SFC FR Model
A Stock Flow Consistent model for the French economy
System of equations and simulations
Jacques Mazier\textsuperscript{1}, Luis Reyes\textsuperscript{2}

April 2022
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A Stock Flow Consistent model for the French economy.

System of equations and simulations

05/04/2022

Jacques Mazier (Université Sorbonne Paris Nord and Chaire Energie et Prospérité)
Luis Reyes (Kedge Business School)

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System of equations

Throughout the presentation, terms in bold indicate that the corresponding term is a single variable included in the code. For instance, \( pv \) (a value) indicates that \( p \) (price) and \( v \) (volume) are separate terms, whereas \( pv \) is a single value item. When this is done, an additional identity \( v = pv/p \) (or alternatively \( p = pv/v \)) is added to the code. In order to save space, these equations are not shown in the document. In this version, the items belonging to the production account (other than value added) are taken as given, so that the supply side is not modeled. The variables \( \pi_{12}^G, \pi_{12}^G, \phi_1^H, \phi_2^H \) and \( \pi_1^H \) are exogenous.
The unwritten identity is described in Equation 271.

The closure for the government is the sector’s total indebtedness ($\frac{G}{B}B_{L}^{G} + L_{A}^{G}$), described in Equation 323
Table 2 Numerical balance sheet structure of economic agents, 2019 % of GDP

<table>
<thead>
<tr>
<th></th>
<th>Non-Fin. Corporations</th>
<th>Financial institutions</th>
<th>Government</th>
<th>Households + NPI SH</th>
<th>Rest of the world</th>
<th>Total</th>
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</thead>
<tbody>
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<td>6.9</td>
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<td>ANF2</td>
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<td>1.2</td>
<td>22.1</td>
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<td>1.6</td>
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<td>75.2</td>
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<td>-1.8</td>
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<td>0</td>
<td>0</td>
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</tr>
</tbody>
</table>

Source: Authors’ calculations using data from INSEE and Webstat (Banque de France)

Note: The totals are the result of operations carried out with more than one decimal (not shown here), therefore totals in the last line and column may differ slightly.

Table 3 Symbolic uses-resources table + flow of funds
<table>
<thead>
<tr>
<th>D39b</th>
<th>Operating subsidies</th>
<th>$^a$</th>
<th>$^b$</th>
<th>$^c$</th>
<th>$^d$</th>
<th>$^e$</th>
<th>$^f$</th>
<th>$^g$</th>
<th>$^h$</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2</td>
<td>Gross operating surplus</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>D21</td>
<td>Net taxes on production</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>D41</td>
<td>Interest</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>D42</td>
<td>Distributed income of corporations</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>D43</td>
<td>Reinvested earnings on direct foreign investment</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>D44</td>
<td>Property income attributed to insurance policy holders</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>D45</td>
<td>Rents</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>D5</td>
<td>Taxes on income and wealth</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>D61</td>
<td>Social contributions</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>D62</td>
<td>Social benefits</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>D7</td>
<td>Transfers</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>D6</td>
<td>Gross disposable income</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>P3</td>
<td>Consumption</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>B8</td>
<td>Gross saving</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>D9</td>
<td>Capital transfers</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>P51</td>
<td>Gross Fixed Capital Formation</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>P52</td>
<td>Changes in inventories</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>P53</td>
<td>Acquisition less disposals of valuables</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>NP</td>
<td>Acquisitions less disposals of non-fin non-produced assets</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>BANF</td>
<td>Financing capacity</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
<tr>
<td>Adj</td>
<td>Adjustment BNP - BANF</td>
<td>$^a$</td>
<td>$^b$</td>
<td>$^c$</td>
<td>$^d$</td>
<td>$^e$</td>
<td>$^f$</td>
<td>$^g$</td>
<td>$^h$</td>
</tr>
</tbody>
</table>

| F1   | Monetary gold and SDRs | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| F2   | Bills and coins | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| F205 | Refinancing between FI res | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| gcB  | Govt acc at the CB | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| tgt2 | Target2 | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| F7   | Deposits | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| F3e  | Public securities | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| F3d  | Foreign securities | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| F3g  | Other securities | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| F4   | Loans | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| F5e  | Domestic equity and investment fund shares | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| F5d  | Foreign equity and investment fund shares | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| F6   | Insurance, pension funds and S.I.A. | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| F7   | Fin. derivatives and employee stock options | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |
| F8   | Other accounts receivable/payable | $^a$ | $^b$ | $^c$ | $^d$ | $^e$ | $^f$ | $^g$ | $^h$ |

NPISH = Non-profit institutions serving households
Cells in blue represent the closing items of the corresponding line
Note: The Central Bank’s financing capacity is nil; it is paid in full to the government in form of a tax (see equations 233, 234 and 282)
Table 4 Numerical uses-resources table + flow of funds, 2019 % of GDP

<table>
<thead>
<tr>
<th>Code</th>
<th>Item</th>
<th>Firms</th>
<th>Financial inst excl BdF</th>
<th>Banque de France</th>
<th>Government</th>
<th>Households + NPISH</th>
<th>Rest of the world</th>
<th>Total (uses -res.)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>paid</td>
<td>received</td>
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<td>Exports</td>
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<tr>
<td>P7</td>
<td>Imports</td>
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<tr>
<td>B11</td>
<td>Trade balance</td>
<td></td>
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<tr>
<td>P1</td>
<td>Production</td>
<td>124.8</td>
<td>10.1</td>
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<td></td>
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<td>176.6</td>
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<td>P2</td>
<td>Intermediate consumption</td>
<td>72.5</td>
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<td></td>
<td></td>
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<td>B1</td>
<td>Value added</td>
<td>52.3</td>
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<td>36.8</td>
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<td>D11</td>
<td>Wages and salaries</td>
<td>26.1</td>
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<td>2.3</td>
<td>39.0</td>
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<td>0.1</td>
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<tr>
<td>D12</td>
<td>Labor contributions</td>
<td>7.3</td>
<td>0.7</td>
<td>4.0</td>
<td>0.8</td>
<td>13.1</td>
<td>0.2</td>
<td>0.0</td>
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<tr>
<td>D29</td>
<td>Taxes on payroll and miscellaneous taxes on production</td>
<td>3.0</td>
<td>0.5</td>
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<td>1.0</td>
<td>0.1</td>
<td>0.0</td>
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<td>D319</td>
<td>Subsidies on production</td>
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<td>-0.1</td>
<td>-0.9</td>
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<td>-1.0</td>
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<td>-0.3</td>
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<td>D39b</td>
<td>Operating subsidies</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>-1.9</td>
</tr>
<tr>
<td>B2</td>
<td>Gross operating surplus</td>
<td>17.4</td>
<td>1.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>34.9</td>
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<tr>
<td>D21</td>
<td>Net taxes on production</td>
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<td></td>
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<td></td>
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<tr>
<td>D41</td>
<td>Interest</td>
<td>2.6</td>
<td>2.1</td>
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<td>6.2</td>
<td>-0.1</td>
<td>0.0</td>
<td>2.9</td>
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<td>D42</td>
<td>Distributed income of corporations</td>
<td>8.3</td>
<td>6.8</td>
<td>1.7</td>
<td>2.2</td>
<td>0.1</td>
<td>0.0</td>
<td>3.1</td>
</tr>
<tr>
<td>D43</td>
<td>Reinvested earnings on direct foreign investment</td>
<td>0.1</td>
<td>0.1</td>
<td>0.0</td>
<td>0.2</td>
<td></td>
<td>0.0</td>
<td>0.2</td>
</tr>
<tr>
<td>D44</td>
<td>Property income attributed to insurance policy holders</td>
<td>0.1</td>
<td>2.0</td>
<td>0.1</td>
<td>1.9</td>
<td></td>
<td>-0.1</td>
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</tr>
<tr>
<td>D45</td>
<td>Rents</td>
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<td></td>
<td></td>
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<tr>
<td>D5</td>
<td>Taxes on income and wealth</td>
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<td>0.6</td>
<td></td>
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<td>10.3</td>
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<tr>
<td>D61</td>
<td>Social contributions</td>
<td>0.6</td>
<td>1.5</td>
<td></td>
<td>16.8</td>
<td>19.2</td>
<td>0.0</td>
<td>0.3</td>
</tr>
<tr>
<td>D62</td>
<td>Social benefits</td>
<td>0.6</td>
<td>1.5</td>
<td></td>
<td>19.5</td>
<td>21.4</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>D7</td>
<td>Transfers</td>
<td>1.0</td>
<td>4.2</td>
<td>4.2</td>
<td>2.7</td>
<td>2.0</td>
<td>1.7</td>
<td>0.0</td>
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<tr>
<td>B6</td>
<td>Gross disposable income</td>
<td>12.1</td>
<td>12.1</td>
<td>0.8</td>
<td>0.8</td>
<td>24.3</td>
<td>24.3</td>
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<tr>
<td>P3</td>
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<td></td>
<td></td>
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<td>53.7</td>
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<td>76.8</td>
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<tr>
<td>B8</td>
<td>Gross saving</td>
<td>12.1</td>
<td>0.8</td>
<td></td>
<td>1.2</td>
<td>9.2</td>
<td></td>
<td>23.4</td>
</tr>
<tr>
<td>D9</td>
<td>Capital transfers</td>
<td></td>
<td></td>
<td></td>
<td>0.8</td>
<td>0.1</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>P51</td>
<td>Gross Fixed Capital Formation</td>
<td>12.8</td>
<td>1.2</td>
<td></td>
<td>3.7</td>
<td>5.8</td>
<td>0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>P52</td>
<td>Changes in inventories</td>
<td>0.4</td>
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<td></td>
<td>0.0</td>
<td>0.1</td>
<td>0.1</td>
<td>0.5</td>
</tr>
<tr>
<td>P53</td>
<td>Acquisition less disposals of valuables</td>
<td>0.1</td>
<td></td>
<td></td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>NP</td>
<td>Acquisitions less disposals of non-fin non-produced assets</td>
<td>0.0</td>
<td></td>
<td></td>
<td>0.0</td>
<td></td>
<td>-0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>B9N</td>
<td>Net financing capacity</td>
<td>-0.3</td>
<td>-0.3</td>
<td>-0.0</td>
<td>-1.0</td>
<td>2.8</td>
<td>0.8</td>
<td>0.0</td>
</tr>
<tr>
<td>Adj</td>
<td>Adjustment B9N - B9NF</td>
<td>-0.1</td>
<td>0.5</td>
<td>-0.4</td>
<td>-0.1</td>
<td>-0.2</td>
<td>0.3</td>
<td>0.0</td>
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</table>

<table>
<thead>
<tr>
<th>Flow</th>
<th>Instrument</th>
<th>Firms</th>
<th>Financial inst excl BdF</th>
<th>Banque de France</th>
<th>Government</th>
<th>Households + NPISH</th>
<th>Rest of the world</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Asset</td>
<td>Liability</td>
<td>Asset</td>
<td>Liability</td>
<td>Asset</td>
<td>Liability</td>
</tr>
<tr>
<td>F1</td>
<td>Monetary gold and SDRs</td>
<td></td>
<td></td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F22</td>
<td>Bills and coins</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.6</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>F295</td>
<td>Refinancing between FI &amp; res</td>
<td>-1.9</td>
<td>-0.6</td>
<td>-1.9</td>
<td>-0.6</td>
<td></td>
<td>1.3</td>
</tr>
<tr>
<td>res</td>
<td>Bank reserves</td>
<td>0.7</td>
<td>0.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The value of GDP can be obtained from the table above;

- By the **demand approach** as the sum of public and personal consumption (76.8), gross fixed capital formation by all sectors (23.7), changes in inventories except those of households (0.5-0.1), acquisition less disposals of valuables (0.1) and exports (31.8), less imports (32.8).

- By the **income approach** as the sum of wages and salaries received by households (39.0) the corresponding labor contributions (13.1), the sum of all sectors’ gross operating surplus (34.9), taxes on income and wealth received by the government (13.1) and a slight discrepancy (-0.1).

- By the **production approach** as total value added (88.9), net taxes on production (12.0) less subsidies on production (-1.0).

Table 5 Symbolic revaluations table
### Table 6: Numerical revaluations table, 2019 % of GDP

<table>
<thead>
<tr>
<th>Flow</th>
<th>Instrument</th>
<th>Firms</th>
<th>Financial inst excl bdl</th>
<th>Banque de France</th>
<th>Government</th>
<th>Households + NPISH</th>
<th>Rest of the world</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFA1</td>
<td>Produced</td>
<td>1.5</td>
<td>0.1</td>
<td>1.2</td>
<td>1.8</td>
<td>4.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NFA2</td>
<td>Non-produced</td>
<td>3.8</td>
<td>0.3</td>
<td>2.2</td>
<td>7.6</td>
<td>13.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 7: Symbolic other changes in volume table

<table>
<thead>
<tr>
<th>Flow</th>
<th>Instrument</th>
<th>Firms</th>
<th>Financial inst excl bdl</th>
<th>Banque de France</th>
<th>Government</th>
<th>Households + NPISH</th>
<th>Rest of the world</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFA1</td>
<td>Produced</td>
<td>OCy1</td>
<td>OCy1</td>
<td>OCy1</td>
<td>OCy1</td>
<td>OCy1</td>
<td>OCy1</td>
<td>OCy1</td>
</tr>
<tr>
<td>NFA2</td>
<td>Non-produced</td>
<td>OCy0</td>
<td>OCy0</td>
<td>OCy0</td>
<td>OCy0</td>
<td>OCy0</td>
<td>OCy0</td>
<td>OCy0</td>
</tr>
</tbody>
</table>

### Notes

- Table 6 and Table 7 represent numerical and symbolic changes in volume, respectively, with columns for different sectors and flow types.
- The tables include revaluations and changes in volume, with specific categories such as financial instruments, banks, and government entities.
- The tables are designed to show the percentage of GDP for each category, providing a clear and concise view of the financial landscape.
Table 8: Numerical other changes in volume, 2019 % of GDP

<table>
<thead>
<tr>
<th>Flow</th>
<th>Firms</th>
<th>Financial inst excl BoF</th>
<th>Banque de France</th>
<th>Government</th>
<th>Households + NPISH</th>
<th>Rest of the world</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFA1</td>
<td>Produced</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>NFA12</td>
<td>Inventories + valables</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>NFA2</td>
<td>Non-produced</td>
<td>2.3</td>
<td>0.4</td>
<td>0.5</td>
<td>2.5</td>
<td>5.8</td>
<td></td>
</tr>
</tbody>
</table>

F295 Refinancing between FI

res Bank reserves

gcb Govt acc at the CB

F2 Deposits

F3e Public securities

F3d Foreign securities

F3g Other securities

F4 Domestic equity and investment fund shares

F5e Foreign equity and investment fund shares

F6 Insurance, pension funds and s.g.s.

