Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

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Motivation of the paper

- **Securitisation** has been at the core of various academic analyses for the causes of the recent financial crisis. Securitisation has given rise to the so called 'originate and distribute' model of banking in which the default risk on granted loans is disconnected from loan originators. By doing so it has played a prominent role in facilitating excessive lending with adverse effects on the macroeconomy's financial fragility (see Kregel, 2008; Lavoie, 2012-3).

- **Wage stagnation** has been viewed as another main root cause of the recent crisis (see e.g. Stockhammer, 2013; Wisman, 2013). It has been argued that the decline in the wage income share in the pre-crisis period was conducive to the excessive rise in household debt and the deterioration of workers' financial position.

Motivation of the paper

- The aim of the paper is to employ the **macroeconomic stock-flow consistent (SFC) approach** (see Godley and Lavoie, 2007) in order to investigate the channels through which securitisation and wage stagnation jointly affect financial fragility.
- The stock-flow consistent approach is **useful** for the purposes of this paper because:

  a) The securitisation process involves complex stock-flow interactions between the various actors within and outside the **shadow banking sector**. In SFC models this interactions can be clearly modelled.

  b) The **dynamic links** between wage stagnation and (housing and consumer) debt accumulation as well as their **implications** for the macroeconomic system can be easily incorporated within a SFC structure.

Motivation of the paper

- There have been some recent attempts to analyse **shadow banking** by using a stock-flow consistent framework (see Eatwell et al., 2008; Pilkington, 2008; Lavoie, 2014; Botta et al., 2015).

- However: (a) these analyses are still incomplete; (b) shadow banking has not been examined in combination with wage stagnation.

- In this paper I use **simulations** to study how a more widespread adoption of securitisation is likely to increase the financial fragility of the economy.

- I also examine the **mechanisms** through which wage stagnation can reinforce this tendency of securitisation to increase financial fragility.

Structure of the presentation

1. Structure of the model

2. Effects of an increase in the degree of securitisation

3. The role of wage stagnation

4. Conclusion

1. Structure of the model

Balance sheet matrix

	Worker households - type I	Worker households - type II	Firms	Commercial banks	SPVs-underwriters	Institutional investors	Investor households	Government	Central bank	Total
Houses	$+p_H H_{DW}$		$+p_H HU$				$+p_H H_{DI}$			$+p_H H$
Productive capital	$+K_F$		$+K_F$							$+K_F$
High-powered money				$+HPM_B$			$+HPM_{IH}$		$-HPM$	0
Consumer loans		$-LC$		$+LC$						0
Housing loans	$-LH$			$+LH_{NS}$	$+LH_S$					0
Firms' loans			$-LF$	$+LF$						0
Treasury bills				$+TB_B$	$+TB_U$	$+TB_{II}$	$+TB_{IH}$	$-TB$	$+TB_{CB}$	0
MBSs					$-p_M M$	$+p_M M$				0
Deposits				$-D_{IH}$			$+D_{IH}$			0
Instit. investors' shares						$-SH$	$+SH$			0
Firms' equities			$-p_e e$				$+p_e e$			0
Advances				$-A$					$+A$	0
Total (net worth)	$+V_{WI}$	$-LC$	$+V_F$	$+K_B$	$+NW_U$	$+K_{II}$	$+V_I$	$-TB$	0	$+K_F + p_H H$

Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

	Worker households - type I	Worker households - type II	Firms Current	Firms Capital	Commercial banks Current	Commercial banks Capital	SPVs-underwriters Current	SPVs-underwriters Capital	Institutional investors Current	Institutional investors Capital	Investor households	Government	Central bank Current	Central bank Capital	Total
Housing investment			$+\Delta H$	$-\Delta H$											0
Investment in prod. capital			$+\Delta K_F$	$-\Delta K_F$											0
Consumption	$-C_{W1}$	$-C_{W2}$	$+C_{W1}+C_{W2}+C_{IH}$								$-C_{IH}$				0
Government expenditures			$+GOV$									$-GOV$			0
Income taxes	$-T_{W1}$	$-T_{W2}$									$-T_{IH}$	$+T_{W1}+T_{W2}+T_{IH}$			0
Wages	$+W_{W1}$	$+W_{W2}$	$-W$												0
Interest on consumer loans		$-i_{LC}LC_{-1}$			$+i_{LC}LC_{-1}$										0
Interest on housing loan	$-i_{LH}LH_{-1}$				$+i_{LH}LH_{NS-1}$		$+i_{LH}LH_{S-1}$								0
Interest on firms' loans			$-i_{LF}LF_{-1}$		$+i_{LF}LF_{-1}$										0
Fees					$+FEE$		$-FEE$								0
Interest on treasury bills					$+i_T TB_{B-1}$		$+i_T TB_{U-1}$		$+i_T TB_{II-1}$		$+i_T TB_{IH-1}$	$-i_T TB_{-1}$	$+i_T TB_{CB-1}$		0
Interest on deposits					$-i_D D_{IH-1}$						$+i_D D_{IH-1}$				0
Interest on advances					$-i_A A_{-1}$								$+i_A A_{-1}$		0
SPVs-underwriters' profits							$-PU$	$+PU_U$	$+COUPON$						0
Instit. investors' profits									$-PI$	$+PI_U$	$+PI_D$				0
Firms' profits			$-PF$	$+PF_U$							$+PF_D$				0
Central bank's profits												$+PB_{CB}$	$-PB_{CB}$		0
Commercial banks' profits					$-PB_B$	$+PB_{BU}$					$+PB_{BD}$				0
Δdeposits						$+\Delta D_{IH}$					$-\Delta D_{IH}$				0
Δequities of firms				$+p_e\Delta e$							$-p_e\Delta e$				0
Δshares of instit. investors										$+\Delta SH$	$-\Delta SH$				0
Δadvances						$+\Delta A$								$-\Delta A$	0
Δhouses	$-p_H\Delta H_{DW}$			$+p_H\Delta H_{DW}+p_H\Delta H_{DI}$							$-p_H\Delta H_{DI}$				0
Δloans for housing	$+\Delta LH$					$-\Delta LH_{NS}$		$-\Delta LH_S$							0
Δloans for consumption		$+\Delta LC$				$-\Delta LC$									0
Δloans to firms				$+\Delta LF$		$-\Delta LF$									0
ΔMBSs								$+p_M\Delta M$		$-p_M\Delta M$					0
Δtreasury bills						$-\Delta TB_B$		$-\Delta TB_U$		$-\Delta TB_{II}$	$-\Delta TB_{IH}$	$+\Delta TB$		$-\Delta TB_{CB}$	0
Δhigh-powered money						$-\Delta HPM_B$					$-\Delta HPM_{IH}$			$+\Delta HPM$	0
Defaulted loans	$+DL$					$-DL_{NS}$		$-DL_{SU}$		$-DL_{SII}$					0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1. Structure of the model

Types of households

1. **Worker households of type I** take out mortgages from commercial banks to partly finance the purchase of houses. They receive wage income.

2. **Worker households of type II** take out consumer loans from commercial banks. They receive wage income.

3. **Investor households** hold various financial assets (e.g. shares, deposits and treasury bills). They receive the distributed profits of firms.

1. Structure of the model

The securitisation process in the financial sector

1. **Commercial banks** decide to securitise a part of housing loans.

2. These loans are sold off to the **special purpose vehicles (SPVs)-underwriters**. The SPVs-underwriters issue mortgage-backed securities (MBSs) and distribute the cash inflows from loan repayment and interest to the holders of the MBSs.

3. The MBSs are bought by **institutional investors** and the proceeds are then used by the SPVs-underwriters to purchase the loans from commercial banks. Institutional investors finance their investment in MBSs by shares that are bought by **investor households**.

1. Structure of the model

Housing loans

▪ The **desired demand for houses** of type I worker households is given by:

$$H_{DW}^{D} = H_{DW-1} + \left(h_{10} - h_{11}BUR_{W1-1} + h_{12}\left(\Delta p_H / p_{H-1}\right)_{-1}\right)H_{DW-1}$$

H_{DW} is the demand for houses, p_H is the price of houses and BUR_{W1} is the burden of debt.

▪ The desired demand for houses relies negatively on the lagged burden of debt of households and positively on the lagged growth of housing prices.

▪ The **effective amount of new housing loans** is given by:

$$NLH = k_H NLH^D$$

NLH^D is the desired amount of new housing loans.

1. Structure of the model

Housing loans

- The **degree of credit availability for housing loans** is captured by:

$$k_H = k_{H0} - k_{H1}LEV_{W1-1} + k_{H2}\left(CAR_{-1} - CAR^T\right) - k_{H3}BUR_{W1-1} - k_{H4}\phi$$

  where LEV_{W1} is the leverage ratio of households, CAR is the actual capital adequacy ratio, CAR^T is the target capital adequacy ratio and ϕ is the default rate.

- An increase in the proportion of mortgages that are securitised brings about a rise in the capital adequacy ratio of commercial banks, inducing them to decrease their credit rationing.

1. Structure of the model

Housing loans

- The **change in the demand for houses** is given by:

$$\Delta H_{DW} = \frac{YD_{W1} + \Delta LH - C_{W1} + DL}{p_H}$$

YD_{W1} is the disposable income of households, C_{W1} is the consumption of households, LH is the amount of housing loans and DL is the amount of defaulted loans.

- A higher amount of housing loans causes an increase in the demand for houses from households of type I, leading to a higher price of houses.

1. Structure of the model

MBSs and housing loans

- The **amount of MBSs** is given by:

$$M = M_{-1} + \Delta LH_S + DL_{SU}$$

  LH_S is the amount of loans that are securitised and DL_{SU} is the amount of defaulted securitised loans.

- The higher amount of housing loans that are securitised the higher the amount of MBSs and, therefore, the higher the **coupon payment** provided to institutional investors by SPVs-underwriters.

