A DYNAMIC MODEL OF FINANCIAL BALANCES FOR THE UK

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Roadmap

- Introduction and motivation
- Relevant literature
- Model overview
- Data
- A 'hands free' forecast
- Simulation of a housing market boom
- Conclusions

Introduction and motivation

- The building up of financial imbalances contributed to the financial crisis and ensuing Great Recession

- Could do with a 'tool' that enables us to look at precisely these issues!

- The approach we're using links decisions about real variables to credit creation in the financial sector and decisions about asset allocation among investors

- This is called the 'stock-flow consistent' approach and is indelibly associated with the late Wynne Godley

Relevant literature

- Godley and Lavoie (2012), *Monetary Economics: An integrated approach to credit, money, income, production and wealth* (2nd Edition)

- Kinsella, Nell and Grief, (2011) Income distribution in an agent based stock flow consistent model, *EEJ*

- Cloyne, Thomas, Tuckett and Wills, (2015) A sectoral framework for analysing money, credit and unconventional monetary policy, BoE *SWP* 556.

Model Overview

- We are building a new dynamic macroeconomic model of financial balances for the United Kingdom using flow of funds data from 1997 to the present.

- The model contains six sectors: households, private non-financial companies, the government, banks, insurance companies and pension funds, and a simplified rest of the world.

Model overview: Transactions flow matrix

		Households	PNFCs Current	PNFCs Capital	Government	Banks	ICPFs	OFIs	Bank of England	Rest of the world
Consumption		-ccp	ccp							
Investment			-ikcp	ikcp						
GDP residual (attributed to housing investment)		-ihcp	ihcp							
Govt expenditure			gonscp		-gonscp					
Exports			xcp							-xcp
Imports			-mcp							mcp
Wages		wages	-wages							
Annuity payments		annpay					-annpay			
Pension contributions		-penscont					penscont			
Taxes		-taxhh	-taxnfc		tax					
Transfers		transhh	transnfc		-trans					
Dividend flows	Banks					-divbank				divbank
	Firms		-divnfc				divnfc_icpf			divnfc_row
	Foreign						divrow			-divrow
	ICPF						-divicpf			divicpf
Interest flows	Deposits	i_dephh*dephh				-i_dephh*dephh				
	Mortgage	-i_mort*mort				i_mort*mort				
	Gov Bonds				-i_dgovt*dgovt		i_dgovt*dgovt_icpf		i_dgovt*dgovt_cb	i_dgovt*dgovt_row
	Banks Bonds					-i_dbank*dbank	i_dbank*dbank_icpf			i_dbank*dbank_row
	ROW Bonds						i_drow*drow			-i_drow*drow
	Loans		-i_loannfc*loannfc			i_loannfc*loannfc				
Income flows: unaccounted for		-nlp_res	-nlnfc_res		-nlgg_res	-nlbank_res	-nlicpf_res	-nlofi_res		-nlrow_res
Net lending		-nlp	-nlnfc		-nlgg	-nlbank	-nlicpf	-nlofi		-nlrow

Model overview: Flow of funds

		Households	PNFCs	Government	Banks	ICPFs	Bank of England	Rest of the world
Net Lending		nlp	nlnfc	nlgg	nlbank	nlicpf		nlrow
Deposits with UK banks		-Δdephh			Δdephh			
Bonds	Government			Δdgovt		-Δdgovt_icpf	-Δdgovt_cb	-Δdgovt_row
	Banks				Δdbank	-Δdbank_icpf		-Δdbank_row
	ROW					-Δdrow		Δdrow
Loans	Corporate		Δloannfc		-Δloannfc			
	HH (mortgage)	Δmort			-Δmort			
Equities	Corporate		Δenfc			-Δenfc_icpf		-Δenfc_row
	Bank (private)				Δebank			-Δebank
	ROW					-Δerow		Δerow
Pensions		-Δpenswlth				Δpenswlth		
Reserves					−Δresbank		Δresbank	
Financial transactions: unaccounted for		Differences between net lending and the sum of the flows listed here will be captured in the residuals for the individual assets.						

