

Modelling Minsky: what we have learned and the way forward

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20th FMM Conference “Towards Pluralism in
Macroeconomics?”, Berlin, 20 – 22 October 2016

- Minsky's Financial Instability Hypothesis (FIH): periods of **tranquillity** increase the financial fragility of firms and banks.
- Financial fragility is an **endogenous evolutionary process**. Institutions play a key role.
- Financial fragility ultimately leads to **financial instability** (debt deflation).
- Big Government and Big Central Bank can reduce instability.

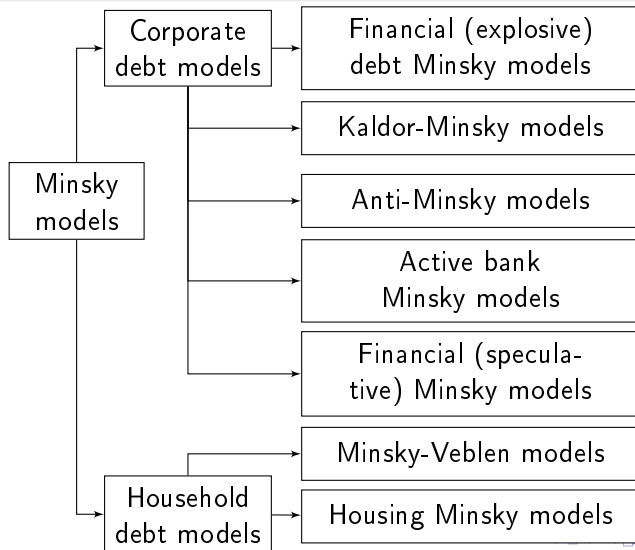
- Can Minsky's Financial Instability Hypothesis (FIH) be modelled? **No**.
- However, certain aspects of Minsky's theory can be modelled. Modelling is a useful exercise that can **illuminate the channels** through which financial cycles and instability can arise.
- "*Minsky does not provide a rigorous formal model, and without one readers cannot judge whether an undamped endogenous cycle follows from the assumptions or not*" (Tobin, 1989, p. 106).

- Minskyan models go back to the 1980s. **Taylor and O'Connell (1985)** was the first attempt to formalise Minsky's arguments.
- Since Minsky's FIH refers to the corporate sector, most Minskyan models have focused on the dynamics of **corporate debt**.
- However, there is also a significant number of Minskyan models that analyse **household debt**.

Outline

- 1 What we have learned
 - Corporate debt models
 - Household debt models
- 2 The way forward
 - Agent-based models
 - Open economies
 - Shadow banking
 - Environmental issues

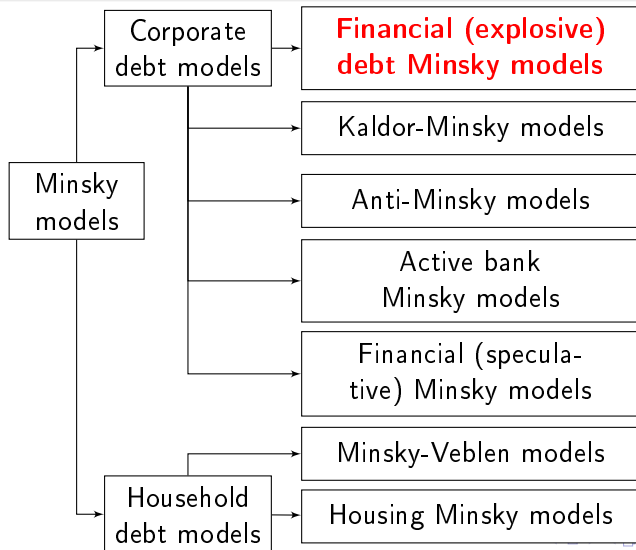
Minsky models based on Nikolaidi and Stockhammer (2016)



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Financial (explosive debt) Minsky models

- Simple economy with households, firms and banks.

