Implications of informality for monetary and fiscal policy effectiveness in Colombia

SGPMIE-GT
Banco de la República

CBBH-BCC Conference
Informal Economy: Measurement and Effects
Sarajevo, 31 October 2024

1 Effects of the informal economy on monetary policy effectiveness

Oscar Ávila, Anderson Grajales, Juan José Ospina and Mario Ramos

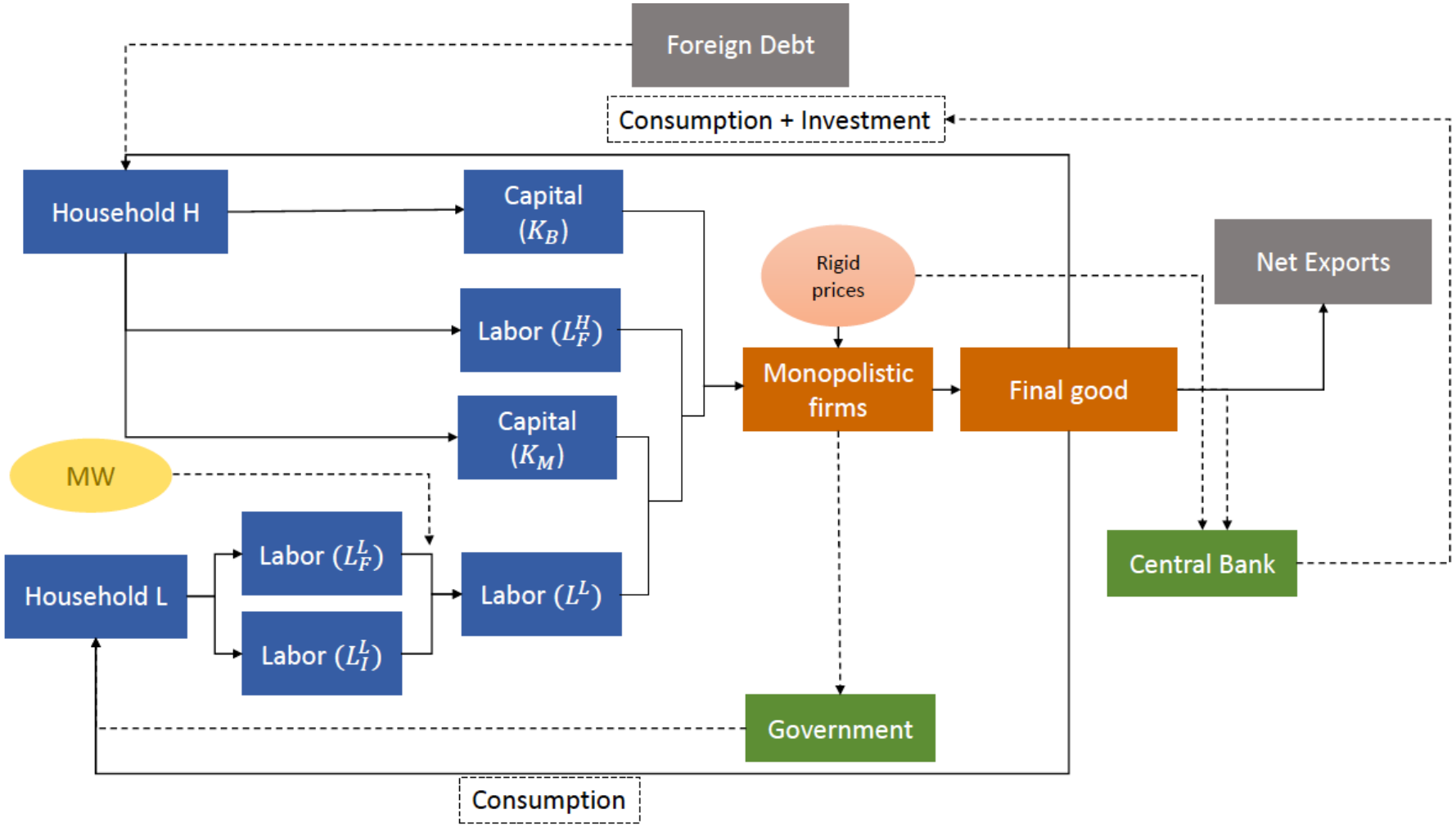
The model

- **Households: High-skilled (H) and Low-skilled (L)**
  - H: access to domestic and foreign financial markets, offer high-skilled labor, own firms and capital (buildings & equipment).
  - L: hand-to-mouth, offer formal and informal low-skilled labor.

- **Firms: Two layers**
  - Heterogeneous firms act in monopolistic competition, use three types of labor and two types of capital to produce a differentiated good (static problem). Face price rigidities (dynamic problem).
  - Final producer aggregates heterogeneous inputs into a homogeneous good that is allocated into consumption, investment, and net exports.

- **Institutions:**
  - Central Bank: Taylor rule that responds to inflation expectations and the output gap.
  - Government: Taxes formal labor and subsidizes low-skilled households (balanced budget).
  - Minimum wage to formal low skilled workers: rule of adjustment that depends on labor productivity + shock.

The model (cont.)



Calibration and estimation

- Data from National Accounts, Household Surveys, and PWT.