Model overview: Balance sheets

Households

Assets	Liabilities
dephh	mort
penswlth	
$P_{hse}h$	

PNFCs

Assets	Liabilities
$P_k k$	loannfc
	enfc

Government

Assets	Liabilities
	dgovt

Bank of England

Assets	Liabilities
dgovt_cb	resbank

ICPFs

Assets	Liabilities
dgovt_icpf	penswlth
dbank_icpf	
drow	
enfc_icpf	
erow	

Banks

Assets	Liabilities
loannfc	dephh
mort	dbank
resbank	ebank

Rest of the world

Assets	Liabilities
dbank_row	drow
dgovt_row	erow
ebank	

Data

- Taking this model to data is a real challenge

- The sectoral net lending series in the national accounts are important balancing items, but the income and financial accounts contain around 6500 individual series!

- Our model has [only] 62 observable variables, with a further 70 identity variables.

- "From-whom-to-whom data" is not always available

- Needed to work on the model assumptions and data inputs at the same time

Data

Extent to which we can explain net lending using the variables in our TFM (blue = data; red = model)

Households
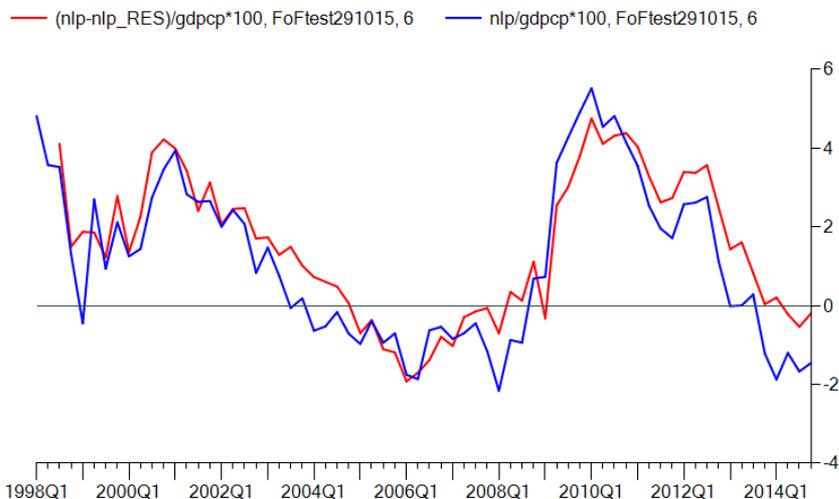
Government
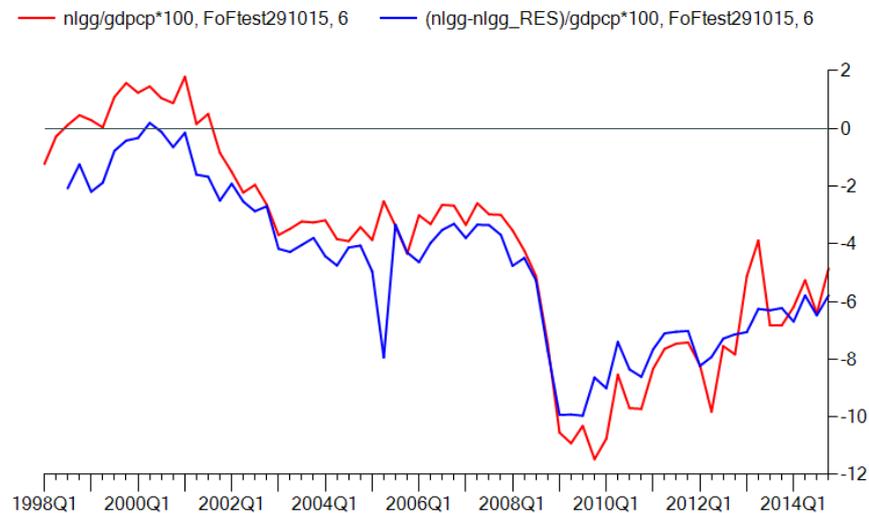
Data