F7 Fin. derivatives and employee stock options

Net financial other changes in volume

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>-1.8</td>
<td>0.0</td>
<td>0.2</td>
<td>0.0</td>
</tr>
<tr>
<td>2.8</td>
<td>-1.3</td>
<td>0.0</td>
<td>0.7</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Net other changes in volume

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Note: some rows that exhibit 0 in 2019 are not shown in the tables.

Equation 1 GDP in volume

\[ Y = \frac{C^M + C^G}{\text{Consumption}} + \frac{I^T + I^M + I^Q + I^L}{\text{Trade balance}} + \frac{\Delta \text{inventories + net val.}}{X - IM} \]

Equation 2 Value added, value

\[ VA = p_Y Y - T_p - T^p + Sub + Sub^R \]

(\text{Reminder: Sub and Sub}^R \text{ appear with a negative sign in Table 4, therefore in the code they appear with a negative sign, and in the previous formula with a positive one.})

Equation 3 Consumer price index

\[ p_Y = \left( \frac{p_Y Y - p_Y^C C^C - p_Y^T I^T - p_Y^Q I^Q - p_Y^L I^L - p_Y^M I^M + p_Y^G G^G}{Y - C^M - I^T - I^M + \frac{\Delta \text{inventories + net val.}}{X - IM}} \right) \]

(\text{Reminder: Sub and Sub}^R \text{ appear with a negative sign in Table 4, therefore in the code they appear with a negative sign, and in the previous formula with a positive one.})

Equation 4 Value added, firms

\[ VA^F = VA - VA^B - VA^G - VA^H \]

Equation 8 Value added, volume

\[ \nu_a = \left( \frac{VA}{p_Y} \right) \]

Equation 9 Value added, market sector (value)

\[ VA^M = VA^F + VA^B + VA^H \]

Equation 10 Value added market sector, volume

Equation 5 Value added, households

\[ VA^H = \alpha_{HA}^H (VA - VA^B - VA^G) \]

Equation 6 Value added, banks

\[ VA^B = \alpha_{HB}^B PF \]

Equation 7 Value added, public sector

\[ VA^C = \alpha_{HC}^C (W^G + LC^G) \]
\[ \nu^F = \left( \frac{VA^M}{p_Y} \right) \]

**Non-financial corporations**

Equation 11 Wages paid

\[ W_p^F = w_p^F(N_p^F) \]

Equation 12 Labor contributions paid

\[ LC_p^F = \beta_{L_p}W_p^F \]

Equation 13 Labor taxes

\[ T_L^F = \beta_{T_L}W_p^F \]

Equation 14 Subsidies received

\[ \text{Sub}_p^F \text{ exogenous} \]

Equation 15 Profits

\[ \Pi^F = VA^F - W_p^F - LC_p^F - T_L^F - \text{Sub}_p^F \]

Equation 16 Interests received

\[ \text{Int}_{int}^F = r_s^F(D_L^{r_{t-1}} + p^F_L \delta_k^{F_{t-1}} + p^F_E \delta_k^{E_{t-1}} + L_s^{r_{t-1}}) \]

Equation 17 Interests paid

\[ \text{Int}_{int}^F = r_s^F(p^F_K_{t-1} + b^F_L_{t-1} + L^F_{t-1}) \]

Equation 18 Dividends paid

\[ \text{Div}_{div}^F = \gamma_{div}^F \Pi^F \]

Equation 19 Dividends received

\[ \text{Div}_{div}^F = \gamma_{div}^F(p^F_K_{t-1} + E^F_{t-1}) \]

Equation 20 Redistributed earnings on FDI received

\[ \text{RFDI}_{FDI}^F = \text{RFDI}_{FDI}^F + \text{RFDI}_{FDI}^F - \text{RFDI}_{FDI}^F - \text{RFDI}_{FDI}^F \]

Equation 21 Redistributed earnings on FDI paid

\[ \text{RFDI}_{FDI}^F = \nu^F_{FDI}p^F_{E_{t-1}}E^F_{t-1} \]

Equation 22 Property income attributed to insurance policy holders received

\[ \text{INS}_p^F = r_s^F A^F_{t-1} \]

Equation 23 Rents paid

\[ \text{RENT}_p^F = r_{rent}^F VA^F \]

Equation 24 Corporate taxes

\[ T^F = \theta_T^F(N_p^F + \text{Int}_{int}^F - \text{Int}_{int}^F - \text{Div}_{div}^F + \text{Div}_{div}^F - \text{RFDI}_{FDI}^F + \text{INS}_p^F - \text{RENT}_p^F) \]

Equation 25 Social benefits paid

\[ \text{SB}_p^F = \gamma_{SB}^F \frac{p_Y Y}{p_Y} \]

Equation 26 Social contributions received

\[ \text{SC}_p^F = \theta_{SC}^F (\text{SC}_p^F + \text{SC}_p^F) \]

Equation 27 Miscellaneous transfers paid

\[ \text{Misc}_{misc}^F = \theta_{misc}^F p_Y Y \]

Equation 28 Disposable (corporate) income

\[ Y_d^F = \Pi^F + \text{Int}_{int}^F + \text{Div}_{div}^F - \text{Wp}_{FDI}^F + \text{RFDI}_{FDI}^F + \text{INS}_p^F - \text{RENT}_p^F - T^F + \text{SC}_p^F - \text{SB}_p^F - \text{Misc}_{misc}^F \]

Equation 29 Savings (self-financing)

\[ S^F = Y_d^F \]

Equation 30 Net acquisition of non-financial non-produced assets

\[ NP^F = \theta_{NP}^F p_Y Y \]

Equation 31 Capital transfers

\[ \text{Tr}_{X}^F = \theta_{TX}^F p_Y Y \]

Equation 32 Financing capacity/need

\[ \text{FCN}^F = S^F - p^F_L T^F - \text{p}^F_{12} - NP^F + \text{Tr}_{X}^F \]

Equation 33 Gross investment

\[ I_t^F = \Delta K_t^F + \delta_{K_t}^F K_t^{F_{t-1}} \]

Equation 34 Net produced non-financial assets, flow (accumulation rate) model runs with option 1

Option 1, without output gap

\[
\frac{\Delta K_{t}^F}{K_{t-1}^F} = 0.02 + 0.1 \left( \frac{\Pi_{t-1}^F}{p_{K,t-1}^F + K_{t-1}^F} + 0.1 (r_{t-1}^F - \pi_1) - 0.02(r_{t-1}^F - \pi_1) - 0.03 \left( \frac{L^F_{t} + p_{K}^F E^F_{t} + W^F L^H_{t}}{p_{K}^F E^F_{t} + W^F L^H_{t}} \right) \right) + 0.3 GAP
\]

Option 2, with output gap

\[
\frac{\Delta K_{t}^F}{K_{t-1}^F} = 0.03 - 0.06 (r_{t-1}^F - \pi_1) - 0.02 \left( \frac{L^F_{t} + p_{K}^F E^F_{t} + W^F L^H_{t}}{p_{K}^F E^F_{t} + W^F L^H_{t}} \right) + 0.3 GAP
\]

Equation 35 Gross investment, price

\[ \Delta \ln (p_{K}^F) = 0.96 \Delta \ln (p_{Y}) \]

Equation 36 Produced non-financial assets, price

\[ p_{K}^F = \theta_{pK}^F \]

Equation 37 Non-financial assets, stock

\[ p_{K}^E K_{t}^F = (1 - \delta_{K}^F) p_{K}^E K_{t-1}^F + p_{K}^E T_{t}^F + K_{t-1}^F \Delta p_{K}^E + OCV_{K}^F \]

Equation 38 Inventories, price

\[ \Delta \ln (p_{I_{t-1}}^F) = 0.3 \Delta \ln (p_{I_{t-1}}^F) + 0.6 \Delta \ln (p_{Y_{t-1}}) \]

Equation 39 Inventories, stock

\[ \Delta \ln (K_{t-1}^F) = -0.01 + 0.8 \Delta \ln (K_{t-1}^F) + 1.2 \Delta \ln (\nu_{o}^F) - 0.6 \Delta \ln (\nu_{o}^F) \]

Equation 40 Value added by firms, volume

\[ \nu_{o}^F = \left( \frac{VA^F}{p_Y} \right) \]
Equation 41 Inventories, flow
\[ \Delta p_{t_3}^F = \Delta(p_{t_3}^F K_{t_2}^F) - K_{t_2-1}^F \Delta p_{t_3}^F - OCV_{t_3}^F \]

Equation 42 Non-produced non-financial assets, price
\[ \ln(p_{t_3}^P) = 0.86 \ln(p_{t_3-1}^P) + 0.8 \ln(p_{t_3}^P) - 0.7 \ln(p_{t_3-1}^P) \]

Equation 43 Non-produced non-financial assets, stock (mainly constructible land)
\[ p_{t_3}^F K_{t_2}^F = p_{t_3}^F K_{t_2-1}^F + p_{t_2}^F K_{t_2}^F + K_{t_2-1}^F \Delta p_{t_3}^F + OCV_{t_3}^F \]

Equation 44 Non-produced non-financial assets, flow
\[ I_{t_3}^F \text{ exogenous (close to nil)} \]

Equation 45 Public securities held, stock
\[ p_{t_3}^{FS} p_{t_3}^{FE} = \psi_{t_3}^{FS} VA_{PF}^F \]

Equation 46 Public securities held, stock
\[ \Delta B_{t_3}^{PS} = B_{t_3}^{PS} - \left( \frac{OCV_{t_3}^{PS}}{p_{t_3}^{PS}} \right) \]

Equation 47 Public securities held, price
\[ p_{t_3}^{PS} \psi_{t_3}^{PS} = \psi_{t_3}^{PS} p_{t_3}^{PS} \]

Equation 48 Foreign securities held, stock
\[ p_{t_3}^{FS} p_{t_3}^{FE} = \psi_{t_3}^{PS} VA_{PF}^F \]

Equation 49 Foreign securities held, flow
\[ \Delta B_{t_3}^{PS} = B_{t_3}^{PS} - \left( \frac{OCV_{t_3}^{PS}}{p_{t_3}^{PS}} \right) \]

Equation 50 Foreign securities held, price
\[ p_{t_3}^{PS} = \psi_{t_3}^{PS} p_{t_3}^{PS} \]

Equation 51 Equities held, flow (accumulation rate)
\[ \left( \Delta E_{t_3}^F \right) / \left( E_{t_3-1}^F \right) = 0.35 \left( \frac{\Delta E_{t_3}^F}{E_{t_3-1}^F} + \frac{\rho^F}{p_{t_3}^F K_{t_3-1}^F + p_{t_2}^F K_{t_2-1}^F + p_{t_2}^F K_{t_2-1}^F} \right) + 0.02 \left( \frac{\rho^F}{p_{t_3}^F - (\rho^F)} \right) + 0.01 \left( \frac{E_{t_3}^F}{E_{t_3}^F + WTH^F} \right) \]

Equation 52 Equities held, price (i.e. CAC 40)
\[ p_{t_3}^F = p_{t_3}^{FS} \left( p_{t_3}^{FS} p_{t_3}^{FE} \right) + p_{t_3}^{FS} \left( p_{t_3}^{FS} p_{t_3}^{FE} \right) \]

Equation 53 Equities held, stock
\[ E_{t_3}^F = E_{t_3-1}^F + \Delta E_{t_3}^F + \left( \frac{OCV_{t_3}^F}{p_{t_3}^F} \right) \]

Equation 54 Domestic equities held, stock
\[ p_{t_3}^{FS} p_{t_3}^{FE} = \psi_{t_3}^{FS} p_{t_3}^{FS} p_{t_3}^{FE} \]

Equation 55 Domestic equities held, price
\[ p_{t_3}^{FS} = \psi_{t_3}^{FS} p_{t_3}^{FS} \]

Equation 56 Domestic equities held, flow
\[ \Delta E_{t_3}^F = \Delta E_{t_3}^F - \left( \frac{OCV_{t_3}^F}{p_{t_3}^F} \right) \]

Equation 57 Foreign equities held, stock
\[ p_{t_3}^{FS} p_{t_3}^{FE} = p_{t_3}^{FS} p_{t_3}^{FE} - p_{t_3}^{FS} p_{t_3}^{FE} \]

Equation 58 Foreign equities held, flow
\[ \Delta E_{t_3}^F = \Delta E_{t_3}^F - \left( \frac{OCV_{t_3}^F}{p_{t_3}^F} \right) \]

Equation 59 Foreign equities held, price
\[ \Delta \ln(p_{t_3}^F) = -0.6 \Delta \ln(p_{t_3}^F) + 1.1 \Delta \ln(p_{t_3}^F) \]

Equation 60 Profitability of equities held
\[ r_{t_3}^F = \left( \frac{\Delta E_{t_3}^F}{p_{t_3}^F} \right) \]

Equation 61 Deposits, stock
\[ \Delta \left( \frac{D_{t_3}^F}{p_{t_3}^F} \right) = 0.009 + 0.4 \left( \frac{D_{t_3}^F}{p_{t_3}^F} \right) - 0.14 \left( p_{t_3}^F \right) \]

Equation 62 Deposits, flow
\[ \Delta D_{t_3}^F = \Delta D_{t_3}^F + \Delta \ln(p_{t_3}^F) - OCV_{t_3}^F \]

Equation 63 Credit assets, flow
\[ \left( \frac{\Delta L_{t_3}^F}{VA} \right) = \frac{0.5 \left( \Delta L_{t_3}^F \right)}{VA} + 0.5 \left( \frac{\Delta L_{t_3}^F}{VA} \right) - 0.3 \left( \frac{\Delta L_{t_3}^F}{VA} \right) \]

