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State-dependent risk taking and the transmission of monetary policy shocks

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HIGHLIGHTS

- The risk-taking channel of monetary policy is analyzed in a non-linear framework.
- We show that the role of the risk-taking channel depends on the state of the economy.
- Excessive risk appetites may potentially lead to boom-bust patterns.
- Central banks should then take this channel seriously into account when adjusting their policies.

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ABSTRACT

Is risk taking an important channel by which monetary policy shocks affect economic activity? On the basis of a nonlinear structural VAR including a new measure of risk sensitivity by economic agents, we show that the role of the risk-taking channel depends on the state of the economy. While it is irrelevant during recession or normal times, it acts as an amplifier by boosting output during expansion. It means that, as long as monetary policy does not actively ''lean against the wind'', it may exacerbate boom-bust patterns.

1. Introduction

In the wake of the recent global financial crisis, the relationship between monetary policy and the risk appetite of economic agents has been pointed out. Market observers have claimed that the prolonged period of low interest rates under favorable economic and financial conditions in the early 2000s might have produced overconfidence by economic agents, (i) increasing dramatically their risk tolerance and (ii) contributing to financial imbalances. This mechanism, called the risk-taking channel of monetary policy, can have long lasting adverse consequences on economic activity if it is neglected (see Borio and Zhu (2012) and Diamond and Rajan (2012), among others).

The aim of this paper is to investigate the importance of the risk-taking channel in the propagation of monetary policy shocks to the US economy. To this end, we build an indicator of risk sensitivity and introducing it together with output and a measure of the monetary policy stance in a logistic vector smooth transition autoregressive model (LVSTAR, Terasvirta et al., 2010). Using a standard identification scheme for monetary policy shocks (Christiano et al., 1999), we find that the role of the risk-taking channel depends on the state of the economy. During recession or normal times, it has a small effect on the transmission of monetary policy shocks to economic activity. However, during economic booms the risk-taking channel acts as an amplifier by boosting output. Excessive risk appetites may potentially lead to boom-bust patterns. Central banks should then account for this channel when adjusting their policy in order to mitigate the adverse consequence of their decisions on economic activity.

2. Measuring risk taking

As pointed out by Borio and Zhu (2012), usual market-based indicators of risk, such as interest rates and risk premia, are often low just before the peak of the financial cycle, when in retrospect, it

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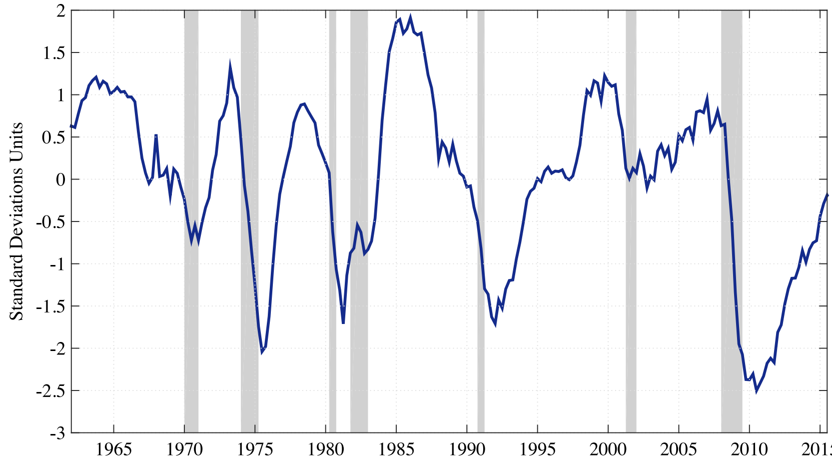

Fig. 1. A risk sensitivity indicator. *Note:* The shaded gray areas are recessions as defined by the NBER.

transpires that risk was at its highest. Then, we need to capture the resilience of the overall financial system, that crucially depends on the underlying health of all sectors of the economy (Hatzius et al., 2010). First, lending to households has taken a central role in the balance sheets of financial intermediaries. Therefore, taking into account both the solvency and liquidity position of the household outperforms the most common metrics used in the literature (Tullio et al., 2013; Ampudia et al., 2016). Second, highly leveraged firms may enter in financial distress during a crisis, exacerbating cutbacks in investment and employment and contributing to the persistence of the downturn (Bernstein et al., 2017).