- Part of the coupon payment is distributed to investor households who hold the **shares** issued by institutional investors.

1. Structure of the model

Rate of default and housing loans

▪ The **rate of default** is given by:

$$\varphi = \varphi_0 + \varphi_1 BUR_{W1-1} - \varphi_2 k_{H-1}$$

▪ It is assumed that, when the burden of debt of worker household of type I increases, there is a higher likelihood that more worker households will face liquidity problems.

▪ Furthermore, the liquidity problems are reinforced when the degree of credit availability by banks declines.

▪ The **amount of defaulted loans** is:

$$DL = \varphi LH_{-1}$$

1. Structure of the model

Consumer loans

- The **desired aggregate consumption** of type II worker households is:

$$C_{W2}^D = a \cdot YD_{W2-1} + (1-a) \cdot C_{IH-1} \frac{n_2}{n_3}$$

where YD_{W2} is the disposable income of worker households of type II, C_{IH} is the aggregate consumption of investor households, n_2 is the number of workers of type II and n_3 is the number of investor households.

- It is assumed that type II worker households try to **emulate the consumption of investor households** to maintain their relative social status (see e.g. Cynamon and Fazzari, 2008).

- Wage stagnation increases, ceteris paribus, the desired aggregate consumption of type II worker households, since it positively affects the income and the consumption of investor households.

Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

1. Structure of the model

Consumer loans

- The **effective amount of new consumer loans** is given by:

$$NLC = k_C NLC^D$$

NLC^D is the desired amount of new consumer loans.

- The **degree of credit availability for consumer loans** is:

$$k_C = k_{C0} + k_{C1}\left(CAR_{-1} - CAR^T\right) - k_{C2}BUR_{W2-1}$$

BUR_{W2} is the burden of debt of type II worker households.

- The increase in the proportion of loans that are securitised brings about a rise in the capital adequacy ratio of commercial banks, inducing them to decrease their credit rationing.

2. Effects of an increase in the degree of securitisation

- The model consists of about 100 equations. It was solved numerically using reasonable values for its parameters.

- In the first simulation experiment we study how a more widespread adoption of securitisation is likely to increase the **financial fragility** of an economy.

- In particular, it is assumed that at a specific point in time there is an **exogenous rise in the proportion of mortgages securitised by banks** and in the willingness of investor households to buy institutional investors' shares.

2. Effects of an increase in the degree of securitisation

First-round effects

Degree of securitisation ↑	→	CAR ↑

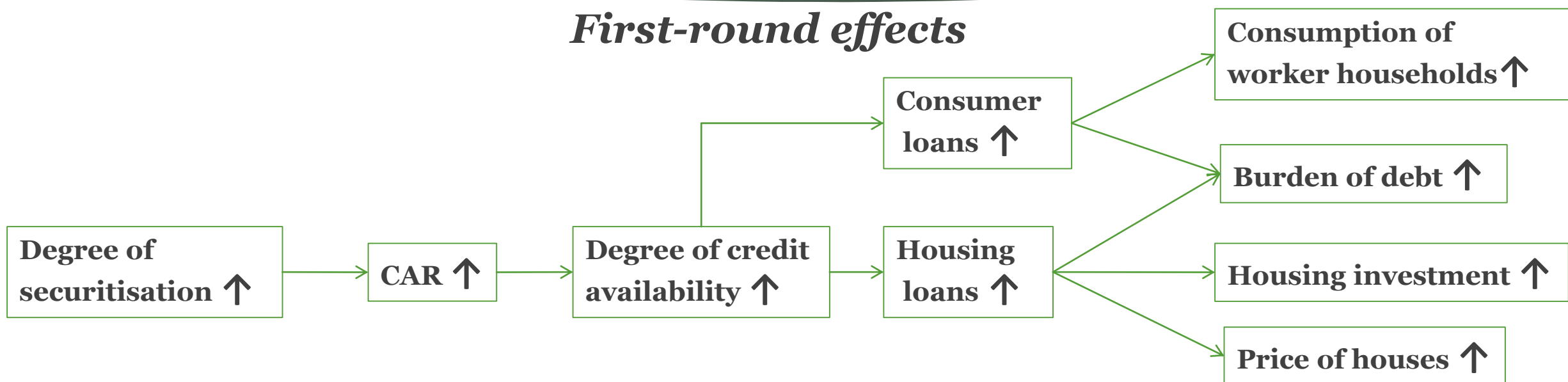# 2. Effects of an increase in the degree of securitisation

Capital adequacy ratio

2. Effects of an increase in the degree of securitisation

First-round effects

| Degree of securitisation ↑ | → | CAR ↑ | → | Degree of credit availability ↑ |

Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

2. Effects of an increase in the degree of securitisation

Degree of credit availability for housing loans

2. Effects of an increase in the degree of securitisation

First-round effects

| Degree of securitisation ↑ | → | CAR ↑ | → | Degree of credit availability ↑ | → | Housing loans ↑ |

2. Effects of an increase in the degree of securitisation

First-round effects

| Degree of securitisation ↑ | → | CAR ↑ | → | Degree of credit availability ↑ | → | Housing loans ↑ |

