Managing COVID Policy Uncertainty: A Behavioural Macroeconomic Model
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Abstract

The COVID pandemic has triggered unprecedented macroeconomic shocks. Large fiscal deficits, historically low interest rates and fluctuations in cash hoarding, alongside long-term trends away from fiat currency towards electronic transactions and crypto-currencies, have magnified policy uncertainty and loosened policy-makers' control of the monetary transmission mechanism. On the real side, a complex nexus of demand- and supply-side shocks have catalysed the inflationary pressures now building around the world.

In analysing the macroeconomic policy implications of these COVID trends, this research contrasts behavioural economic insights about present bias with rational expectations models of time-inconsistent monetary policy and explores the implications for control of inflation. Preliminary theoretical analysis shows that policy uncertainty is magnified when policy-makers' loss functions embed present bias in the form of quasi-hyperbolic discounting relative to a scenario in which policy-makers and private agents form forward-looking rational expectations using exponential discounting.

In identifying some of the empirical associations, policy uncertainty data from Baker *et al.* (2020) (downloaded from policyuncertainty.com) is used in an econometric analysis of price pressures. These analyses suggest that policy uncertainty increases with the market volatility associated with the spread of infectious disease. The policy implications in the context of the ongoing COVID pandemic and its fallout are profound if the extent and complexity of policy uncertainty are magnified by policy-makers' susceptibility to present bias, thus limiting their ability to control macroeconomic outcomes.

Rational versus Behavioural Time Inconsistency

Behavioral economic analyses of time inconsistency [1] are substantively different from rational expectations models of time inconsistency [2, 3]. Rational expectations models embed a constant discount rate into an exponential discount function $D(t)$:

$$max \sum_{t=1}^{\infty} u_\tau(c_\tau)D(\tau)d\tau \quad (1)$$

u is utility, c is consumption:

$$D(t) = \delta^t = (\frac{1}{1+\rho r})^t \approx e^{-\rho t} \quad (2)$$

δ is the discount factor, ρ is the discount rate.
In behavioural economic models, time inconsistency is associated with hyperbolic or quasi-hyperbolic discounting (QHD), where QHD is set out in Laibson (1997):

$$D(t) = \beta\delta^t = \beta[\frac{1}{1+\rho r}]^t \quad (3)$$

δ represents the time-consistent rate of time preference, and β is the present bias parameter. Specifically, QHD generates a problem of present bias, reflecting the fact that the discount rate is not constant, as in ED, but will vary according to when the payoffs are received – leading to shifts in the discount rate over time. For example, if I suffer from present bias: when I choose between rewards today and tomorrow, I might prefer rewards today; but when I'm choosing between rewards in a year versus a year and a day, then I might prefer to wait the extra day. My rate of time preference (i.e. my discount rate) will be inconsistent because it is shifting over time.

The specification of the QHD function is encompassing in the sense that it nests the ED and QHD possibilities as follows: with ED, $\beta = 1$ and preferences are time-consistent; with QHD $0 < \beta < 1$ and short-term rewards will be over-weighted relative to long-term rewards – generating present bias. (The implications for monetary policy are explored in Baddeley (2021) [4].)

Policy Uncertainty: Implications

Increases in uncertainty triggered by COVID shocks will blunt macroeconomic policy tools, undermine co-ordination of fiscal and monetary policy and limit central banks' ability to target inflation. With QHD, given that heterogeneity of policy-makers' preferences is likely, the present bias parameter β will be a random variable with a positive error variance. In ED models, $\beta = 1$ and so will have a variance of zero. Therefore, assuming that policy uncertainty is quantifiable and measurable by the error variance (admittedly an heroic assumption, as explored elsewhere, e.g. [5]), policy uncertainty will be greater with QHD than with ED and macroeconomic policy control will be decreasing as present bias increases.

Preliminary Findings

Table 1 shows results from a simple 2-stage least squares estimation of the US Phillips Curve (dependent variable = logged CPI, Jan 1985 to Nov 2021). The analysis of policy uncertainty data follows Baker et al. (2021) and Husted, Rogers and Sun (2017)[6, 7], with Economic Policy Uncertainty (EPU) and Infectious Disease Equity Market Volatility (ID-EMV) data downloaded from policyuncertainty.com. CPI and the unemployment rate are BLS data. The unemployment rate and EPU are statistically significantly associated with CPI at 1% and below. ID-EMV is statistically significant only at 23.5% but other estimations (not reported) reveal statistically significant associations between ID-EMV and EPU, suggesting that infectious disease uncertainty might feed through to price pressures via EPU. These findings are preliminary. Further theoretical/econometric analysis is ongoing.

cpi	Coefficient	p value
EPU	0.0019	0.000
ID-EMV	0.00384	0.235
Unemployment	-0.000265	0.000

Table 1:Impact of COVID Uncertainty on Price Pressures

References

[1] Laibson D.
Golden eggs and hyperbolic discounting.
Quarterly Journal of Economics, 112(2):443–477, 1997.

[2] Kydland F and Prescott E.
Rules rather than discretion: The inconsistency of optimal plans.
Journal of Political Economy, 85(3):473–492, 1977.

[3] Barro RJ and Gordon DB.
Rules, discretion and reputation in a model of monetary policy.
Journal of Monetary Economics, 12(1):101–121, 1983.

[4] Baddeley MC.
Behavioural macroeconomic policy: New perspectives on time inconsistency.
In *arXiV Working Paper 1907.07858*, page arXiv:1907.07858v1, 2019.

[5] Baddeley MC.
Behavioural macroeconomics: Time, optimism and animal spirits.
In *Routledge Handbook of Behavioral Economics*, pages 266–79. Abingdon: Routledge, 2016.

[6] Baker SR, Bloom N, Davis SJ, Kost KJ, Sammon MC, and Viratyosin T.
The unprecedented stock market impact of covid-19.
Working Paper 26945, National Bureau of Economic Research, April 2020.

[7] Husted L, Rogers JH, and Sun B.
Monetary policy uncertainty.
Technical report, 2017.

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