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Policy risks, technological risks and stock returns: New evidence from the US stock market☆

Nicholas Apergis

Business School, Northumbria University, Newcastle upon Tyne NE1 8ST, UK

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ABSTRACT

This study examines the role of policy and technological risk on U.S. stock returns. The results will highlight the effect of economic policy uncertainty on stock returns, given that such uncertainty rose to historically high levels after the recession of 2007–2009. In our case, uncertainty is related to tax, spending, and monetary policies. To identify the effect of different uncertainties (shocks) related to stochastic driving processes on stock returns, the empirical methodology allows factors relative to capital and labour tax rates, government spending, monetary policy and total factor productivity to play a leading role in the process of affecting stock returns, whereas the econometric methodology builds upon the stochastic volatility in mean (TVP-SVM) model by Koopman and Hol Uspensky (2002). The empirical findings document the importance of both policy and technological risks, especially after the recent financial crisis event. The findings also carry substantial implications for asset pricing modelling, indicating not only the time-varying character of shocks but also the asymmetric effect of such shocks on stock returns.

1. Introduction

In a recent paper, Born and Pfeifer (2014) analyse the negative effect of policy risk, defined as the uncertainty about fiscal and monetary policy on the business cycle process. In their work, uncertainty is the dispersion of the economic shock distribution, in the sense that future shocks are drawn from a wider distribution, as opposed to the ex-post volatility resulting from on average more extreme shock realization.

The goal of this empirical study is to explore the role of policy risk, based on the former definition, on U.S. stock returns. It seems worthy to attempt to analyse the effect of economic policy uncertainty on stock returns, given that such uncertainty rose to historically high levels after the 2007–2009 recession because of uncertainty about tax, spending, and monetary policies. In addition, the rise in policy uncertainty slowed recovery from the recession by causing businesses and households to cutback or postpone investment, hiring and consumption.

In the world of corporate finance and capital markets, financial risk management turns out to be a very difficult task, especially in the presence of economic policy uncertainty. The literature highlights a number of research areas in which novel studies have contributed significantly to the analysis of financial risk management when there is economic policy uncertainty. Alexopoulos and Cohen (in press) investigate the role played by uncertainty shocks in driving fluctuations in the economy and in asset markets. The authors create new text-based indicators of both general economic and policy-specific uncertainty and use them to chart changes in the level of uncertainty in the US spanning the period 1985–2007 to determine the role of policy in these swings and to assess their impact on the economy, equity markets and business cycles. Their empirical findings indicate that uncertainty shocks, both general and policy related, depress the level of economic activity, significantly increase stock market volatility and decrease market returns.

To identify the effect of different uncertainties (shocks), related to stochastic driving processes on stock returns, the following mechanisms are allowed to play a leading role in this process: i) capital and labour tax rates, ii) government spending, iii) monetary policy shocks and iv) total factor productivity (TFP).

Our empirical study makes use of the methodology and builds upon the stochastic volatility in mean (TVP-SVM) model of Koopman and Hol Uspensky (2002) to identify the relative effects of policy risks and technological risks on stock returns in the U.S. capital market. The novelties of the paper are fivefold. In particular, i) this is the first study that makes explicit use of the definition of policy risk given above to explore its effect on stock returns; ii) aggregate uncertainty is used in the empirical analysis without turning to explicit proxies; iii) the methodology allows the joint consideration of level and uncertainty shocks (i.e., uncertainty about future tax liabilities, government spending, monetary policy); iv) other risks, such as TFP, are explicitly introduced to be used for comparison purposes vis-à-vis policy risks; and v) our analysis differs from that by Born and Pfeifer (2014) because it explicitly considers the role of the

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E-mail address: Nicholas.apergis@northumbria.ac.uk.

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recent financial crisis to explore the role of policy risk over both a rather tranquil and a stressed period of time.

The outline of the paper is as follows: Section 2 presents the literature review related to the effect of policy risks (uncertainty) on stock returns, and Section 3 presents the data and methodological approaches. Section 4 reports the empirical analysis, and, finally, Section 5 concludes.

2. Literature review

Our empirical study relates to at least two literatures. The first is research on the impact of general economic uncertainty on investment. Theoretical work on this topic dates at least to Bernanke (1983), who notes that high uncertainty gives firms an incentive to delay investment and hiring when investment projects are expensive to cancel or workers are costly to hire and fire. Of course, once uncertainty falls back down, firms start hiring and investing again to address pent-up demand. Other reasons for a depressing effect of uncertainty include precautionary spending cutbacks by households, upward pressure on the cost of finance (Gilchrist et al., 2010 and Pastor and Veronesi, 2011a), and increased managerial risk-aversion (Panousi and Papanikolaou, 2011).

Second, there is a literature focused on policy uncertainty. Higgs (1997) and Hassett and Metcalf (1999), among others, consider the detrimental economic effects of monetary, fiscal, and regulatory policy uncertainty. More recently, Born and Pfeifer (2014) and Fernandez-Villaverde et al. (2011) have studied policy uncertainty in Dynamic Stochastic General Equilibrium (DSGE) models, finding moderately negative effects, and Pastor and Veronesi (2011a,b) model the theoretical links among the business cycle, policy uncertainty and stock market volatility.