- Calibration strategy considers parameters from the literature, target matching, data and normalization.
- Estimation through Simulated Method of Moments to match business cycle moments.

The literature

Parameter	Definition	Value	Source
σ	Intertemporal elast. Subs	2.0	Glover (2019)
β	Discount factor	0.99	González et al. (2011)
ν_H	High-skilled Labor elasticity	1.0	Glover (2019)
ψ_H	Disutility of high-skilled labor	1.0	Glover (2019)
η	Elast. subs. L_m vs L_H	0.7	Krusell et al. (2000)
η_L	Elast. subs. L_I vs L_F	1.50	Krusell et al. (2000)
ϕ	Price rigidity	0.75	González et al. (2011)
ξ	Elast. subs. intermediates	12	González et al. (2011)
r_π	Taylor π	1.50	González et al. (2011)
r_y	Taylor y	0.25	González et al. (2011)
δ_m	Depreciation of K_m	0.01	Krusell et al. (2000)
δ_b	Depreciation of K_b	0.03	Krusell et al. (2000)

Target matching

Parameter	Definition	Value	Source
$\nu_{FL} = \nu_{IL}$	Low-skilled labor elasticity	2.0	Calibrated
$\psi_I = \psi_F$	Disutility of low-skilled labor	3.12	Calibrated
η_m	Elast. subs. L_L vs K_m	1.25	Calibrated
α	Capital share	0.31	Calibrated
ϑ	Productivity L_m vs L_H	0.34	Calibrated
ϑ_L	Productivity L_{FL} vs L_{IL}	0.51	Calibrated
ϑ_m	Productivity L_L vs K_m	0.42	Calibrated
w_{min}	LR real minimum wage	0.38	Calibrated
A	Productivity	0.83	Calibrated
ϕ_b	Capital adjustment cost k_b	0.004	Estimated
ϕ_m	Capital adjustment cost k_m	0.0065	Estimated
ϕ_a	Risk premium elast. to debt	0.90	Estimated

