The French economy seen through the lens of an empirical Stock-Flow model

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13/07/2018
Outline

1 Introduction
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2. Data
   - National accounting
   - Who gets what? Uses and resources
   - Perpetual Inventory Method
   - Who gets what? Stocks, flows, revaluation...
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3. Economic Analysis
   - Wealth
   - Non-financial firms
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4. Preliminary results
   - Some estimates
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The model distinguishes 5 institutional sectors and explicit dynamics for over 250 equations up to this point
The main purpose of some macroeconomic models is to study economic growth via the determinants of the growth rate of the volume of GDP.
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Macro modeling issues

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- An ideal for macroeconomic models is to integrate both simultaneously, while at the same time keeping the analysis simple.
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- However, several criticisms arise, with a major one being that GDP measures flows (of income and production) rather than stocks (of financial and non-financial wealth).
- An ideal for macroeconomic models is to integrate both simultaneously, while at the same time keeping the analysis simple.
- This is one of the objectives of the Stock-Flow Consistent approach.
SFC modeling goes beyond the analysis of GDP and its components, and allows us to take into account the interactions among sectors in the real and financial spheres.
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We distinguish:

- S.11 Non-financial firms
- S.12 Financial institutions
- S.13 Government
- S.14 Households + S15 NPISH
- S.2 Rest of the world
Quite often, the starting point of macro models is GDP
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\[ pY = wN + \Pi + T_{net} \]; income approach
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- \( p_Y Y = wN + \Pi + T_{net} \); income approach
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- \( p_Y Y = p_{VA} VA + VAT - Sub \); production approach
- \( p_Y Y = p_C C + p_I I + p_X X - p_M M \); demand approach
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The distinction between volumes, prices and values is explicit throughout the simulations
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The distinction between volumes, prices and values is explicit throughout the simulations

In our model, these identities actually look a bit different
Symbolic GDP accounting using French data

\[ p_Y Y = W^H_r + L^H_C + \Pi + T_L + T_P - Sub^G_p \]

income (respected)
Symbolic GDP accounting using French data

- $p_Y Y = W_r^H + LC_r^H + \Pi + T_L + T_P - Sub_p^G$
  - income (respected)
- $p_{VA} VA = p_Y Y - T_P + Sub_p^G$
  - value added
Symbolic GDP accounting using French data

- \[ p_Y Y = W_r^H + L C_r^H + \Pi + T_L + T_P - Sub_p^G \]
  - income (respected)
- \[ p_{VA} VA = p_Y Y - T_P + Sub_p^G \]
  - value added
- \[ Y = C^H + C^G + I_1^F + I_1^B + I_1^G + I_1^H + I_{12}^F + X - M \]
  - volume of demand
Symbolic GDP accounting using French data

- \( p_Y Y = W_r^H + LC_r^H + \Pi + T_L + T_P - Sub_P^G \)
  income (respected)

- \( p_{VA} VA = p_Y Y - T_P + Sub_P^G \)
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- \( Y = C^H + C^G + I_1^F + I_1^B + I_1^G + I_1^H + I_{12}^F + X - M \)
  volume of demand

- Superscripts \( F, B, G, H, R \) are for each institutional sector, subscripts \( r, p \) are for received or paid (except \( P \), which stands for products)
Symbolic GDP accounting using French data

- \( p_Y Y = W_r^H + LC_r^H + \Pi + T_L + T_P - Sub_p^G \)
  - income (respected)
- \( p_{VA} VA = p_Y Y - T_P + Sub_p^G \)
  - value added
- \( Y = C^H + C^G + I_1^F + I_1^B + I_1^G + I_1^H + I_{12}^F + X - M \)
  - volume of demand
- Superscripts \( F, B, G, H, R \) are for each institutional sector, subscripts \( r, p \) are for received or paid (except \( P \), which stands for products)
- \( I_1^F + I_1^B + I_1^G + I_1^H \) is the volume of GFCF, and \( I_{12}^F \) is the volume of the change in inventories.
"Real sector" transactions are measured via accounts, each of which has a subtotal. These are:
Non-financial transactions