Equation 64 Credit assets, stock
\[ L_{t_3}^F = L_{t_3}^F + \Delta \ln(p_{t_3}^F) + OCV_{t_3}^F \]

Equation 65 Bills and coins, stock
\[ H_{t_3}^F = \psi_{t_3}^{FS} p_{t_3}^F \]

Equation 66 Bills and coins, flow
\[ \Delta H_{t_3}^F = \Delta H_{t_3}^F - OCV_{t_3}^F \]

Equation 67 Insurance, pension funds and standardized guarantee schemes, flow
\[ \Delta A_{t_3}^F = \psi_{t_3}^{FS} VA_{PF}^F \]

Equation 68 Insurance, pension funds and standardized guarantee schemes, stock
\[ A_{t_3}^F = A_{t_3}^F + \Delta A_{t_3}^F + OCV_{t_3}^F \]

Equation 69 Total indebtedness, stock
\[ \Delta \left( \frac{p_{t_3}^{FS} BL_{t}^F}{p_{t_3}^F K_{t_3}^F + p_{t_3}^F K_{t_3}^F + p_{t_3}^F K_{t_3}^F} \right) \]
\[ = 0.3 \left( \frac{p_{t_3}^{FS} K_{t_3}^F + p_{t_3}^F K_{t_3}^F + p_{t_3}^F K_{t_3}^F}{p_{t_3}^F K_{t_3}^F + p_{t_3}^F K_{t_3}^F + p_{t_3}^F K_{t_3}^F} \right) \]
\[ + 1.8 \left( \frac{p_{t_3}^F K_{t_3}^F + p_{t_3}^F K_{t_3}^F + p_{t_3}^F K_{t_3}^F}{p_{t_3}^F K_{t_3}^F + p_{t_3}^F K_{t_3}^F + p_{t_3}^F K_{t_3}^F} \right) - 0.07 u_{t_3} \]
\[ v_c = \frac{\ln(p_{\text{eq}}) - 7.7}{p_{\text{eq}}^{\text{BLF}}} - 3.2 \left( \frac{p_{\text{eq}}^{\text{BLF}}}{p_{\text{eq}}^{\text{BLF}}} \right) \]

Equation 70 Total indebtedness, flow

\[ \Delta B_L^c = \Delta R_L^c - \left( \frac{OCV_{\text{BLF}}}{p_{\text{eq}}^{\text{BLF}}} \right) \]

Equation 71 Bonds issued, stock

\[ \frac{p_{\text{eq}}^{\text{BLF}}}{p_{\text{eq}}^{\text{BLF}}} = 0.9 \left( \frac{p_{\text{eq}}^{\text{BLF}} - B_L^c}{p_{\text{eq}}^{\text{BLF}} - B_L^c} \right) + 0.002 \ln(p_{\text{eq}}^c) \]

Equation 72 Total indebtedness, price

\[ \Delta \ln(p_{\text{eq}}^c) = 0.4 \Delta \ln(p_{\text{eq}}^{\text{BLF}}) + 0.13 \ln(p_{\text{eq}}^c) - 0.09 \Delta \ln(p_{\text{eq}}^{\text{BLF}}) - 0.05 \ln(p_{\text{eq}}^c) \]

Equation 73 Bonds issued, price

\[ \ln(p_{\text{eq}}^c) = 0.8 \ln(p_{\text{eq}}^{\text{BLF}}) + 0.9 \ln(p_{\text{eq}}^c) - 0.7 \ln(p_{\text{eq}}^{\text{BLF}}) \]

Equation 74 Bonds issued, flow

\[ \Delta B_L^c = \Delta R_L^c - \left( \frac{OCV_{\text{BLF}}}{p_{\text{eq}}^{\text{BLF}}} \right) \]

Equation 75 Loans issued, flow

\[ \Delta L_L^c = p_{\text{eq}}^{\text{BLF}} \Delta B_L^c - p_{\text{eq}}^{\text{BLF}} \Delta B_L^c \]

Equation 76 Loans issued, stock

\[ L_L^c = L_{L-1} + \Delta L_L^c + \text{real}_{\text{BLF}} + OCV_{\text{BLF}} \]

Equation 77 Other accounts payable/receivable, stock (net assets)

\[ Z^c = \theta_{\text{BLF}} p_Y \]

Equation 78 Other accounts payable/receivable, flow (net assets)

\[ \Delta Z^c = \Delta Z^c - OCV_{\text{BLF}} \]

Equation 79 Equities issued, flow, closes account of non-financial corporations

\[ p_{\text{eq}}^{\text{E}} \Delta E_L^c = p_{\text{eq}}^{\text{E}} \delta_{\text{E}} + p_{\text{eq}}^{\text{E}} \delta_{\text{E}} \Delta E_{\text{L}}^c + p_{\text{eq}}^{\text{E}} \Delta \delta_{\text{E}} + p_{\text{eq}}^{\text{E}} \Delta \delta_{\text{E}} \]

Equation 80 Equities issued, price

\[ p_{\text{eq}}^{\text{E}} = \theta_{\text{E}} p_Y \]

Equation 81 Equities issued, stock

\[ E_L^c = E_{L-1} + \Delta E_L^c + \left( \frac{OCV_{\text{BLF}}}{p_{\text{eq}}^{\text{BLF}}} \right) \]

Equation 82 Profitability of equities issued

\[ r_{\text{eq}}^c = \left( \frac{E_{L-1}^{\text{BLF}} + \Delta w_{\text{eq}}}{p_{\text{eq}}^{\text{BLF}} - B_L^{\text{BLF}}} \right) \]

Equation 83 Price of domestic equity (the simulations shown are with v1)

\[ \Delta \ln(p_{\text{eq}}^c) = 0.9 \Delta \ln(p_{\text{eq}}^c) - 0.4 \Delta \ln(p_{\text{eq}}^{\text{BLF}}) - 0.5 \ln(p_{\text{eq}}^{\text{BLF}}) \]

\[ \ln(p_{\text{eq}}^c) = 0.9 \ln(p_{\text{eq}}^c) + 0.8 \ln(p_{\text{eq}}^{\text{BLF}}) - 2.3 \ln(p_{\text{eq}}^{\text{BLF}}) \times 100 \]

Equation 84 Domestic equities held by the rest of the world (at constant prices)

\[ E_{\text{eq}}^{\text{MN}} = \left( \frac{p_{\text{eq}}^c}{p_{\text{eq}}^{\text{BLF}}} \right) \]

Equation 85 Profitability of domestic equities

\[ r_{\text{eq}}^{\text{MN}} = \left( \frac{\Delta w_{\text{eq}} - \Delta w_{\text{BLF}} + \Delta p_{\text{eq}}^c - \Delta p_{\text{eq}}^{\text{BLF}}}{p_{\text{eq}}^{\text{BLF}} - p_{\text{eq}}^{\text{BLF}}} \right) \]

Equation 86 Financial wealth

\[ FW^c = H^c + D^c + p_{\text{eq}}^{\text{E}} E^c + p_{\text{eq}}^{\text{E}} \Delta E^c + p_{\text{eq}}^{\text{E}} \Delta \delta_{\text{E}} + \delta_{\text{E}} \Delta E^c + \delta_{\text{E}} \Delta \delta_{\text{E}} + \delta_{\text{E}} \Delta \delta_{\text{E}} \]

Equation 87 Net wealth

\[ WLTH^c = p_{\text{eq}}^{\text{E}} K_1^c + p_{\text{eq}}^{\text{E}} K_{12}^c + p_{\text{eq}}^{\text{E}} K_{12}^c + FW^c \]

Households and NPISH

Equation 88 Wages paid by households

\[ W_{p}^H = W - W_{p}^H - W_{p}^H \]

Equation 89 Total wages received

\[ W_{p}^H = W - W_{p}^H - W_{p}^H \]

Equation 90 Labor contributions paid by individual entrepreneurs

\[ LC_{\text{i}}^{\text{p}} = \beta_{\text{i}}^{\text{p}} W_{p}^H \]

Equation 91 Labor contributions received

\[ LC_{\text{i}}^{\text{p}} = \sum_{i} LC_{\text{i}}^{\text{p}} - LC_{\text{i}}^{\text{p}} \quad \text{for} \quad i = F, B, G, H, R \]

Equation 92 Labor taxes paid

\[ T_{\text{i}}^{\text{p}} = \beta_{\text{i}}^{\text{p}} W_{p}^H \]

Equation 93 Subsidies received

\[ Sub_{\text{i}}^{\text{p}} = \beta_{\text{i}}^{\text{p}} p_Y \]

[Operating surplus of individual entrepreneurs + \Pi_{\text{p}} = VA - W_{p}^H - LC_{\text{i}}^{\text{p}} - T_{\text{i}}^{\text{p}} + Sub_{\text{i}}^{\text{p}}]
Equation 94 Interests received

\[ \text{Int}^H = r^H \left( D^H_{t-1} + p^H e^t_{t-1}B^H_{t-1} + p^H e^{-1}B^H_{t-1} \right) \]

Equation 95 Interests paid

\[ \text{Int}^p = r^p \left( D^p_{t-1} + p^p e^{-t}_{t-1}B^p_{t-1} + p^p e^{-1}B^p_{t-1} \right) \]

Equation 96 Dividends received

\[ \text{Div}^H = Y^H_{t-1}p^H e^{-t}_{t-1} - E^H_{t-1} \]

Equation 97 Property income attributed to insurance policy holders received

\[ INS^H = r^H A^H_{t-1} \]

Equation 98 Rents paid

\[ RENT^p = RENT^p_{t-1} + RENT^H - RENT^p_{t-1} \]

Equation 99 Rents received

\[ RENT^H = r^H A^H_{t-1} \]

Equation 100 Income tax paid

\[ T^H = \theta^H \left( VA^H_{t-1} + W^H_{t-1} - W^H_{t-1} + LC^H_{t-1} - LC^H_{t-1} - T^H_{t-1} + \text{Int}^H_{t-1} \right. \]
\[ \left. - \text{Int}^H_{t-1} - \text{Div}^H_{t-1} + INS^H_{t-1} + RENT^H_{t-1} \right) - RENT^H_{t-1} \]

Equation 101 Social contributions paid by workers

\[ LCW^p = \theta^p W^p \]

Equation 102 Social contributions paid

\[ SC^H = LC^H + LCW^p \]

Equation 103 Social benefits received

\[ SB^H = -SB^p + \sum SB^p_i \text{ for } i = F, B, G, H, R \]

Equation 104 Social benefits paid

\[ SB^p = \theta^p p^p Y \]

Equation 105 Miscellaneous transfers received (net)

\[ TR^H = TR^p + TR^p - TR^p - TR^p \]

Equation 106 Disposable income

\[ Y^d = VA^H - W^H - LC^H - T^H + S ub^H + \text{Int}^H - \text{Int}^p + \text{Div}^H + INS^H + RENT^H + W^H + LC^H \]
\[ - T^H - SC^H + SB^H + TR^H \]

Equation 107 Personal consumption (volume)

\[ \Delta \ln (C^H) = 0.6 \Delta \ln \left( \frac{Y^d}{P^H} \right) + 0.09 \Delta \ln \left( \frac{\text{WIT}^H}{P^H} \right) - 0.14 \nu c_{t-1} \]
\[ \nu c = \ln (C^H) - 0.5 - 0.86 \ln \left( \frac{Y^d}{P^H} \right) - 0.04 \ln \left( \frac{\text{WIT}^H}{P^H} \right) \]

Equation 108 Savings

\[ S^H = Y^d - p^H \]

Equation 109 Net acquisition of non-financial non-produced assets

\[ NP^H = \theta^H p^H Y \]

Equation 110 Capital transfers paid

\[ TR^p = \theta^p p^H Y \]

Equation 111 Financing capacity/need

\[ FCN^H = S^H - p^H T^H - p^H T^H - p^H T^H - p^H T^H - N P^H - T R^p \]

Equation 112 Investment

\[ \Delta \ln (I^H) = 0.2 \Delta \ln (I^H) + 0.2 \Delta \ln \left( \frac{Y^d}{P^H} \right) - 0.14 \nu c_{t-1} \]
\[ \nu c = \ln (I^H) - 0.5 - 0.86 \ln \left( \frac{Y^d}{P^H} \right) - 0.04 \ln \left( \frac{\text{WIT}^H}{P^H} \right) \]

Equation 113 Investment, price

\[ \Delta \ln (P^H) = 0.98 \Delta \ln (p^H) \]

Equation 114 Produced non-financial assets, price

\[ \Delta \ln \left( P^H_{t-1} \right) = 0.03 + 0.14 \ln \left( P^H_{t-1} \right) + 0.72 \Delta \ln \left( p^H_{t-1} \right) \]
\[ - 0.72 \Delta \ln \left( p^H_{t-1} \right) \]

Equation 115 Produced non-financial assets, stock (including housing investment)

\[ p^H K^H = (1 - 0.01 p^H) p^H K^H_{t-1} + p^H K^H + K^H \Delta p^H + O C V^H_{t-1} \]

Equation 116 Non-produced non-financial assets, price

\[ \Delta \ln (p^H_{t-1}) = 0.6 \Delta \ln (p^H_{t-1}) + 0.9 \Delta \ln (I^H) - 0.15 \nu c_{t-1} \]
\[ \nu c = \ln (p^H_{t-1}) + 9.5 - 2.7 \ln (I^H_{t-1}) - 1.5 \ln \left( \frac{P^H}{P^H_{t-1}} \right) \]

Equation 117 Non-produced non-financial assets, stock (mainly constructible land)

\[ p^H K^H_{t-1} + p^H K^H_{t-1} + K^H \Delta p^H + O C V^H_{t-1} \]

Equation 118 Bills and coins, stock

\[ H^H = \psi^H p^H Y \]

Equation 119 Bills and coins, flow

\[ \Delta H^H = \Delta H^H - O C V^H \]

Equation 120 Deposits, stock (mainly savings accounts)

\[ \Delta \left( \frac{D^H}{V^H} \right) = 0.5 \Delta \left( \frac{D^H}{V^H_{t-1}} \right) - 0.4 \Delta (t_{10years} - \pi^H_{t-1}) \]
\[ - 0.2 \nu c_{t-1} \]
\[ \nu c = \left( \frac{D^H}{V^H} \right) - 0.9 + 1.04 (t_{10years} - \pi^H_{t-1}) \]