Extent to which we can explain net lending using the variables in our TFM (blue = data; red = model)

MFIs
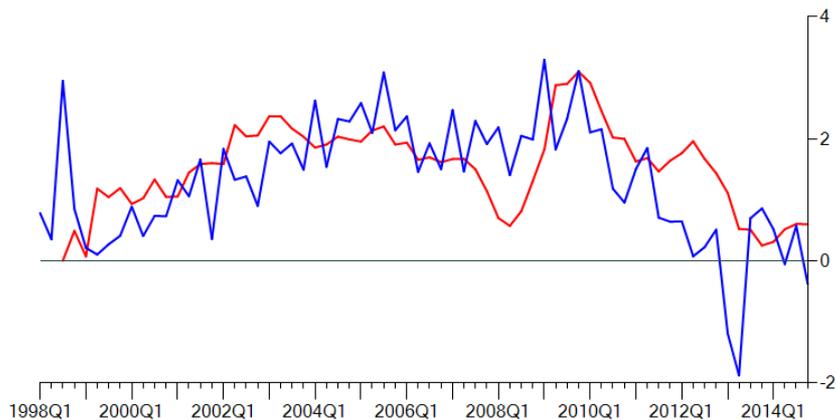
Rest of the world
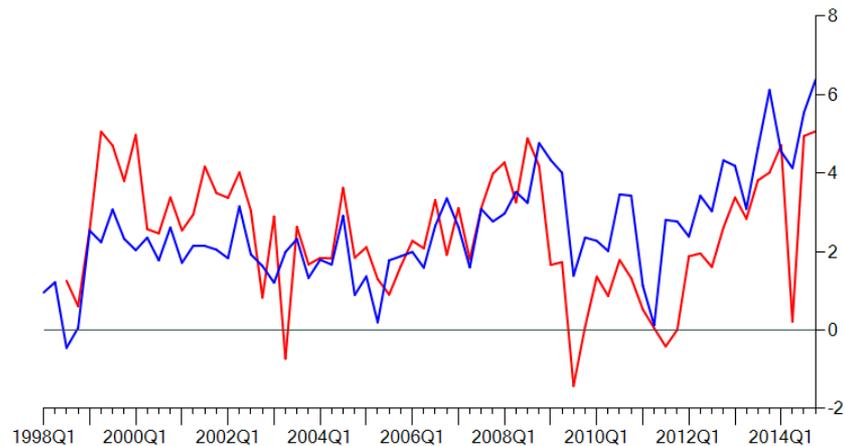
Data

Extent to which we can explain net lending using the variables in our TFM (blue = data; red = model)