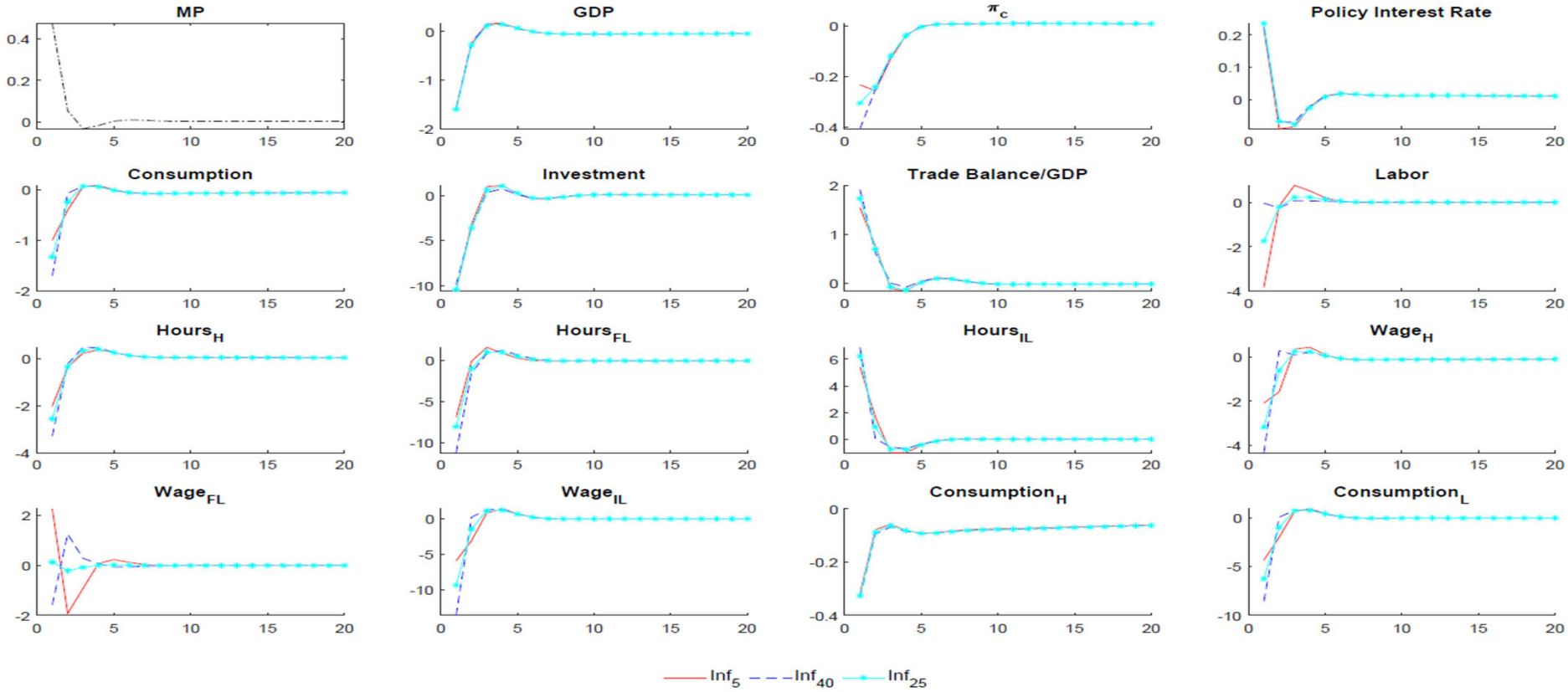
Data and normalization

Parameter	Definition	Value	Source
π	Long run inflation	1.0	Normalization
πfss	LR foreign inflation	1.0	Normalization
Afss	Net foreign assets LR	-0.50	Data
Φss	LR risk premium	1.0037	Data
τss	Labor taxes	1.2	Data

Estimated parameters (SMM)