Equation 121 Deposits, flow

\[ \Delta D^H = \delta D^H - \text{rev} \left( \frac{D^H}{V^H} \right) - O C V^H \]

Equation 122 Foreign securities held by households, stock
Equation 123 Foreign equities held by households, price
\[ p_{22}^H = \psi_{21} p_{21}^H \]
Equation 124 Foreign equities held by households, flow
\[ \Delta \times B_{22}^H = \Delta R_{21}^H - \left( \frac{OCV_{21}^H}{p_{21}^H} \right) \]
Equation 125 Other securities held by households, price
\[ p_{22}^H = \psi_{21} p_{21}^H \]
Equation 126 Other securities held by households, flow
\[ \Delta \times B_{22}^H = \Delta R_{21}^H - \left( \frac{OCV_{21}^H}{p_{21}^H} \right) \]
Equation 127 Other securities held by households, stock
\[ \Delta \times E_{22}^H = \Delta E_{22}^H - \left( \frac{OCV_{21}^H}{p_{21}^H} \right) \]
Equation 128 Equities held, stock
\[ \Delta \times E_{22}^H = \Delta E_{22}^H - \left( \frac{OCV_{21}^H}{p_{21}^H} \right) \]
Equation 129 Equities held, price
\[ p_{22}^H = \frac{P_{22}^H}{P_{21}^H} \left( \psi_{21} p_{21}^H \right) + \psi_{21} \left( \frac{P_{22}^H}{P_{21}^H} \right) \]
Equation 130 Equities held, flow
\[ \Delta \times E_{22}^H = \Delta E_{22}^H - \left( \frac{OCV_{21}^H}{p_{21}^H} \right) \]
Equation 131 Profitability of equities held by households
\[ \eta_{22}^H = \left( \frac{\Delta \times E_{22}^H}{\Delta \times E_{22}^H} + \Delta \times \text{Div}_{22}^H \right) \]
Equation 132 Domestic equities held by households, stock
\[ p_{22}^H = \psi_{21} p_{21}^H \]
Equation 133 Domestic equities held by households, price
\[ p_{22}^H = \eta_{22}^H \left( \frac{P_{22}^H}{P_{21}^H} \right) \]
Equation 134 Domestic equities held by households, flow
\[ \Delta \times E_{22}^H = \Delta E_{22}^H - \left( \frac{OCV_{21}^H}{p_{21}^H} \right) \]
Equation 135 Foreign equities held by households, stock
\[ p_{22}^H = \psi_{21} p_{21}^H \]
Equation 136 Foreign equities held by households, price
\[ p_{22}^H = \psi_{21} p_{21}^H \]
Equation 137 Foreign equities held by households, stock
\[ \Delta \times E_{22}^H = \Delta E_{22}^H - \left( \frac{OCV_{21}^H}{p_{21}^H} \right) \]
Equation 138 Insurance, pension funds and standardized guarantee schemes, stock
\[ \Delta \times E_{22}^H = \Delta E_{22}^H - \left( \frac{OCV_{21}^H}{p_{21}^H} \right) \]
Equation 139 Insurance, pension funds and standardized guarantee schemes, flow
\[ \Delta \times E_{22}^H = \Delta E_{22}^H - \left( \frac{OCV_{21}^H}{p_{21}^H} \right) \]
Equation 140 Loans, stock
\[ \Delta \times E_{22}^H = \Delta E_{22}^H - \left( \frac{OCV_{21}^H}{p_{21}^H} \right) \]
Equation 141 Change in inventories
\[ p_{22}^H = \psi_{21} p_{21}^H \]

[Note: this is the sum of Changes in Inventories and Acquisition less disposals of valuables p52+p53, see Table 3]
Equation 142 Loans, flow
\[ \Delta \times E_{22}^H = \Delta E_{22}^H - \left( \frac{OCV_{21}^H}{p_{21}^H} \right) \]
Equation 143 Other accounts payable/receivable, stock (net assets)
\[ Z_t^H = \psi_{21} Y_t^H \]
Equation 144 Other accounts payable/receivable, flow (net assets)
\[ \Delta \times E_{22}^H = \Delta E_{22}^H - \left( \frac{OCV_{21}^H}{p_{21}^H} \right) \]
Equation 145 Financial wealth
\[ FW_{22}^H = H_{22}^H + D_{22}^H + \psi_{21} B_{21}^H + p_{22}^H B_{22}^H + p_{22}^H E_{22}^H + A_{22}^H - L_{22}^H + Z_{22}^H \]
Equation 146 Net wealth
\[ W_{22}^H = \psi_{21} K_{21}^H + \psi_{21} K_{12}^H + \psi_{21} K_{13}^H + p_{22}^H K_{22}^H + FW_{22}^H \]

Financial institutions
Equation 147 Wages paid by banks
\[ W_{22}^H = w_{22}^H N_{22}^H \]
Equation 148 Labor contributions paid
\[ L_{22}^H = \beta_{22}^H W_{22}^H \]
\[ T^p = \beta \beta^p, WP^p \]

Equation 150 Subsidies received

\[ \text{Sub}^p = \beta \text{Sub}^p, p_Y \]

Equation 151 Profits

\[ P^p = YA^p - WP^p - LC^p - T^p + \text{Sub}^p \]

Equation 152 Interests paid

\[ Int^p = r^p_i (P^p_{L+1} + P^p_{L-1} + R^p_{L-1}) + r_c b RF_{L-1} \]

Equation 153 Interests received

\[ Int^p_0 = Int^p + Int^p + Int^{CR} + Int^p + Int^p - Int^{CR} - Int^p - Int^p - Int^p \]

Equation 154 Dividends paid

\[ Div^p = \gamma_{\text{div}}, P^p \]

Equation 155 Dividends received

\[ Div^p = \gamma_{\text{div}}, P^p_{L+1} E^p_{L-1} \]

Equation 156 Redistributed earnings on FDI received

\[ RFDI^p = r^p_{FDI} P^p_{L+1} E^p_{L-1} \]

Equation 157 Redistributed earnings on FDI paid

\[ RFDI^p = r^p_{FDI} P^p_{L+1} E^p_{L-1} \]

Equation 158 Property income attributed to insurance policy holders paid

\[ INS^p = \sum_i INS^i_i \quad \text{for } i = F, G, H, R \]

Equation 159 Corporate taxes

\[ T^p = \theta (P^p_{L+1} + \text{Int}^p_{L-1} - \text{Int}^p_{L-1} + \text{Div}^p_{L-1} - \text{Div}^p_{L-1} + \text{RFDI}^p_{L-1} - \text{RFDI}^p_{L-1} - \text{INS}^p_{L-1}) \]

Equation 160 Social contributions received

\[ SC^p = \theta \beta^p, SC^p + SC^p \]

Equation 161 Social benefits paid

\[ SB^p = \theta \beta^p, SB^p_y \]

Equation 162 Miscellaneous transfers received

\[ Tr^p = \theta \beta^p, Tr^p_y \]

Equation 163 Miscellaneous transfers paid

\[ Tr^p = \theta \beta^p, Tr^p_y \]

Equation 164 Disposable (corporate) income

\[ Y^p_d = P^p + \text{Int}^p_{L+1} - \text{Int}^p_{L-1} + \text{Div}^p_{L+1} - \text{Div}^p_{L-1} + \text{RFDI}^p_{L-1} - \text{RFDI}^p_{L-1} - \text{INS}^p_{L-1} - T^p + SC^p - SB^p + Tr^p - Tr^p \]

Equation 165 Savings

\[ S = Y^p_d \]

Equation 166 Net acquisition of non-financial non-produced assets

\[ NP^p = \theta \beta^p, N_Y Y \]

Equation 167 Capital transfers received

\[ Tr^p = \theta \beta^p, Tr^p_y \]

Equation 168 Financing capacity/need

\[ FCN^p = S^p - p^p_{L+1} L^p - N P^p + Tr^p \]

Equation 169 Investment (accumulation rate)

\[ \left( \frac{I^p}{K^p_{L-1}} \right) = 0.02 + 0.9 \left( \frac{I^p_{L-1}}{K^p_{L-1}} \right) \]

Equation 170 Investment, price

\[ \Delta \ln (p^p_d) = -0.01 + 1.1 \Delta \ln (p^p) \]

Equation 171 Produced non-financial assets, price

\[ \Delta \ln (p^p_{L-1}) = 0.4 \Delta \ln (p^p_{L-1}) + 0.7 \Delta \ln (p^p) \]

Equation 172 Produced non-financial assets, stock

\[ p^p_{L+1} K^p_{L+1} = (1 - \delta^p_{L+1}) p^p_{L+1} K^p_{L+1} + p^p_{L+1} l^p_{L+1} = K^p_{L+1}, \Delta p^p_{L+1} + OCV^p_{L+1} \]

Equation 173 Non-produced non-financial assets, price

\[ p^p_{L+1} = \psi^p_{L+1}, p^p_{L+1} \]

Equation 174 Non-produced non-financial assets, stock

\[ p^p_{L+1} K^p_{L+1} = p^p_{L+1} K^p_{L-1} + p^p_{L+1} K^p_{L-1} = K^p_{L-1}, \Delta p^p_{L+1} + OCV^p_{L+1} \]

Equation 175 Non-produced non-financial assets, flow

\[ l^p_{L+1} \text{ exogenous (close to nil)} \]

Financial institutions, other than the central bank

Equation 176 Bills and coins, stock

\[ H^p = \psi \beta^p, p_Y \]

Equation 177 Bills and coins, flow

\[ \Delta^p H^p = \Delta H^p - OCV^p \]

Equation 178 Loans, flow; closes the row of the instrument

\[ \Delta^p L^p = \Delta^p L^p + \Delta^p L^p + \Delta^p L^p + \Delta^p L^p + \Delta^p L^p + \Delta^p L^p - \Delta^p L^p - p^p_{L+1} \Delta^p L^p - \Delta^p L^p \]

Equation 179 Loans, stock

\[ L^p_{L+1} = L^p_{L+1} + \Delta^p L^p_{L+1} + \text{reval}_{L+1} \]

Equation 180 Loans, revaluation effects (closes reval for this instrument)

\[ \text{reval}_{L+1} = \text{reval}_{L+1} + \text{reval}_{L+1} + \text{reval}_{L+1} + \text{reval}_{L+1} - \text{reval}_{L+1} - \text{reval}_{L+1} \]
Equation 181 Loans, other changes in volume (closes OCV for this instrument)

\[ OCV_{FA} = OCV_{FA}^L + OCV_{FA}^D + OCV_{FA}^F + OCV_{FA}^P - OCV_{FA}^C - OCV_{FA}^R \]

Equation 182 Financial derivatives and employee stock options, flow; closes the row of the instrument

\[ \Delta X_F^P = \Delta X_F^P + \Delta X_F^{SP} + \Delta X_F^{ESO} - \Delta X_F^P \]

Equation 183 Financial derivatives and employee stock options, stock

\[ X_F^P = X_F^P + \Delta X_F^P + \text{reval}_{FA}^P + OCV_{FA}^P \]

Equation 184 Financial derivatives and employee stock options, revaluation effects (closes reval for this instrument)

\[ \text{reval}_{FA}^P = \text{reval}_{FA}^P + \text{reval}_{FA}^{ESO} + \text{reval}_{FA}^{ESO} - \text{reval}_{FA}^P \]

Equation 185 Financial derivatives and employee stock options, other changes in volume (closes OCV for this instrument)

\[ OCV_{FA}^P = OCV_{FA}^P + OCV_{FA}^{SP} + OCV_{FA}^{ESO} + OCV_{FA}^P - OCV_{FA}^P \]

Equation 186 Deposit holdings, stock

\[ D^P_F = \psi_{FA} p_Y \]

Equation 187 Deposit liabilities, flow

\[ \Delta D^P_F = \Delta D^P_F - \text{reval}_{FA}^P - OCV_{FA}^P \]

Equation 188 Banks absorb all public debt securities available (model runs with v1)

\[ p_{FB}^A \Delta B^F_{FB} = p_{FB}^A \Delta B^F_{FB} - p_{FB}^C \Delta B^F_{FB} - p_{FB}^{ESO} \Delta B^F_{FB} - p_{FB}^{ESO} \Delta B^F_{FB} v1 \]

\[ \left( \frac{p_{FB}^A \Delta B^F_{FB}}{p_Y} \right) = 0.35 \left( \frac{p_{FB}^A \Delta B^F_{FB}}{p_Y} \right) + 2.3 \left( i_{tyr} - i_{tyr} + \frac{\Delta \text{NEER}_{tyr}}{\text{NEER}_{tyr}} \right) v2 \]

Equation 189 Public debt securities held, stock

\[ B^F_{FA} = B^F_{FA} + \Delta B^F_{FA} + \left( \frac{OCV_{FB}^P}{p_{FB}^A} \right) \]

Equation 190 Public debt securities, price

\[ p_{FB}^A = \psi_{FB} p_{FB}^A \]

Equation 191 Foreign debt securities held, flow (accumulation rate)

\[ \left( \frac{\Delta B^F_{FB}}{B^F_{FA}} \right) = 0.65 \left( \frac{\Delta B^F_{FB}}{B^F_{FA}} \right) + 0.6 \left( i_{tyr} - i_{tyr} \right) \]

Equation 192 Foreign debt securities held, stock

\[ B^F_{FA} = B^F_{FA} + \Delta B^F_{FA} + \left( \frac{OCV_{FB}^P}{p_{FB}^A} \right) \]

Equation 193 Foreign debt securities held, price

\[ \Delta p_{FB}^F = \left( \frac{p_{FB}^F}{p_{FB}^F} \right) \Delta p_{FB}^F - \sum_i \left( \frac{p_{FB}^F}{p_{FB}^F} \right) \Delta p_{FB}^F \text{ for } i = F, CB, G, H \]

Equation 194 Demand for other securities

\[ \left( \frac{p_{FB}^F \Delta B^F_{FB}}{p_Y} \right) = 0.6 \left( \frac{\Delta Y}{Y} \right) + 0.6 r_f - 0.6 \left( i_{tyr} - \frac{\Delta \text{NEER}_{tyr}}{\text{NEER}_{tyr}} \right) \]