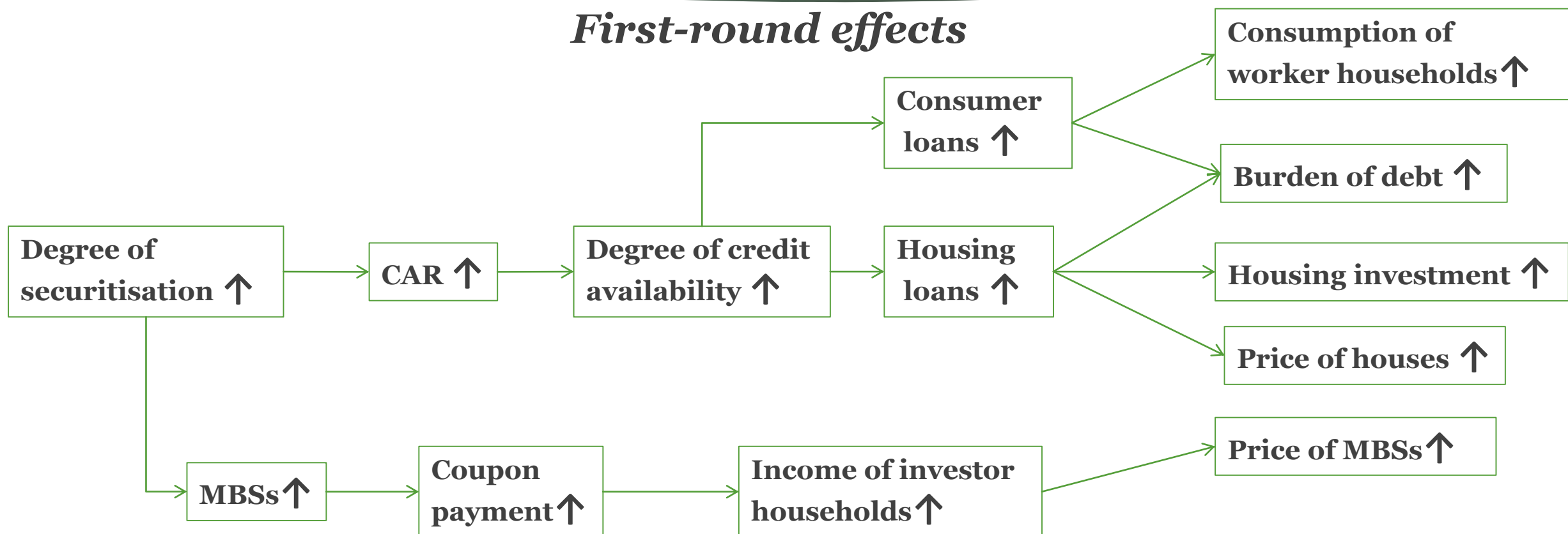Housing investment ↑

Price of houses ↑
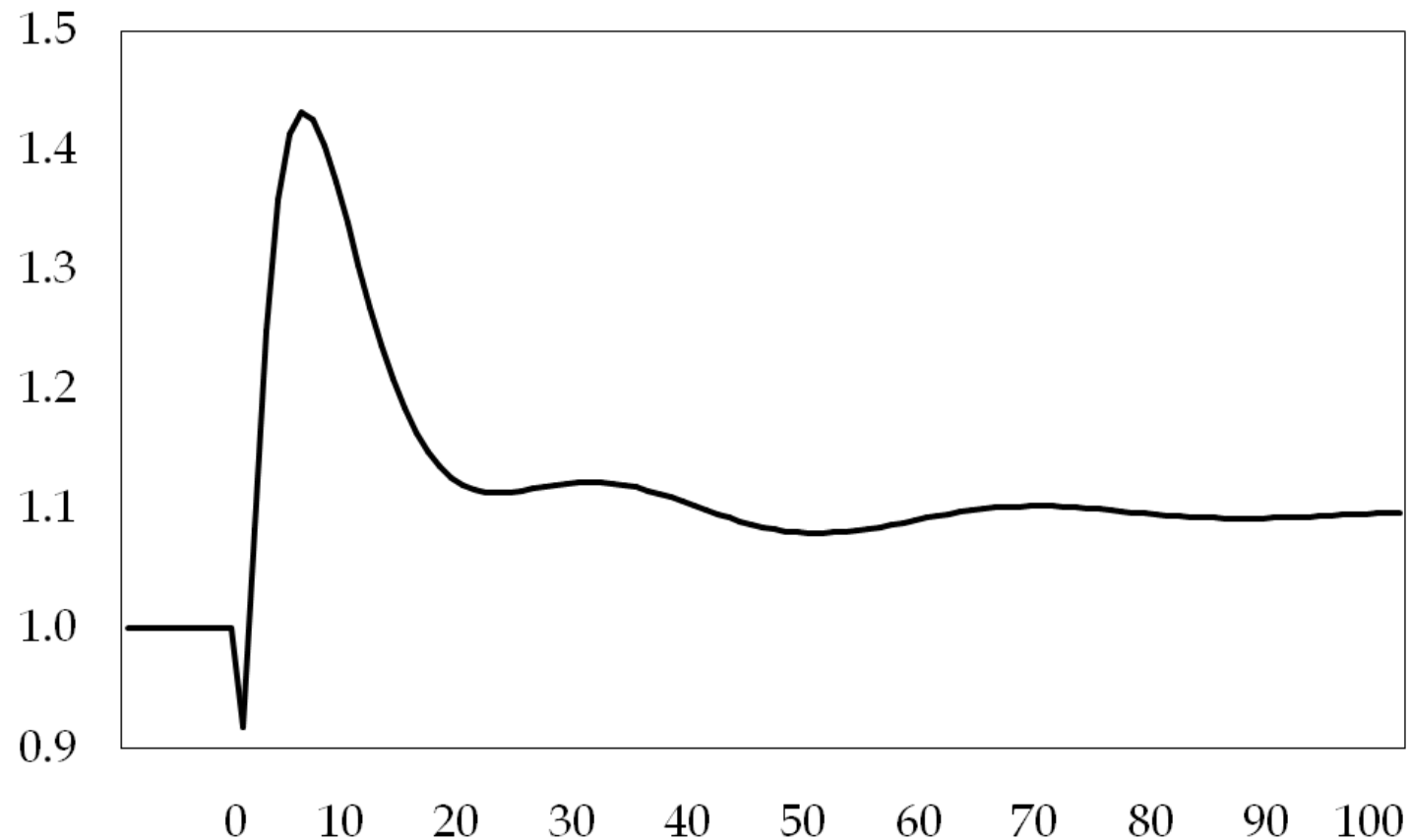
2. Effects of an increase in the degree of securitisation

Price of houses

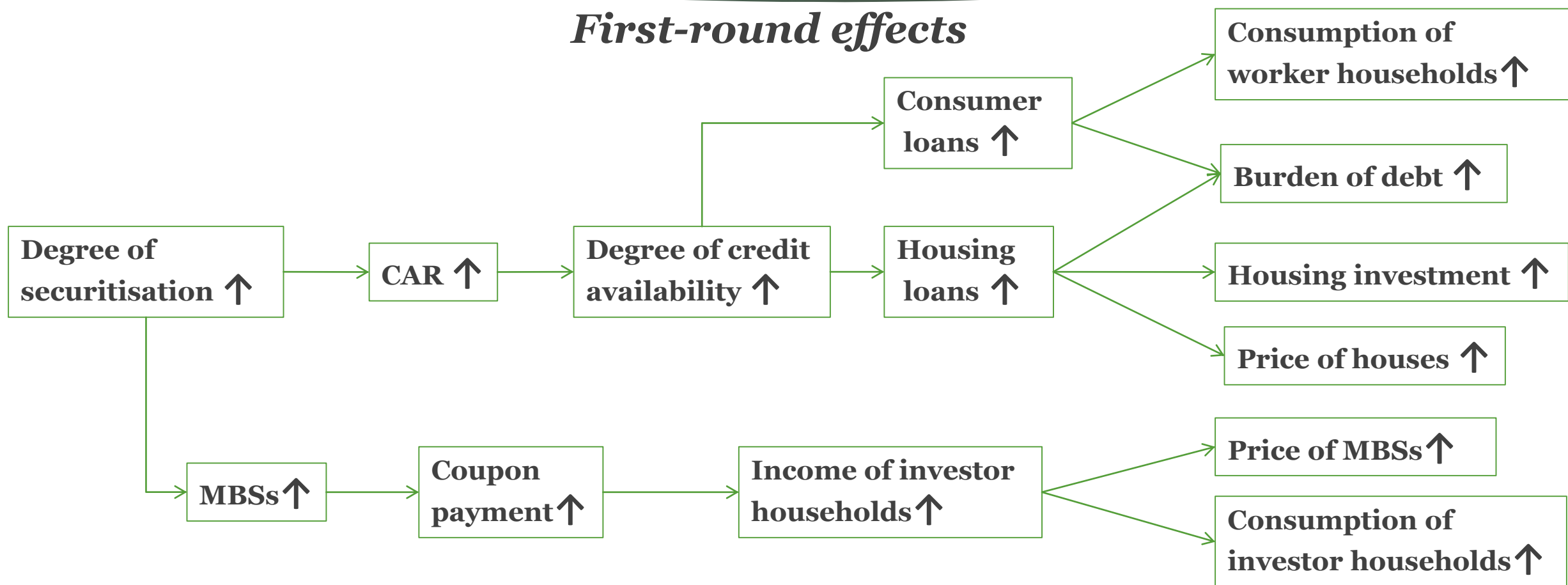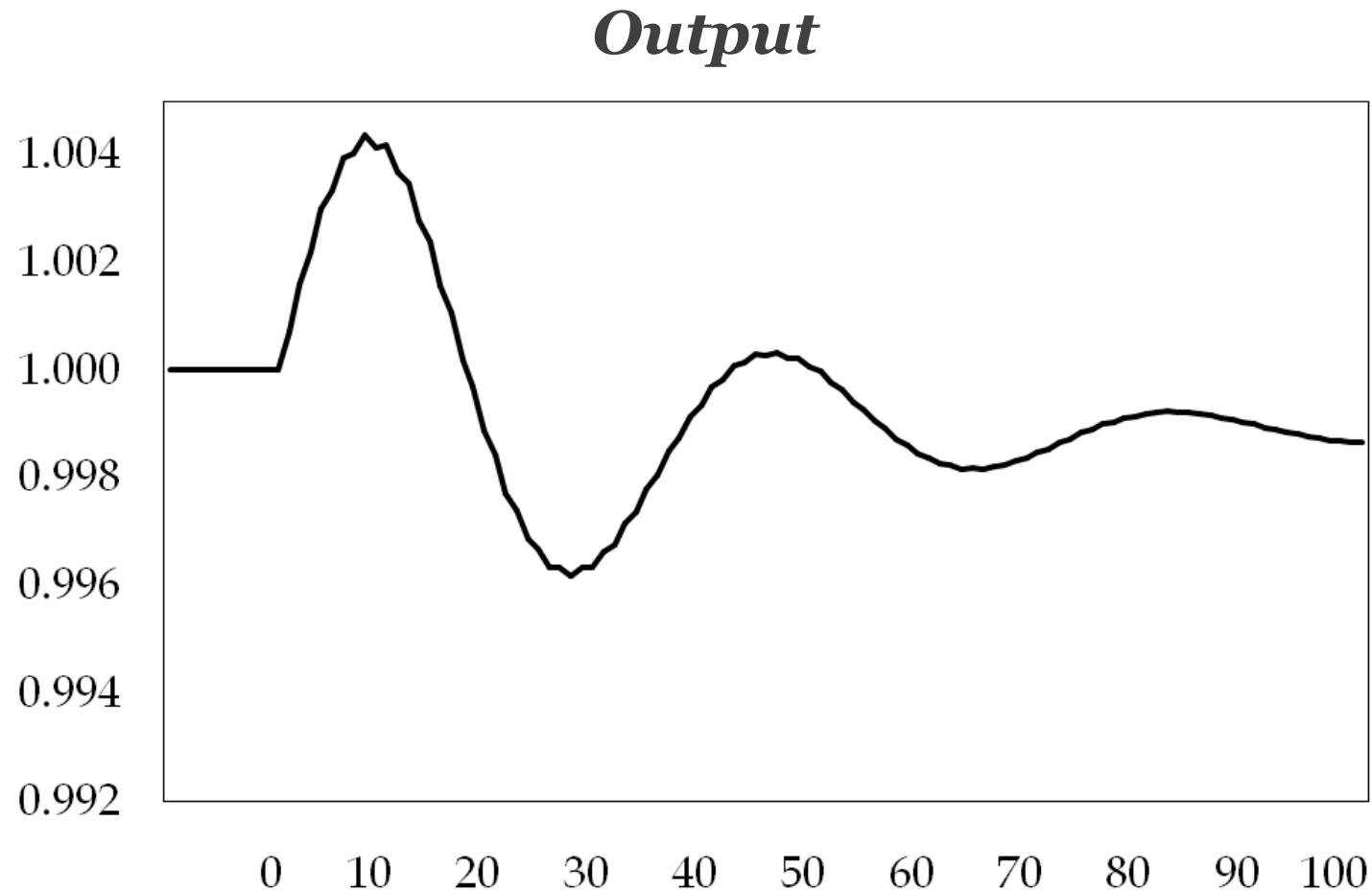# 2. Effects of an increase in the degree of securitisation

First-round effects


```
Degree of                      Degree of credit        Housing              Burden of debt ↑
securitisation ↑  →  CAR ↑  →  availability ↑     →    loans ↑     →        Housing investment ↑
                                                                            Price of houses ↑
```

Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

2. Effects of an increase in the degree of securitisation

Debt burden of type I worker households

2. Effects of an increase in the degree of securitisation

First-round effects

Degree of securitisation ↑ → CAR ↑ → Degree of credit availability ↑ → Housing loans ↑ → Burden of debt ↑ / Housing investment ↑ / Price of houses ↑

Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

2. Effects of an increase in the degree of securitisation

Degree of credit availability for consumer loans

2. Effects of an increase in the degree of securitisation

First-round effects

Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

2. Effects of an increase in the degree of securitisation

First-round effects

Degree of securitisation ↑ → CAR ↑ → Degree of credit availability ↑ → Consumer loans ↑, Housing loans ↑

