Asset Price Booms and Busts and Policies to Counter Them

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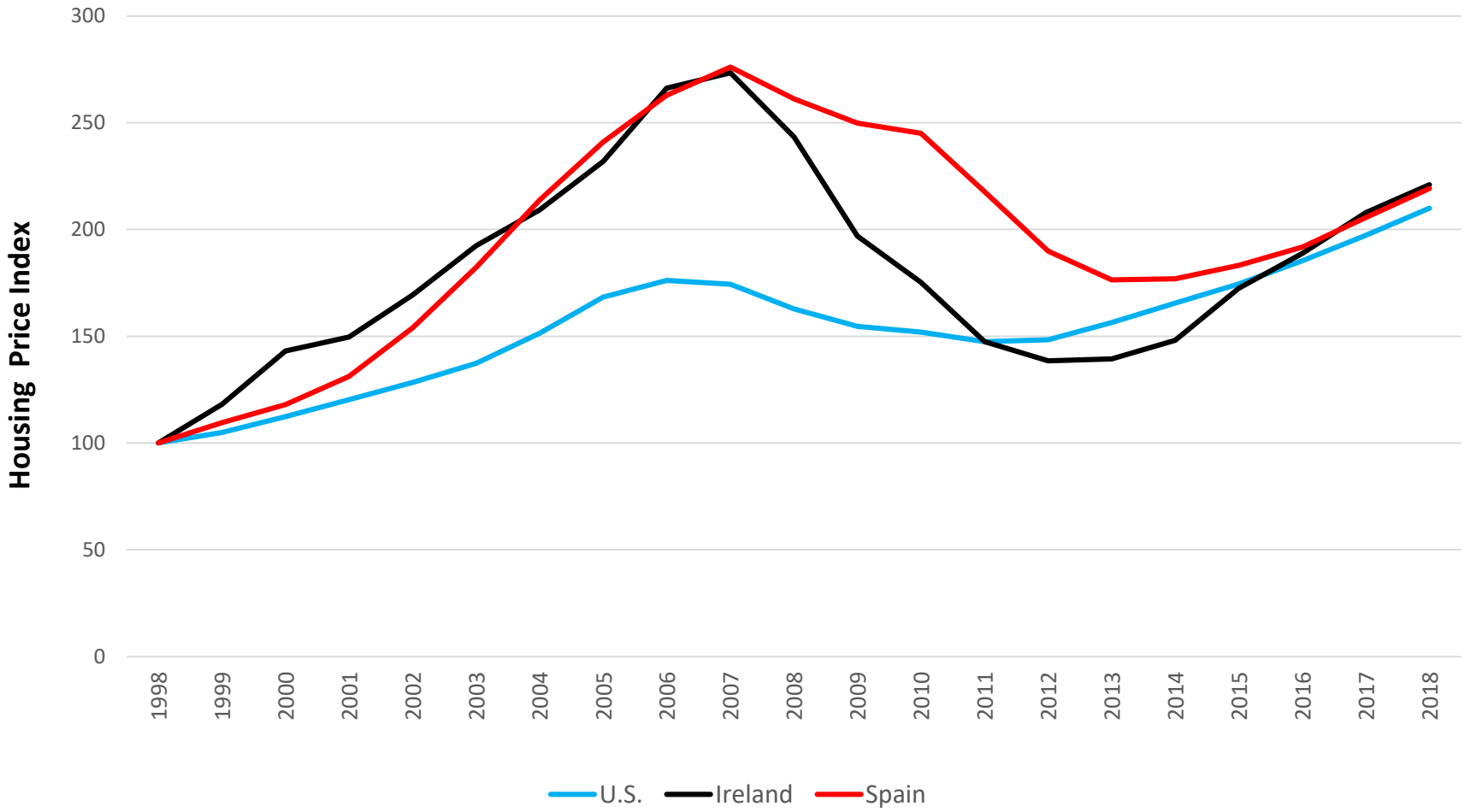
Introduction

- Borio and Lowe (2002) documented a relationship between credit growth, asset price increases and collapses (bubbles) and financial instability – verified in subsequent work such as Jorda, Schularick and Taylor (2015) and Mian, Sufi and Verner (2017)