Equation 195 Other debt securities held, flow

\[ b^F_{FA} = b^F_{FA} + \Delta b^F_{FA} + \left( \frac{OCV_{FB}^P}{p_{FB}^A} \right) \]

Equation 196 Other securities held, price

\[ \Delta \ln \left( p_{FB}^F \right) = 0.2 \Delta \ln \left( p_{FB}^F \right) + 0.7 \Delta \ln \left( p_{FB}^F \right) \]

Equation 197 Equities held, flow (financial accumulation rate)

\[ \left( \frac{\Delta E_{FA}^P}{E_{FA}^P} \right) = 0.03 + 0.4 \left( \frac{\Delta E_{FA}^P}{E_{FA}^P} \right) + 0.05 \left( r_{FA} - \pi_{FA} \right) \]

Equation 198 Equities held (domestic + foreign), stock

\[ E_{FA} = E_{FA} + \Delta E_{FA}^P + \left( \frac{OCV_{FA}^P}{p_{FA}^A} \right) \]

Equation 199 Equities held, price

\[ p_{FA}^A = \psi_{FA} \left( \frac{p_{FA}^A}{p_{FA}^A} \right) + p_{FA}^A \left( \frac{p_{FA}^A}{p_{FA}^A} \right) \]

Equation 200 Profitability of equities held

\[ r_{FA} = \left( \frac{E_{FA} + \Delta E_{FA}^P}{E_{FA}^P} \right) \]

Equation 201 Domestic equities held by banks, stock

\[ p_{FB}^{ER} E_{FA}^P = p_{FB}^{ER} E_{FA}^P - p_{FB}^{ER} E_{FA}^P \]

Equation 202 Domestic equities held by banks, flow

\[ \Delta E_{FA}^{ER} = \Delta E_{FA}^{ER} - \left( \frac{OCV_{FA}^{ER}}{p_{FA}^A} \right) \]

Equation 203 Domestic equities held by banks, price

\[ p_{FB}^{ER} = \psi_{FB} p_{FB}^{ER} \]

Equation 204 Foreign equities held by banks, stock

\[ \left( \frac{p_{FB}^{ER} E_{FA}^P}{p_{FB}^{ER} E_{FA}^P} \right) = 0.03 + 0.36 \left( \frac{p_{FB}^{ER} E_{FA}^P}{p_{FB}^{ER} E_{FA}^P} \right) - 0.4 \left( \frac{\Delta \text{NEER}_{tyr}}{\text{NEER}_{tyr}} \right) \]

Equation 205 Foreign equities held by banks, stock

\[ \Delta E_{FA}^{ER} = \Delta E_{FA}^{ER} - \left( \frac{OCV_{FA}^{ER}}{p_{FA}^A} \right) \]

Equation 206 Foreign equities held by banks, price

\[ \Delta \ln \left( p_{FB}^{ER} \right) = 0.5 \Delta \ln \left( p_{FB}^{ER} \right) \]

Equation 207 Bank reserves, flow; closes the account of financial institutions excluding the central bank (this version runs with option 1)

Option 1 (QE, 2007-)

\[ \Delta \ln \left( p_{FB}^F \right) = 0.5 \Delta \ln \left( p_{FB}^F \right) \]
Option 2 (no QE, 1992-2006)

\[ \Delta \text{RES} = \Delta \text{RF} + \Delta D_p^p + p_{B,q}^p \Delta B_t^p + p_{E,q}^p \Delta E_t^p + p_{R,q}^p \Delta R_t^p + (\Delta D_p^q - \Delta D_p^p) + p_{B,q}^q \Delta B_t^q + p_{E,q}^q \Delta E_t^q + \Delta X_a^q + \Delta Z^q + \text{Reserv} + N_{BP} + \text{Adj}^p \]

Equation 208 Bank reserves, stock

\[ \text{RES} = \text{RES}_{-1} + \Delta \text{RES} + \text{OCV}_{E}^B \]

Equation 209 Bank deposits, flow, closes the row of the instrument

\[ \Delta \text{D}_p^p = \Delta \text{D}_{-1}^p + \Delta \text{D}_{-1}^q + \text{reval}_{D_p}^p + \text{OCV}_{D_p}^B \]

Equation 210 Deposit liabilities, stock

\[ \text{D}_p = \text{D}_{-1}^p + \Delta \text{D}_p^p + \text{reval}_{D_p} + \text{OCV}_{D_p}^B \]

Equation 211 Deposit liabilities, revaluation effects (closes reserve for this instrument)

\[ \text{reval}_{D_p} = \text{reval}_{D_p}^p + \text{reval}_{D_p}^q + \text{reval}_{D_p}^{p,q} + \text{reval}_{D_p}^{p,-} - \text{reval}_{D_p}^{q,-} - \text{reval}_{D_p}^{q,-} \]

Equation 212 Deposit liabilities, other changes in volume (closes OCV for this instrument)

\[ \text{OCV}_{D_p} = \text{OCV}_{D_p}^B + \text{OCV}_{D_p}^G + \text{OCV}_{D_p}^H + \text{OCV}_{D_p}^I + \text{OCV}_{D_p}^L + \text{OCV}_{D_p}^R - \text{OCV}_{D_p}^N - \text{OCV}_{D_p}^{CB} - \text{OCV}_{D_p}^{C} \]

Equation 213 Debt securities issued, closes the instrument

\[ p_{B,q}^p \Delta B_t^p = p_{B,q}^p \Delta B_{-1}^p + p_{E,q}^p \Delta B_{-1}^q + p_{E,q}^p \Delta B_{-1}^{p,q} + p_{E,q}^p \Delta B_{-1}^{p,-} - p_{B,q}^q \Delta B_t^q - p_{E,q}^q \Delta B_{-1}^q \]

Equation 214 Debt securities issued, price

\[ \Delta p_{B,q} = - \left( \frac{B_{-1}^t}{p_{B,q}^{t-1}} \right) \Delta p_{B,q} + \sum_{i} \left( \frac{B_{-1}^t}{p_{B,q}^{t-1}} \right) \Delta p_{B,q} \quad \text{for} \quad i = B,C,G,H,R \]

Equation 215 (Other) debt securities issued, stock

\[ B_{-1}^p = B_{-1}^{p-1} + \Delta B_{-1}^p + \text{OCV}_{B}^B \]

Equation 216 Other securities held, other changes in volume (closes OCV for this instrument)

\[ \text{OCV}_{B} = \text{OCV}_{B}^B + \text{OCV}_{B}^G + \text{OCV}_{B}^H + \text{OCV}_{B}^I + \text{OCV}_{B}^L - \text{OCV}_{B}^N \]

Equation 217 Insurance, pension funds and standardized guarantee schemes, flow, closes the row of the instrument

\[ \Delta A_{B}^p = \Delta A_{B}^p + \Delta A_{B}^q + \Delta A_{B}^{p,q} + \Delta A_{B}^{p,-} \]

Equation 218 Insurance, pension funds and standardized guarantee schemes, stock

\[ A_{B}^p = A_{B}^{p-1} + \Delta A_{B}^p + \text{reval}_{A_{B}} + \text{OCV}_{A_{B}}^B \]

Equation 219 Insurance, pension funds and standardized guarantee schemes, other changes in volume (closes OCV for this instrument)

\[ \text{OCV}_{A_{B}}^B = \sum_{i} \text{OCV}_{A_{B}}^{i} \quad \text{for} \quad i = F,G,H,R \]

Equation 220 Equities issued (closes the block equities) → model runs with option 1

\[ p_{B,q}^p \Delta E_t^p = p_{B,q}^p \Delta E_{-1}^p + p_{E,q}^p \Delta E_{-1}^q + p_{E,q}^p \Delta E_{-1}^{p,q} + p_{E,q}^p \Delta E_{-1}^{p,-} - p_{B,q}^q \Delta E_t^q - p_{E,q}^q \Delta E_{-1}^q \]

Equation 221 Equities issued, stock

\[ E_{-1}^p = E_{-1}^p + \Delta E_{-1}^p + \frac{\text{OCV}_{E_{-1}^p}}{p_{E_{-1}^p}} \]

Equation 222 Equities issued, other changes in volume (closes OCV for the instrument)

\[ \text{OCV}_{E_{-1}^p} = \text{OCV}_{E_{-1}^p}^{B} + \text{OCV}_{E_{-1}^p}^{G} + \text{OCV}_{E_{-1}^p}^{H} + \text{OCV}_{E_{-1}^p}^{I} + \text{OCV}_{E_{-1}^p}^{L} - \text{OCV}_{E_{-1}^p}^{N} - \text{OCV}_{E_{-1}^p}^{CB} \]

Equation 223 Equities issued, price

\[ p_{E_{-1}^p} = \theta_{p_{E_{-1}^p}} p_{E_{-1}^p} \]

Equation 224 Profitability of equities issued

\[ r_{E_{-1}^p} = \frac{E_{-1}^p - \text{Div}_{E_{-1}^p}}{p_{E_{-1}^p}} \]

Equation 225 Other accounts receivable/payable, stock

\[ Z = \psi_{Z} p_{E_{-1}^p} \]

Equation 226 Other accounts receivable/payable, flow

\[ \Delta Z = \Delta Z - \text{OCV}_{Z}^p \]

Equation 227 Financial wealth

\[ \text{FW} = H^B + \text{RES} + D_{-1}^B + p_{B,q}^B B_{-1}^B + p_{E,q}^B B_{-1}^q + p_{B,q}^B B_{-1}^{p,q} + p_{B,q}^B B_{-1}^{p,-} - D_{-1}^B - p_{E,q}^B B_{-1}^B - \text{OCV}_{B}^B \]

Equation 228 Net wealth

\[ \text{WLNTH}_{B} = p_{B}^{B} K_{+1}^{B} + p_{E,B}^{B} K_{+1}^{E} + p_{B,E}^{B} K_{+1}^{E} + \text{FW}^B \]

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Equation 229 Interests paid

\[ \text{Int}_{E_{-1}^B} = r_{E_{-1}^B} \text{RES}_{-1} + r_{D_{-1}^B} \text{D}_{-1}^{B_{-1}} + \text{Int}_{E_{-1}^B}^{CB} \]

Equation 230 Interests received

\[ \text{Int}_{E_{-1}^B} = r_{E_{-1}^B} \text{FTP}_{-1} + r_{E_{-1}^B} \text{G2T}_{-1} + \text{Int}_{E_{-1}^B}^{CB} \]

\[ + r_{D_{0}^{E_{-1}^B}} \text{D}_{-1}^{E_{-1}^B} + p_{B}^{E_{-1}^B} B_{-1}^{E_{-1}^B} + p_{B}^{E_{-1}^B} B_{-1}^{E_{-1}^B} + p_{B}^{E_{-1}^B} B_{-1}^{E_{-1}^B} + p_{E}^{E_{-1}^B} B_{-1}^{E_{-1}^B} + p_{E}^{E_{-1}^B} B_{-1}^{E_{-1}^B} + p_{E}^{E_{-1}^B} B_{-1}^{E_{-1}^B} \]