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- The **production** account → value added ($pVA$ $VA$)
- The **operating** account → gross operating surplus ($\Pi$)
- Primary **income allocation** account → gross primary income balance
- Secondary **income distribution** account → gross disposable income ($Y_d$)
- Use account of **disposable income** → gross saving ($S$)
- **Capital** account → financing capacity or need ($FCN$), aka net lending/borrowing
Non-financial transactions

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Identities such as $Saving - Investment = Exports - Imports$ must be satisfied (therefore, accounting simplifications are not abundant)
Financial transactions

**SNA 2008**

F.1 Monetary gold and SDRs

F.2 Currency and deposits

F.3 Debt securities

F.4 Loans

F.5 Equity and investment fund shares

F.6 Insurance, pension and standardized guarantee schemes

F.7 Financial derivatives and employee stock options

F.8 Other accounts receivable/payable
Financial transactions

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F.1 Monetary gold and SDRs
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SNA 1993

F.1 Monetary gold and SDRs
F.2 Currency and deposits
F.3 Securities other than shares
F.4 Loans
F.5 Shares and other equity
F.6 Insurance technical reserves
F.7 Other accounts receivable/payable
Who gets what? Uses and resources

Billions of current euros and % of GDP (2010)

<table>
<thead>
<tr>
<th>Variable Nomenclature</th>
<th>Firms F</th>
<th>Banks B</th>
<th>Government G</th>
<th>Households H</th>
<th>RoW R</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Prod</td>
<td>2420.9</td>
<td>212.8</td>
<td>436.9</td>
<td>468.5</td>
<td></td>
<td>3539.1</td>
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<tr>
<td></td>
<td>121.4%</td>
<td>10.7%</td>
<td>21.9%</td>
<td>23.5%</td>
<td></td>
<td>177.5%</td>
</tr>
<tr>
<td>Inter. cons. IC</td>
<td>-1409.9</td>
<td>-122.7</td>
<td>-102.5</td>
<td>-104.5</td>
<td></td>
<td>-1739.6</td>
</tr>
<tr>
<td></td>
<td>-70.7%</td>
<td>-6.1%</td>
<td>-5.1%</td>
<td>-5.2%</td>
<td></td>
<td>-87.2%</td>
</tr>
<tr>
<td>Value Added pVA</td>
<td>1011</td>
<td>90.3</td>
<td>334.5</td>
<td>364</td>
<td></td>
<td>1799.8</td>
</tr>
<tr>
<td></td>
<td>50.7%</td>
<td>4.5%</td>
<td>16.8%</td>
<td>18.3%</td>
<td></td>
<td>90.3%</td>
</tr>
<tr>
<td>Remuneration W</td>
<td>-504.3</td>
<td>-34.8</td>
<td>-175.4</td>
<td>777.3 - 53.4</td>
<td>-9.1</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>-25.3%</td>
<td>-1.7%</td>
<td>-8.8%</td>
<td>39% - 2.7%</td>
<td></td>
<td>0.02%</td>
</tr>
<tr>
<td>L. Contributions LC</td>
<td>-157.3</td>
<td>-14</td>
<td>-84.4</td>
<td>275.4 - 16.6</td>
<td>-3.1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>-7.9%</td>
<td>-0.7%</td>
<td>-4.2%</td>
<td>13.8% - 0.8%</td>
<td></td>
<td>0.02%</td>
</tr>
<tr>
<td>Labor taxes T_L</td>
<td>-49.2</td>
<td>-5.9</td>
<td>82.1 - 9.2</td>
<td>-17.3</td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>-2.5%</td>
<td>-0.3%</td>
<td>4.1% - 0.5%</td>
<td>-0.9%</td>
<td></td>
<td>0.03%</td>
</tr>
<tr>
<td>Subsidies Sub</td>
<td>18.5</td>
<td>0.4</td>
<td>-18.6</td>
<td>7.5</td>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>0.9%</td>
<td>0.02%</td>
<td>-0.9%</td>
<td>0.4%</td>
<td></td>
<td>0.02%</td>
</tr>
<tr>
<td>G.O.S. Π</td>
<td>318.6</td>
<td>35.7</td>
<td>(68.9)</td>
<td>(283.8)</td>
<td></td>
<td>(707)</td>
</tr>
<tr>
<td></td>
<td>16%</td>
<td>1.8%</td>
<td>(3.5%)</td>
<td>(14.2%)</td>
<td></td>
<td>(35.5%)</td>
</tr>
</tbody>
</table>
## Who gets what? Uses and resources