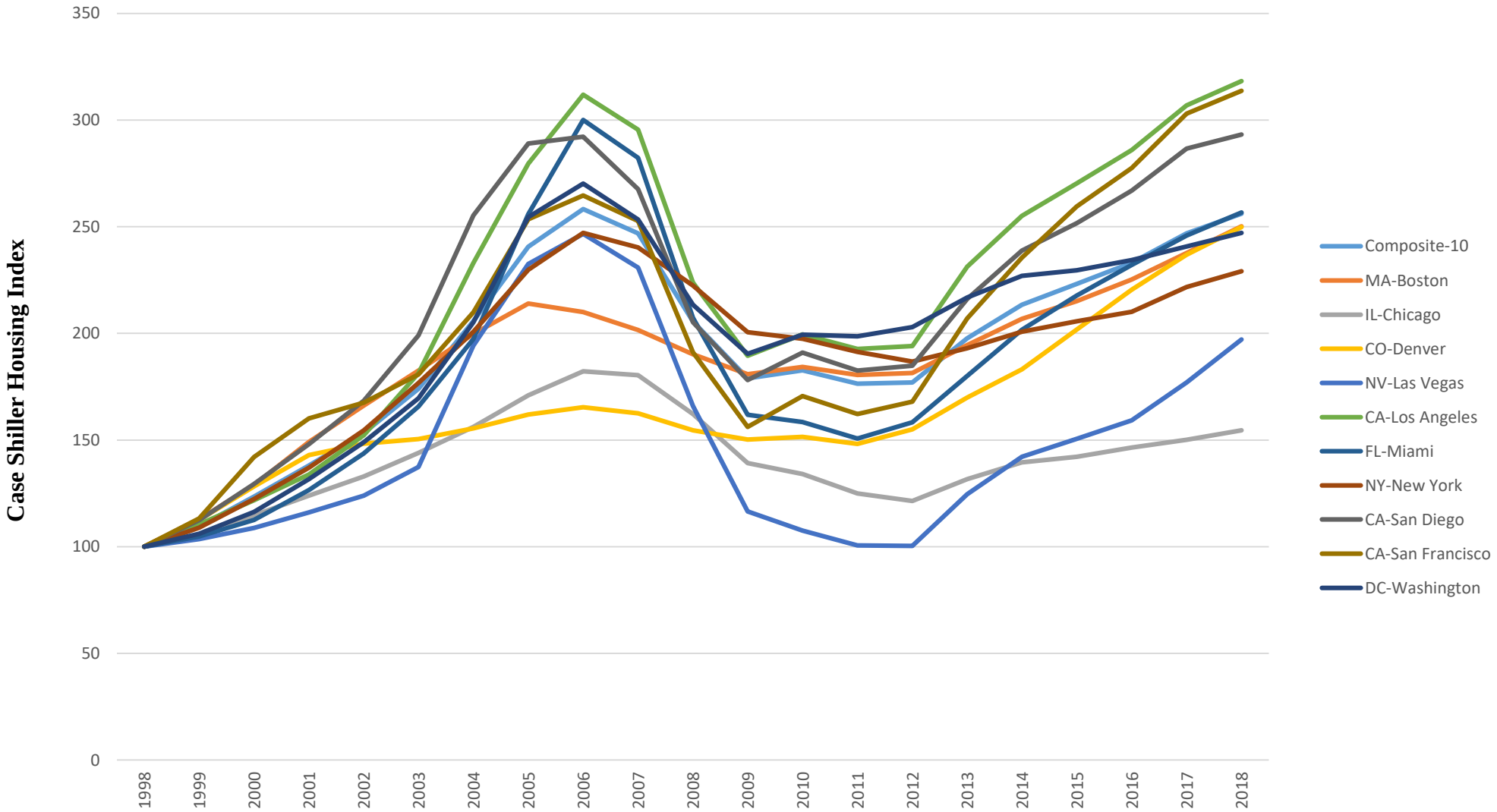
- The global financial crisis that struck in 2007 illustrates this relationship

- In countries such as the U.S., Ireland and Spain, significant run ups in property prices were followed by collapses, bank runs and bail outs