Consumer loans ↑ → Consumption of worker households ↑, Burden of debt ↑

Housing loans ↑ → Burden of debt ↑, Housing investment ↑, Price of houses ↑

2. Effects of an increase in the degree of securitisation

Debt burden of type II worker households

2. Effects of an increase in the degree of securitisation

First-round effects

Degree of securitisation ↑ → CAR ↑ → Degree of credit availability ↑ → Consumer loans ↑ → Consumption of worker households ↑

Consumer loans ↑ → Burden of debt ↑

Degree of credit availability ↑ → Housing loans ↑ → Burden of debt ↑

Housing loans ↑ → Housing investment ↑

Housing loans ↑ → Price of houses ↑

Degree of securitisation ↑ → MBSs ↑ → Coupon payment ↑ → Income of investor households ↑

Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

2. Effects of an increase in the degree of securitisation

Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

2. Effects of an increase in the degree of securitisation

Price of MBSs

2. Effects of an increase in the degree of securitisation

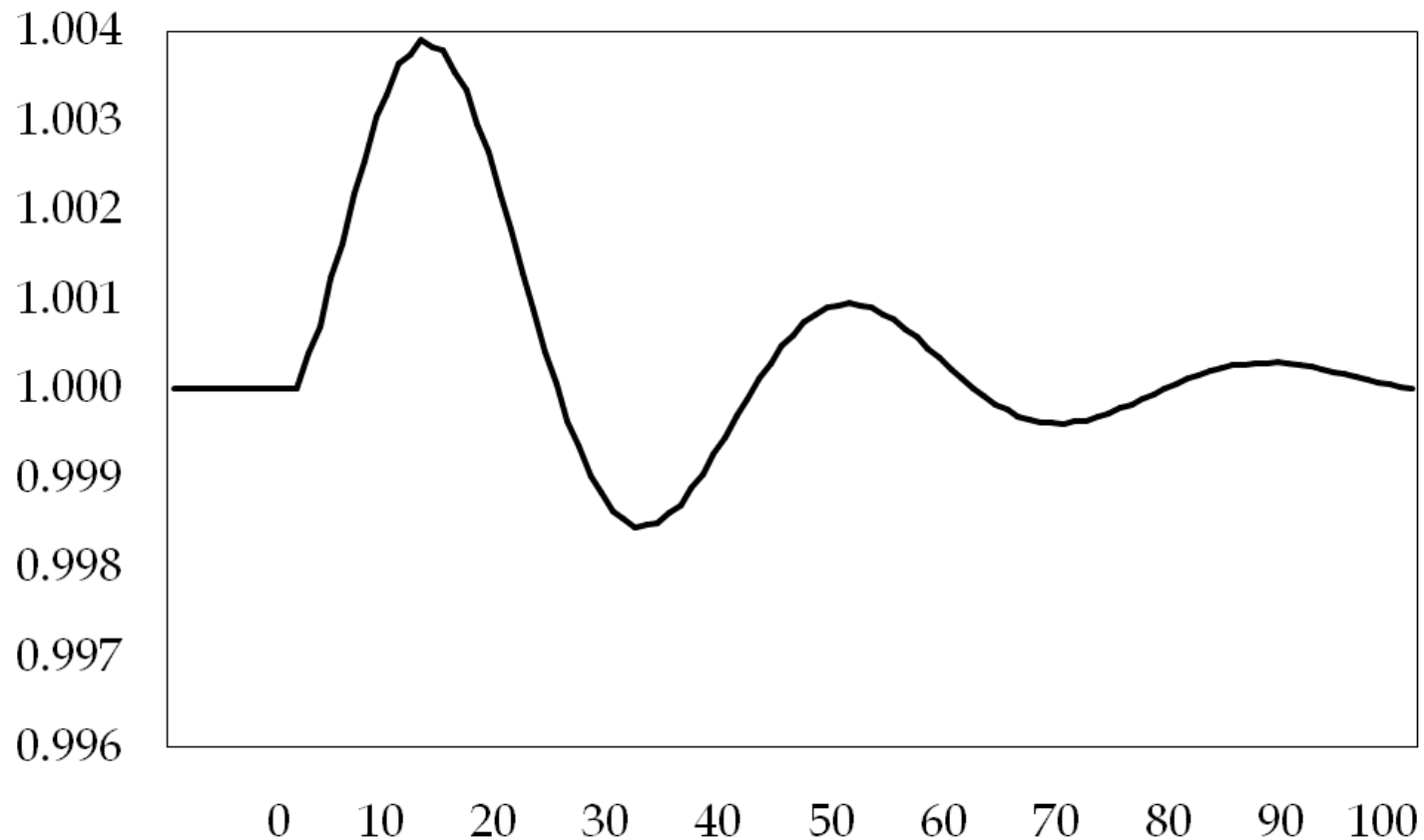***First-round effects***

Degree of securitisation ↑ → CAR ↑ → Degree of credit availability ↑ → Consumer loans ↑ → Consumption of worker households ↑, Burden of debt ↑

Degree of credit availability ↑ → Housing loans ↑ → Burden of debt ↑, Housing investment ↑, Price of houses ↑

Degree of securitisation ↑ → MBSs ↑ → Coupon payment ↑ → Income of investor households ↑ → Price of MBSs ↑, Consumption of investor households ↑

Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

2. Effects of an increase in the degree of securitisation

Output

2. Effects of an increase in the degree of securitisation

Rate of default
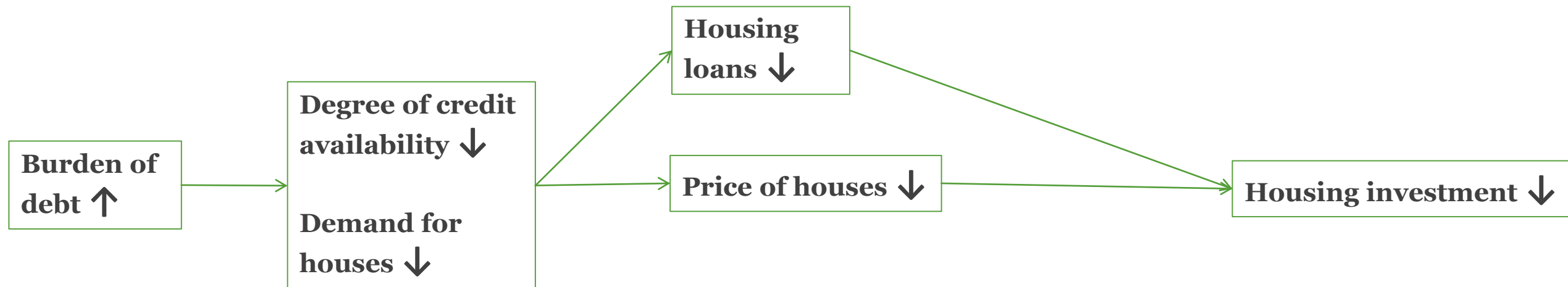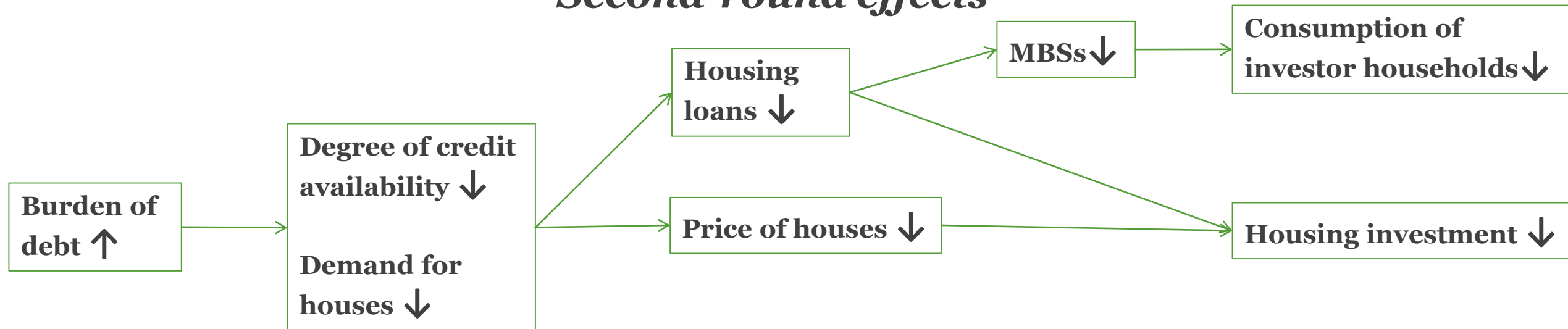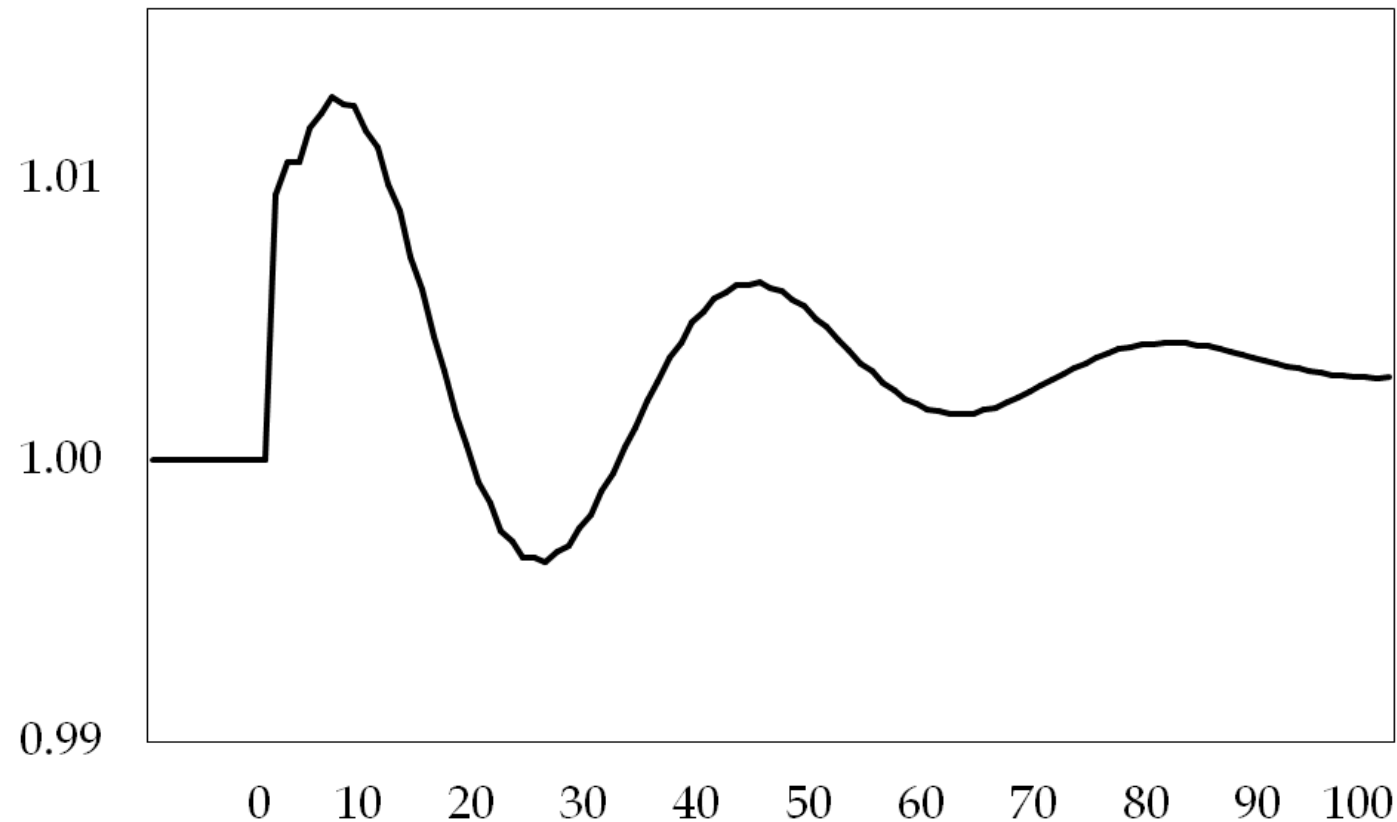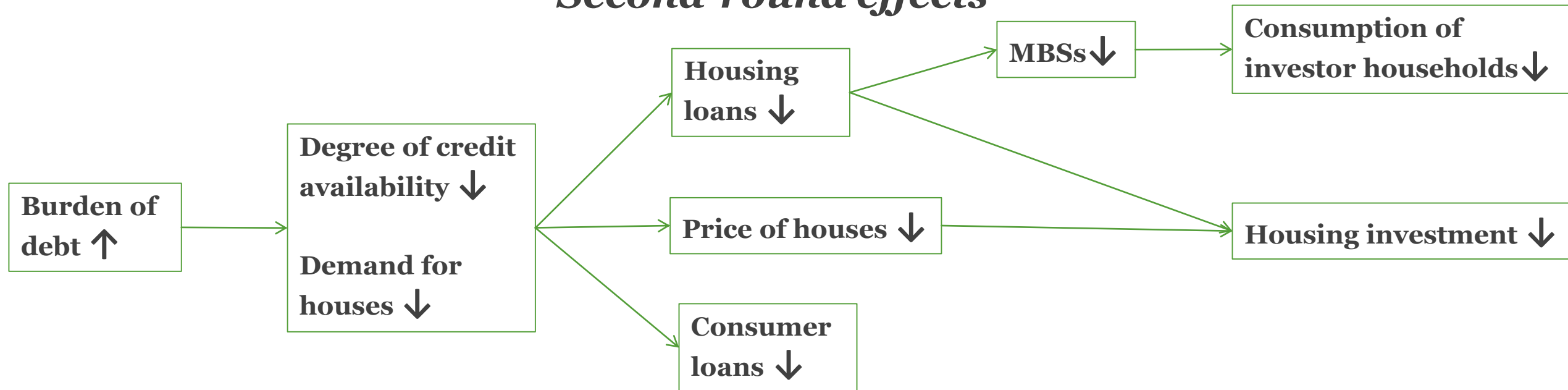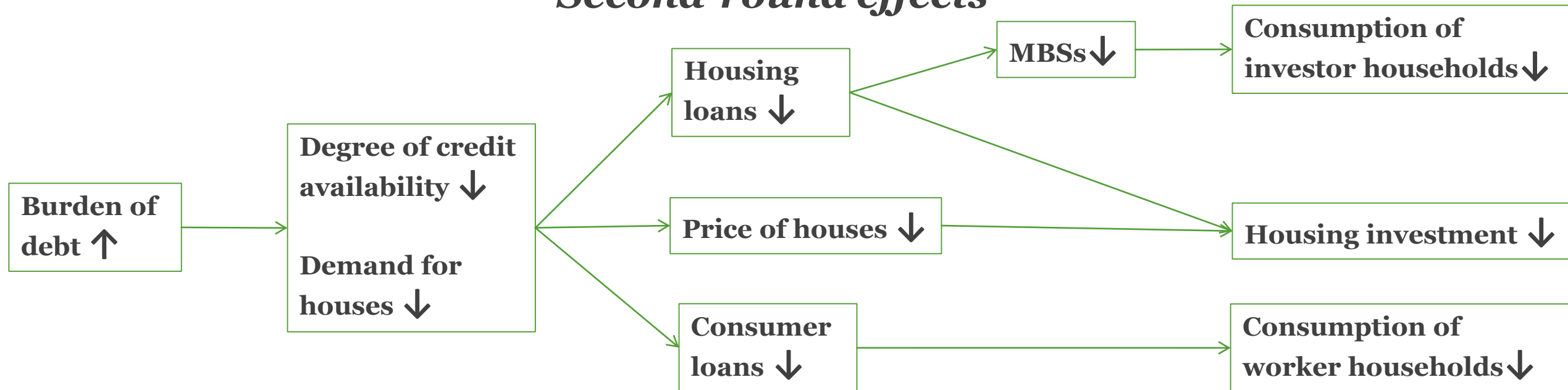
2. Effects of an increase in the degree of securitisation

- Overall, **in the first periods** the economy experiences an economic, housing and financial boom that coexists with a rise in the burden of debt of households and a fall in the rate of default.

- It is also noteworthy that higher credit provision and increasing housing and MBSs prices reinforce the one the other.

- Following Tymoigne's (2010, 2011) conceptualisation of financial fragility, it can be argued that these developments correspond to an economy characterised by **increasing financial fragility**.

2. Effects of an increase in the degree of securitisation

Second-round effects

Burden of debt ↑	→	Degree of credit availability ↓ Demand for houses ↓

2. Effects of an increase in the degree of securitisation

Degree of credit availability for housing loans

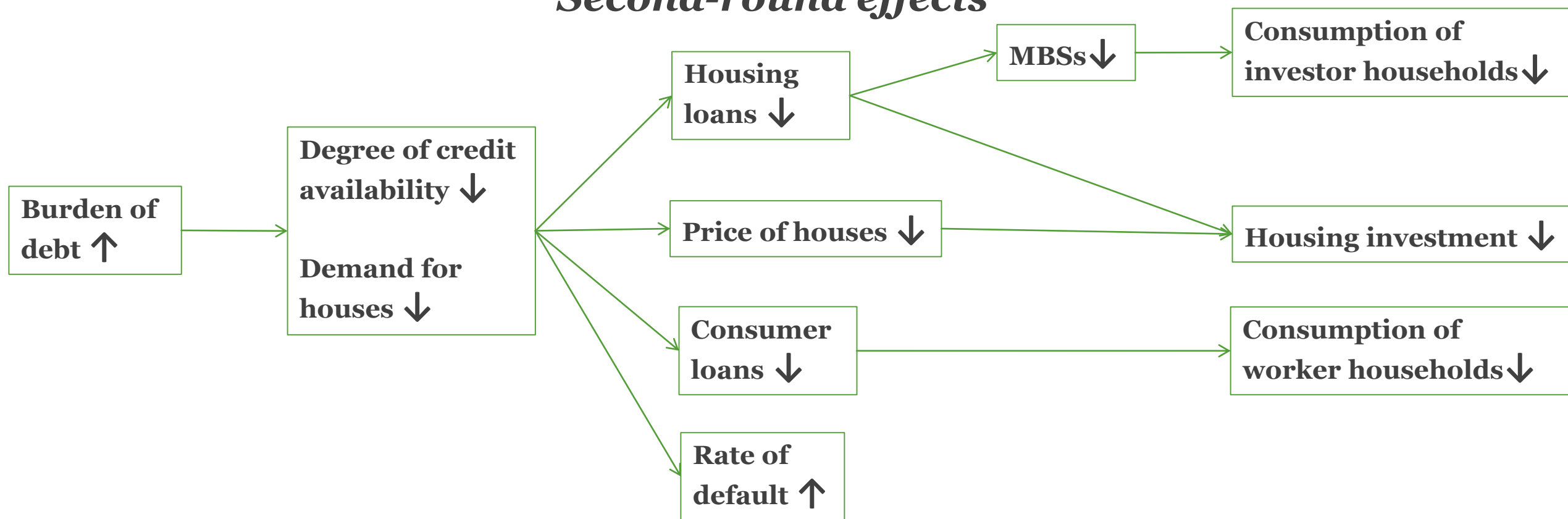# 2. Effects of an increase in the degree of securitisation