### Billions of current euros and % of GDP (2010)

<table>
<thead>
<tr>
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<th>Banks (Nom.) $B$</th>
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<th>RoW (Nom.) $R$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net taxes on pr. $T_P$</td>
<td>197 9.9%</td>
<td></td>
<td></td>
<td></td>
<td>1.9 0.1%</td>
</tr>
<tr>
<td>Interests $Int$</td>
<td>40.1 - 68 2% - 3.4%</td>
<td>198.8 - 137.1 10% - 6.9%</td>
<td>2.2 - 47.7 0.1% - 2.4%</td>
<td>25.1 - 20.8 1.3% - 1%</td>
<td>75.4 - 68.2 3.8% - 3.4%</td>
</tr>
<tr>
<td>Dividends $Div$</td>
<td>156 - 214 7.8% - 10.7%</td>
<td>43.8 - 28.8 2.2% - 1.4%</td>
<td>9.4 0.5%</td>
<td>50 2.5%</td>
<td>29.1 - 45.6 1.5% - 2.3%</td>
</tr>
<tr>
<td>RFDI*</td>
<td>9.8 0.5%</td>
<td>-59.4 -3%</td>
<td>4.4 0.2%</td>
<td>57.6 2.9%</td>
<td>-12.2 -0.6%</td>
</tr>
<tr>
<td>Income taxes $T$</td>
<td>-32.3 -1.6%</td>
<td>-11.1 -0.6%</td>
<td>220.7 11.1%</td>
<td>-173.4 -8.7%</td>
<td>-3.6 -0.2%</td>
</tr>
<tr>
<td>Soc. contributions $SC$</td>
<td>10.8 0.5%</td>
<td>29.6 1.5%</td>
<td>361.7 18.1%</td>
<td>-406.9 -20.4%</td>
<td>4.4 0.2%</td>
</tr>
<tr>
<td>Soc. benefits $SB$</td>
<td>-10.8 -0.5%</td>
<td>-29.5 -1.5%</td>
<td>-382.9 -19.2%</td>
<td>419</td>
<td>4.3 0.2%</td>
</tr>
<tr>
<td>Transfers $Tr$</td>
<td>-20.4 -1%</td>
<td>-1.9 -0.1%</td>
<td>-51.1 -2.6%</td>
<td>40.2 2%</td>
<td>33.1 1.7%</td>
</tr>
<tr>
<td>Disp. Inc. $Y_d$</td>
<td>190 9.5%</td>
<td>40.2 2%</td>
<td>442.5 22.2%</td>
<td>1327.3 66.6%</td>
<td></td>
</tr>
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</thead>
<tbody>
<tr>
<td>Firms</td>
<td>190</td>
<td>40.2</td>
<td>-476.2</td>
<td>-1121.8</td>
<td></td>
<td>-1598</td>
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<tr>
<td>Banks</td>
<td>9.5%</td>
<td>2%</td>
<td>-11.7%</td>
<td>205.5</td>
<td></td>
<td>402</td>
</tr>
<tr>
<td>Government</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saving</td>
<td>16.7</td>
<td>1.2</td>
<td>16.9</td>
<td>-0.7</td>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td>Saving</td>
<td>-222.2</td>
<td>-13.2</td>
<td>-85.1</td>
<td>-120.6</td>
<td></td>
<td>-441.1</td>
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<tr>
<td>Saving</td>
<td>-11.1%</td>
<td>0.1%</td>
<td>-0.8%</td>
<td>-0.04%</td>
<td></td>
<td>0.01%</td>
</tr>
<tr>
<td>Saving</td>
<td>5</td>
<td>0.2%</td>
<td>0.2%</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Ch. inventories</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imp - Exp</td>
<td>555.5 - 518.8</td>
<td>36.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imp - Exp</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Imp - Exp</td>
<td>27.8% - 26%</td>
<td>1.8%</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Imp - Exp</td>
<td>36.7 / (-)33.8</td>
<td>1.8% / (-)1.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>FC/FN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC/FN</td>
<td>-10.7</td>
<td>28.3</td>
<td>-135.6</td>
<td>84</td>
<td>33.9</td>
<td>-0.1</td>
</tr>
<tr>
<td>FC/FN</td>
<td>-0.5%</td>
<td>1.4%</td>
<td>-6.8%</td>
<td>4.2%</td>
<td>1.7%</td>
<td>-0.01%</td>
</tr>
<tr>
<td>Disp. Inc.</td>
<td>190</td>
<td>40.2</td>
<td>442.5</td>
<td>1327.3</td>
<td></td>
<td>2000</td>
</tr>
<tr>
<td>Disp. Inc.</td>
<td>9.5%</td>
<td>2%</td>
<td>22.2%</td>
<td>66.6%</td>
<td></td>
<td>100.3%</td>
</tr>
<tr>
<td>Disp. Inc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In kind transfers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In kind transfers</td>
<td>-307.5</td>
<td>307.6</td>
<td>0.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In kind transfers</td>
<td>-15.4%</td>
<td>15.4%</td>
<td>0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj. Disp. Inc.</td>
<td>190</td>
<td>40.2</td>
<td>134.8</td>
<td>1634.9</td>
<td></td>
<td>1999.9</td>
</tr>
<tr>
<td>Adj. Disp. Inc.</td>
<td>9.5%</td>
<td>2%</td>
<td>6.8%</td>
<td>82%</td>
<td></td>
<td>100.3%</td>
</tr>
</tbody>
</table>
Accumulation accounts
J-F Baron (2008)