We choose to capture the resilience of the financial system by constructing a synthetic measure. The latter is a weighted average of variables related to the balance sheets and funding methods of the main US economic agents (households, non financial corporations and financial corporations). A detailed description of the underlying data used for the construction of the indicator is offered in the Appendix. The synthetic measure is estimated using a dynamic factor model. Specifically, we use an iterative method based on the Expectation–Maximization algorithm to estimate the weight associated with each variables (see Stock and Watson 2002 and Brave and Butters 2012).

Fig. 1 displays the resulting (standardized) indicator. Positive values indicate higher levels of risk-tolerance, credit supply and indebtedness than on average. By contrast, negative index values means lower levels than on average. The series is clearly procyclical, i.e. known periods of economic expansion correspond closely with increasingly positive index values. It is also worth noting that the turning points of the index usually lead changes in economic conditions. Remarkably, most of NBER recession dates are leaded by our risk sensitivity indicator.

3. The econometric methodology

We rely on a logistic vector smooth transition autoregressive (LVSTAR) model (Terasvirta et al., 2010) in order to capture the nonlinear relationships between the financial and real sides of the economy. The specification is given by

$$X_t = A_0 + \sum_{j=1}^{q} \left[A_j + G(d_t)B_j\right] X_{t-j} + u_t, \tag{1}$$

where X_t is an $m \times 1$ vector, A_0 is an $m \times 1$ intercept vector, A_j and $B_j, j = 1, \ldots, q$, are $m \times m$ parameter matrices, u_t is a vector of canonical innovations with zero mean, and covariance matrix given by Σ_u, and

$$G(d_t) = \text{diag}\left[G_1(d_t), \ldots, G_m(d_t)\right], \tag{2}$$

is an $m \times m$ diagonal matrix of logistic transition functions

$$G_i(d_t) = [1 + exp\{-\frac{\gamma_i}{\sigma_d}(d_t - \bar{d})\}]^{-1}, \tag{3}$$

for $i = 1, \ldots, m$. $\gamma_i > 0$, and $\bar{d}$ is the long run average of the transition variable d_t. By construction, the transition function $G_i(d_t)$ is bounded between 0 and 1. When $G(d_t) = 0$, the LVSTAR model becomes a linear vector autoregressive model (VAR) with parameters A_j. In contrast, when $G(d_t) = 1$, the LVSTAR model becomes a different VAR with parameters $A_j + B_j$. The smoothness of the transition from one extreme regime to the other is governed by the standardized parameter $\tilde{\gamma}_i = \gamma_i/\sigma_d$. The model is estimated by nonlinear least squares techniques (see Hubrich and Terasvirta (2013) for a complete exposition).

The vector X_t includes the detrended US real gross domestic product per capita[1] (Y_t), our risk sensitivity indicator (F_t), and the shadow federal funds rate (R_t) of Wu and Xia (2016).[2] The data covers the period 1961Q1–2015Q3. The choice of the transmission variable d_t in (1)–(3) is not innocuous. We restrict attention to three candidates: the backward-looking 4 quarters moving averages of output, the risk sensitivity index and the monetary policy rate. After estimation, we evaluate key statistics (mean square error, sum of squares residuals and Theil's U-statistic) for each of these models, and select the one that shows greater accuracy. The results suggest that the moving average of output is the best candidate. In addition, our LVSTAR model includes two lags.[3]

We use the following usual strategy to identify monetary policy shocks. We denote ε_t the vector of structural shocks whose variance are normalized to unity and they are mutually uncorrelated. Let the mapping between canonical innovations and structural shocks $u_t = S\varepsilon_t$ where S is a 3×3 matrix. This matrix is obtained as the Cholesky decomposition of Σ_u. As in Christiano et al. (1999), we choose to position the variables in X_t in the following order $[Y_t, F_t, R_t]'$. Indeed, Christiano et al. (2005) argue that this identifying assumption reflects a long-standing view that many macroeconomic variables do not respond instantaneously to

[1] The cyclical component of real GDP per capita is obtained by fitting a linear and quadratic time trends to the log of the original series.

[2] The shadow rate is a summary measure of total accommodation provided by conventional and unconventional monetary policies. When policy rates are positive, it is identical to the federal funds rate. When the zero lower bound is breached, it is the rate that observed long-term interest rates would imply if the policy rate could be negative.

[3] We conduct some misspecification tests (system stability, neglected serial correlation, structural change, normality of innovation) on the estimated model and we do not find any evidence against it.