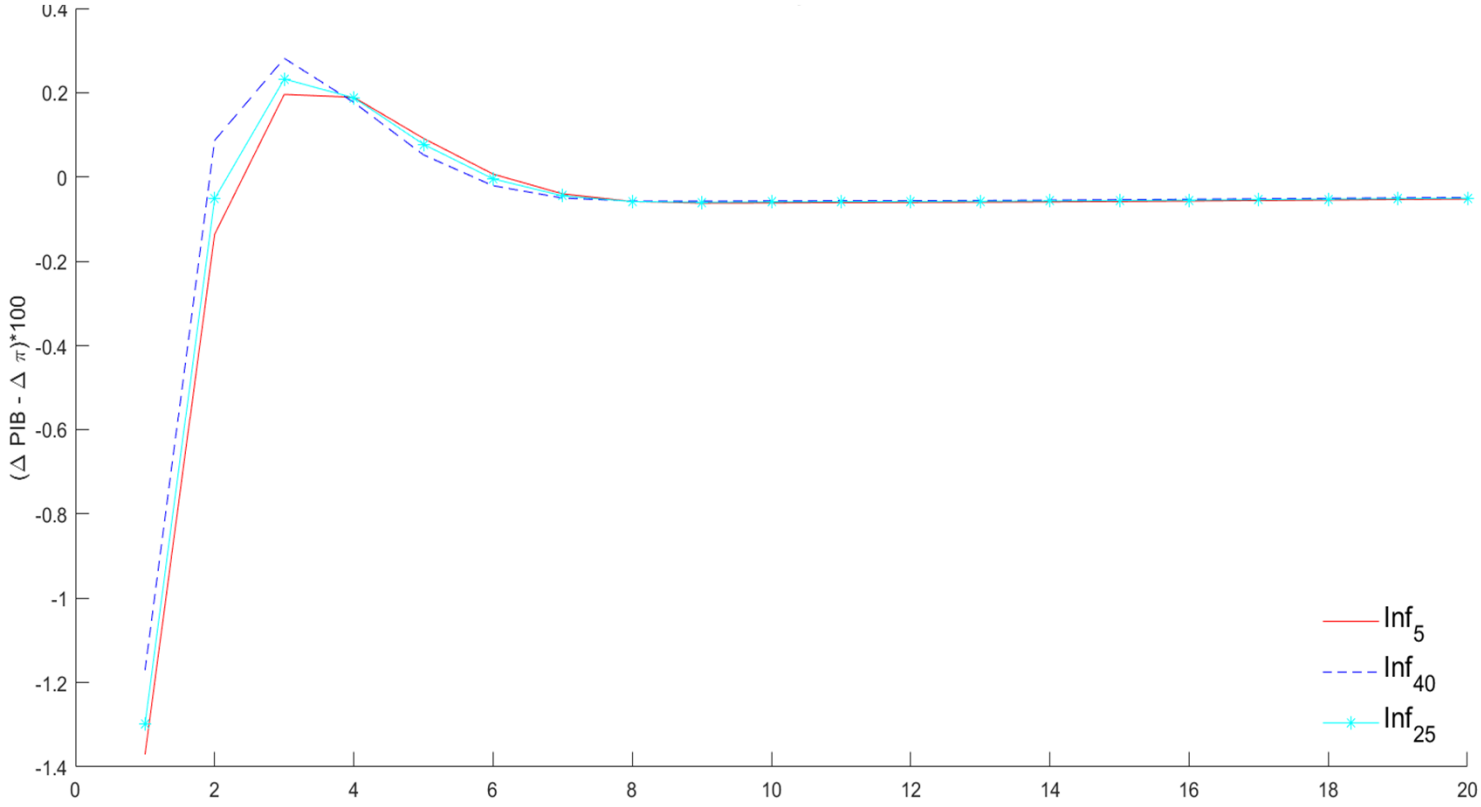
Shock	Persistence	Volatility
Total Factor Productivity (TFP)	0.92	0.0025
Demand	0.85	0.0015
Monetary Policy	0.75	0.0038
Labor costs	0.2	0.065

Impulse response function to a monetary policy shock



- With low informality, the economy has an additional rigidity associated with the minimum wage.
- An increase in the policy rate affects inflation the most in the economy with highest informality.

The sacrifice ratio is lower with higher informality



When informality is low, reducing inflation via the policy interest rate is more difficult as a larger share of the marginal cost is directly affected by the minimum wage rigidity.

2 Long-term effects of informality on fiscal policy

Catalina Granda and Jesús E. Morales

A SOE-RBC-SAM model with government

- A dynamic stochastic general equilibrium model of a small open economy with a labor market characterizing developing economies (unemployment + informality + inactivity), based on Leyva & Urrutia (2020, 2023).