Second-round effects

Burden of debt ↑ → Degree of credit availability ↓ / Demand for houses ↓ → Housing loans ↓ / Price of houses ↓

2. Effects of an increase in the degree of securitisation

Price of houses

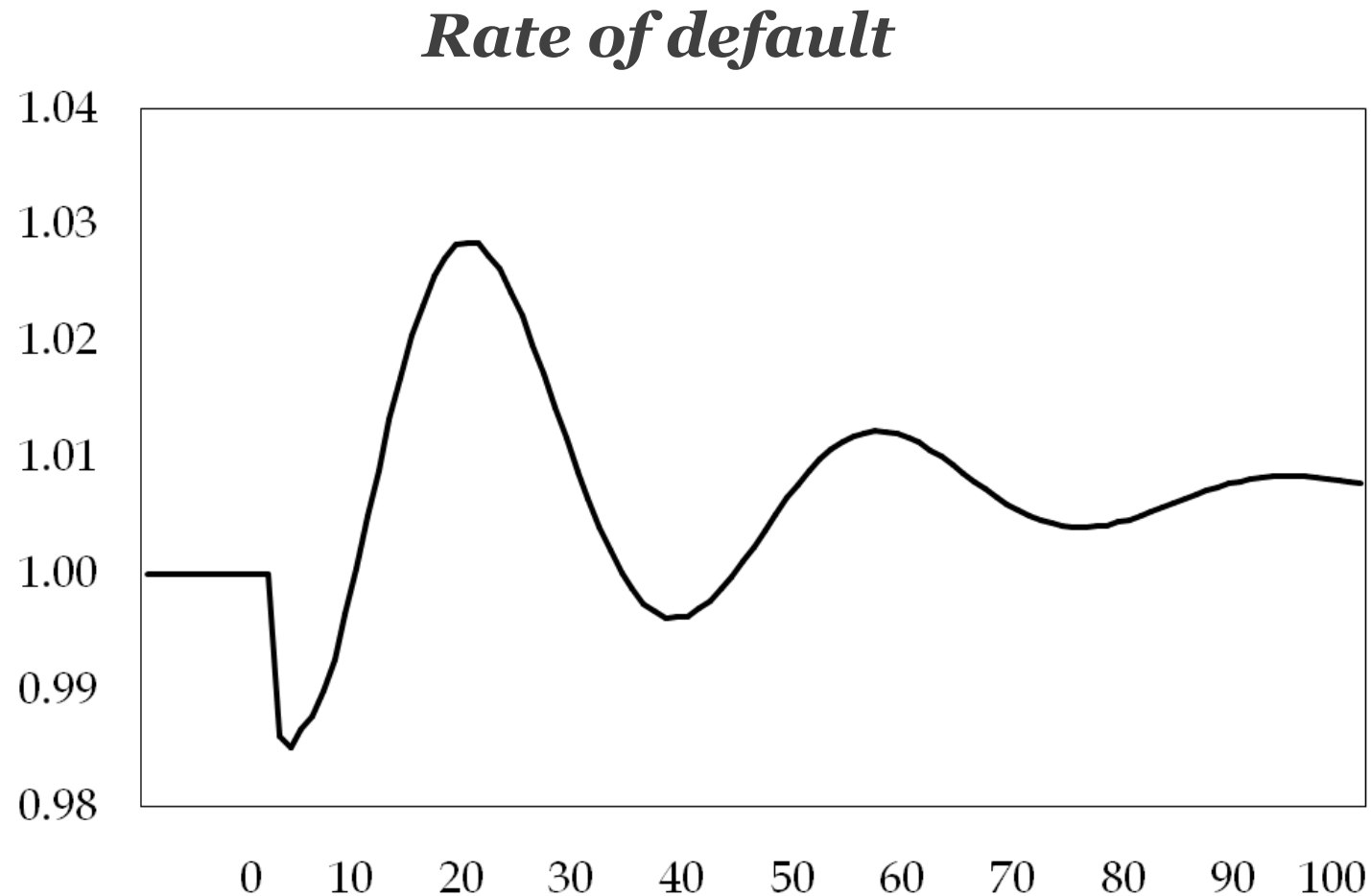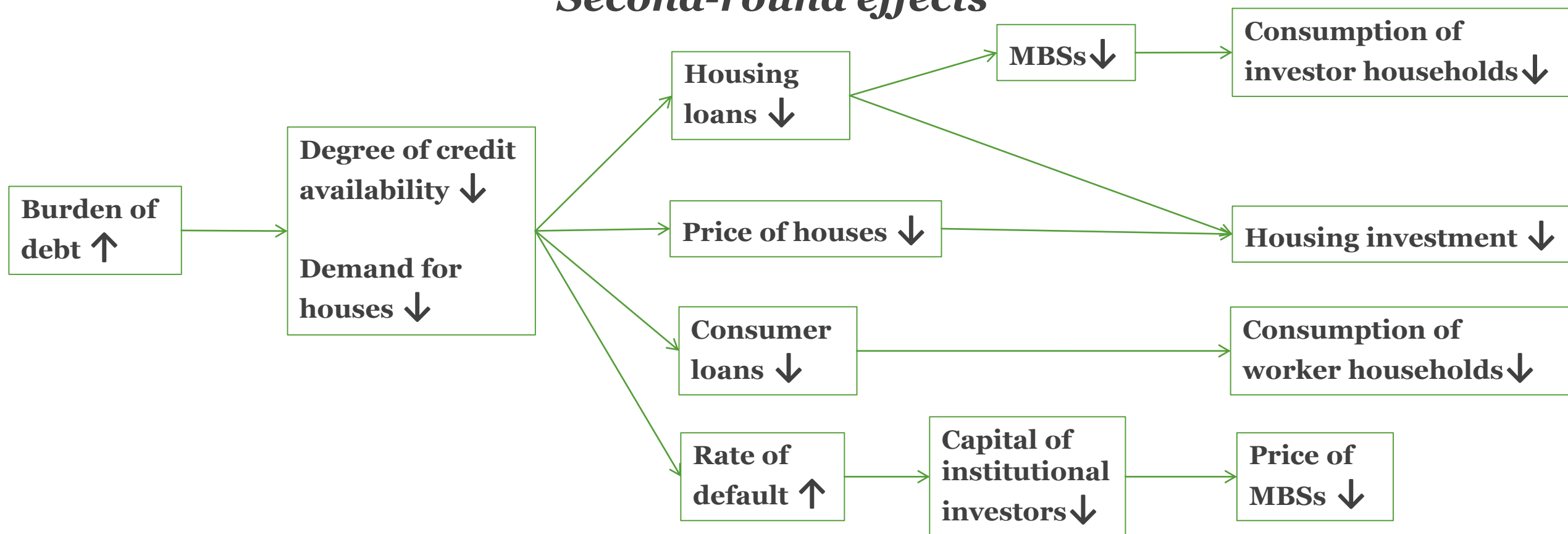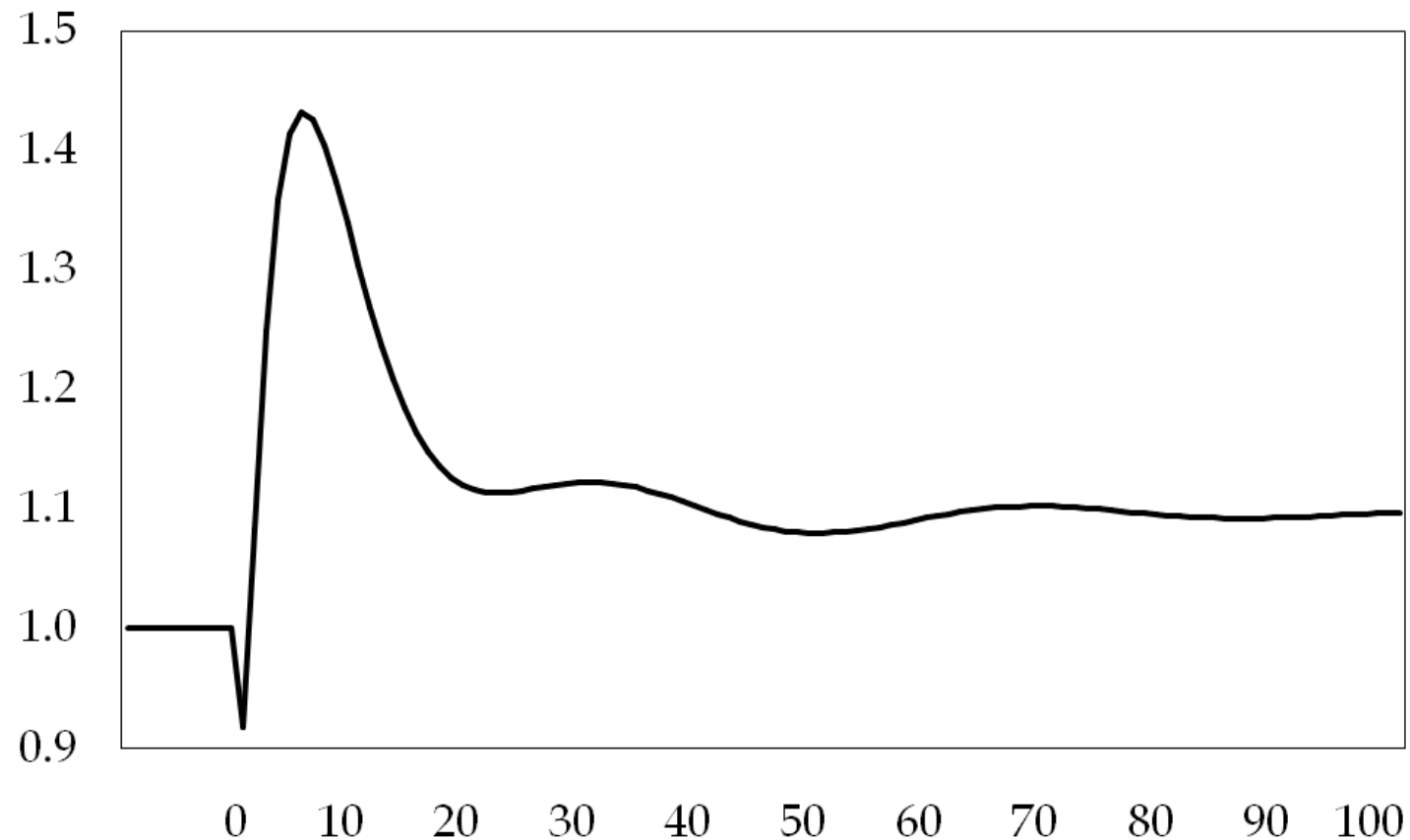# 2. Effects of an increase in the degree of securitisation