- **Investment function:**

$$g_d = f(r, id)$$

- **Consumption function:**

$$\frac{C}{K} = x(r, id)$$

- **Net borrowing of firms:**

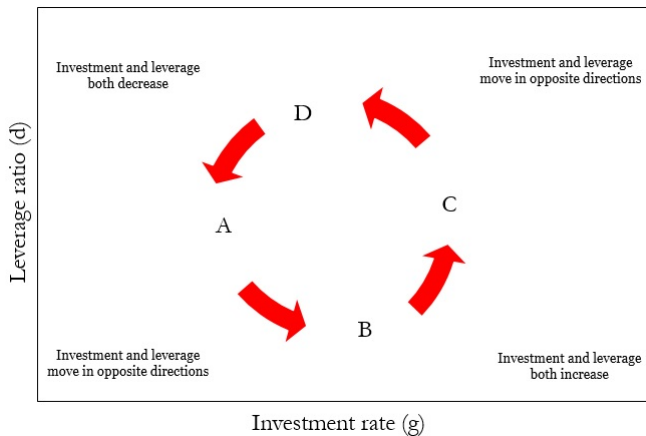
$$\frac{\dot{D}}{K} = g - s_f(r - id)$$

r is the gross rate of profit, i is the interest rate, d is the leverage ratio of firms, g is the effective investment rate, s_f is the retention rate of firms profits and K is capital stock.

Financial (explosive debt) Minsky models

- **Pro-cyclical leverage ratio:** $g \uparrow \rightarrow \dot{d} \uparrow$
- **Debt-burdened investment:** $d \uparrow \rightarrow \dot{g} \downarrow$
- **Goods market is self-stabilising:** $g \uparrow \rightarrow \dot{g} \downarrow$
- **Over-shooting debt:** $d \uparrow \rightarrow \dot{d} \uparrow$
- The family of financial (explosive debt) Minsky models includes, under certain assumptions, Jarsulic (1990), Delli Gatti, Gallegati and Minsky (1994), Lima and Meirelles (2007), Charles (2008, 2015), Fazzari et al. (2008) and Nishi (2012).

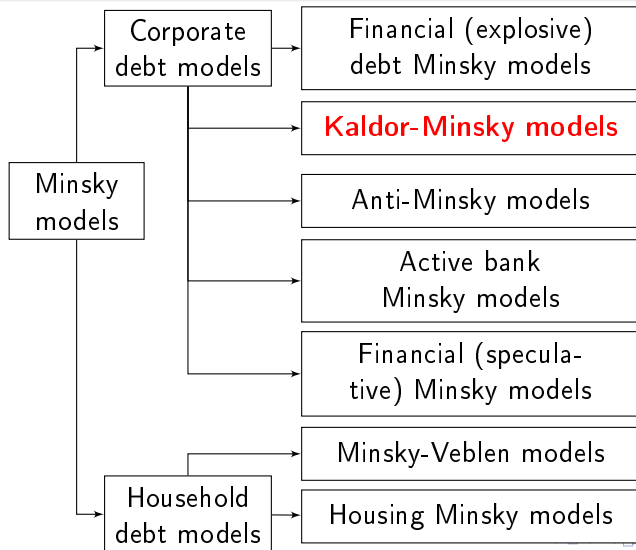
Financial (explosive debt) Minsky models



Financial (explosive debt) Minsky models

- In line with Minsky, **interest rate can be endogenous**.
- Keen (1995) and Charles (2008a), for example, assume that **commercial banks** increase the interest rate when leverage ratio increases.
- Fazzari et al. (2008) and Lima and Meirelles (2007) assume that the rise in the interest rate is caused by **central banks**.
- An endogenous interest rate reinforces the destabilising forces.