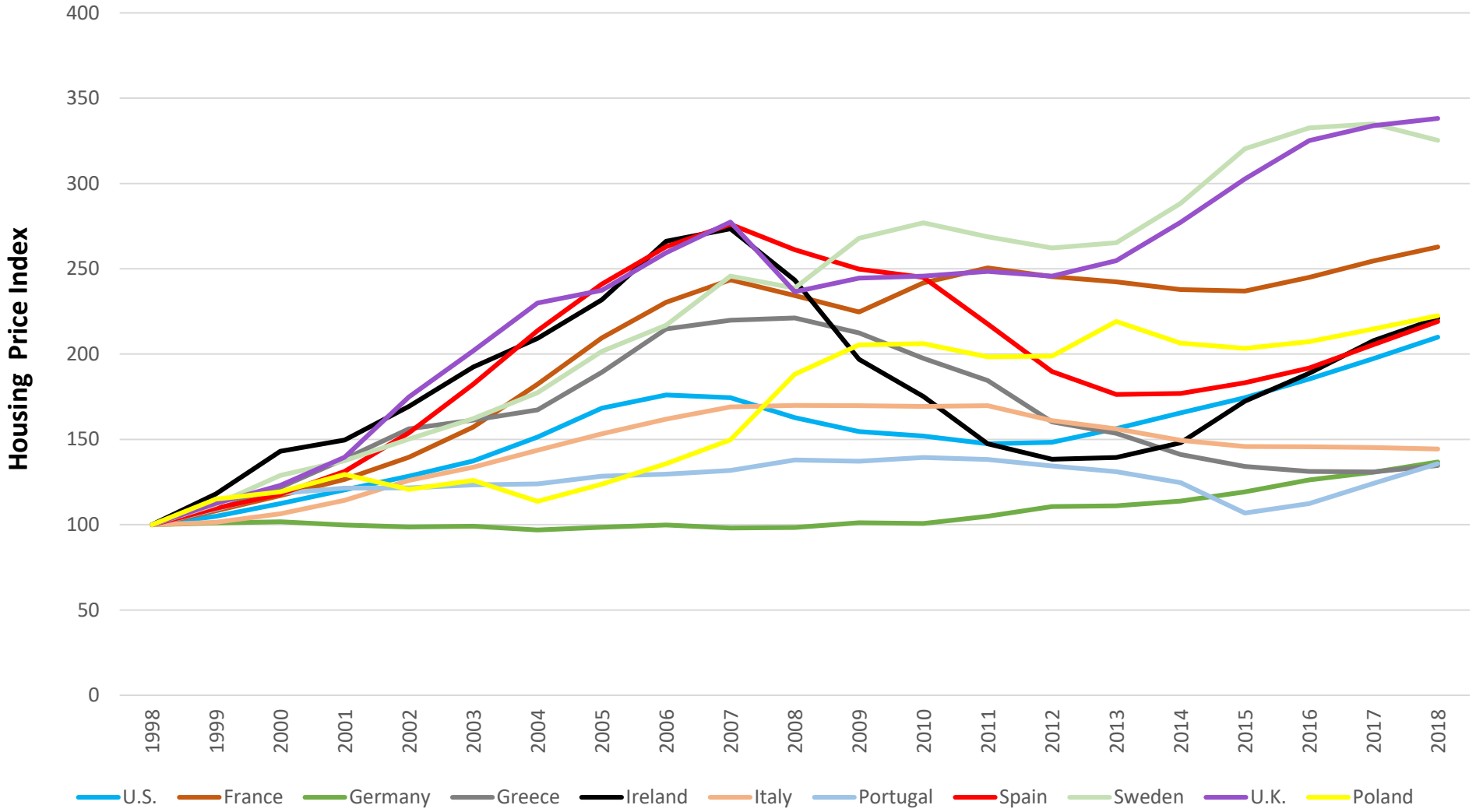
Nominal housing Prices in Ireland, Spain and the U.S.



Nominal Housing Prices in Different U.S. Cities



Nominal Housing Prices in U.S. and Various European Countries



Introduction (cont.)

- Borio and Lowe (2002) argued central banks should consider “leaning against the wind” by raising interest rates to burst the bubble and prevent subsequent financial instability
- This policy has been controversial and is only followed rarely
- The standard view became that it’s too difficult to identify bubble and it’s better to “clean” up after any bubble collapse (Bernanke and Gertler (1999) and Gilchrist and Leahy (2002))
- This did not work well in the global financial crisis of 2007-9 and the debate shifted to using macroprudential versus interest rates to prevent booms and busts

Introduction (cont.)

- We consider how policymakers should respond to asset price booms in risk-shifting models where lenders are unable to effectively monitor how the funds they lend are invested by borrowers

- There is evidence that risk-shifting plays an important role in many asset price booms and busts
  - Asset booms that end badly often feature extensive lending against assets
  - Asset booms are often associated with new and imperfectly understood technologies or with assets like housing that are valued idiosyncratically

Introduction (cont.)