ICPFs
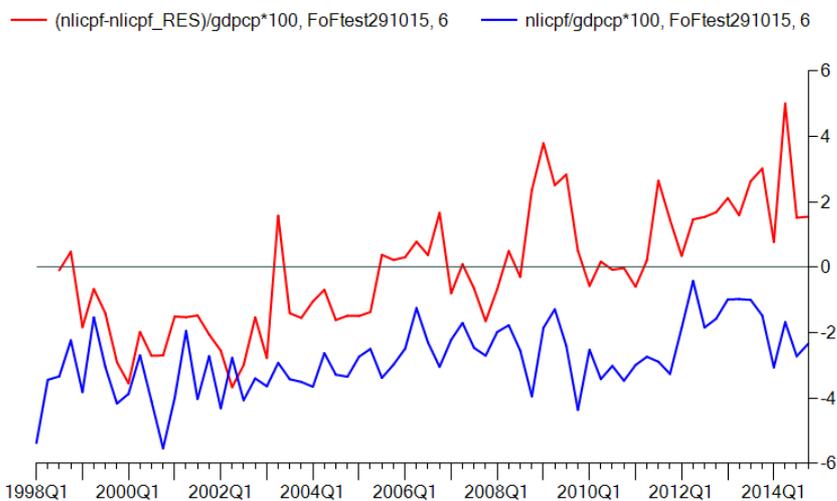
NFCs
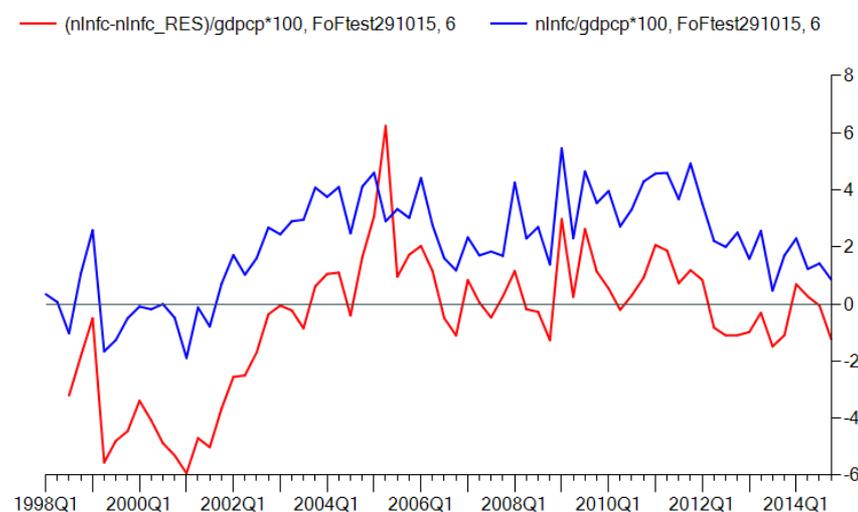
The larger difference for these two sectors is explicable