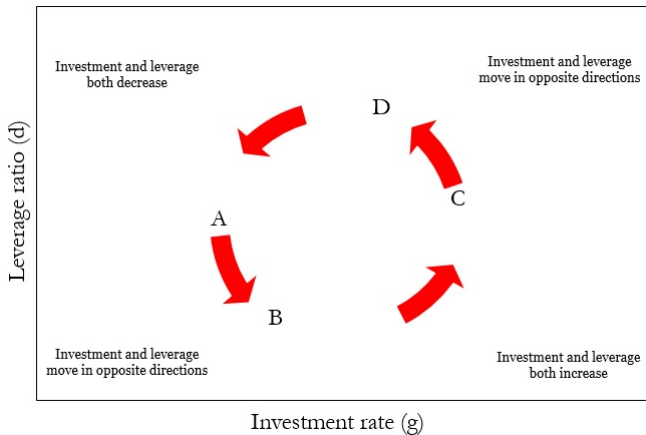
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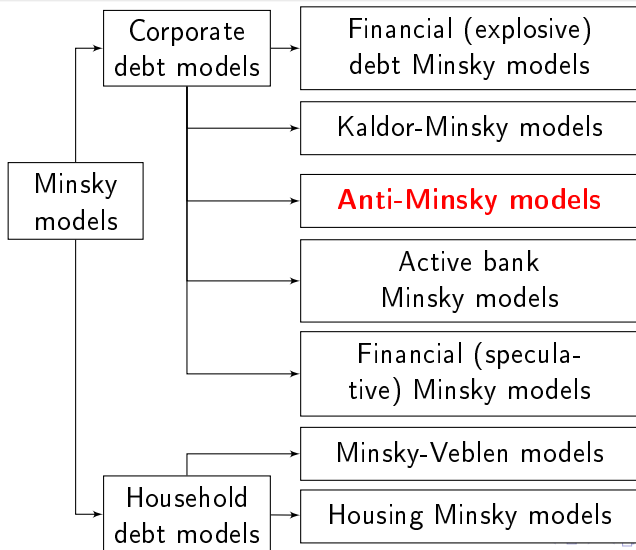
Kaldor-Minsky models

- Pro-cyclical leverage ratio: $g \uparrow \rightarrow \dot{d} \uparrow$
- Debt-burdened investment: $d \uparrow \rightarrow \dot{g} \downarrow$
- **Goods market is destabilising:** $g \uparrow \rightarrow \dot{g} \uparrow$
- **Stabilising debt ratio:** $d \uparrow \rightarrow \dot{d} \downarrow$
- The family of Kaldor-Minsky models includes, under certain assumptions, Foley (1987), Skott (1994) and Asada (2001, 2004, 2012).

Kaldor-Minsky models



Minsky models based on Nikolaidi and Stockhammer (2016)



Anti-Minsky models

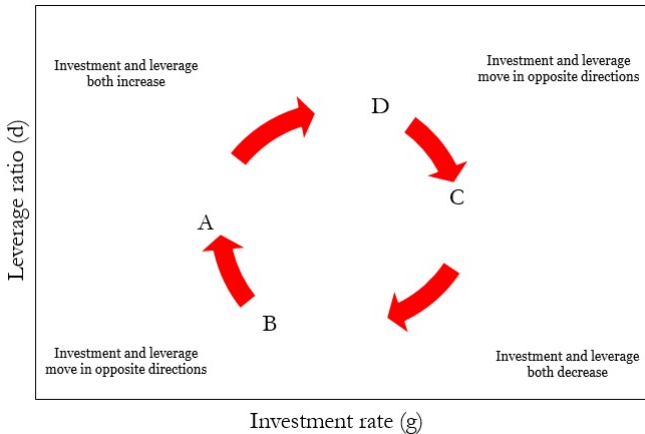
- A main criticism of Minsky's theory is that at the macroeconomic level we may have a **paradox of debt**.
- There is some evidence for the existence of a **counter-cyclical leverage ratio** for the US (1919-1930) (see Isenberg, 1989) and for G-7 countries (1971-1995) (see Lavoie and Seccareccia, 2001). Also, Belhul (2011) shows that the nonfinancial corporate sector did not increase its leverage (liabilities to GDP) before the financial crisis of 2007-2008 in the US.

Anti-Minsky models

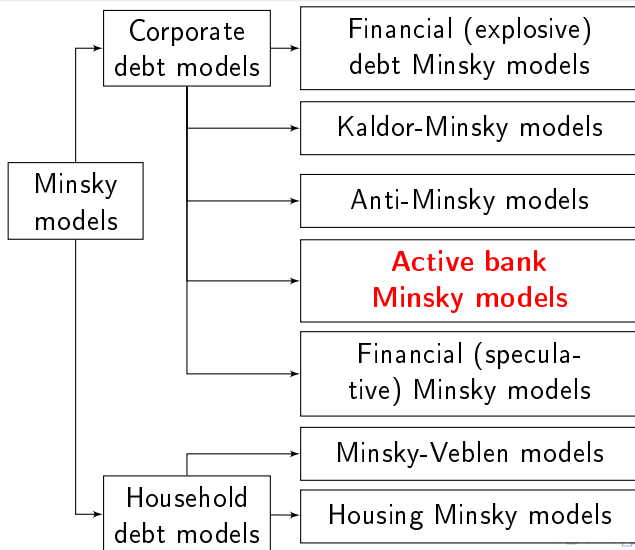
Minsky-type models (see e.g. Nishi, 2012) can generate cycles/instability when there is a paradox of debt. This is the case when:

- **Counter-cyclical leverage ratio:** $g \uparrow \rightarrow \dot{d} \downarrow$
- **Debt-led investment:** $d \uparrow \rightarrow \dot{g} \uparrow$
- **Goods market is self-stabilising:** $g \uparrow \rightarrow \dot{g} \downarrow$
- **Over-shooting debt:** $d \uparrow \rightarrow \dot{d} \uparrow$

Anti-Minsky models



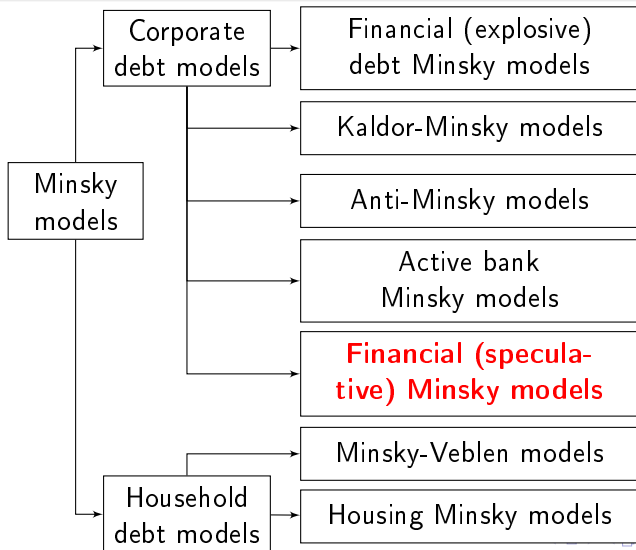
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Active bank Minsky models

- According to Minsky (1986 [2008], p. 265) "*the higher leverage ratio of banks was part of the process that moved the economy toward financial fragility because it facilitated an increase in short-term borrowing (and in leverage) by bank customers: the leverage ratio of banks and the import of speculative and Ponzi financing in the economy are two sides of a coin*".
- Some Minskyan models (see e.g. Ryoo, 2013a; Nikolaidi, 2014) have incorporated an **active banking sector**.
- Nikolaidi (2014) has endogenised the desired margins of safety of firms and banks.

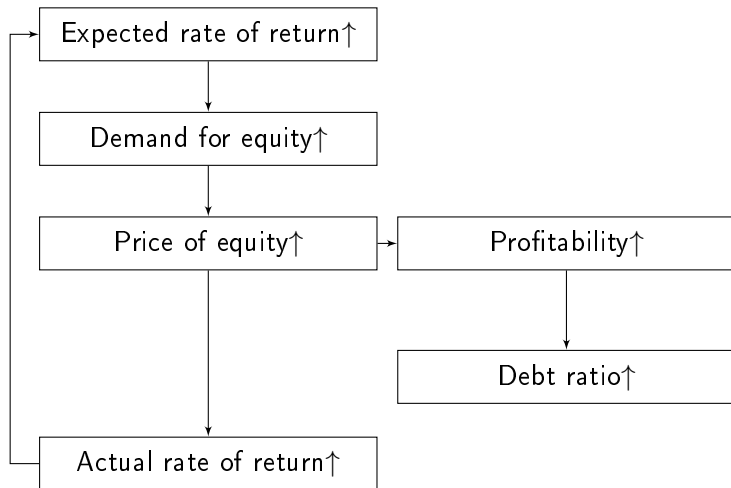
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Financial (speculative) Minsky models

- The previous Minsky models do **not incorporate financial asset prices**.
- There are some Minskyan models (see e.g. Taylor and O'Connell, 1985; Downe, 1987; Ryoo, 2010, 2013b) that emphasise the destabilising role of the equity market.
- **Asset price inflation** allows debt to expand together with higher investment.