- Risk-shifting models have played an important role in finance since Jensen and Meckling (1976) stressed their importance

- Allen and Gorton (1993) showed how risk-shifting allows asset prices to exceed the fundamental value of the dividends that assets can generate – this approach was subsequently developed by Allen and Gale (2000), Barlevy (2014), Dow and Han (2015), Dubecq, Mojon and Ragot (2015) and Bengui and Phan (2018)

- Our innovation is to use this approach to consider the advantages and disadvantages of monetary policy and macroprudential regulation

Introduction (cont.)

- Our model starts with two important assumptions
  - An information asymmetry where borrowers know the risks of their investments better than lenders
  - We assume default is costly

- As a result some agents borrow and gamble on risky assets knowing they benefit if the assets do well but the lenders bear the losses if they do not and this leads to two inefficiencies
  - Misallocation of resources
  - Too much debt is used because borrowers fail to fully internalise the costs that borrowers bear when they default

Introduction (cont.)

- Our first main result is that bubbles are a symptom of risk-shifting – this means that Borio and Lowe (2002) are correct to argue that policymakers should intervene even if they cannot be sure assets are overvalued since this can correct the misallocation of resources

- The second main result is that since risk-shifting models require productive uses of credit to cross-subsidize the lending that finances risk-shifting speculation, policies that affect both activities can have surprising effects such as

  - Raising interest rates can reduce asset prices but can also reduce productive investments
  - Macroprudential leverage restrictions can reduce productive investments leaving more resources for speculation and increasing asset prices

1. The Model with Credit, Production, and Assets without Risk

We consider an infinite horizon OLG model with an asset that pays off $d_t = d \geq 0$ per period where agents live for two periods

- Agents only care about consumption when old: $u(c_t, c_{t+1}) = c_{t+1}$
- At t = 0 the old own all the fixed supply of the asset of one unit
- A new cohort is born at each date t = 0, 1, 2, … consisting of two types of agents
  - **Savers** who are endowed with an aggregate e units of the good when young who can buy the asset or trade intertemporally to allow them to consume when old
  - **Entrepreneurs** who can convert the good at date t into 1+ y goods when old where y > 0 but only up to a finite capacity of one unit of input and have initial endowment in this section of w = 0, but later we have $0 \leq w < 1$

1. The Model with Credit, Production, and Assets without Risk (cont.)

Trade between savers and entrepreneurs is subject to the following frictions:

1. Savers cannot monitor whether those they finance produce or buy assets. They also cannot observe any of the agent's wealth beyond the particular project the lender finances so loans are effectively *non-recourse*.

2. Trade is restricted to debt contracts so that for each unit of funding agents receive at date t, they must promise to pay a fixed amount $1 + R_t$ at date $t + 1$