- Preferences as in Leyva & Urrutia (2023, Appendix A) with external habits.

- The **government** balances a budget constraint that equals revenues and expenditures.
  - Revenue sources: tax collection (taxes on consumption, payroll, and capital and labor income) and oil revenue.
  - Expenditures: consumption, investment, and transfers
    - Productive investment expenditure ➔ **Public capital** as an externality.
    - Fiscal policy follows **rules** such that consumption and investment react endogenously to changes in government revenue.

A SOE-RBC-SAM model with government (cont.)

- Main decision margins of households:
  - **Labor participation** (labor-leisure choice).
  - **Formal** employment with:
    - Search and matching frictions ➔ Equilibrium **unemployment.**
    - Wage rigidity.
    - **Regulatory burden:** payroll taxes and firing costs.
  - **Informal** (self-)employment w/o frictions, rigidities and burdens of formal, but less productive.

- Shocks on aggregate productivity, foreign interest rate, government spending, and oil income.

- Limitations: representative agent, exogenous separation, no minimum wage.

- Estimated for the Colombian economy using GMM.

GMM Estimation

Matched data moments vs. Model moments

Moment	Data	Model
E[u_obs]	0.0711408	0.0720515
E[ls_obs]	0.3481620	0.3481390
E[lf_obs]	0.2442642	0.2438040
E[wfp_obs]	0.8862849	0.5709476
E[Estrechez_v_u]	0.3194186	0.3193847
E[diff_inv_obs*diff_inv_obs]	0.0028715	0.0006399
E[diff_v*diff_v]	0.0053584	0.0014154
E[diff_v*diff_v(-1)]	-0.0000007	-0.0006073
E[diff_lnw*diff_lnw]	0.0002950	0.0000005
E[diff_lnw*diff_lnw(-5)]	0.0000391	0.0000003
E[diff_y_obs*diff_lnw]	0.0000298	0.0000011
E[diff_lf_obs*diff_lnw]	-0.0000008	-0.0000004
E[diff_ii*diff_ii]	0.7553449	0.7479726
E[diff_r*diff_r]	0.0001746	0.0000058
E[diff_c_obs*diff_c_obs]	0.0000564	0.0000262
E[diff_y_obs*diff_y_obs]	0.0000694	0.0000679
E[diff_ii*diff_ii(-1)]	-0.1027612	-0.0700836
E[diff_c_obs*diff_c_obs(-1)]	-0.0000041	0.0000068
E[diff_y_obs*diff_y_obs(-1)]	0.0000062	0.0000022
E[diff_c_obs*diff_y_obs]	0.0000329	0.0000402
E[diff_y_obs*diff_u_obs]	-0.0000221	-0.0000463
E[diff_c_obs*diff_u_obs]	-0.0000440	-0.0000187
E[diff_u_obs*diff_u_obs]	0.0009967	0.0010681

Results from estimation

parameters

	Estimate	s.d.	t-stat
pzi	0.2581	0.0034	75.6552
D	0.5647	0.0041	137.2618
omega	2.3292	0.0062	377.7307
gama	0.7512	0.0013	566.8441
adjk	24.9279	2.8849	8.6409
phi	0.1765	0.0165	10.6753
delta_w	0.9717	0.0263	36.9637
hc	0.3652	0.0259	14.0726
rhoi	0.8126	0.0862	9.4266