- These allow us to articulate the successive balance sheets of the entity considered
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J-F Baron (2008)

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Between the beginning and the end of an accounting period, wealth changes in composition and value. These operations can (or not) be related to production.

The latter include the patrimonial changes related to discoveries, inventions, disappearances, transformations, transfers and other unforeseen events (other changes in volume account) as well as price movements (revaluation account).
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The latter include the patrimonial changes related to discoveries, inventions, disappearances, transformations, transfers and other unforeseen events (other changes in volume account) as well as price movements (revaluation account).

Although not all operations pertaining to wealth items are recorded in the capital account or the financial account, all flows in these two accounts are components of changes in wealth.
Non-financial assets

\[ Stock = Stock_{-1} + Flow - FCC + Revaluation \]
**Non-financial assets**

\[ \text{Stock} = \text{Stock}_{-1} + \text{Flow} - \text{FCC} + \text{Revaluation} + \text{OCV} \]
Non-financial assets

\[
Stock = Stock_{-1} + Flow - FCC + Revaluation + OCV
\]

\[
p_K K = p_{K-1} K_{-1} + p_K I - \delta (p_{K-1} K_{-1} + K_{-1} \Delta p_K) + K_{-1} \Delta p_K + OCV_K
\]
Non-financial assets

\[ \text{Stock} = \text{Stock}_{-1} + \text{Flow} - \text{FCC} + \text{Revaluation} + \text{OCV} \]

\[ p_K K = p_{K-1} K_{-1} + p_K I - \delta(p_{K-1} K_{-1} + K_{-1} \Delta p_K) + K_{-1} \Delta p_K + OCV_K \]

Simplifying FCC as \( \delta(p_{K-1} K_{-1} + K_{-1} \Delta p_K) = \delta p_K K_{-1} \) and dividing through both sides by \( p_K \) yields
Non-financial assets

\[ \text{Stock} = \text{Stock}_{-1} + \text{Flow} - \text{FCC} + \text{Revaluation} + \text{OCV} \]

\[ p_K K = p_{K-1} K_{-1} + p_K I - \delta(p_{K-1} K_{-1} + K_{-1} \Delta p_K) + K_{-1} \Delta p_K + OCV_K \]

Simplifying FCC as \( \delta(p_{K-1} K_{-1} + K_{-1} \Delta p_K) = \delta p_K K_{-1} \) and dividing through both sides by \( p_K \) yields

\[ K = \frac{p_{K-1} K_{-1}}{p_K} + I - \delta K_{-1} + K_{-1} - \frac{p_{K-1} K_{-1}}{p_K} + \frac{OCV_K}{p_K} \]
Non-financial assets

\[ Stock = Stock_{-1} + \text{Flow} - FCC + \text{Revaluation} + OCV \]

\[ p_K K = p_{K-1} K_{-1} + p_K I - \delta(p_{K-1} K_{-1} + K_{-1} \Delta p_K) + K_{-1} \Delta p_K + OCV_K \]

