



## [Macroeconomic Fluctuations with HANK & SAM: An Analytical Approach](#)

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Morten O. Ravn<sup>1,2,3</sup> and Vincent Sterk<sup>1,2,3</sup>

<sup>1</sup>Centre For Economic Policy Research, <sup>2</sup>Centre For Macroeconomics, <sup>3</sup>University College London

A new generation of New Keynesian (NK) models have emerged which combine financial market incompleteness and idiosyncratic risk (HANK) with labour market frictions that generate unemployment in the tradition of search and matching models (SAM). The new HANK&SAM models mark a clear break with the traditional "representative agent" assumption, offer a rich array of cross-sectional predictions, and allow inequality across households to matter in models of aggregate fluctuations.

We provide an analytically tractable HANK&SAM model and apply it to revisit core qualitative results highlighted in the New Keynesian literature. We demonstrate that the equilibrium outcomes are shaped by the interaction between two endogenous wedges, a standard sticky-price wedge in the labor demand equation (the "NK Phillips Curve"), and a wedge in the Euler equation which results from financial market incompleteness. The incomplete markets wedge is pinned down as a function of tightness of the labor market, it interacts with the sticky-price wedge, and it is affected by policy. This wedge produces endogenous unemployment risk which feeds back through price setting and savings decisions to produce a powerful amplification mechanism.

We present six main results. The first concerns the steady-state properties of the model. As in the basic NK model there is an "intended" steady state as well as an unintended "liquidity trap". In the latter steady state, the ZLB binds and output is relatively low, as in Benhabib, Schmitt-Grohé and Uribe (2001, 2002). Unlike the standard NK model, however, our model may have a third steady state, which we label the "unemployment trap", in which aggregate demand is depressed to a level at which hiring declines to a minimum, which perpetuates high job uncertainty and hence low demand.

Secondly, we present an analytical local determinacy condition for the intended steady state. We show that local indeterminacy can arise even when the "Taylor Principle" is satisfied. Additionally, the unemployment trap is determinate under a standard rule which responds more than one-for-one to inflation. Around this steady state, the monetary policy rule determines the rate of inflation, but has no grip on unemployment.

Our third set of results concerns the responses to fundamental and non-fundamental shocks. We show that the presence of incomplete markets can create significant amplification. When the steady



state is locally indeterminate, pessimistic belief shocks generate joint declines in employment, inflation and the real interest rate. The persistence of the effects is endogenously determined, and is maximized at degrees of price stickiness and market incompleteness that are just strong enough to generate local indeterminacy.

Fourth, we revisit the role of the ZLB. We show that a negative productivity shock may bring the nominal interest rate to the ZLB. Further, ZLB episodes are not necessarily deflationary under incomplete markets. Additionally, we revisit "paradoxes" that arise in the representative-agent NK model when the ZLB binds. The precautionary savings mechanism in our model can overturn the paradox that, at the ZLB, positive productivity shocks may be contractionary, as well as the paradox that greater price flexibility may lead to larger drops in output.

Fifth, we study the determination of risk premia. We show that under incomplete markets, the NK model can generate substantial risk premia and derives from a close connection between risk premia, the business cycle, and monetary policy. Idiosyncratic unemployment risk co-moves negatively with aggregate demand, causing households to dislike risky assets which pay off relatively little after an adverse shock hits the macro economy. Monetary policy has a dual effect on risk premia, since more stable fluctuations in aggregate demand reduce both fluctuations in asset payoffs and fluctuations in households' stochastic discount factors.

Finally, we propose a simple way to confront the model with the data. The model predicts that the real interest rate declines during times when the labor market becomes less tight, which increases unemployment risk and strengthens the precautionary savings motive. Under complete markets, the real interest rate increases when tightness of the labor market weakens, as income declines temporarily, encouraging households to save less. We show that in the data, there is a striking, positive co-movement between the real interest rate and the vacancy-unemployment ratio, providing direct support for the precautionary savings mechanism.