On considere une economie monetaire duale fermee avec deux secteurs geographiques:

* un secteur rural
* un secteur urbain

Chaque secteur geographique k*k* contient:

* un marche des biens unique
* des marches du travail formel et informel

Dans l'economie tout entiere, on a:

* un systeme bancaire unique
* une administration publique commune

les secteurs institutionnelles sont:

* les menages
* les entreprises
* les banques
* l'etat
* la Banque Centrale

Dans chaque secteur geographique, le secteur des menages est desagrege en 5 sous-secteurs j*j* :

* les entrepreneurs formels
* les entrepreneurs informels
* les salaries formels
* les salaries informels
* les chomeurs

De meme, dans chaque secteur geographique, le secteur des entreprises est desagrege en 2 sous-secteurs j*j* :

* les entreprises formels
* les entreprises informels

# Accounting Matrices

## Balance Sheets

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | Central bank |  |
| HP Money |  |  |  |  |  |  |
| Cash Advances |  |  |  |  |  |  |
| Deposits |  |  |  |  |  |  |
| Bonds |  |  |  |  |  |  |
| Loans |  |  |  |  |  |  |
| Equities |  |  |  |  |  |  |
| Balance |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## Transactions Matrix

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Consumption |  |  |  |  |  |  |
| Wages |  |  |  |  |  |  |
| Transfers |  |  |  |  |  |  |
| Taxes |  |  |  |  |  |  |
| Interests on advances |  |  |  |  |  |  |
| Interests on bonds |  |  |  |  |  |  |
| Interests on loans |  |  |  |  |  |  |
| Interests on deposits |  |  |  |  |  |  |
| Entrepreneurial profits |  |  |  |  |  |  |
| Central Bank profits |  |  |  |  |  |  |
| Change in advances |  |  |  |  |  |  |
| Change in bonds |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
| Change in loans |  |  |  |  |  |  |
| Change in deposits |  |  |  |  |  |  |
| Change in equities |  |  |  |  |  |  |
| Loan defaults |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

# Transactions accounting

We consider transactions during the following events:

1. \*Production planning\*: firms set desired production, labor demand, wages and prices (No transaction).

2. \*Credit markets matching\*: firms ask credit. banks grant loans and possibly ask cash advances to Central bank.

3. \*Labor markets matching\*: households set reservation wage. firms and government fires and hires workers (No transaction).

4. \*Wages and taxes payment\*: Firms pay wages. Households, banks and firms pay taxes.

6. \*Profit distribution\*: Firms and banks pay dividends. Central bank transfer profit.

5. \*Public expenditures\*: Government pay wages and doles.

6. \*Goods markets matching\*: Firms produce and export goods. Households consume and import goods.

6. \*Financial debt repayments\*: Government repay bonds. Firms repay loans. Banks pay deposit's interests and repay advances.

6. \*Bonds market matching\*: Government issue bonds. Banks buy bonds. Central Bank buy residuals bonds.

6. \*Deposits market matching\*: Firms and Households place deposits.

6. \*Firms and banks entry-exit\*: Defaulted firms and banks exit the market. New firms and banks are created.

## Non negative funds

To ensure some funds are non-negative. If some agents lack of liquid funds, he can use less liquid assets:

- Households use deposits if there is lack of cash (positive cash constraint)

- Firms use deposits if there is lack of cash (positive cash constraint)

- Banks use cash advances if there is lack of reserves (positive reserve constraint)

To pay anything firms and households must withdraw if necessary deposits.

## Consumption

Household consume goods using only cash

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Consumption |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## Wages

Firm pay wage to households

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Wages |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Government pay wage to households

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Wages |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## Transfers

Government pay doles to households

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Transfers |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## Taxes

Household pay taxes

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Taxes |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Firm pay taxes

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Taxes |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Bank pay taxes

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Taxes |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## Profits

Firm pay dividends to households

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Entrepreneurial profits |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Bank pay dividends to households

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Entrepreneurial profits |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Central bank transfer profits to Government

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Central Bank profits |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## Deposits

Household make deposits

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Change in HP Money |  |  |  |  |  |  |
| Change in deposits |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Household withdraw deposits

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Change in HP Money |  |  |  |  |  |  |
| Change in deposits |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Firm make deposits

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Change in HP Money |  |  |  |  |  |  |
| Change in deposits |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Firm withdraw deposits

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Change in HP Money |  |  |  |  |  |  |
| Change in deposits |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Bank pay interests to household

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Interests on deposits |  |  |  |  |  |  |
| Change in deposits |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Bank pay interests to firm

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Interests on deposits |  |  |  |  |  |  |
| Change in deposits |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## Loans

Bank give loans to firm

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Change in loans |  |  |  |  |  |  |
| Change in deposits |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Firm reimburse loans to bank (capital + interests)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Interests on loans |  |  |  |  |  |  |
| Change in loans |  |  |  |  |  |  |
| Change in deposits |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

bank make default loans

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Change in loans |  |  |  |  |  |  |
| Loan defaults |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## Bonds

bank buy bonds

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Change in bonds |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

central bank buy bonds

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Change in bonds |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Government repay bank bonds

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Interests on bonds |  |  |  |  |  |  |
| Change in bonds |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Government repay central bank bonds

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Interests on bonds |  |  |  |  |  |  |
| Change in bonds |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

bank transfer bonds to central bank

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Change in bonds |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## Advances

central bank give cash advance

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Change in advances |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

bank repay cash advance

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Interests on advances |  |  |  |  |  |  |
| Change in advances |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

## Entry-Exit

household invest in firm equities (firm entry)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Change in HP Money |  |  |  |  |  |  |
| Change in equities |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

firms exit process imply 3 steps:

* repay residual loans (see section 2.7)
* withdraw residual deposits (see section 2.6)
* reimburse residual equities

firm close by transferring residual money

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Entrepreneurial profits |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
| Change in equities |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

household invest in bank equities (bank entry)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Change in HP Money |  |  |  |  |  |  |
| Change in equities |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

bank exit process imply 5 steps:

* collect residual loans (see section 2.7)
* repay residual deposits (see section 2.6)
* transfer residual bonds (see section 2.8)
* repay residual advances (see section 2.9)
* reimburse residual equities

bank close by transferring residual cash to owners

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Households | Firms | Banks | Government | C. bank |  |
| Entrepreneurial profits |  |  |  |  |  |  |
| Change in HP Money |  |  |  |  |  |  |
| Change in equities |  |  |  |  |  |  |
|  |  |  |  |  |  |  |