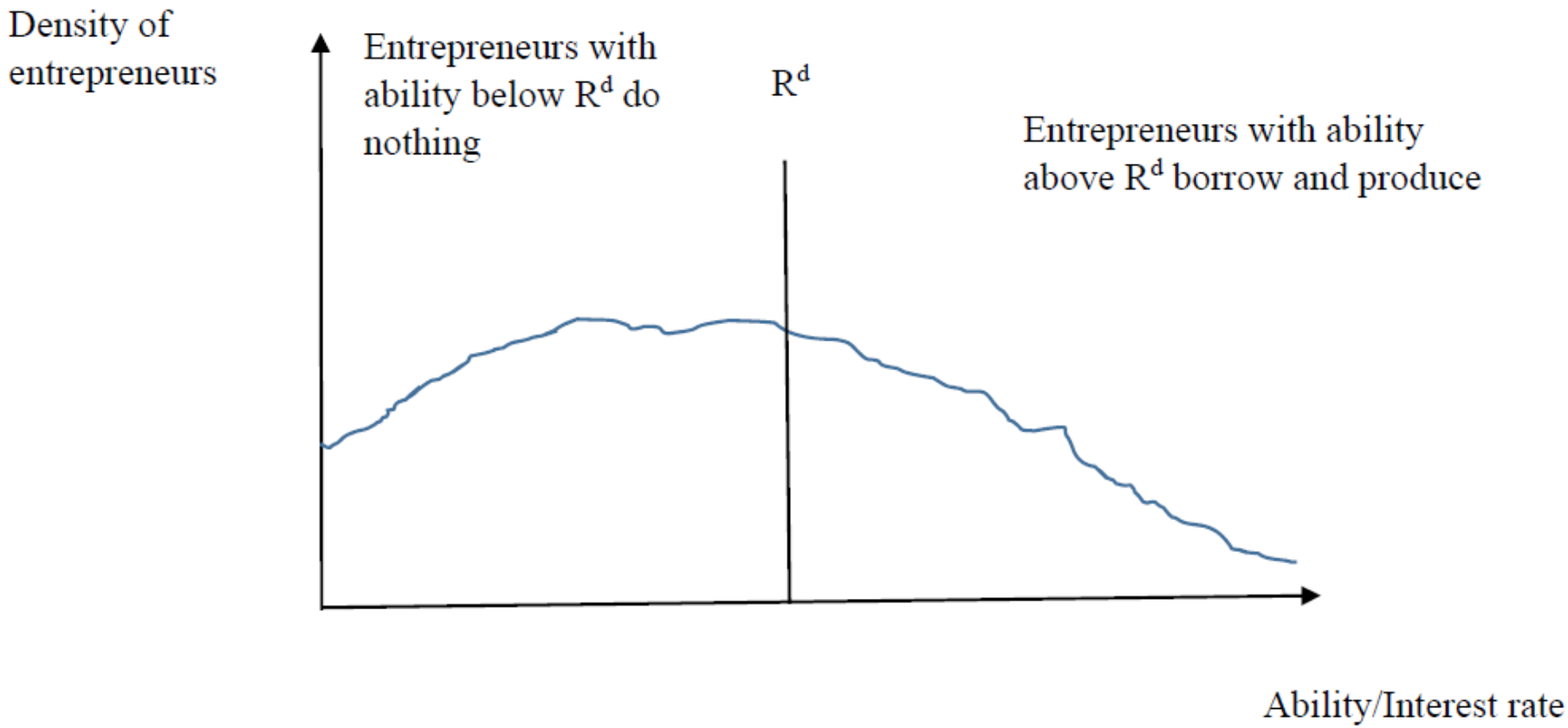
3. If borrowers fail to pay their obligation, lenders can get a court to transfer any proceeds from the project agents invested in, but there is a deadweight bankruptcy cost of Φ per unit invested in the project

1. The Model with Credit, Production, and Assets without Risk (cont.)

The equilibrium for the economy with credit involves

- Some savers putting their money in the asset and some lending to entrepreneurs
- A constant asset price $p_t = p^d$
- A constant return on the asset $r_t = d/p^d$ for all t
- An equal interest rate in the credit market $R^d = d/p^d = r_t$ for all t
- The fundamental of the asset $f_t = p^d$ so there is no bubble