"Hands-free" financial balances forecast
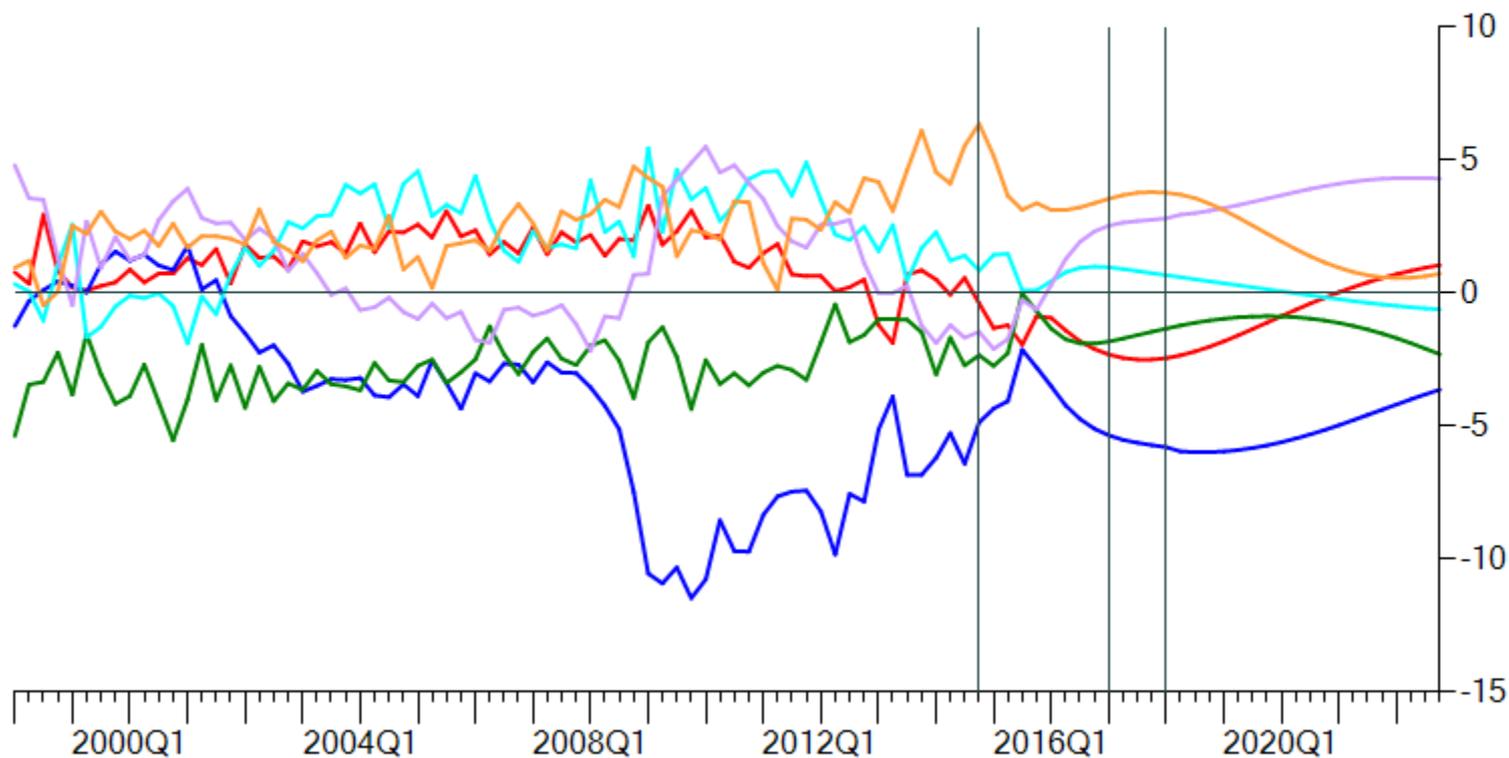
Hands-free forecasts starting in 2007