\[ + \text{Int}_{E_{-1}^B}^{CB} \]
Equation 231 Dividends paid
\[ D_{t}^{CB} = y_{t}^{B} p_{t}^{CB} R_{t}^{CB} \]
Equation 232 Dividends received
\[ D_{t}^{CR} = y_{t}^{B} p_{t}^{CR} R_{t}^{CR} \]
Equation 233 Profits
\[ \Pi^{CB} = \text{Int}^{CB} - \text{Int}^{CR} + D_{t}^{CB} - D_{t}^{CR} \]
Equation 234 Taxes paid to the government
\[ \tau^{CB} = \Pi^{CB} \]
Equation 235 Central bank deposits held by the government
\[ D_{t}^{CB} = D_{t}^{CB} \]
Equation 236 Central bank deposits assets, stock
\[ D_{t}^{CB} = y_{t}^{CB} p_{t}^{CB} Y \]
Equation 237 Central bank deposits liabilities, stock
\[ D_{t}^{CB} = y_{t}^{CB} p_{t}^{CB} Y \]
Equation 238 Central bank deposits (assets and liabilities), flow
\[ \Delta D_{t}^{CB} = \Delta D_{t}^{CB} - \text{reval}_{t}^{CB} - OCV_{t}^{CB} \]
for \( i = A, L \)
Equation 239 Central bank deposits assets, other changes in volume
\[ OCV_{t}^{CB} = \alpha_{FORRES} OCV_{t}^{CB} \]
Equation 240 Bills and coins, flow; closes the row of the instrument
\[ H = H_{t-1} + \Delta H + OCV_{t} \]
Equation 241 Bills and coins, stock
\[ H = H_{t-1} + \Delta H + OCV_{t} \]
Equation 242 Bills and coins, other changes in volume (closes OCV for this instrument)
\[ OCV_{t} = \sum_{i} OCV_{t}^{i} \text{ for } i = F, B, H, R \]
Equation 243 Public bonds bought by the central bank (QE), flow
\[ P_{t}^{CB} R_{t}^{CB} = y_{t}^{CB} p_{t}^{CB} Y \]
Equation 244 Public bonds bought by the central bank (QE), stock
\[ B_{t}^{CB} = B_{t-1}^{CB} + \Delta B_{t}^{CB} + \left( \frac{OCV_{t}^{CB}}{p_{t}^{CB}} \right) \]
Equation 245 Price of public bonds bought by the central bank
\[ P_{t}^{CB} = y_{t}^{CB} p_{t}^{CB} Y \]
Equation 246 Foreign bonds bought by the central bank, stock
\[ P_{t}^{CB} B_{t}^{CB} = y_{t}^{CB} p_{t}^{CB} Y \]
Equation 247 Foreign bonds bought by the central bank, flow
\[ \Delta B_{t}^{CB} = \Delta B_{t}^{CB} - \left( \frac{OCV_{t}^{CB}}{p_{t}^{CB}} \right) \]
Equation 248 Price of foreign bonds bought by the central bank
\[ P_{t}^{CB} = y_{t}^{CB} p_{t}^{CB} Y \]
Equation 249 Other bonds bought by the central bank (QE), flow
\[ P_{t}^{CB} R_{t}^{CB} = y_{t}^{CB} p_{t}^{CB} Y \]
Equation 250 Other bonds bought by the central bank (QE), stock
\[ B_{t}^{CB} = B_{t}^{CB} + \Delta B_{t}^{CB} + \left( \frac{OCV_{t}^{CB}}{p_{t}^{CB}} \right) \]
Equation 251 Other bonds held by the central bank, price
\[ P_{t}^{CB} = y_{t}^{CB} p_{t}^{CB} Y \]
Equation 252 Purchase of bank credit, flow
\[ \Delta R_{t}^{CB} = y_{t}^{CB} p_{t}^{CB} Y \]
Equation 253 Purchase of bank credit, stock
\[ L_{t}^{CB} = L_{t}^{CB} + \Delta R_{t}^{CB} + \text{reval}_{t}^{CB} + OCV_{t}^{CB} \]
Equation 254 Refinancing, flow (this version runs with option 1)
Option 1 (QE, 2007-)
\[ \Delta R^{FB} = \Delta R^{FB} - \Delta R^{FB} \]
Option 2 (no QE, 1992-2006)
\[ \Delta R^{FB} = \Delta R^{FB} - \Delta R^{FB} - p_{t}^{FB} R_{t}^{FB} - p_{t}^{FB} R_{t}^{FB} - \Delta R^{FB} + \Delta R^{FB} + p_{t}^{FB} R_{t}^{FB} \]
\[ + \Delta R^{FB} + \Delta R^{FB} + \Delta R^{FB} + \Delta R^{FB} + \Delta R^{FB} + \Delta R^{FB} + \Delta R^{FB} \]
\[ + \Delta R^{FB} + \Delta R^{FB} - S^{0} - T_{t}^{FB} + N^{FB} + Adj^{FB} \]
Equation 255 Refinancing, stock
\[ RF = RF_{t-1} + \Delta R + OCV_{RF} \]
Equation 256 Refinancing, other changes in volume (closes OCV for this instrument)
\[ OCV_{RF} = OCV_{RF} - OCV_{RF} \]
Equation 257 Refinancing by the central bank, flow
\[ \Delta R^{CB} = \phi_{t}^{CB} p_{t}^{CB} Y \]
Equation 258 Refinancing by the central bank, stock
\[ R^{CB} = R^{CB} + \Delta R^{CB} + OCV_{RF}^{CB} \]
Equation 259 Domestic equities held, flow
\[ P_{t}^{EX} = y_{t}^{EX} p_{t}^{EX} Y \]
Equation 260 Domestic equities held, stock
\[ E_{t}^{EX} = E_{t}^{EX} + \Delta E_{t}^{EX} + \left( \frac{OCV_{t}^{EX}}{p_{t}^{EX}} \right) \]
Equation 261 Domestic equities held, price
\[ p_{t}^{EX} = \text{exogenous} \]
Equation 262 Foreign equities held, flow
\[ p_{A}^{CB} \Delta^{t} E_{A}^{CB} = \varphi_{A}^{CB} p_{A} Y \]
Equation 263 Foreign equities held, stock
\[ E_{A}^{CB} = E_{A}^{CB}_{-1} + (O C V_{A}^{CB} \Delta^{t} E_{A}^{CB}) p_{A} \]
Equation 264 Foreign equities held, price
\[ p_{A}^{CB} \text{ exogenous} \]
Equation 265
\[ \Delta^{t} E_{A}^{CB} = \Delta^{t} E_{A}^{CB} + p_{A}^{CB} \Delta^{t} E_{A}^{CB} + p_{A}^{CB} \Delta^{t} E_{A}^{CB} \]
Equation 266 Other accounts payable/receivable
\[ Z_{A}^{CB} \text{ exogenous} \]
Equation 267 Equity issued, stock
\[ p_{E_{1}}^{CB} \text{ exogenous} \]
Equation 268 Equity issued, flow
\[ \Delta^{t} E_{1}^{CB} = \Delta^{t} E_{1}^{CB} - (O C V_{E_{1}}^{CB} \Delta^{t} E_{1}^{CB}) p_{E_{1}} \]
Equation 269 Equity issued, price
\[ p_{E_{1}}^{CB} = \varphi_{E_{1}}^{CB} p_{E_{1}} \]
Equation 270 Net wealth = financial wealth
\[ W L T H^{CB} = F W^{CB} = p_{A}^{CB} + R F^{CB} + T R G T^{2} + D_{0}^{CB} + p_{A}^{CB} B_{A}^{CB} \]
\[ + p_{A}^{CB} B_{A}^{CB} + L_{A}^{CB} + p_{A}^{CB} R_{A}^{CB} + X_{A}^{CB} + Z_{A}^{CB} - H = R E S - D_{2}^{CB} - D_{1}^{CB} \]
\[ - p_{E_{1}}^{CB} E_{1}^{CB} \]
Equation 271 Central bank's accounting equilibrium (system's unwritten identity)
\[ p_{A}^{CB} \Delta^{t} G^{CB} + \Delta^{t} T R G T^{2} + \Delta^{t} R E^{CB} + \Delta^{t} D^{CB} + \Delta^{t} B_{A}^{CB} \]
\[ + p_{A}^{CB} B_{A}^{CB} + p_{A}^{CB} B_{A}^{CB} + \Delta^{t} L_{A}^{CB} \]
\[ + \Delta^{t} E_{A}^{CB} \]
\[ = \Delta^{t} H + \Delta^{t} R E S + \Delta^{t} D_{1}^{CB} + \Delta^{t} D_{1}^{CB} + p_{E_{1}}^{CB} \Delta^{t} E_{1}^{CB} \]
\[ + + A d j^{t} \]

Government
Equation 272 Wages paid by the public sector
\[ W_{p}^{G} = w_{p}^{G} N^{G} \]
Equation 273 Labor contributions paid
\[ L C_{p}^{G} = \beta_{L}^{G} W_{p}^{G} \]
Equation 274 Labor taxes paid
\[ T_{L}^{G} = \beta_{L}^{G} W_{p}^{G} \]
Equation 275 Labor taxes received
\[ T_{L}^{G} = \sum_{t} T_{L}^{G} - T_{L}^{G} \text{ for } i = F, B, C, G, H \]
[Operating surplus of the public sector \( \rightarrow H^{G} = V A^{G} - W_{p}^{G} - L C_{p}^{G} - T_{L}^{G} + S u b^{G} \)]
Equation 276 Subsidies on production
\[ S u b = \beta_{L}^{G} V A \]
Equation 277 Value added taxes
\[ T^{P} = \gamma_{T} V A \]
Equation 278 Interests received
\[ I n t_{2}^{G} = r_{A}^{2}(D_{2}^{G} - 1 + p_{E_{2}}^{G} B_{A}^{G} + r_{D}^{D_{2}^{G}}) \]
Equation 279 Interests paid
\[ I n t_{2}^{G} = r_{A}^{2}(D_{2}^{G} - 1 + p_{E_{2}}^{G} B_{A}^{G} + r_{D}^{D_{2}^{G}}) \]
Equation 280 Dividends received
\[ D i v_{G}^{G} = \gamma_{D}^{G} p_{E_{2}}^{G} E_{2}^{G} \]
Equation 281 Rents received
\[ R E N T_{2}^{G} = r e n t_{2}^{G} p_{E_{2}}^{G} K_{2}^{G} \]
Equation 282 Income taxes received
\[ T = \sum_{t} T^{i} \text{ for } i = F, B, C, B, G, H, R \]
Equation 283 Social contributions received
\[ S C_{i}^{G} = S C_{i}^{G} + \sum_{i} S C_{i}^{G} \text{ for } i = F, B, R \]
Equation 284 Social benefits paid
\[ S B_{i}^{G} = \theta_{i} p_{p} Y \]
Equation 285 Miscellaneous transfers paid
\[ T r_{G}^{G} = \beta_{T}^{G} p_{p} Y \]
Equation 286 Disposable income
\[ Y_{d}^{G} = V A^{G} - W_{p}^{G} - L C_{p}^{G} - T_{L}^{G} + S u b^{G} + T_{L}^{G} + I n t_{2}^{G} - I n t_{2}^{G} + D i v_{G}^{G} \]
\[ + I N S_{G}^{G} + R E N T_{G}^{G} + T + S C_{G}^{G} - S B_{G}^{G} - T r_{G}^{G} \]
\[ + T_{G}^{G} + S u b + S u b^{G} + T^{C}^{G} \]
Equation 287 Current public spending (collective and individual)
\[ C^{G} = \beta_{C}^{G} Y \]
Equation 288 Price of current public expenditure
\[ \Delta \ln(p_{G}^{G}) = 1.02 \Delta \ln(p_{G}^{G}) \]
Equation 289 Savings (current public balance)
\[ S^{G} = Y^{G} - p_{G}^{G} C^{G} \]
Equation 290 Capital transfers paid
\[ T r_{p}^{G} = T r_{G}^{G} + T r_{G}^{G} + T r_{G}^{G} - T r_{G}^{G} - T r_{G}^{G} \]
Equation 291 Acquisitions less disposals of non-financial non-produced assets
\[ NP^G = \beta^G \cdot p^G Y \]
Equation 292 Financing capacity/need

\[ FCN^G = S^G - \left( p^G_t I^A_t - p^G_{t+1} I^A_{t+1} - NP^G - TR\tilde{G}_t \right) \]
Equation 293 Investment

\[ \Delta \ln (p^G_t) = 1.1 \Delta \ln (p^F_t) \]
Equation 294 Investment, price

\[ \Delta \ln (p^G_t) = 0.3 \Delta \ln (p^F_{t-1}) + 0.6 \Delta \ln (p^E_t) \]
Equation 295 Produced non-financial assets, price

\[ p^G_t K^G_t = (1 - \delta^G_t) p^G_{t-1} K^G_{t-1} + p^G_t I^G_t + K^G_t \Delta p^G_t + OCV^G_t \]
Equation 296 Produced non-financial assets, stock

\[ p^G_t K^G_t = p^G_{t-1} K^G_{t-1} + p^G_t I^G_t + K^G_t \Delta p^G_t + OCV^G_t \]
Equation 297 Non-produced non-financial assets, price

\[ p^G_t = \psi^G_t p^G_t \]
Equation 298 Non-produced non-financial assets, stock

\[ p^G_t K^G_t = p^G_{t-1} K^G_{t-1} + p^G_t I^G_t + K^G_t \Delta p^G_t + OCV^G_t \]
Equation 299 Government's account vis-à-vis the central bank, stock

\[ D^\text{CA}_A = \psi^{\text{CA}}_A VA^C \]
Equation 300 Government's account vis-à-vis the central bank, flow

\[ \Delta D^\text{CA}_A = \Delta D^\text{CA}_A - OCV^\text{CA}_A \]
Equation 301 Deposits received by the government, stock

\[ D^G = \psi^G_c (D^G - h m) \]
Equation 302 Deposits received by the government, flow

\[ \Delta D^G = \Delta D^G - \text{reval} D^G_A - OCV^G_{D^G} \]
Equation 303 Deposits, stock

\[ D^G = \psi^G_c VA^G \]
Equation 304 Deposits, flow

\[ \Delta D^G = \Delta D^G - \text{reval} D^G_A - OCV^G_{D^G} \]
Equation 305 Foreign securities held by the government, stock

\[ p^G_{G^A} B^G_{G^A} = \psi^G_{G^A} p^G Y \]
Equation 306 Foreign securities held by the government, flow

\[ \Delta^G B^G_{G^A} = \Delta B^G_{G^A} - \frac{OCV^G_{G^A}}{p^G_{G^A}} \]
Equation 307 Foreign securities held by the government, price

\[ p^G_A = \psi^G_{p^G A} p^G A \]
Equation 308 Other securities held by the government, stock

\[ p^G_A B^G_A \text{ exogenous} \]
Equation 309 Other securities held by the government, flow

\[ \Delta^G B^G_{G^A} = \Delta B^G_{G^A} - \frac{OCV^G_{G^A}}{p^G_{G^A}} \]
Equation 310 Other securities held by the government, price

\[ p^G_A = \psi^G_{p^G A} p^G A \]
Equation 311 Equity held, stock

\[ p^G_A E^A_A = \psi^G_{E^A A} \]
Equation 312 Equity held, price

\[ p^G_A = p^G_{E^A A} \left( p^G_{E^A A} \frac{p^G_{E^A A}}{p^G_{E^A A}} \right) + p^G_{E^A A} \frac{p^G_{E^A A}}{p^G_{E^A A}} \]
Equation 313 Equity held, flow

\[ \Delta^G E^A_A = \Delta E^A_A - \frac{OCV^G_{E^A A}}{p^G_{E^A A}} \]
Equation 314 Domestic equities held by the government, stock

\[ p^G_{E^A A} = \psi^G_{E^A A} e^G_{E^A A} \]
Equation 315 Domestic equities held by the government, flow

\[ \Delta^G E^A_A = \Delta E^A_A - \frac{OCV^G_{E^A A}}{p^G_{E^A A}} \]
Equation 316 Domestic equities held by the government, price

\[ \Delta \ln (p^G_{E^A A}) = 0.4 \Delta \ln (p^E_t) - 0.5 \ln (p^E_t) \]
Equation 317 Foreign equities held by the government, stock

\[ p^G_{E^A A} = p^G_{E^A A} p^G_{E^A A} \]
Equation 318 Foreign equities held by the government, price

\[ p^G_{E^A A} \text{ exogenous} \]
Equation 319 Foreign equities held government, flow

\[ \Delta^G E^A_A = \Delta E^A_A - \frac{OCV^G_{E^A A}}{p^G_{E^A A}} \]
Equation 320 Profitability of equities held

\[ r^G_{E^A A} = \frac{E^A_A - \Delta p^G_{E^A A} + Div^G}{p^G_{E^A A} E^A_A} \]
Equation 321 Financial derivatives held by the government, stock

\[ \chi^G = \psi^G_c VA^G \]
Equation 322 Financial derivatives held by the government, flow

\[ \Delta^G \chi^G = \Delta \chi^G - \text{reval} \chi^G_A - OCV^G \]
Equation 323 Total public indebtedness, flow; closes the account of the government
Equation 324 Public bonds (model runs with υ1)

\[ \ln(p_{\text{BL}}^*) = -0.39 + 0.1 \ln \left( \frac{1}{\mu} \right) + \nu1 \]