Financial (speculative) Minsky models



Key lessons about instability

Instability is more likely when:

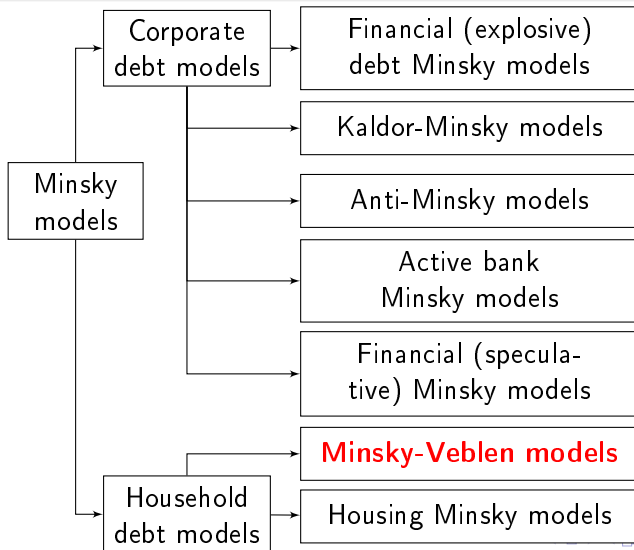
- 1 firms' retention ratio is low
- 2 the sensitivity of investment to the rate of profit is high
- 3 the sensitivity of credit supply to bank profitability is high
- 4 the desired margins of safety are more responsive to economic growth

Instability can be reduced through **counter-cyclical fiscal policy** (see Keen, 1995; Yoshida and Asada, 2007; Charpe et al., 2011; Nikolaidi, 2014).

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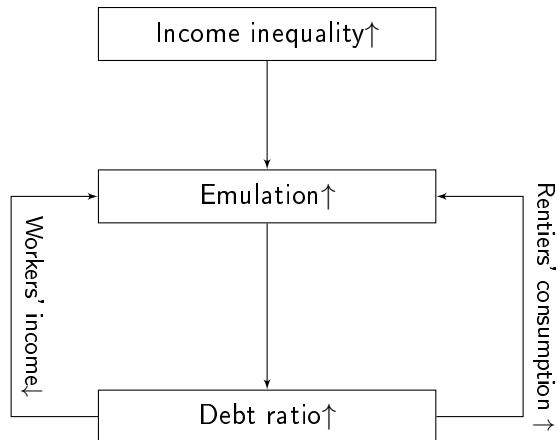
Minsky-Veblen models

- Household debt was not at the core of Minsky's analysis.
- Also, Minsky did not pay attention to **inequality issues**.
- As Palley (2009, p. 4) argues, "*the mechanisms identified in Minsky's financial instability hypothesis are critical to understanding the neoliberal era, but they are part of a broader narrative*".

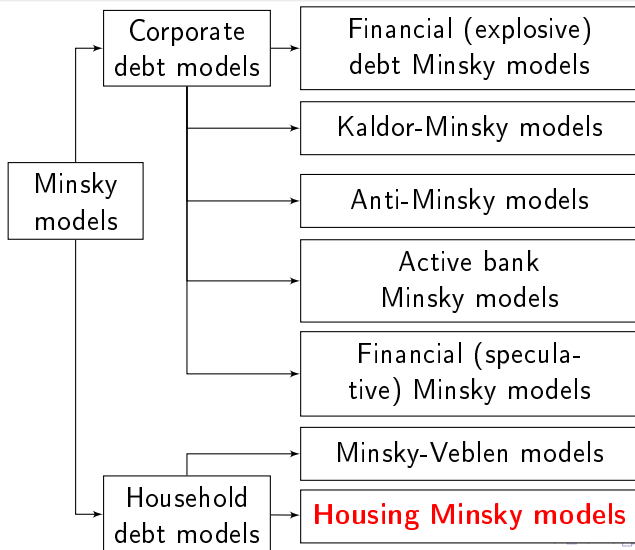
Minsky-Veblen models

- Palley (1994) developed a Minsky model with household debt.
- Recently, Minsky-Veblen models have been developed that combine **emulation motives**, income distribution and household debt (see Kapeller and Schutz, 2014; Ryoo and Kim, 2014).
- These models are in line with the **evidence** provided by Cynamon and Fazzari (2008, 2015) and Barba and Pivetti (2009) who argue that increasing income inequality contributed to the rise in the indebtedness of the US household sector (note though that Stockhammer and Wildauer (2016) find no evidence for expenditure cascades in OECD countries).

