figure 2
Forecast Error Magnitude in East and West Germany



Source: Authors' calculations.

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¹ This short piece summarizes a working paper with the same title. The paper, which also contains all references, can be accessed at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2229702.

² Germany was reunited on October 3, 1990. An economic and monetary union was already established on July 1st of that year.