Equation 325 Total public indebtedness, stock

\[ BL^L_t = BL^L_{t-1} + \Delta BL^L_t + \left( \frac{OCV_{BL}^L}{p_{BL}^*} \right) \]

Equation 326 Total public indebtedness, price

\[ \Delta \ln(p_{\text{BL}}^*) = 0.82 \Delta \ln(p_{\text{BL}}^*) \]

Equation 327 Bonds issued, stock

\[ p_{\text{BL}}^* \text{ exogenous} \]

Equation 328 Bonds issued, price

\[ p_{\text{BL}}^* \text{ exogenous} \]

Equation 329 Public debt securities held, other changes in volume (closes OCV for this instrument)

\[ OCV_{a}^L = OCV_{a}^L + OCV_{a}^L + OCV_{a}^L + OCV_{a}^L \]

Equation 330 Bonds issued, flow

\[ \Delta B^L_t = \Delta B^L_t - \left( \frac{OCV_{a}^L}{p_{BL}^*} \right) \]

Equation 331 Credit demand, flow

\[ \Delta L^T_t = p_{BL}^* \Delta B^L_t - p_{BL}^* \Delta B^L_t \]

Equation 332 Credit demand, stock

\[ L^T_t = L^T_{t-1} + \Delta L^T_t + \text{reval}_{L^T_t} + OCV_{L^T_t} \]

Equation 333 Insurance, pension funds and guarantee schemes, stock

\[ A^G_t = \psi^G p_f Y \]

Equation 334 Insurance, pension funds and guarantee schemes, flow

\[ \Delta A^G_t = \Delta A^G_t - \text{reval}_{A^G_t} - OCV_{A^G_t} \]

Equation 335 Other accounts payable/receivable, stock

\[ Z^G_t = \psi^G p_f Y \]

Equation 336 Other accounts payable/receivable, flow

\[ \Delta Z^G_t = \Delta Z^G_t - OCV_{Z^G_t} \]

Equation 337 Financial wealth

\[ FW^G_t = D^{G_a} + D^{G_p} + A^{G_p} + p_{BL}^* B^{G_a} + \mathbf{A}^{G_a} + X^{G_a} + Z^{G_a} + Z^G - D^G_t - p_{BL}^* B^G_t - L^G_t \]

Equation 338 Net wealth

\[ WLIH^G = p_{\text{E}_1}^* K_{\text{E}_1}^G + p_{\text{E}_2}^* K_{\text{E}_2}^G + p_{\text{E}_3}^* K_{\text{E}_3}^G + FW^G \]

Rest of the world

Equation 339 Labor contributions paid

\[ LC^R_t = p_{\text{E}_1}^* W^R_t \]

Equation 340 Import taxes (on value added), paid as a fraction of imports

\[ T^R_t = \theta^R_t p_{\text{IM}}^* M \]

Equation 341 Wages paid

\[ W^R_t \text{ exogenous} \]

Equation 342 Subsidies

\[ Sub^R_t = \beta^R_{\text{sub}} p_f Y \]

Equation 343 Interests received

\[ Int^R_t = r^R_t \left( D_{a1}^L + p_{BL}^* B_{a1}^G + p_{BL}^* B_{a1}^G + L^R_{a1} \right) \]

Equation 344 Interests paid

\[ Int^R_t = r^R_t \left( D_{a1}^L + p_{BL}^* B_{a1}^G + L^R_{a1} \right) + r^R T^G_{a1} \]

Equation 345 Dividends paid

\[ Div^R_t = \gamma^R_t p_{\text{E}_1}^* \mathbf{L}^G_{a1} \]

Equation 346 Dividends received

\[ Div^R_t = Div^R_t + Div^R_t + Div^R_t + Div^R_t + Div^R_t - Div^R_t - Div^R_t \]

Equation 347 Reinvested earnings on FDI paid

\[ RFDI^R_t = r^R_{\text{FDI}} p_{\text{E}_1}^* \mathbf{E}^G_{a1} \]

Equation 348 Reinvested earnings on FDI received

\[ RFDI^R_t = r^R_{\text{FDI}} p_{\text{E}_1}^* \mathbf{E}^G_{a1} \]

Equation 349 Property income attributed to insurance policy holders received

\[ INS^R_t = r^R_{\text{INS}} A_{\text{a1}}^L \]

Equation 350 Import duties (paid on foreign income)

\[ T^R_t \text{ exogenous} \]

Equation 351 Social benefits received

\[ SB^R_t = \beta^R_{\text{sub}} p_f Y \]

Equation 352 Social benefits paid

\[ SB^R_t = \beta^R_{\text{sub}} p_f Y \]

Equation 353 Social contributions received

\[ SC^R_t = \theta^R_{\text{SC}} (SC^R_t + SC^R_t) \]

Equation 354 Exports of goods and services (volume)
\[ \Delta \ln(X) = 0.3 \Delta \ln(X_{-1}) + 0.4 \Delta \ln(Y') - 0.2 \Delta \ln \left( \frac{P_x}{p_y} \right) - 0.14 \nu_{c,-1} \]
\[ \nu_c = \ln(X) - 1.7 - 0.6 \ln(Y') + 0.5 \ln \left( \frac{P_x}{p_y} \right) \]

Equation 355 Price of exports of goods and services
\[ \ln(p_x) = 0.03 + 0.5 \ln(p_{x1}) + 0.3 \ln(p_y) \]

Equation 356 Imports of goods and services (volume)
\[ \Delta \ln(IM) = 2.2 \Delta \ln(Y) + 0.5 \nu_{c,-1} \]
\[ \nu_c = \ln(IM) - 1.8 \ln(Y) + 0.2 \ln(p_{IM}) + 0.8 - 0.01t \]

Equation 357 Price of imports of goods and services
\[ \Delta \ln(p_{IM}) = 0.12 \Delta \ln(p_{IM1}) + 0.7 \Delta \ln(p_{MESH}) - 0.45 \nu_{c,-1} \]
\[ \nu_c = \ln(p_{IM}) - 0.6 \ln(p_{MESH}) \]

Equation 358 Financing capacity/need \(-\) (-) current account
\[ FCN^R = p_{IM}M - p_xX + W_x - W_y + LC^R_\pi - LC^R_y + T^R + Sub^R \]
\[ - Sub^T + T^T + In^C_T - In^T_T + Div^R - Div^T + RFD^R_\pi - RFD^R_y + Ins^R - T^R + Sc^R \]
\[ + SF^R + Tr^R + Tr^R_y - Tr^R_T \]

Equation 359 Unworn equilibrium of goods and services with the rest of the world \(5 - I - \text{Current account} = 0\)
\[ \sum_i^{i=1} FCN^I = 0 \quad \text{for } I = F, B, G, H, R \]

Equation 360 Bills and coins, stock (0 before 2002)
\[ H^R = \eta_{h}p_yY \]

Equation 361 Bills and coins, flow
\[ \Delta^t H^R = \Delta H^R - \text{OCV}^R_\pi \]

Equation 362 Deposits held by foreigners, flow (accumulation rate)
\[ \left( \frac{\Delta D^R}{D^R_{t-1}} \right) = 2.9 \left( \frac{\Delta Y}{Y_{t-1}} \right) + 2 \left( \nu_{c-1} - \nu_{c-1} + \frac{\Delta NEER_{-1}}{NEER_{-1}} \right) \]

Equation 363 Deposits held by foreigners, stock
\[ D^R = D^R_{t-1} + \Delta D^R + \text{OCV}^R_\pi \]

Equation 364 Refinancing, flow
\[ \Delta^t RF^R \text{ exogenous} \]

Equation 365 Refinancing, stock
\[ RF^R = RF^R_{t-1} + \Delta^t RF^R + \text{OCV}^R_\pi \]

Equation 366 Public debt securities held by the RoW, flow
\[ \left( \frac{\Delta P^R_{B^c}}{B^c_{t-1}} \right) = 0.04 - 0.14 \left( \frac{\Delta P^R_{B^c}}{B^c_{t-1}} + 2.2 \left( \frac{\Delta Y}{Y_{t-1}} \right) + 3.9 \left( \nu_{c-1} - \nu_{c-1} + \frac{\Delta NEER_{-1}}{NEER_{-1}} \right) \right) \]

Equation 367 Public debt securities held by the RoW, stock
\[ B^c_{t} = B^c_{t-1} + \Delta B^c_{t} + \left( \frac{OCV^R_{B^c}}{P^R_k} \right) \]

Equation 368 Public debt securities held by the RoW, price
\[ \Delta p^R_{B^c} = \frac{B^c_{t+1}}{B^c_{t-1}} \Delta p^R_k - \sum_i \left( \frac{\Delta p^R_{B^c_i}}{B^c_{t-1}} - \Delta p^R_{Ia} \right) \text{ for } i = F, B, CB \]

Equation 369 Other debt securities held by the RoW, flow
\[ \left( \frac{\Delta' B^R_k}{B^R_k} \right) = 0.34 \left( \frac{\Delta' B^R_k}{B^R_k} + 2.2 \left( \frac{\Delta Y}{Y_{t-1}} \right) + 3.1 \left( \nu_{c-1} - \nu_{c-1} + \frac{\Delta NEER_{-1}}{NEER_{-1}} \right) \right) \]

Equation 370 Other debt securities held by the RoW, stock
\[ B^R_k = B^R_{k-1} + \Delta B^R_k + \left( \frac{OCV^R_k}{P^R_k} \right) \]

Equation 371 Loans held by the RoW, flow
\[ \left( \frac{\Delta' L^R_k}{L^R_k} \right) = 0.03 + 1.2 \left( \frac{\Delta Y}{Y_{t-1}} \right) + 1.3 \left( \nu_{c-1} - \nu_{c-1} + \frac{\Delta NEER_{-1}}{NEER_{-1}} \right) \]

Equation 372 Loans held by the RoW, stock
\[ L^R_k = L^R_{k-1} + \Delta' L^R_k + \text{OCV}^R_k \]

Equation 373 Domestic equities held by the RoW, flow (includes inward FDI)
\[ \left( \frac{\Delta' E^R_k}{E^R_k} \right) = 0.04 + 0.05 \left( r^R_k - \pi_r \right) + 0.6 \left( \frac{\Delta Y_{t-1}}{Y_{t-1}} \right) \]

Equation 374 Domestic equities held by the RoW, stock
\[ E^R_k = E^R_{k-1} + \Delta E^R_k + \left( \frac{OCV^R_k}{P^R_k} \right) \]

Equation 375 Equities, flow-stock
\[ \Delta^t E^R_k = \Delta^t E^R_k + \left( \frac{OCV^R_k}{P^R_k} \right) \]

Equation 376 Equities held by the RoW, price
\[ \Delta p^R_k = \sum_i \left( E^R_{t-1} \Delta p^R_i - \sum_j \left( E^R_{t-1} \Delta p^R_{Ia} \right) \text{ for } i = F, B, CB \quad \& \quad j = F, B, CB, G, H \]

Equation 377 Profitability of equities held by the RoW
\[ r^R_k = \left( \frac{E^R_{t-1} \Delta p^R_k + Div^R_k}{P^R_k} \right) \]

Equation 378 Insurance, pension funds and standardized guarantee schemes held by the RoW, stock
\[ A^R_k = \eta_{a}p_yY \]

Equation 379 Insurance, pension funds and standardized guarantee schemes held by the RoW, flow
\[ \Delta^t A^R_k = \Delta A^R_k - \text{OCV}^R_k \]

Equation 380 Financial derivatives and employee stock options, stock (net)
\[ X^R_k = \eta_{a}p_yY \]
Equation 381 Financial derivatives and employee stock options, flow (net)

\[ \Delta X_{t}^{d} = \Delta X_{t}^{e} - OCV_{t}^{d} \]

Equation 382 Deposits received by the RoW, stock

\[ D_{t} = D_{t-1} + \Delta D_{t} + \text{real}_{t} + OCV_{t}^{d} \]

Equation 383 Deposits received by the RoW, closes the rest of the world’s account

\[ \Delta^{*} D_{t} = \Delta H^{R} + \Delta D_{t} + p_{t}^{R} A_{t} B_{t}^{R} + p_{t}^{R} A_{t} C_{t}^{R} + \Delta L_{t}^{R} + \Delta^{*} E_{t}^{R} + \Delta^{*} X_{t}^{R} \]

Equation 384 Debt securities issued by the RoW, flow, closes the line

foreign debt securities

\[ p_{t}^{B} = p_{t}^{B} * x_{R} \]

Equation 385 Debt securities issued by the RoW, stock

\[ B_{t} = B_{t-1} + \Delta B_{t} + (OCV_{t}^{d} - \text{real}_{t}) \]

Equation 386 Debt securities issued by the RoW, other changes in volume

(abbreviated for this instrument)

\[ OCV_{t}^{d} = \sum_{i} OCV_{t}^{ia} \text{ for } i = F, B, CB, G, H \]

Equation 388 Credit demand by the RoW, flow (accumulation rate)

\[ \left( \frac{\Delta L_{t}^{R}}{L_{t-1}^{R}} \right) = 1.9 \left( \frac{\Delta Y_{t}}{Y_{t-1}} \right) \]

Equation 389 Credit demand by the RoW, stock

\[ L_{t}^{R} = L_{t-1}^{R} + \Delta L_{t}^{R} + \text{real}_{t} + OCV_{t}^{d} \]

Equation 389 Foreign equities held by domestic agents, stock

(abbreviated foreign FDI)

\[ E_{t}^{R} = E_{t-1}^{R} + \Delta E_{t}^{R} + (OCV_{t}^{d} - \text{real}_{t}) \]

Equation 389 Foreign equities held by domestic agents, flow

(abbreviated foreign FDI), value

\[ p_{t}^{E} E_{t}^{d} = p_{t}^{E} A_{t} E_{t}^{d} + p_{t}^{E} A_{t} E_{t}^{d} + p_{t}^{E} A_{t} E_{t}^{d} + p_{t}^{E} A_{t} E_{t}^{d} + p_{t}^{E} A_{t} E_{t}^{d} + p_{t}^{E} A_{t} E_{t}^{d} + p_{t}^{E} A_{t} E_{t}^{d} + p_{t}^{E} A_{t} E_{t}^{d} \]