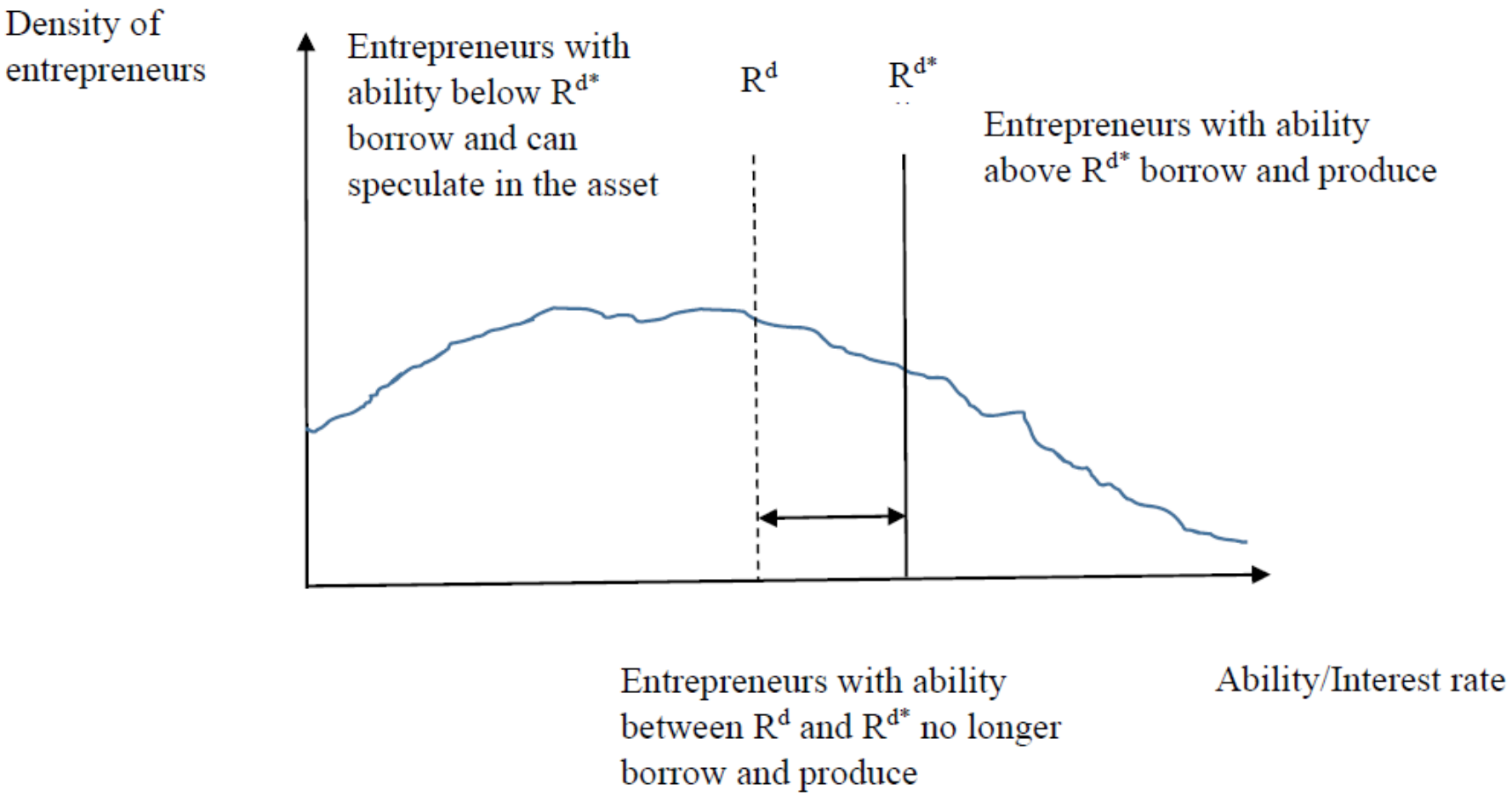
1. The Model with Credit, Production, and Assets without Risk (cont.)



2. Risky Assets, Credit Booms, and Bubbles

- To introduce risk we use a regime switching process similar to that in Zeira (1999)
  - The asset initially pays a dividend $d_t = D > 0$
  - There is a probability $\pi > 0$ each period that the dividend falls to d where $0 < d < D$
  - Once the dividend is d it stays there forever
- The informational friction is as in Allen and Gorton (1993), Allen and Gale (2000) and Barlevy (2014) that lenders can't observe an entrepreneur's productivity and cannot observe what the borrower does with the funds
  - This friction means that the low ability entrepreneurs who cannot make a profit at the rate R^d by producing can now borrow and invest in the asset (and so can others using non-recourse loans)
  - They bid up the price of the asset until they can just repay the loan if the dividend turns out to be D but default if it switches to d
  - This borrowing to invest in the asset means less is available for production by entrepreneurs so the interest rate rises

2. Risky Assets, Credit Booms, and Bubbles (cont.)



2. Risky Assets, Credit Booms, and Bubbles (cont.)

- There are two regimes in the equilibrium
  - The dividend has not yet fallen and the asset is risky with p_t^D and R_t^D
  - The dividend has fallen and the asset is safe with p_t^d and R_t^d
- The equilibrium after the dividend has fallen is the same as in the previous section with constant p^d and R^d
- The key insight is that the risk shifting behaviour of the low ability entrepreneurs means that before the dividend falls the prices and interest rates are constant and the same as if D were to continue forever – they are denoted p^D and R^D
  - If this wasn't true then low ability entrepreneurs could make a positive profit but in equilibrium they must make zero profits – they can afford paying $p^D + R^D$ as long as the dividend is D but default when it switches to d
  - Low ability entrepreneurs (and others using non-recourse loans) hold the asset while the savers lend since then they have some entrepreneurs definitely repaying their loans

2. Risky Assets, Credit Booms, and Bubbles (cont.)

- It can be shown that this equilibrium with risky assets can capture many of the episodes documented by Borio and Lowe (2002), Jorda, Schularick, and Taylor (2015), and Mian, Sufi, and Vernier (2017)