Simplifying FCC as \( \delta(p_{K-1} K_{-1} + K_{-1} \Delta p_K) = \delta p_K K_{-1} \) and dividing through both sides by \( p_K \) yields

\[ K = \frac{p_{K-1} K_{-1}}{p_K} + I - \delta K_{-1} + K_{-1} - \frac{p_{K-1} K_{-1}}{p_K} + \frac{OCV_K}{p_K} \]

\[ K = (1 - \delta) K_{-1} + I + \frac{OCV_K}{p_K} \]
Financial assets. Example: equity

\[ \text{Stock} = \text{Stock}_{-1} + \text{Flow} + \text{Revaluation} \]
Financial assets. Example: equity

\[ \text{Stock} = \text{Stock}_{-1} + \text{Flow} + \text{Revaluation} + \text{OCV} \]
Financial assets. Example: equity

\[ Stock = Stock_{-1} + Flow + Revaluation + OCV \]

\[ p_E E = p_{E-1} E_{-1} + p_E \Delta^* E + E_{-1} \Delta p_E + OCV_E \]
Financial assets. Example: equity

\[ Stock = Stock_{-1} + Flow + Revaluation + OCV \]

\[ p_E E = p_{E-1} E_{-1} + p_E \Delta^* E + E_{-1} \Delta p_E + OCV_E \]

\[ E = \frac{p_{E-1} E_{-1}}{p_E} + \Delta^* E + E_{-1} - \frac{p_{E-1} E_{-1}}{p_E} + \frac{OCV_E}{p_E} \]
Financial assets. Example: equity

\[ Stock = Stock_{-1} + Flow + Revaluation + OCV \]

\[ p_E E = p_{E-1} E_{-1} + p_E \Delta^* E + E_{-1} \Delta p_E + OCV_E \]

\[ E = \frac{p_{E-1} E_{-1}}{p_E} + \Delta^* E + E_{-1} - \frac{p_{E-1} E_{-1}}{p_E} + \frac{OCV_E}{p_E} \]

\[ E = E_{-1} + \Delta^* E + \frac{OCV_E}{p_E} \]
Financial assets. Example: equity

\[
Stock = Stock_{-1} + Flow + \text{Revaluation} + OCV
\]

\[
p_{E}E = p_{E-1}E_{-1} + p_{E}\Delta^{*}E + E_{-1}\Delta p_{E} + OCV_{E}
\]

\[
E = \frac{p_{E-1}E_{-1}}{p_{E}} + \Delta^{*}E + E_{-1} - \frac{p_{E-1}E_{-1}}{p_{E}} + \frac{OCV_{E}}{p_{E}}
\]

\[
E = E_{-1} + \Delta^{*}E + \frac{OCV_{E}}{p_{E}}
\]

\[
\Delta^{*}E = E - E_{-1} - \frac{OCV_{E}}{p_{E}}
\]
Implicit prices, calculation

On an annual basis, the growth rate of implicit prices are calculated by dividing through *Revaluation* and *Stock*$_{−1}$
Implict prices, calculation

On an annual basis, the growth rate of implicit prices are calculated by dividing through Revaluation and Stock_{-1}

\[
\frac{\text{Revaluation}}{\text{Stock}_{-1}} = \frac{K_{-1}\Delta p_K}{p_{K-1}K_{-1}} = \frac{\Delta p_K}{p_{K-1}}
\]
Implict prices, calculation

On an annual basis, the growth rate of implict prices are calculated by dividing through $Revaluation$ and $Stock_{-1}$

$$\frac{Revaluation}{Stock_{-1}} = \frac{K_{-1} \Delta p_K}{p_{K-1} K_{-1}} = \frac{\Delta p_K}{p_{K-1}}$$

From this growth rate, we can easily get a price index of the item of interest
Who gets what? Stocks, flows, revaluation...

