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Uncertainty and unemployment: The effects of aggregate and sectoral channels

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ABSTRACT

We explore the role of uncertainty shocks in explaining unemployment dynamics over the time period 1963–2014. The novelty of our approach is that we distinguish between aggregate and sectoral channels of uncertainty and compare their effects on the unemployment rate. Using S&P500 data we construct both an aggregate measure of time-series volatility in stock returns and a sectoral measure of cross-industry uncertainty in stock returns. We find that an increase in aggregate uncertainty leads to an immediate increase in unemployment, only lasting for three quarters. An increase in sectoral uncertainty leads to a longer-lasting increase in unemployment, with the peak impact occurring after two years. The combination of the two channels can account for the unemployment experience during periods such as the Great Recession when unemployment increased sharply at the outset and remained persistently high. The results are based on a standard macroeconomic vector autoregressive model and are shown to be robust to various checks, as well as to the use of other techniques such as a local projection method.

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1. Introduction

The U.S. unemployment rate rose sharply in 2007 and remained persistently high over the next several years. Long-term unemployment was particularly high: in 2014:Q3 for instance, the unemployment rate for those unemployed for over half a year remained above 2%, more than double the 0.7% rate in 2007. Many policymakers have conjectured that uncertainty about future prospects played a role in both the initial swift deterioration in economic conditions and in the subsequent sluggish recovery (see, e.g., Blanchard (2009); Williams (2013)).

The appeal to the effects of uncertainty dovetails with the increased academic interest in the topic triggered by the work of Bloom (2009), who shows that in the presence of adjustment costs in factors of production, the option value of waiting increases when uncertainty is high, prompting firms to freeze hiring and firing decisions. In his empirical work, Bloom shows that "a number of *cross-sectional* measures of uncertainty are highly correlated with *time-series* measures of stock-market volatility (p. 628; emphasis in original). His demonstration of the macroeconomic effects of uncertainty focuses only on the latter. A time-series measure of stock market volatility has a negative impact on industrial production and employment, after controlling for the effects of several other macroeconomic variables. The impact of time-series uncertainty on the economy is short-lived: within a

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year, both industrial production and employment have returned to baseline. Hence, time-series uncertainty cannot account for the persistent increases in unemployment seen during episodes such as the Great Recession.

The results of this paper suggest that it may be too soon to give up on uncertainty as an explanation for unemployment dynamics. We explore the role of both aggregate (time-series) and sectoral (cross-sectional) uncertainty and show that, despite the high correlation between the two measures that Bloom noted, they have distinct impacts on unemployment.

Specifically, we provide two robust empirical findings. First, the dynamic response of unemployment rate to aggregate uncertainty and sectoral uncertainty shocks is strikingly different. Aggregate uncertainty shocks—measured by the volatility of aggregate stock returns—have short-lived effects on the unemployment rate, peaking in two quarters and returning to baseline after four quarters. In contrast, sectoral uncertainty shocks—measured by the cross-industry dispersion of stock returns—have more persistent effects, peaking in two years and becoming statistically insignificant after four years. With the addition of the sectoral channel, a persistent increase in the unemployment rate thus remains consistent with an uncertainty-based explanation.

Second, the share of unemployment fluctuations attributed to aggregate and sectoral uncertainty shocks changes significantly when moving from short-term to long-term unemployment. Sectoral uncertainty becomes more important as the duration increases: it is particularly important for explaining the long-term unemployment rate (27 weeks and over). Aggregate uncertainty shocks exhibit, if anything, an opposite pattern. Taken together, these two findings contribute to an explanation of the unemployment experience during the Great Recession. As we show, there were distinct spikes in both aggregate and sectoral uncertainty at the onset of the Great Recession. These help explain the sharp initial rise in unemployment, its persistence, and the unusual increase in long-term unemployment. We find that nearly 40% of the persistent increase in the long-term unemployment rate during this period can be explained by the long-lasting effects of sectoral uncertainty shocks.