standard deviation of shocks

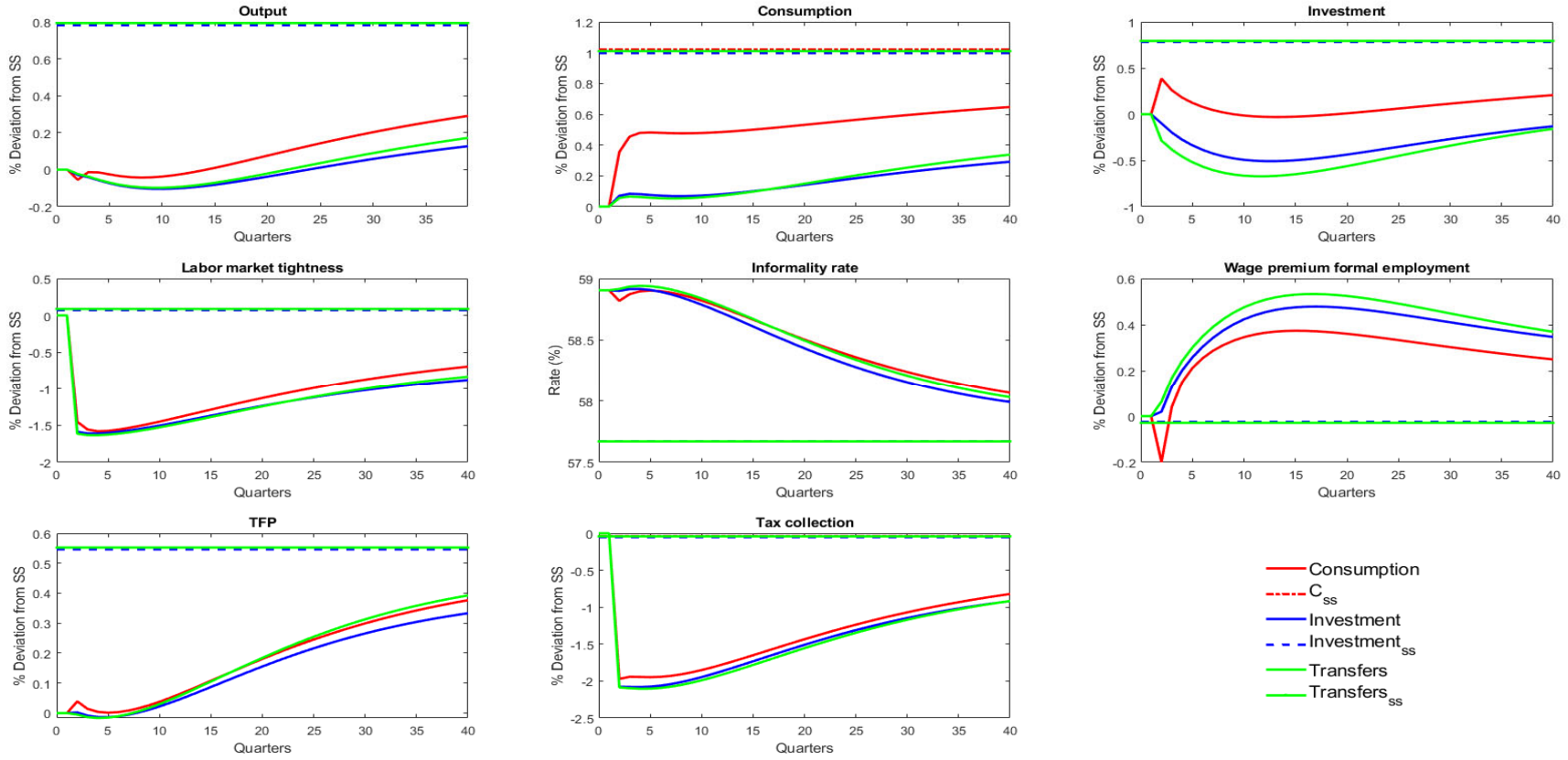
	Estimate	s.d.	t-stat
ea	0.0072	0.0002	33.7689
ei	0.8233	0.0348	23.6572

MINIMUM CHECK

Fval obtained by the optimization routine: 0.058097

Value of J-test statistic: 3.485793
p-value of J-test statistic: 0.991034

A ten-percent payroll tax reduction under different assumptions of how fiscal revenues are spent



THANK YOU!