Minsky-Veblen models



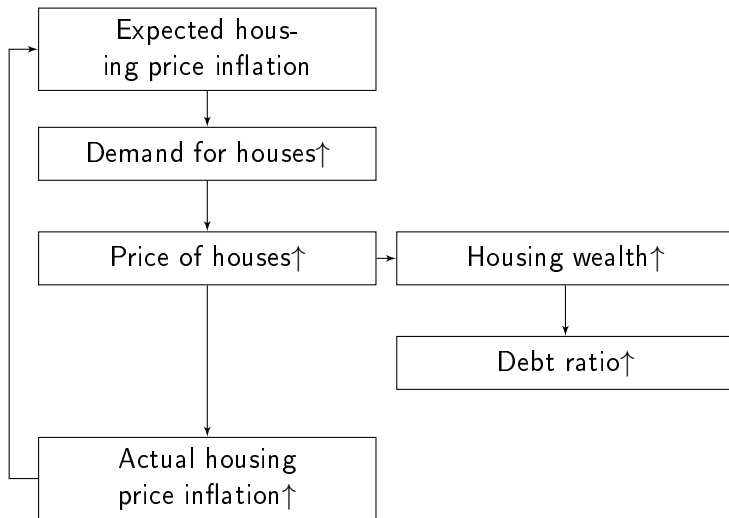
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Housing Minsky models

- *"a cash-flow orientation by bankers is conducive to sustaining a robust financial structure. an emphasis by bankers on the collateral value and the expected values of assets is conducive to the emergence of a fragile financial structure"* (Minsky, 1986 [2008], p. 261).
- Recently, attention has also been paid to the links between Minsky and the **housing market/mortgages**.
- For example, Ryoo (2015) develops a housing Minsky model where instability can emerge because of the interaction between house prices, **collateral** and household debt.

Housing Minsky models



Key lessons about instability

Instability is more likely when:

- 1 emulation motive is strong
- 2 credit supply is responsive to the value of collateral
- 3 the sensitivity of housing supply to prices is low

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- *"The mixture of hedge, speculative, and Ponzi finance in an economy is a major determinant of its stability. The existence of a large component of positions financed in a speculative or a Ponzi manner is necessary for financial instability"* (Minsky, 1986 [2008], p. 232).
- A few studies (see e.g. Chiarella and di Guilmi, 2011; Michell, 2014; Caiani et al., 2016) analyse the Minskyan finance regimes within agent-based frameworks where **firm heterogeneity** is important.
- More work is necessary (e.g. heterogeneous households, heterogeneous banks).

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- Minsky's analysis refers to closed economies. However, his arguments can be **extended within open economy** frameworks.
- Foley (2003) develops a Minskyan model with open economy issues where capital inflows play an important role in the dynamics of financial fragility (see also Schoeder, 2009).
- Exchange rate fluctuations are linked with the ability of the domestic sector to repay debt denominated in foreign currency (see e.g. Kregel, 1998; De Paula and Alves, 2000; Arestis and Glickman, 2002; Kaltenbrunner, 2015).
- How does the **industrial structure** and the price competitiveness of an economy affect the financial fragility of households and firms?

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- "*Securitization implies that there is no limit to bank initiative in creating credits for there is no recourse to bank capital*" (Minsky, 1987, p. 3).
- The **financial innovation** related to shadow banking is in line with Minsky's view about the rise of money manager capitalism.
- How can the pricing of complex financial instruments (such as MBSs) and the leverage of shadow banks contribute to the emergence of a Minsky boom?
- Recent models have tried to shed light on these issues (Nikolaïdi, 2015; Botta et al., 2016). The channels of financial fragility are more complex.

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Are we going to experience a **climate Minsky moment** (see Carney, 2016)?

- A lower expected profitability of the fossil fuel companies might lead to a sudden decline in the asset prices of these companies.
- Euphoria about the returns on green projects can cause an over-expansion of green credit.
- The physical catastrophes of climate change might result in financial instability (see Dafermos, Nikolaidi and Galanis, 2016).