Second-round effects


```
Burden of debt ↑  →  Degree of credit availability ↓
                     Demand for houses ↓
                          ↗ Housing loans ↓ ────────┐
                          → Price of houses ↓ ──→ Housing investment ↓
```

2. Effects of an increase in the degree of securitisation

Second-round effects

Burden of debt ↑ → Degree of credit availability ↓ / Demand for houses ↓ → Housing loans ↓ → MBSs ↓ → Consumption of investor households ↓

Degree of credit availability ↓ / Demand for houses ↓ → Price of houses ↓ → Housing investment ↓

Housing loans ↓ → Housing investment ↓

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2. Effects of an increase in the degree of securitisation

Degree of credit availability for consumer loans

2. Effects of an increase in the degree of securitisation

Second-round effects

Burden of debt ↑ → Degree of credit availability ↓ / Demand for houses ↓ → Housing loans ↓ → MBSs ↓ → Consumption of investor households ↓

Price of houses ↓

Consumer loans ↓

Housing loans ↓ / Price of houses ↓ → Housing investment ↓

Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

2. Effects of an increase in the degree of securitisation

Second-round effects

Burden of debt ↑ → Degree of credit availability ↓ / Demand for houses ↓

Housing loans ↓ → MBSs ↓ → Consumption of investor households ↓

Price of houses ↓ → Housing investment ↓

Consumer loans ↓ → Consumption of worker households ↓

Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

2. Effects of an increase in the degree of securitisation

Second-round effects

Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

2. Effects of an increase in the degree of securitisation

Rate of default

2. Effects of an increase in the degree of securitisation

Second-round effects

Burden of debt ↑ → Degree of credit availability ↓ / Demand for houses ↓

- Housing loans ↓ → MBSs ↓ → Consumption of investor households ↓
- Housing loans ↓ → Housing investment ↓
- Price of houses ↓ → Housing investment ↓
- Consumer loans ↓ → Consumption of worker households ↓
- Rate of default ↑ → Capital of institutional investors ↓ → Price of MBSs ↓

Securitisation, wage stagnation and financial fragility: A stock-flow consistent perspective

2. Effects of an increase in the degree of securitisation

Price of MBSs

2. Effects of an increase in the degree of securitisation

Output

2. Effects of an increase in the degree of securitisation

- Overall, after a period of economic and financial prosperity, the initial rise in the degree of securitisation and the willingness of investor households to buy institutional investors' shares brings eventually the economy into a period of **financial instability**, which is characterised by a lower output, a higher rate of loan defaults, a declining price of MBSs and a volatility in the price of houses.

3. The role of wage stagnation

- In the second simulation experiment, the securitisation shock is accompanied by **an exogenous decline in the wage income share**.

- Relative to the previous experiment, the following additional effects take place:

  1. Type II worker households **demand more consumer loans** in order to attain their consumption norms.

  2. The income and the wealth of investor households become higher. As a result, the investor households demand more shares of institutional investors. This increases the **demand for MBSs**, leading to a higher degree of securitisation.

3. The role of wage stagnation

- As a consequence of these effects, the burden of debt increases more rapidly.
- This is the main reason that the period of prosperity is shorter relative to the previous simulation.
- Furthermore, the **long-run adverse effects on macroeconomic performance are enhanced**.

3. The role of wage stagnation
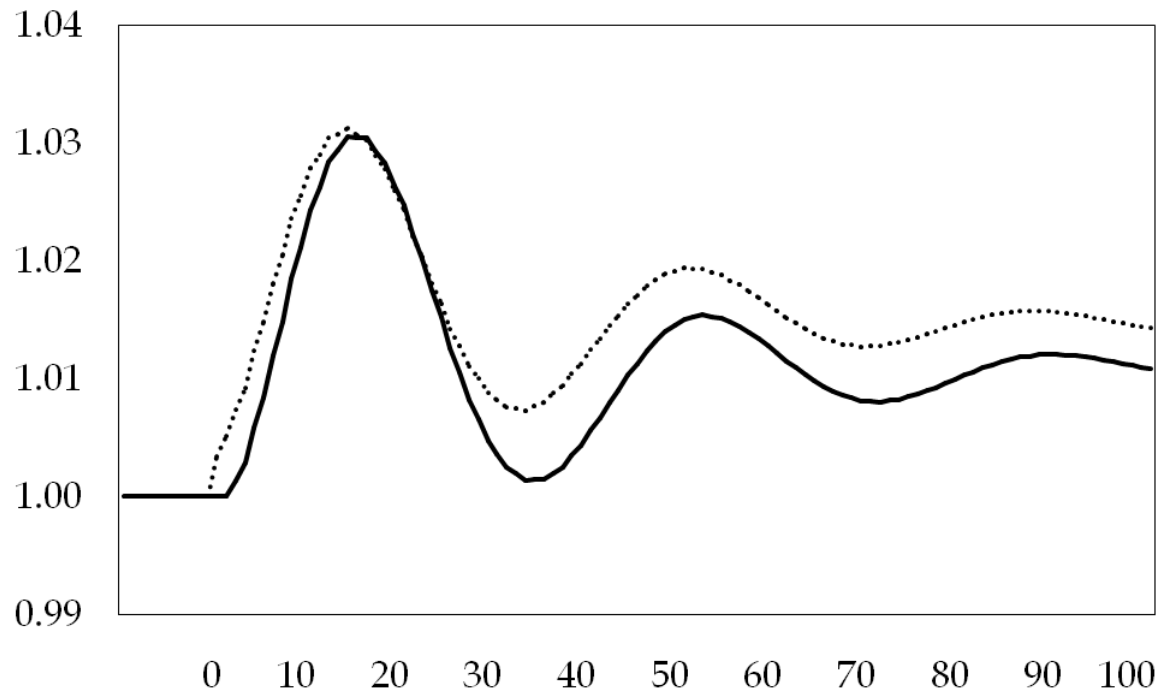
Debt burden of type I worker households

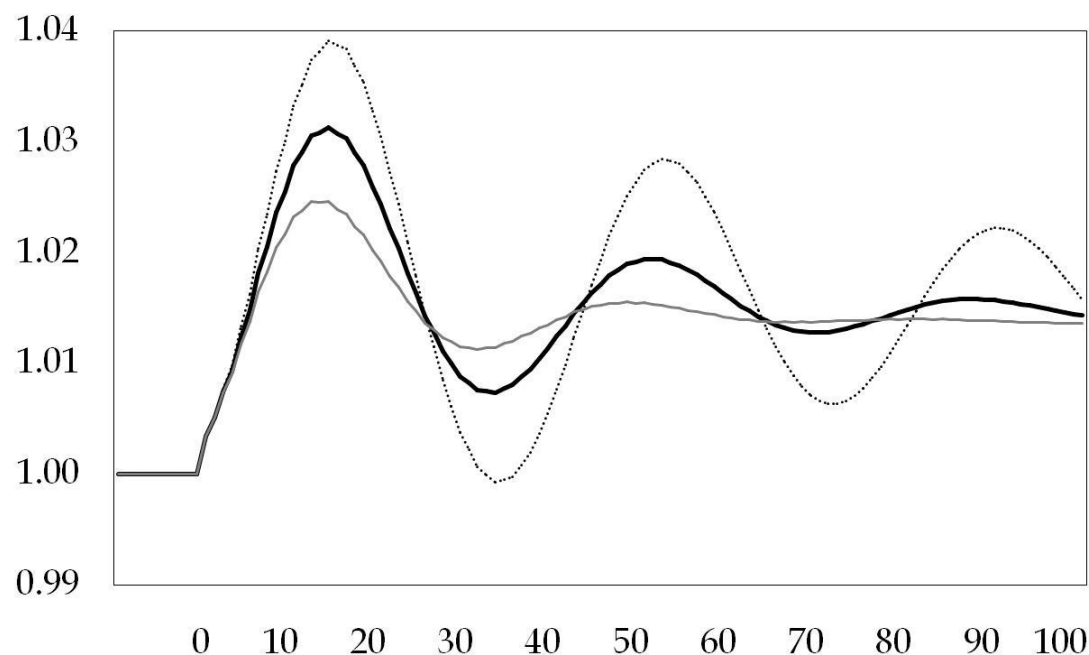**Solid line:** Effects of an increase in the degree of securitisation.
Dotted line: Effects of an increase in the degree of securitisation combined with a decline in the wage income share.