Annual GDP growth

GDP falls by 3% in the first quarter of the hands-free forecast

Sectoral financial balances

Ballooning fiscal and current account deficits…

Simulation: housing market boom

- We take the Debt Service Ratio (DSR) as a semi-exogenous input to the model, proxying banks' appetite to supply mortgages

- We increase this until 2018Q4 and then let it flatten off.

- This alone is sufficient to generate a recession, 2-3 years after the DSR flattens.

- A wider deficit in the household sector is offset by higher financial balances in all other sectors except NFCs

- The recession arises because housing investment collapses and households suffer under the burden of higher mortgage debt. Endogenous feedback mechanisms in the model amplify these effects.

Simulation: housing market boom

Debt service ratio assumptions
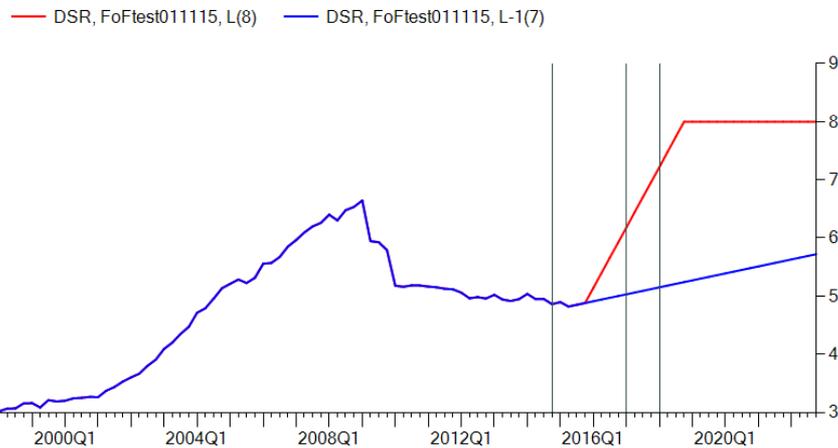
GDP growth (red = N15 Bmk, blue = scenario)
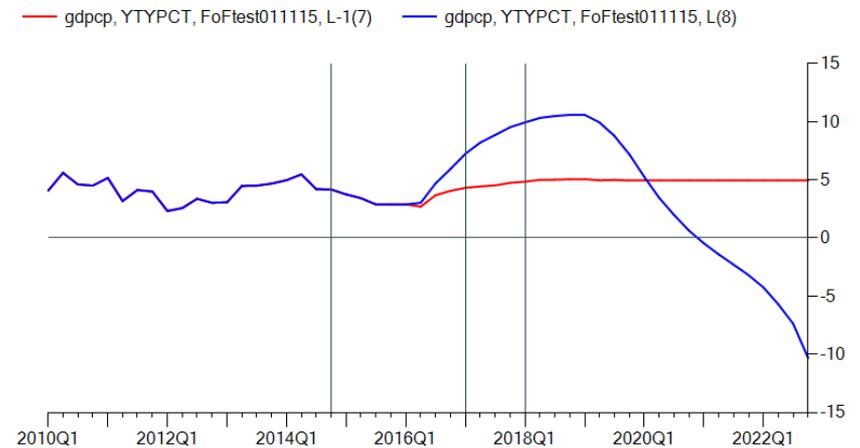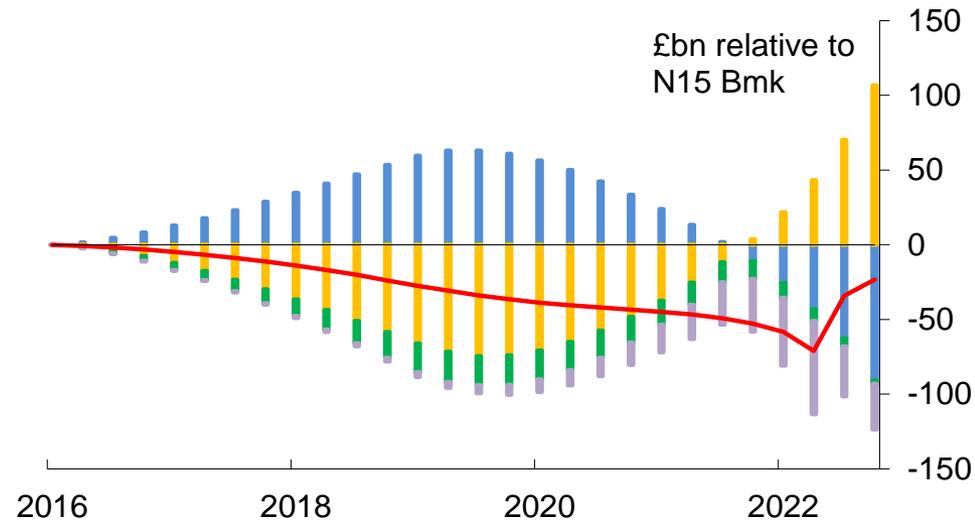
Simulation: housing market boom