**Stocks, bn of current euros and % of GDP (2010)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Item</th>
<th>$F$</th>
<th>$B$</th>
<th>$G$</th>
<th>$H$</th>
<th>$R$</th>
<th>Total</th>
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<td>3429.5</td>
<td>6675.4</td>
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<tr>
<td></td>
<td>101.3%</td>
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<td>= 6675.4</td>
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<tr>
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<td></td>
<td>=334.8%</td>
</tr>
<tr>
<td><strong>NFA2</strong></td>
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<td>3582.4</td>
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<tr>
<td></td>
<td>16.3%</td>
<td>6.2%</td>
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<tr>
<td><strong>F2</strong></td>
<td>15.4%</td>
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<td>122.4 - 77.6</td>
<td>1127.3</td>
<td>1556.5 - 1018.4</td>
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<td>135.6% - 236.8%</td>
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<td>1828.2 - 1670.9</td>
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<tr>
<td><strong>F4</strong></td>
<td>1598.4 - 2424</td>
<td>2163.4</td>
<td>-159.2</td>
<td>-1025.1</td>
<td>468.8 - 622.3</td>
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<td>80.2% - 121.6%</td>
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<td><strong>F5</strong></td>
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<td>130.1% - 191.5%</td>
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<td><strong>F6</strong></td>
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<td>73.5%</td>
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<td><strong>F7</strong></td>
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<td>639.3 - 641.9</td>
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<td>21.4</td>
<td>419.4 - 416.9</td>
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<td>32% - 32.2%</td>
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<tr>
<td><strong>Total</strong></td>
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<td>391.2</td>
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<td>9727.2</td>
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<td>102.3%</td>
<td>19.6%</td>
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<td>487.8%</td>
<td>=13085</td>
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<td>5.7%</td>
<td>656.2%</td>
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Who gets what? Stocks, flows, revaluation...

## Flows, bn of current euros and % of GDP (2010)

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<th>Item</th>
<th>$F$</th>
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<th>$G$</th>
<th>$H$</th>
<th>$R$</th>
<th>Total</th>
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<td>222.3</td>
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<td>83</td>
<td>118</td>
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<td>11.1%</td>
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<td>5.9%</td>
<td></td>
<td>=21.9%</td>
</tr>
<tr>
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<td>=-0.2%</td>
</tr>
<tr>
<td>$F1$</td>
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<tr>
<td>$F3$</td>
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<td>60.8</td>
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<td>-2.8%</td>
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<td>74.9 - 106.8</td>
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<td>7.7</td>
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<td>3.8% - 5.4%</td>
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<td>0.01%</td>
<td>4.4%</td>
<td>0.1%</td>
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<tr>
<td></td>
<td>36% - 36.5%</td>
<td>36%</td>
<td>+13.2</td>
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<td>9.9</td>
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<td>200.9</td>
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<td>-2.5%</td>
<td>10.1%</td>
<td>1.7%</td>
<td>21.7%</td>
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### Capital gains, bn of current euros and % of GDP (2010)

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<th>R</th>
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<td>NFA1*</td>
<td>38.9</td>
<td>2</td>
<td>29.8</td>
<td>86.8</td>
<td>= 157.5</td>
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<td>1.9%</td>
<td>0.1%</td>
<td>1.5%</td>
<td>4.3%</td>
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<td>NFA12</td>
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<td>=14.1</td>
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<td></td>
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<td></td>
<td>=0.7%</td>
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<tr>
<td>NFA2</td>
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<td>9.9</td>
<td>79.4</td>
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<td>4%</td>
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<td>F1</td>
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<tr>
<td>F7</td>
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<td>114.4</td>
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<td>5.7%</td>
<td>26.5%</td>
<td>=38.3%</td>
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</tr>
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</table>
The Volcker shock, a long term perspective

- Following the second oil shock, the Fed’s determination to end inflation provoked a series of structural changes that had a deep impact in the French economy.
- In order to counter the capital flight (stemming from $i_{US}$), BdF raised the interest rate as well.
- The capital structure of French non-financial firms shifted in favor of equity since then (in part driven by speculation in the stock market).
- The relative fall in the demand for firms’ debt led French banks to look for other sources of credit demand (households and the rest of the world, mainly).
Wealth distribution across institutional sectors

- From the 1990s and up to the 2nd half of the 2010s, overall wealth went from less than 4 times GDP to more than 6.
Wealth distribution across institutional sectors

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- The most important net holders of wealth in France are households.
Wealth distribution across institutional sectors

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- The most important net holders of wealth in France are households.
- All sectors benefited from a strong increase in the price of non-produced non-financial assets (1998-2006).
Wealth distribution across institutional sectors