- Asset Price Booms

- Credit Booms

- Asset Bubbles

- Realized Returns and Interest Rates

- Fallout from the Crash

3. Inefficiency of Risky Asset Equilibria

There are two inefficiencies in the allocation:

1. The marginal return to production exceeds the expected return on the asset because of the extra borrowing and default by the speculators so there are potential gains to redirecting resources spent on assets to production

2. The second is that the speculators who borrow to buy assets ignore the default cost Φp^D borne by their lenders when the dividend switches from d to D and take on too much debt

These two sources of inefficiency suggest there are potential interventions that can improve welfare

- Monetary policy – raising interest rates
- Macroprudential – imposing leverage restrictions

4. Monetary Policy

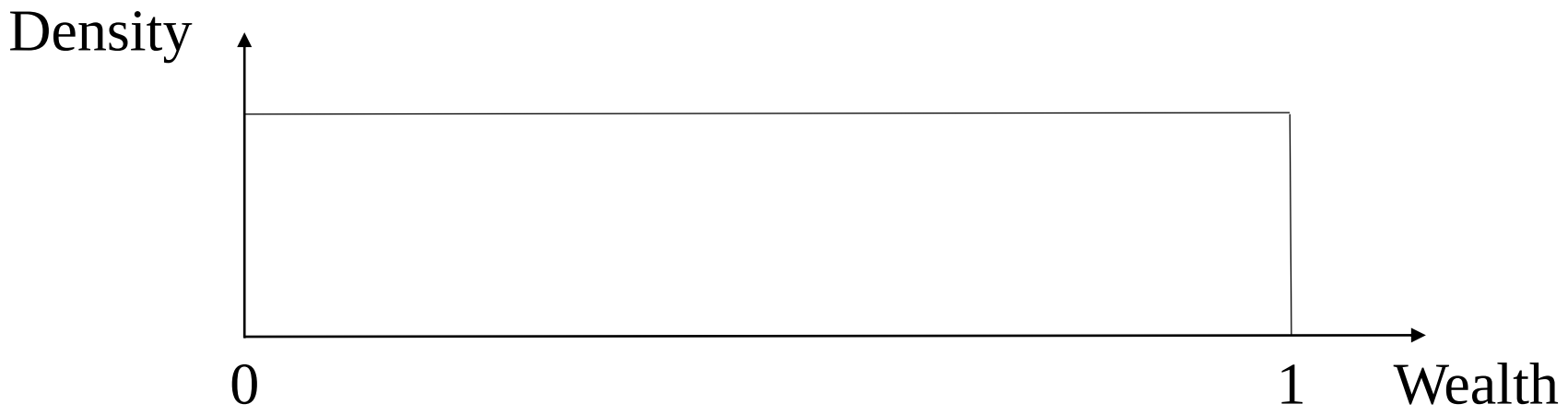
- To introduce monetary policy we follow Gali (2014) and introduce modifications that allow us to model interest rate increases as being equivalent to the initial young generation have their endowment reduced
- The effect of raising the interest rate is then that less is produced by entrepreneurs and less is borrowed by speculators so the asset price p_0^D is reduced compared to p^D
- There are then two opposing welfare effects
  - The lower production by entrepreneurs tends to reduce welfare
  - The reduction in deadweight bankruptcy costs Φp_0^D from the fall in price tends to increase welfare
- The net effect depends on the size of bankruptcy costs Φ

4. Monetary Policy (cont.)

- These opposing effects mean that in general monetary policy has ambiguous effects on welfare
- The entrepreneurs in the generation born at date 0 are made worse off because of the higher interest rate but the lower asset price p_0^D means deadweight bankruptcy costs Φp_0^D are reduced – provided Φ is large enough the whole generation can be made better off
- The old at date 0 are made worse off by the reduction in p_0^D but when Φ is large enough it is possible for the young at date 0 to leave the old at date 0 whole and still be better off themselves so there can be a Pareto improvement
- Even if there is not a bubble because bankruptcy costs are high it can be advantageous to raise interest rates to reduce risk shifting