Equation 392 Foreign equities held by domestic agents, flows

(abbreviated foreign FDI), volume

\[ \Delta E_{t}^{R} = \left( \frac{p_{t}^{E} A_{t} E_{t}^{d}}{p_{t}^{E}} \right) \]

Equation 393 Foreign equities held by domestic agents, other changes in volume

(closes OCV for this instrument)

\[ OCV_{t}^{ia} = \sum_{i} OCV_{t}^{ia} \text{ for } i = F, B, CB, G, H \]

Equation 394 Foreign equities held by domestic agents, price

(includes outward FDI)

\[ \Delta p_{t}^{R} = \sum_{i} (\frac{p_{t}^{ia}}{p_{t-1}^{ia}}) \text{ for } i = F, B, CB, G, H \]

Equation 395 Proﬁtability of equities issued by the RoW

\[ r_{t}^{E} = \left( \frac{E_{t}^{R} - \Delta p_{t}^{R} + \text{Div}_{t}^{R}}{p_{t}^{R} E_{t-1}} \right) \]

Equation 396 Target 2

TRGT2 exogenous

Equation 397 Monetary gold and Special Drawing Rights, stock

\[ G^{CB} = G^{CB-1} + \Delta^{*} G^{CB} + \left( \frac{OCV_{t}^{CB}}{p_{t}^{CB}} \right) \]

Equation 398 Monetary gold and Special Drawing Rights, flow

\[ p_{t}^{CB} \Delta^{*} G^{CB} \text{ exogenous} \]

Equation 399 Monetary gold and Special Drawing Rights, price

\[ \Delta \ln(p_{t}^{CB}) = 0.5 \ln(p_{t-1}^{CB}) - 0.5 \ln(p_{t-1}^{CB}) \]

Equation 400 Other accounts payable/receivable, stock

\[ Z^{R} = Z^{R-1} + \Delta^{*} Z^{R} + OCV^{R} \]

Equation 401 Other accounts payable/receivable, flow; closes the instrument

\[ \Delta^{*} Z^{R} = - \sum_{i} \Delta^{*} Z^{i} \text{ for } i = F, B, G, H \]

Equation 402 Other accounts payable/receivable, other changes in volume

(closes OCV for this instrument)

\[ OCV^{R} = \sum_{i} OCV_{t}^{ia} \text{ for } i = F, B, G, H \]

Equation 403 Net wealth

\[ WLTCH^{R} = H^{R} + p_{t}^{R} A_{t} B_{t}^{R} + p_{t}^{R} A_{t} C_{t}^{R} + p_{t}^{R} A_{t} E_{t}^{R} + \text{real}_{t} + \Delta L_{t}^{R} + \Delta^{*} E_{t}^{R} + \Delta^{*} X_{t}^{R} - \Delta^{*} \text{TRGT2} - p_{t}^{R} A_{t} B_{t}^{R} - L_{t}^{R} - p_{t}^{R} A_{t} B_{t}^{R} \]

Prices, wages, employment and interest rates

Equation 404 General price index

\[ \Delta \ln(p_{t}) = 0.01 + 0.4 \ln(ULC) + 0.3 \ln AP + 0.03 \Delta \ln(p_{t-1}) \]

\[ \Delta \ln(p_{t}) = \ln(p_{t}) - 0.4 - 0.9 \ln(ULC) \]
Equation 405 Unit labor costs, market sector
\[\frac{ULC^M}{\nu^M} = \left(\frac{W^M + LC^M + LC_{wp}^M + \theta_r^M T_p^M}{\nu^M}\right)\]

Note: \(LC^M = LC_p^M + LC_{wp}^M + LC_r^M\) and \(T_p^M = T_p^M + T_p^F + T_p^H\) and \(LC_{wp}^M = \theta_{25}^M W^M\)

Equation 406 Wages paid, market sector
\[W^H = W^M N^{SM}\]

Equation 407 Total wages paid in France
\[W = W^M + W^C\]

Equation 408 Employment in the market sector (salaried + non-salaried)
\[\Delta \ln(N^M) = 0.5 \Delta \ln(N^H) + 0.5 \Delta \ln(\nu^M) - 0.08 \nu_c \cdot \Delta t\]
\[\nu_c = \ln(N^M) - \left(\frac{\ln(\nu^M) - 0.8 - 0.5 \ln(K^M_1) - 0.014 \tau + 0.01 \tau_{1992}}{1 - 0.5}\right)\]

Equation 409 Non-salaried workers (total household employment = salaried + non-salaried), market sector
\[N^{NS} = N^M - N^{SM}\]

Equation 410 Salaried employment, share of total employment (market sector)
\[\ln\left(\frac{N^{SM}}{N^M}\right) = 3.9 + 0.009 \tau - 0.01 \tau_{2000-2019}\]

Equation 411 Firms’ workers
\[N^F = N^M - N^H - N^M\]

Equation 412 Total employment
\[N = N^M + N^C\]

Equation 413 Salaried workers, households
\[N^{H} = N^M - N^{NS}\]

Equation 414 Public sector (i.e. non-market sector) workers
\[N^C = N^{SM} \text{ exogenous}\]

Equation 415 Banks and households workers
\[N^I = \frac{y_t}{\gamma_t} N^M \quad \text{for} \quad i = B, H\]

Equation 416 Wage per worker, market sector
\[\Delta \ln\left(\frac{W^M}{N^M}\right) = \Delta \ln(w^M) = 0.005 + 0.5 \Delta \ln(w^M) + 0.43 \Delta \ln\left(\frac{\nu^M}{N^M}\right)\]
\[+ 0.38 \Delta \ln\left(\frac{\nu^M}{N^M}\right) - 0.2 \nu_c \cdot \Delta t\]
\[\nu_c = \ln(w^M) - 0.9 \Delta \ln(p^F) + 0.1 \ln(u) - 0.7 \Delta \ln\left(\frac{\nu^M}{N^M}\right)\]

Equation 417 Wage per worker paid by firms
\[\Delta \ln\left(\frac{w^F_p}{p^F}\right) = 0.4 \Delta \ln(w^F_p) + 1.014 \Delta \ln(w^F) - 0.4 \Delta \ln(w^M)\]

Equation 418 Wage per worker paid by banks
\[\Delta \ln\left(\frac{w^F_p}{p^F}\right) = 1.065 \ln(w^F) - 0.17 \nu_c - 1\]
\[\nu_c = \ln(w^F) + 1 - 1.12 \ln(w^F)\]

Equation 419 Wage per worker paid by the public sector
\[\Delta \ln\left(\frac{w^C_p}{p^F}\right) = 0.45 \Delta \ln(w^C_p) + 0.53 \Delta \ln(w^M) - 0.17 \nu_c - 1\]
\[\nu_c = \ln(w^C_p) + 0.2 - 1.02 \ln(w^M)\]

Equation 420 Output gap
\[\text{gap} = \left(\frac{\nu^F_{PM} - \nu^H_{PM}}{\nu^F_{PM}}\right)\]

Equation 421 Potential output; potential value added in volume (model runs with option 2)
\[\ln\left(\frac{\nu^F_{PM}}{N^M}\right) = 0.8 + 0.5 \ln\left(\frac{K^M_1}{N^M}\right) + 0.014 \tau - 0.01 \tau_{1992-2019}\]

Equation 422 Produced non-financial assets of the market sector, stock
\[K^M_t = K^F_t + K^B_t + K^H_t\]

Equation 423 Unemployment (number of unemployed)
\[U = AP - N\]

Equation 424 Unemployment rate
\[u = \left(\frac{U}{AP}\right)\]

Equation 425 Active population
\[\Delta \ln(\AP) = 0.4 \Delta \ln(N) + 0.4 \Delta \ln(TAP) - 0.2 \nu_c - 1\]
\[\nu_c = \ln(\AP) - 0.37 \ln(N) - 0.56 \ln(TAP) - 0.002 \tau\]

Equation 426 Interest rate received by firms
\[r^F_p = 3.6 + 0.63 \epsilon\]

Equation 427 Interest rate received by households
\[r^H_p = 1.6 + 0.5 \epsilon\]

Equation 428 Interest rate paid by firms
\[r^F_p = 1.6 + 0.7 \epsilon_{10\text{yrs}}\]

Equation 429 Interest rate received by banks
\[r^B_p = 0.4 + 0.5 r^F_{p-1} + 0.4 \epsilon_{10\text{yrs}}\]
Equation 430 Interest rate paid by banks

\[ r_p^b = 0.9 + 0.9 t_{10yrs} \]

Equation 431 Interest rate received by the government

\[ r_g^o = 2.5 + 1.6 r_e \]

Equation 432 Interest rate paid by the government

\[ r_g^f = 0.9 + 0.85 t_{10yrs} \]

Equation 433 Interest rate paid by households

\[ r_h^f = 0.9 t_{10yrs} \]

Equation 434 Interest rate received by the rest of the world

\[ r_r^f = t_{10yrs} + k_r^f \]

**Exogenous parameters and variables**

Note: exogenous parameters change over time (thus, do not have a single value). Example, \( \alpha_{IA}^H \) (in Equation 5) is calculated as \( \alpha_{IA}^H = VA^H / (VA - VA^B - VA^G) \), so that the parameter varies across periods. In the projections, they are given the last value.

\[
\begin{align*}
\alpha_{IA}^H & = \alpha_{IA}^H_t, \quad \alpha_{IA}^H_t = \alpha_{IA}^H_{t-1}, \\
G & = G_t, \quad G_t = G_{t-1}, \\
\end{align*}
\]

**Simulations**

**Observed vs simulated**

![Figure 1 GDP and components](image)

**Observed vs baseline, simulations start in 1996 solved with Newton’s algorithm**

The graphs for behavioral equations (\( p_Y, C^H, I^H, K^f, X, p_X, IM, p_{1M} \)) display the observed series (blue) and the simulated series (red). The graphs of the remaining series (mainly the identities \( Y, p_Y, p_H^G \), GAP and other ratios) display observed left-hand side of the equation (blue), observed right-hand side (red) and simulated series (green).
GDP in volume (prices of 2015), $Y$

GDP growth (%)

GDP in value, $p_Y Y$

Consumer price index, $p^C$

Unit labor costs, market sector $\left( \frac{w^M + LC^M + LCW^M + T^M}{N^M} \right)$

Labor productivity market sector, thousands $\left( \frac{w^M}{N^M} \right)$
Scenarios

Figure 2 Scenarios vs baseline (shocks start in 2021)
Baseline series compared to after-shock series (%), simulations start in 2019 solved with Newton’s algorithm

Top left $\rightarrow$ 1% increase in firms’ accumulation rate / 5% increase in household consumption / 5% in wage per worker growth

Top right $\rightarrow$ permanent 1% increase in the interest rate (10 year treasury & ECB rate + 10 year)

Middle left $\rightarrow$ 5% of GDP increase in public investment (permanent + one-shot)

Middle right $\rightarrow$ 5% of GDP increase in helicopter money with public investment (permanent + one-shot) / 5% of GDP recapitalization

Bottom left $\rightarrow$ 15% of GDP public debt cancellation (pure v 5% of GDP increase in public investment)

Bottom right $\rightarrow$ 5% of GDP increase in helicopter money (pure v CB transfer to the government v 5% of GDP increase in public investment v social benefits)
GDP volume, $V_{\text{shock}} / V_{\text{baseline}}$
GDP deflator, $\frac{P_t}{P_{t-1}} \times 100$
Output gap, $GAP_{\text{shock}} - GAP_{\text{baseline}}$ (%)
Labor productivity\(\left(\frac{N_{\text{post}}}{N_{\text{baseline}}} \times 100\right)\)

- Labor productivity following a 0.25% increase in firms accumulation rate (one-shot)
- Labor productivity following a 1% increase in household consumption (one-shot)
- Labor productivity following a 1% increase in wage per working hours (one-shot)
- Labor productivity following a 1% increase in firms accumulation rate (permanent)
- Labor productivity following a 1% increase in household consumption (permanent)
- Labor productivity following a 1% increase in wage per working hours (permanent)
- Labor productivity following a 1% of GDP increase in public investment (one-shot)
- Labor productivity following a 1% of GDP increase in public investment (permanent)
- Labor productivity following a 1% of GDP increase in public investment, one-shot public debt cancellation (permanent)
- Labor productivity following a 1% of GDP increase in public investment, one-shot + permanent increase in public invest (permanent)
- Labor productivity following a 1% of GDP increase in Helicopter Money (HM)
- Labor productivity following a 2% of GDP decrease in HM + or CB to good (one-shot)
- Labor productivity following a 2% of GDP decrease in HM + CB, social benefits (one-shot)
Firms' investment volume, $i_{t}^{back_{baseline}} (x100)$
Trade balance, \( \frac{PV_{\text{shock}} X_{\text{shock}} - PV_{\text{baseline}} X_{\text{baseline}}}{PV_{\text{shock}} Y_{\text{shock}}} = \frac{PV_{\text{baseline}} X_{\text{baseline}} - PV_{\text{baseline}} X_{\text{baseline}}}{PV_{\text{baseline}} Y_{\text{baseline}}} \) (%)
Government balance, \( \frac{FCN_{\text{stock}}^{\text{shock}}}{PV_{\text{shock}}^{\text{shock}}} - \frac{FCN_{\text{baseline}}^{\text{baseline}}}{PV_{\text{baseline}}^{\text{baseline}}} \) (%)
Government debt, \( p_g^{\text{shock}} \frac{\beta_c^{\text{shock}}}{p_y^{\text{shock}}} - p_g^{\text{baseline}} \frac{\beta_c^{\text{baseline}}}{p_y^{\text{baseline}}} \) (%)
Bank reserves $RES$

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**Diagram 1:**
- Graph showing changes in bank reserves over time.
- Y-axis: bank reserves.
- X-axis: time.\n
**Diagram 2:**
- Graph showing changes in GDP and related variables over time.
- Y-axis: GDP, bank reserves, etc.
- X-axis: time.

**Diagram 3:**
- Graph showing impact of various scenarios on GDP and related variables.
- Y-axis: GDP, bank reserves, etc.
- X-axis: time.

**Diagram 4:**
- Graph showing impact of different monetary policy actions on bank reserves and GDP.
- Y-axis: bank reserves, GDP, etc.
- X-axis: time.
Government wealth (%)