- From the 1990s and up to the 2nd half of the 2010s, overall wealth went from less than 4 times GDP to more than 6.
- The most important net holders of wealth in France are households.
- All sectors benefited from a strong increase in the price of non-produced non-financial assets (1998-2006).
- GDP growth and inflation slowdown, coupled with strong price volatility of land and financial assets contributed greatly to this evolution.
Wealth, % of GDP
Non-produced non-financial assets by sector, % of GDP
Price of non-produced non-financial assets, % of GDP
Indebtedness of non-financial firms

- Global indebtedness of firms, % of own funds (net wealth+equity issued)
- Net indebtedness of firms, % of own funds (net wealth+equity issued)
Non-financial firms

Stock of assets of non-financial firms, % of GDP
Stock of liabilities of non-financial firms, % of GDP
Behavioral equations

\[
\Delta \ln(C^H) = 0.26 \Delta \ln(C_{-2}^H) + 0.62 \Delta \ln\left(\frac{Y_d^H}{pC}\right) - 0.47 \Delta \ln\left(\frac{Y_{d-2}^H}{pC-2}\right) + \\
0.06 \Delta \ln\left(\frac{WLTH^H}{pC}\right) + 0.09 \Delta \ln\left(\frac{WLTH_{-1}^H}{pC-1}\right) - 0.2 vc_{-1}
\]
Behavioral equations

\[
\text{CH} \quad \Delta \ln(C^H) = 0.26 \Delta \ln(C_{-2}^H) + 0.62 \Delta \ln\left(\frac{Y_d^H}{p_C}\right) - 0.47 \Delta \ln\left(\frac{Y_{d-2}^H}{p_{C-2}}\right) + 0.06 \Delta \ln\left(\frac{WLT^H}{p_C}\right) + 0.09 \Delta \ln\left(\frac{WLT_{-1}^H}{p_{C-1}}\right) - 0.2 v_{C-1}
\]

\[
\text{IH} \quad \left(\frac{p_{K1}^H \Delta K_1^H}{Y_d^H}\right) = 0.34 \left(\frac{p_{K1-1}^H \Delta K_{1-1}^H}{Y_{d-1}^H}\right) - 0.08 r_{L-1}^F * + 0.02 \left(\frac{\Delta p_{K2}^H}{p_{K2-1}^H}\right) + 0.01 \left(\frac{\Delta p_{K2-1}^H}{p_{K2-2}^H}\right) - 0.005 v_{C-1}
\]
Behavioral equations

CH \[ \Delta \ln(C^H) = 0.26 \Delta \ln(C_{-2}^H) + 0.62 \Delta \ln \left( \frac{Y_d^H}{P_C} \right) - 0.47 \Delta \ln \left( \frac{Y_{d-2}^H}{P_{C-2}} \right) + 0.06 \Delta \ln \left( \frac{WLT^H}{P_C} \right) + 0.09 \Delta \ln \left( \frac{WLT^H}{P_{C-1}} \right) - 0.2 v_{C-1} \]

IH \[ \left( \frac{p_{K1}^H \Delta K_1^H}{Y_d^H} \right) = 0.34 \left( \frac{p_{K1-1}^H \Delta K_{1-1}^H}{Y_{d-1}^H} \right) - 0.08 r_{L-1}^F + 0.02 \left( \frac{\Delta p_{K2}^H}{p_{K2-1}^H} \right) + 0.01 \left( \frac{\Delta p_{K2-1}^H}{p_{K2-2}^H} \right) - 0.005 v_{C-1} \]

IF \[ \Delta \left( \frac{l_1^F}{K_{1-1}^F} \right) = 0.31 \Delta r_K + 0.19 \Delta r_{K-2} - 0.27 \Delta r_{L-1}^F - 0.14 \Delta r_{L-1}^E + 0.12 \Delta r_{L-2}^F - 0.005 \Delta r_E + 0.003 \Delta r_{E-2} - 0.05 \Delta \left( \frac{L_{L-1}^F}{p_{K1}^F K_{1-1}^F} \right) - 0.02 v_{C-1} \]
Some estimates