5. Macroprudential Regulation

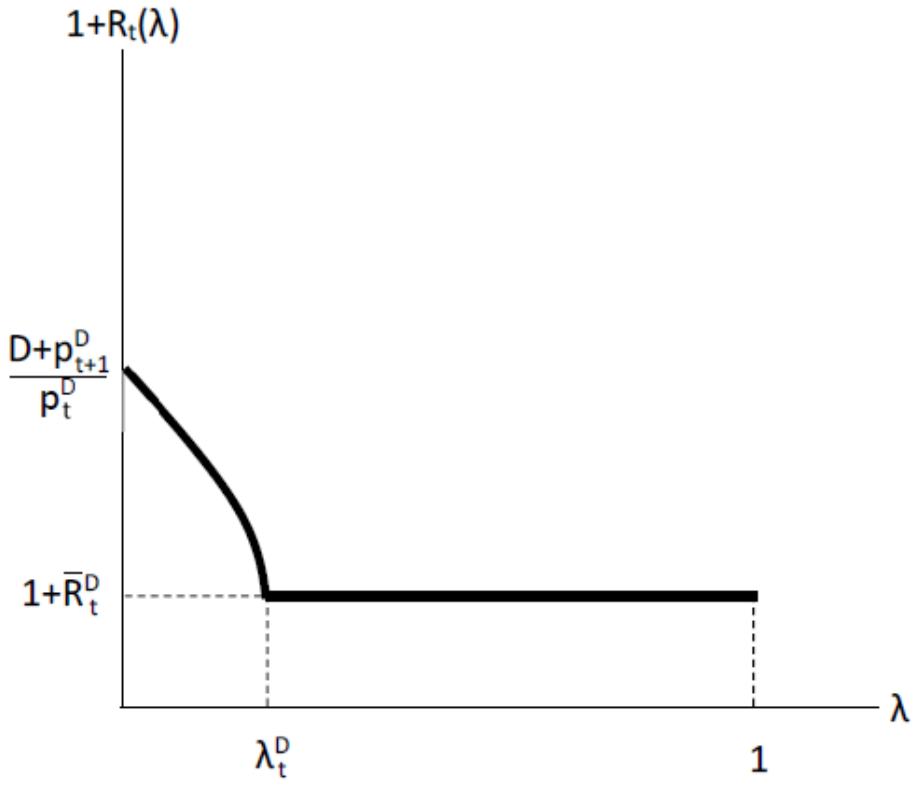
- We focus in this section on one of the most common macroprudential regulations of limiting credit by imposing restrictions on loan to value ratios
- To consider this case we need to introduce entrepreneurs that have differing wealth w that is now uniformly distributed on [0,1]



5. Macroprudential Regulation (cont.)

- To make things simpler we now assume there is only one level of entrepreneur productivity $y = y^*$ (the case where there is a distribution of wealth w and productivity y is considerably more complicated)
- Otherwise the model is similar to the initial one with savers who have endowment e that they can lend to entrepreneurs who can produce output a period later with the inputs funded by the savers
- The entrepreneurs produce at capacity and can borrow the funds they need to do this
- Borrowers choose the fraction of their investment to finance from their own wealth λ and borrow the remaining $(1 - \lambda)$
- The interest rate depends on the proportion λ

5. Macroprudential Regulation (cont.)



Interest rates as a function of share λ of investment that borrowers pay

5. Macroprudential Regulation (cont.)

- The macroprudential regulation we focus on is restrictions on leverage – typically these involve putting a lower bound on the amount financed λ
- The effect of this restriction is to reduce the borrowing for production of those entrepreneurs with low wealth – this means more savings are invested in the asset and its *price* p_0^D *goes up*
- Thus in this version of the model macroprudential credit restrictions exacerbate the asset boom
- For low values of the cutoff on λ, all assets are purchased with debt and in this case the increase in asset prices means there is a Pareto reduction in welfare because of the increased bankruptcy costs Φp_0^D
- This Pareto worse outcome from imposing macroprudential leverage restrictions goes against conventional wisdom that they improve welfare

6. Concluding Remarks

- We develop a simple framework to investigate the effects of monetary policy and macroprudential regulations in countering the effects of asset price booms and busts
- Despite the simple framework the policies can have ambiguous and surprising effects – for example, in some circumstances imposing leverage restrictions can *increase asset prices* and make everybody worse off
- Our results suggest that understanding the effects of monetary policy and macroprudential regulations require careful analysis and cannot be taken for granted

- Our framework can also be used to explore other questions such as considering small open economies as in Gali and Monacelli (2005) to study the effect of capital flows on our analysis