3. The role of wage stagnation

Debt burden of type II worker households
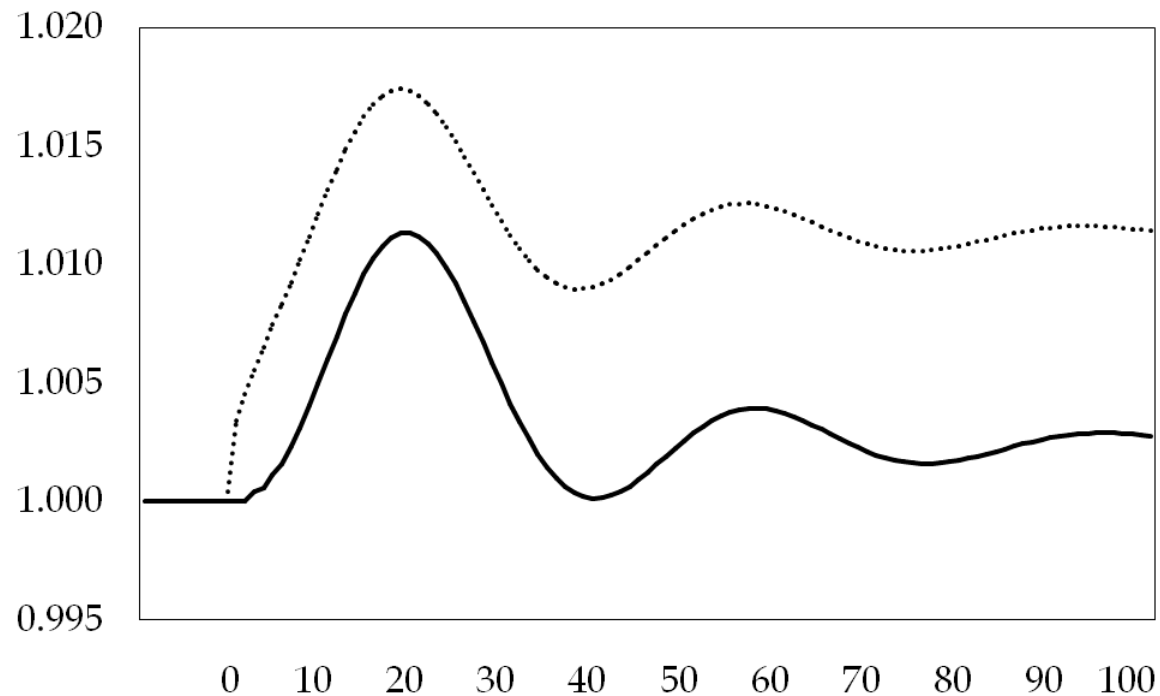
Solid line: Effects of an increase in the degree of securitisation.
Dotted line: Effects of an increase in the degree of securitisation combined with a decline in the wage income share.

3. The role of wage stagnation

Output

Solid line: Effects of an increase in the degree of securitisation.
Dotted line: Effects of an increase in the degree of securitisation combined with a decline in the wage income share.

3. The role of wage stagnation

- We additionally check whether our simulation results critically depend on our particular choice of parameters.

- In order to do this we conduct **sensitivity analysis** changing some values of key parameters.

- We investigate whether our simulation results are modified as a result of **changes in the parameters** related to the sensitivity of (1) the degree of credit availability to capital adequacy ratio, (2) the degree of credit availability to the burden of debt and (3) the desired demand for houses to the burden of debt.

3. The role of wage stagnation

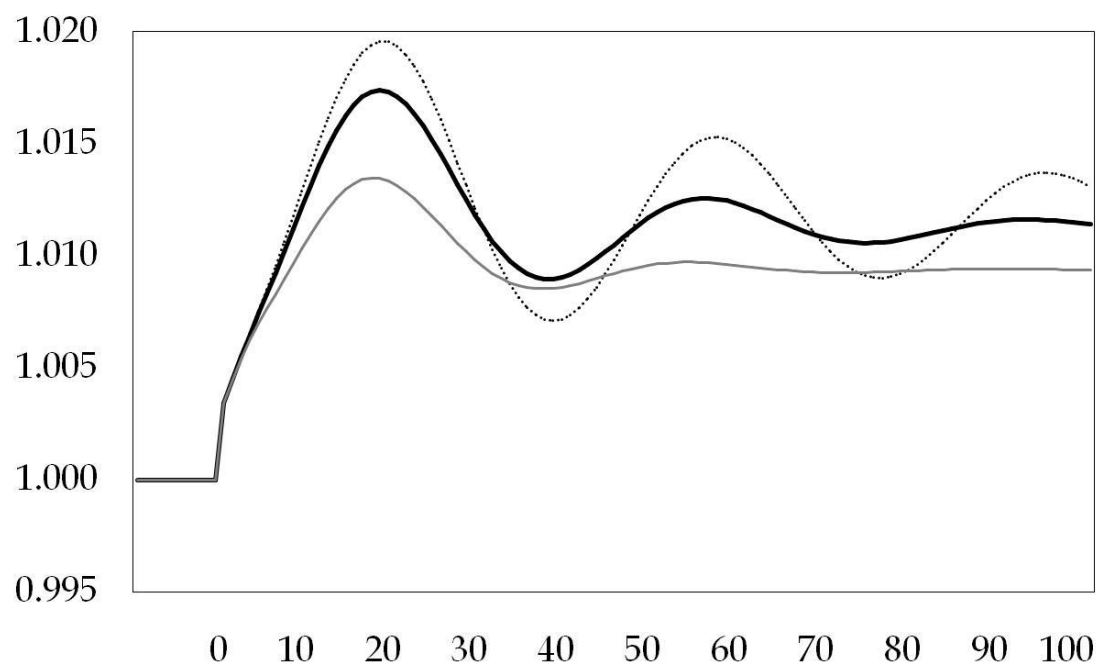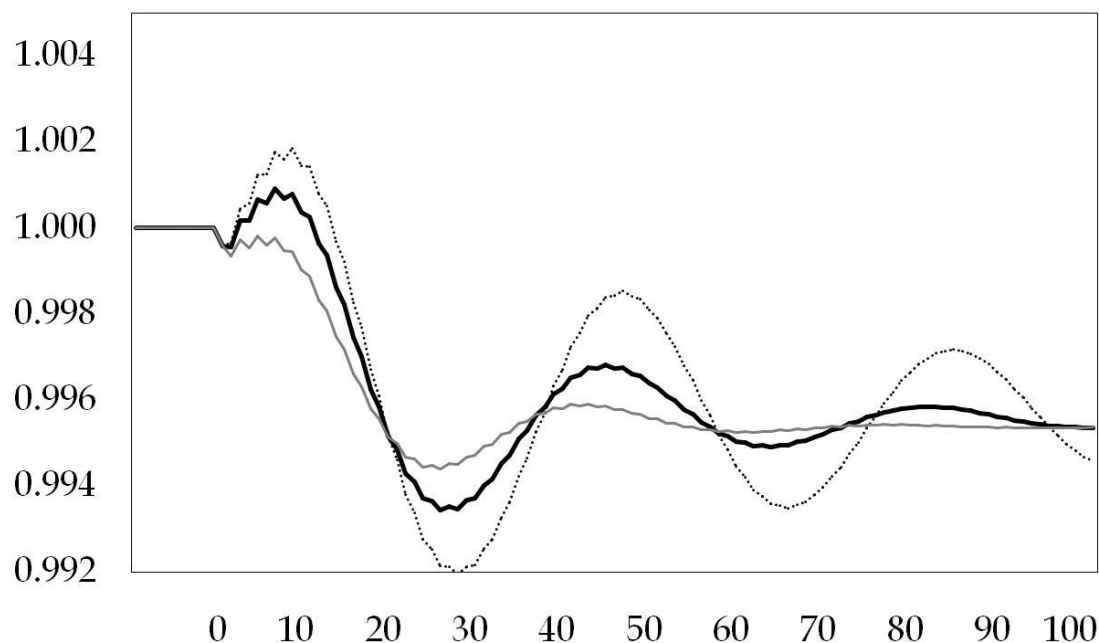## *Debt burden of type I worker households*

Black solid line: Baseline parameters

Dotted line: Degree of credit availability is more sensitive to capital adequacy ratio and less sensitive to the burden of debt; there is a low sensitivity of the desired demand for houses to the burden of debt.

Grey solid line: Degree of credit availability is less sensitive to capital adequacy ratio and more sensitive to the burden of debt; there is a high sensitivity of the desired demand for houses to the burden of debt.

3. The role of wage stagnation

Debt burden of type II worker households

Black solid line: Baseline parameters

Dotted line: Degree of credit availability is more sensitive to capital adequacy ratio and less sensitive to the burden of debt; there is a low sensitivity of the desired demand for houses to the burden of debt

Grey solid line: Degree of credit availability is less sensitive to capital adequacy ratio and more sensitive to the burden of debt; there is a high sensitivity of the desired demand for houses to the burden of debt.

3. The role of wage stagnation

Output

Black solid line: Baseline parameters

Dotted line: Degree of credit availability is more sensitive to capital adequacy ratio and less sensitive to the burden of debt; there is a low sensitivity of the desired demand for houses to the burden of debt.

Grey solid line: Degree of credit availability is less sensitive to capital adequacy ratio and more sensitive to the burden of debt; there is a high sensitivity of the desired demand for houses to the burden of debt.

4. Conclusion

- This paper explored the **macroeconomic effects of securitisation and wage stagnation** within a stock-flow consistent model, paying particular attention to their role in the emergence of financial fragility.

- The simulation experiments indicated that a rise in securitisation practices is likely to bring about, at a first stage, a **borrowing-induced expansion**, a housing boom and a decline in the rate of default. However, this prosperity is accompanied by a rise in the burdens of debt of households, indicating a situation of **increasing financial fragility**.

- The rising burdens of debt gradually set the stage for the **reversal of the initial expansionary effects of securitisation**. Ultimately, the economy experiences a lower level of output, a higher rate of default on mortgages and a volatility in the price of houses.

4. Conclusion

- When the securitisation shock is accompanied by an exogenous decline in the wage income share the **long-run adverse effects on macroeconomic performance are enhanced**.

- Overall, these results provide support to the view that the combination of risky financial practices and wage stagnation can **render a macro system more prone to instability**.