### Behavioral equations

\[
\begin{align*}
\text{CH } & \quad \Delta \ln (C^H) = 0.26 \Delta \ln (C_{-2}^H) + 0.62 \Delta \ln \left(\frac{Y_d^H}{p_c}\right) - 0.47 \Delta \ln \left(\frac{Y_{d-2}^H}{p_c-2}\right) + 0.06 \Delta \ln \left(\frac{\text{WLT}H^H}{p_c}\right) + 0.09 \Delta \ln \left(\frac{\text{WLT}H^H}{p_{c-1}}\right) - 0.2 v_c - 1 \\
\text{IH } & \quad \left(\frac{p_{K1}^H \Delta K_1^H}{Y_d^H}\right) = 0.34 \left(\frac{p_{K1-1}^H \Delta K_{1-1}^H}{Y_{d-1}^H}\right) - 0.08 r_{L-1}^F * + 0.02 \left(\frac{\Delta p_{K2}^H}{p_{K2-1}^H}\right) + 0.01 \left(\frac{\Delta p_{K2-1}^H}{p_{K2-2}^H}\right) - 0.005 v_c - 1 \\
\text{IF } & \quad \Delta \left(\frac{I_1^F}{K_{1-1}^F}\right) = 0.31 \Delta r_K + 0.19 \Delta r_{K-2} - 0.27 \Delta r_{L}^F - 0.14 \Delta r_{L-1}^F + 0.12 \Delta r_{L-2}^F - 0.005 \Delta r_E + 0.003 \Delta r_{E-2} - 0.05 \Delta \left(\frac{L_L^F}{p_{K1}^F K_1^F}\right) - 0.02 v_c - 1 \\
\text{M } & \quad \Delta \ln M = 1.44 \Delta \ln Y^{ID} - 0.53 \Delta \ln Y_{-2}^{ID} + 0.06 \Delta \left(\frac{p_Y}{p_M}\right) - 0.13 v_c - 1
\end{align*}
\]
Consumption and disposable income

![Graph showing consumption and disposable income from 1980 to 2015](image-url)

- Blue line: Household consumption, volume (ln)
- Red line: Households disposable income, deflated (right scale, ln)
Introduction

Data

Economic Analysis

Preliminary results

Some estimates

Consumption and wealth

![Graph showing household consumption and wealth over time](image-url)
Investment and profit rate

- Blue line: Firms accumulation rate, %
- Red line: Profit rate of firms, % (right scale)
Investment and interest rate

- Firms accumulation rate, %
- Real interest rate paid by firms, % (right scale)
Investment and debt ratio

- Firms accumulation rate, %
- Debt-to-capital ratio, % (right scale)
Investment and financial profitability

![Graph showing firms accumulation rate and real financial profitability of firms over time.](image-url)
Some estimates

System solving

- Other types of equations were used in the system; identities, exogenous series and period-by-period calibrated parameters (mainly)
- The system was solved using Broyden’s method, which approximates partial derivatives via an iterative method
- The parameters of the error correction models remain constant in the projection period
- Exogenous series are projected using the Holt-Winters method
- Parameters and interest rates keep the value of the last period throughout the projection period
- All interest rates (paid and received by all sectors, −1) are linked to the nominal 10-year treasury bond rate
Scenarios

- Three shocks are applied to the model: $\uparrow i$, $\downarrow X$ and $\downarrow C^G$.
- These are compared to the baseline.
- Starting 2017:
  - The interest rate is set to 4% (3.5% higher than its current level)
  - The volume of exports increases by 3% (average g.r.)
  - The volume of current public expenditure is reduced by 8.5% (average g.r. = 2.1%)
The results on the profit rate of firms

![Graph showing the profit rate of non-financial firms under different scenarios. The x-axis represents years from 1980 to 2025, and the y-axis represents profit rates from 9% to 18%. Different lines represent different conditions, such as a baseline, an increase in the interest rate, a decrease in exports, and a decrease in current public expenditure.]
The results on the public balance

- Public balance, % of GDP (Baseline)
- Public balance, % of GDP (Increase in the interest rate by 3.5%)
- Public balance, % of GDP (Fall in the volume of exports by 3%)
- Public balance, % of GDP (Fall in current public expenditure by 8.5%)
The results on the current account
Scenarios

The results on the volume of GDP
The results on the growth rate of GDP
Thank you for your attention