Our results are based on adding measures of aggregate and sectoral uncertainty to a standard macroeconomic vector autoregressive (VAR) model of the kind estimated by Bernanke et al. (2005) and Bloom (2009) and others. The estimation period is 1963:Q1 to 2014:Q3. We use S&P 500 data to construct a measure of time-series volatility of aggregate stock returns and also the cross-industry dispersion of stock returns at a point in time. We then add these aggregate and sectoral measures of uncertainty to a VAR model that includes overall stock returns, real GDP, inflation rate and the Federal Funds rate.

We carry out several robustness checks of our findings. The importance of sectoral uncertainty holds up over sub-samples and to the exclusion of the Great Recession period. It is also robust to the inclusion of other measures of uncertainty, such as the economic policy uncertainty constructed by Baker et al. (2013), and other drivers of the business cycle, such as the credit spreads emphasized by Gilchrist et al. (2014) and Caldara et al. (2014) and oil price volatility. We try alternate methods of de-trending the unemployment rate and show that the economic and statistical significance of sectoral uncertainty is preserved. Using the local projection method (Jorda, 2005) gives stronger results than those from the VAR.

Why do aggregate and sectoral uncertainty have differential impacts on unemployment dynamics? The focus of this paper is on demonstrating the empirical finding of differential effects and its robustness, so we leave the answer to this important question to future work. Nevertheless, we can offer some conjectures based on previous work in this literature. The most relevant work is the analysis of sectoral uncertainty and unemployment by Topel and Weiss (1988). Their theory emphasizes the role of costly, irreversible, industry-specific human capital. In the face of increased uncertainty about the relative future prospects of sectors, firms and workers may prefer to 'wait and see' before making the investments necessary to switch industries. This 'wait and see' period could involve unemployment for some workers. This mechanism is not too different from the one emphasized by Bloom at the aggregate level. The more persistent effect of sectoral uncertainty could arise because periods of increased sectoral uncertainty are more persistent or because the costs associated with inter-sectoral mobility entail long periods of unemployment.

A related theory is that put forward by Lilien (1982) who suggested that increased dispersion in sectoral shocks could lead to higher unemployment because of the need for greater labor reallocation. As Topel and Weiss note, "in contrast to Lilien who implies that the occurrence of a sectoral shock which requires labor to be reallocated raises unemployment," their theory argues "that the prospect of future shocks is a more likely candidate for explaining the observed rise in unemployment" (emphasis in original). Nevertheless, they acknowledge that "to the extent that the occurrence of sectoral shocks is correlated over time, a sectoral shock may increase expectations of future shocks, so it may be difficult to completely separate the two theories empirically. In this sense, models of costly sectoral mobility and sectoral uncertainty are complementary theories of rising unemployment."

The remainder of this paper is organized as follows. Section 2 provides a simple economic framework in which two types of uncertainty shocks can have different effects on a labor market, and presents indices of each type of uncertainty. In Section 3, we describe our VAR model and present our baseline results. Section 4 presents a battery of robustness checks, including the local projection method proposed by Jorda (2005) to guard against model misspecification. In Section 5, we present our conclusions.

2. Measuring aggregate and sectoral uncertainty

We closely follow Bloom (2009) in describing how uncertainty shocks affect the macroeconomy and also in using stock market data to construct the empirical proxies for them. We assume that a representative firm[1] in an industry i produces output

[1] In principle, we can consider firm-level uncertainty within each industry and its effect on unemployment through an intra-industry reallocation mechanism separate from the inter-industry reallocation mechanism. However, we do not have a sufficient number of firms for many industries, leading to very noisy firm-level uncertainty. Moreover, Shin (1997) finds that inter-industry labor re-allocation accounts for a larger share of unemployment fluctuations than intra-industry re-allocation. Therefore, we focus only on sectoral uncertainty.

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