Monetary Policy, the Housing Market, and the 2008 Recession: A Structural Factor Analysis

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Royal Economic Society 5th PhD Presentation Meeting
City University London
16-17 January 2010
Prologue & Questions

Prologue

- Since the beginning of 2006 residential investments in the US have collapsed and similarly have house prices.
- Between September and October 2008, the “sub-prime mortgage bubble” burst and a furious storm hit the stock market.
- The contagion has then propagated to the real economy and to the rest of the world, by resulting in a severe recession of global proportions.

Questions

- Which policies are needed in order to minimize the negative effects of the crisis?
- What are the causes of this crisis?
Objectives & Preliminary Remarks

Objectives
This paper estimates a Structural Dynamic Factors Model (SDFM) on a panel of US macroeconomic variables with a twofold goal:

- to show how SDFMs are a suitable and powerful tool for policy analysis
- to use our model to shed light on the causes of the current recession.

Preliminary Remarks
In order to understand what the causes of this recession are, it is first necessary to determine how many shocks drive the economy:

- Economic theory has in fact focused on a variety of shocks of different types but it has not agreed yet on which of these are significant sources of fluctuations
- For example: does the housing sector simply reflect macroeconomic activity, or is it a source of business cycle fluctuations?
The main idea behind factor models is that fluctuations in the economy depend

- from a few structural shocks affecting all variables, and
- from many idiosyncratic shocks resulting for example from measurement error, or from sectoral or regional dynamics, that influence one or few variables.

Therefore each variable ($x_{it}$) in the dataset can be decomposed into

- a common component ($\chi_{it}$) that is driven by the structural shocks ($\varepsilon_t$),
- and an idiosyncratic component ($\xi_{it}$)
The Structural Dynamic Factors Models: Formalization

This idea can be formalize as follows:

\[ x_t = \Lambda F_t + \xi_t \quad (1) \]
\[ A(L)F_t = G\eta_t \quad (2) \]
\[ \eta_t = H\varepsilon_t \quad (3) \]

\( F_t \) - Static Factor, \( r \times 1 \)
\( \Lambda \) - Factor Loadings, \( N \times r \)
\( \eta_t \) - Common Shocks, \( q \times 1 \)
\( G \), \( r \times q \)
\( \varepsilon_t \) - Structural Shocks, \( q \times 1 \)
\( H \), \( q \times q \), s.t. \( HH' = I \)
Model Setup

- **Data:**
  - the analysis has been carried out on a panel of 102 quarterly series from 1963:1 to 2007:4 describing the US economy
  - all variables have been transformed to reach stationarity and then demeaned and standardized.

- **Number of Factors:**
  - $r = 8$ - Bai & Ng (2002), Alessi et al. (2008)
In order to estimate $H$ we use a mix of short and long run restrictions:

1. the oil shock can affect all variables without restrictions, while all the other shocks have no contemporaneous effects on oil price
2. we rely on a vertical Phillips curve, and therefore we allow only supply (i.e. oil and productivity) shocks to affect GDP in the long run
3. we assume no contemporaneous effect of the monetary policy shock on output
4. we assume that the contemporaneous impact of the housing demand shock is the same for residential investment and for output
5. we assume that housing demand shock has no contemporaneous effect on CPI
The Structural Model - Impulse Responses
### The Structural Model - FEVD

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Accounting for Structural Breaks - IRF

Solid = 1963:1, Dashed = 1974:1, Dotted = 1982:4
Accounting for Structural Breaks - 5y FEVD

Accounting for Structural Breaks - Conclusions

- We interpret this result as a consequence of the institutional changes occurred in housing finance during the ’80s...
  - abrogation of the so-called Reg Q
  - abrogation of the state laws capping the mortgage rate
  - securitization of mortgage debt
- ... because institutional changes in the housing finance sector produce changes in the transmission mechanism of housing demand shock...
- ... by easing the access to mortgages
- ... by increasing the role of housing as a collateral for loans
- ... and thus increasing the spillovers from the housing market to the whole economy
Historical Decomposition - Residential Investments
Our model indicates that...

- ... monetary policy shocks are the main cause of the downturn of residential investment started at the beginning of 2006...
- ... but this is indeed an important result. In fact:
  - “eight of the ten [US] recessions were preceded by sustained and substantial problems in housing, and there was a more minor problem in housing prior to the 2001 recession.”
- ... therefore if we put together our results and those provided by Leamer (2007) ...
- ... we cannot exclude that monetary policy shocks played a non negligible role in leading the way for the 2008 recession.
Why is that?

Our answer is closely related with the characteristics of sub-prime mortgages:

- Most of the sub-prime mortgages were of the adjustable rate mortgage (ARM) kind (2/28, 3/27)
- Many of these mortgages were issued between 2002 and 2004, that is when the interest rate was at historical low values
- Therefore most of sub-prime borrowers experienced their first interest rate reset when the interest rate had increased substantially
- In fact from 2004:3 to 2006:2 the Federal Reserve raised interest rates to fight the risk of inflation.
- The unfortunate consequence was that many non prime borrowers could no longer afford to pay the installments of their loans...
- ... and once problems in sub-prime mortgage arose, the percentage of total mortgages that were sub-prime mortgages dropped substantially
- The collapse of sub-prime origination caused the collapse in housing demand and consequently the downturn in residential investment
Main Results

1. US economic comovements can be modeled by means of 5 underlying structural shocks: oil price, productivity, aggregate demand, monetary policy, and housing demand.

2. After the early eighties' liberalizations in housing finance, the housing demand shock has become a substantial source of business cycle fluctuations.

3. We cannot exclude that monetary policy played a non negligible role in leading the way for the downturn in residential investments and the ensuing recession.