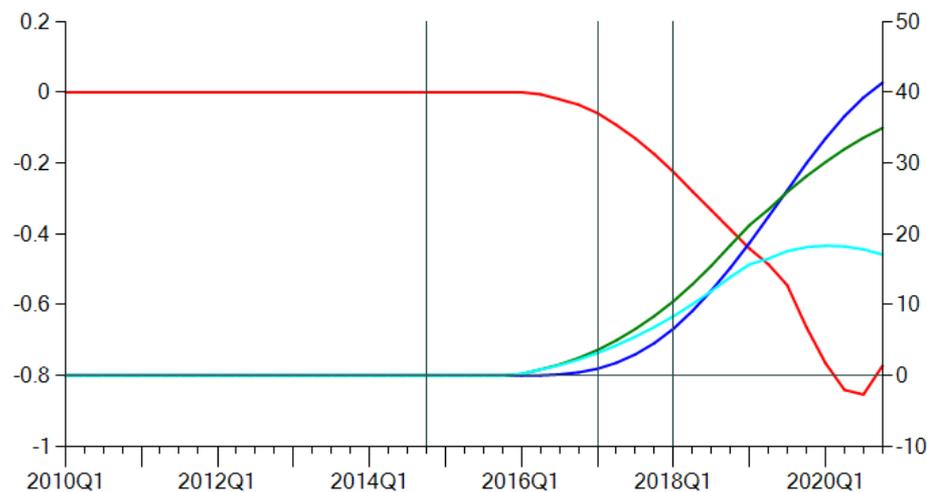## Financial balances (differences, pp of GDP)
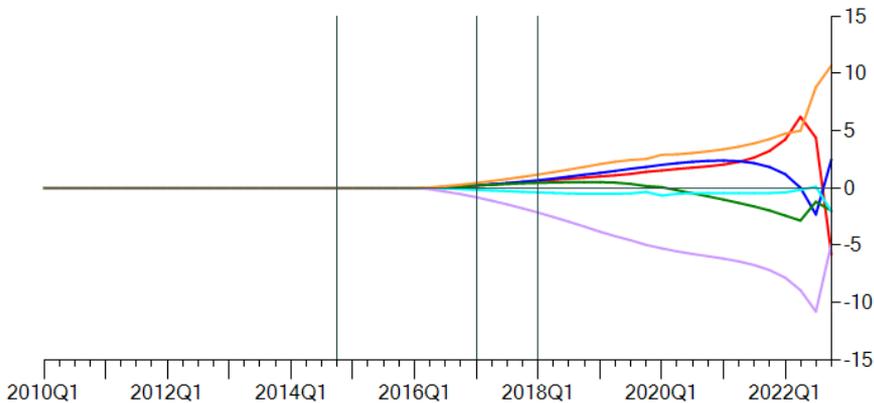
Decomposition of changes in household net lending

Simulation: housing market boom

Bank balance sheets and mortgage rates

Private sector debt relative to annual GDP
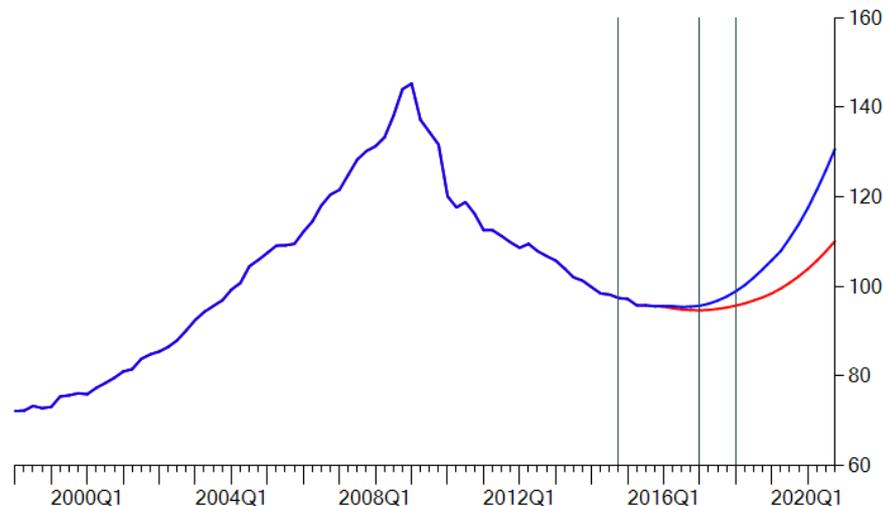
Potential applications

- Working out the implications of forecasts for growth and inflation for the evolution of financial balances

- Framework for thinking about how the financial system (including asset prices) feeds back to the real economy

- Modelling the unwind of financial imbalances with applications to, eg, stress testing

Future work

- The portfolio equations need more work

- More analysis of the long run properties of the model

- More sophisticated estimation techniques

- Extensions to the model – more detailed housing market block, more detailed treatment of the banking sector etc.

Conclusions

- Global financial crisis made clear the need for models that can shed light on the role of financial imbalances

- We build a large (though tractable) model of the UK economy using Flow of Funds data

- The model is calibrated / estimated on UK data