Santa-Clara and Valkanov (2003) find that stock returns are higher and real interest rates are lower during Democratic presidencies. In an international context, Brogaard and Detzel (2012) construct a country-specific proxy for economic policy uncertainty and report that greater uncertainty reduces investment. Belo et al. (2013) report that the market is positively surprised by the spending policies of Democratic presidents and negatively surprised by those of Republican presidents. Belo and Yu (2012) examine the stock return implications of government investments in public sector capital. Their study finds a positive relationship between public sector capital spending and stock returns that are consistent with the government's ability to increase the marginal productivity of private capital through investments in public goods such as highways.

Fiscal policy also has tax implications. Specifically, counter-cyclical fiscal policies may increase tax uncertainty as higher taxes in good economic conditions are needed to fund deficits in poor economic conditions. The impact of government stimulus on the economy is highly controversial. There exists an extensive level of debates, centering on the implications of different fiscal policies for unemployment (Battaglini and Coate, 2013) and investment (Alesina et al., 2002).

Hermes and Lensink (2001) show that uncertainty about budget deficits, tax payments, government consumption, and inflation is positively related to capital outflows at the country level, while Gomes et al. (2008) calibrate a life-cycle model to measure the welfare losses resulting from uncertainty about government policies regarding taxes and social security. They find that policy uncertainty materially affects the agents' consumption, saving, labour supply and portfolio decisions. In Croce et al. (2012) a model is presented in which tax uncertainty can be as important as the level of taxation to the cost of equity. Although high-income households finance a large portion of government deficits under progressive tax rates, counter-cyclical fiscal policies that expand available tax credits during recessions benefit these households. The expectation of tax increases can also increase the savings and equity investments of high-income households.

In the strand of the literature that associates stock returns and fiscal issues through the political factor, Yonce (2009) and Julio and Yook (2012) find that firms reduce their investment in years leading up to major elections, while Durnev (2011) provides evidence that corporate investment is less sensitive to stock returns during election years. Other studies, such as McGrattan and Prescott (2005); Sialm (2009) and Gomes et al. (2009), relate stock returns to tax rates without emphasizing tax-related uncertainty, whereas Boutchkova et al. (2010) relate political uncertainty to stock returns volatility.

3. The methodological approach and data

The methodological approach builds upon the modelling process of Born and Pfeifer (2014). In particular, to obtain the TFP variable, a Cobb–Douglas production function is assumed, according to which:

$$Y_t = z_t K^a L^{(1-a)} \tag{1}$$

with the TFP shocks following an AR(1) process:

$$z_t = bz_{t-1} + e^{\sigma_{zt}} V_t^z, V_t^z \sim N(0,1)$$

where σ_{zt} allows for time-varying volatility.

The government spending rule indicates that government spending is allowed to respond to lagged output and to the lagged debt to GDP ratio. It is described by the following process:

$$log\left(\frac{G_t}{G}\right) = b_1 log\left(\frac{G_{t-1}}{G}\right) + b_2 log\left(\frac{G_{t-2}}{G}\right) + b_3 log\left(\frac{D_{t-1}/Y_{t-1}}{D/Y}\right) + b_4 log\left(\frac{Y_{t-1}}{Y}\right) + e^{\sigma} V_t^g \tag{2}$$

where $D_t$denotes real debt and $(\frac{B_t}{P_t})$ variables without time notation indicate steady state variables. Taxes are described by the following tax rule in which the government finances its government spending by taxing labour income (at the rate τ_t^L) and capital and interest income (at the rate τ_t^K). The tax rule for both the labour and capital income yields, respectively:

$$\tau_t^L = (1-\rho_1-\rho_2)\tau^L + \rho_1\tau_{t-1}^L + \rho_2\tau_{t-2}^L + \varphi^D log\left(\frac{D_{t-1}/Y_{t-1}}{D/Y}\right) + \varphi^Y log\left(\frac{Y_{t-1}}{Y}\right) + e^{\sigma_{\tau tL}} V_t^{\tau L} \tag{3}$$

and

$$\tau_t^K = (1-\rho_1-\rho_2)\tau^K + \rho_1\tau_{t-1}^K + \rho_2\tau_{t-2}^K + \varphi^D log\left(\frac{D_{t-1}/Y_{t-1}}{D/Y}\right) + \varphi^Y log\left(\frac{Y_{t-1}}{Y}\right) + e^{\sigma_{\tau tK}} V_t^{\tau K} \tag{4}$$

Finally, we also assume that the central bank follows a standard Taylor rule described as:

$$\frac{R_t}{R} = \left(\frac{R_{t-1}}{R}\right)^{\rho R} \left[\left(\frac{\pi_t}{\pi}\right)^{\varphi\pi} \left(\frac{y_t}{y^{HP}}\right)^{\varphi y}\right]^{1-\rho R} e^{mt} \tag{5}$$

where ρ^R is a parameter capturing 'interest rate smoothing', π is the target inflation rate set by the central bank, and the parameters φ^π and φ^ycapture the responsiveness of the intervention nominal interest rate to deviations of inflation from its steady state and output from its Hodrick–Prescott (HP) filter trend, respectively. Lastly, m_t is a monetary shock (i.e., a shock to the nominal interest rate) assumed to follow an AR(1) process, i.e.,

$$m_t = c_1 m_{t-1} + e^{\sigma_{mt}} V_t^m$$

Given that we need to evaluate the impact of shocks to the volatility on stock returns, we employ a stochastic volatility model. In particular, we contribute to this line of research by considering that the stochastic