

Macroeconomic Effects of Covid 19: Evidence from an Oil-Exporting Country

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Sharif U. of Tech.

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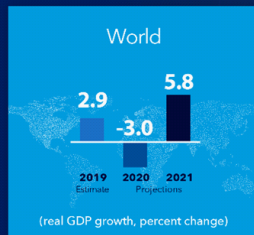
Who am I?

- Seyed Ali Madanizadeh
- Career:
 - Assistant professor Economics at Sharif University of Technology (2013-2021)
 - Economic Advisor of the Deputy of Iran's Budget Office (2018-2020)
 - Economic Advisor in the Central Bank of Iran (2018-2021)
 - Economic Modeling group head in Monetary and Banking Research Institute (2013-18)
- Education
 - PhD in Economics from the University of Chicago
 - MS in Computational and Mathematical Engineering from the Stanford University
 - BS in Electrical Engineering from the Sharif University of Technology

Covid 19 arrives

Latest World Economic Outlook growth projections

(percent change)



UNITED STATES



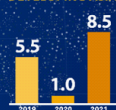
EURO AREA



MIDDLE EAST AND CENTRAL ASIA



EMERGING AND DEVELOPING ASIA



LATIN AMERICA AND THE CARIBBEAN



SUB-SAHARAN AFRICA



Source: IMF, World Economic Outlook, April 2020.

Note: Order of bars for each group indicates (left to right): 2019, 2020 projections, and 2021 projections.

IMF.org/social

Covid 19 arrives

Stock Markets in the beginning of Covid-19 (Yahoo Trends)

International Stock Markets	<i>Dec 2019</i>	<i>Jan 2020</i>	<i>Feb 2020</i>	<i>Mar 2020</i>	<i>Apr 2020</i>	<i>May 2020</i>
<i>S&P500</i>	3,144	3,245	3,236	2,974	2,498	2,869
<i>NYSE</i>	13,554	13,913	13,656	12,441	9,917	11,159
<i>NASDAQ Composite</i>	8,673	9,039	9,191	8,667	7,460	8,681
<i>Euronext</i>	1,131	1,152	1,123	1,041	834	870
<i>Gold Prices</i>	1,463	1,521	1,598	1,593	1,597	1,694

Covid 19 arrives

Oil Price estimations in the beginning of Covid-19

Oil Price	2019	2020.1	2020.2	2020.3	2020.4	2021
Brent	64	57	28	32	32	48
West Texas	57	23	15	21	21	32
OPEC	66	56	26	29	29	44

Budget Deficit Estimations in the beginning of Covid-19 (Thousands of Billion Tomans)

	Before	After
Ess. Goods Subs.	41	62
Subs. Fund	0	41.5
Gov.	198	215

Covid 19 arrives

Changes (in percent (%))

	19-3 to 20-3	19-4 to 20-4
Non-Oil Exports	-34.98	-36.33
Imports	-7.99	-17.28

Question

- How did the Covid-19 affect Iran's Economy?
- What are the short-run and long-run consequences?
- How do different policies affect the economy?

How Covid 19 Affected the Economy

- 4 channel that Covid-19 affected the Iran's economy
 - ① Oil Price Drop and thus a sharp fall in government's income from the export of oil and gas
 - ② Drop in demand for Iran's non-oil exporting goods: drop in quantity and prices of Iran's exportation
 - ③ Postponing consumption
 - ④ Lower labor supply due to precautions and government's enforcement of businesses' closure

- A Dynamic Stochastic General Equilibrium model Based on Iran's institutions
- Major Shocks:
 - Covid-19 shock
 - Sanctions shocks

- Household:

$$\max \sum \beta^t U(c_t, l_t; \psi_{ct}, \psi_{lt})$$

$$\begin{aligned} & P_t c_t + P_t l_t + E_t Q_t + B_t + M_t \\ = & (1 - \tau_t) (W_t l_t + r_t K_t) + E_t Q_{t-1} + (1 + i_t) B_{t-1} + M_{t-1} + S_t \end{aligned}$$

$$\begin{aligned} P_t C_t & \leq M_{t-1} + S_t \\ Q_t & \geq 0 \end{aligned}$$

- Firms:
 - Intermediate good producers
 - Final good producers: Combining domestic and foreign intermediate goods
 - Capital good producers: Combining Final goods with foreign capital goods producers
 - Consumption good producers: Combining Final goods with foreign consumption goods producers

- Government:

$$\begin{aligned} & G_t + S_t + (1 + i_t) B_{t-1} \\ = & \tau_t (W_t l_t + r_t K_t) + (1 - \tau_t^o) E_t p_t^o O_t + B_t + D_t \end{aligned}$$

- S_t includes all the subsidies and transfers to the households including the subsidies related to the cheap dollar (4200 Tomans) to the importers
- B_t is the government bonds minus the the banks' debt to the central bank
- D_t is the Central bank's seigniorage: Gov's debt and banks' debt to the central bank
- τ_t^o is the oil shock from sanctions or Covid-19 shock

- Central Bank:

$$\begin{aligned}\Delta M_t &= D_t + (1 - \tau_t^o) E_t (p_t^o O_t - f_t) \\ F_t &= F_{t-1} + p_t^o O_t - f_t\end{aligned}$$

- f_t : CB's intervention in the foreign market
- F_t : CB's Foreign Reserves
- M_t : Money Base

- Import of consumption, intermediate and capital goods
- Export of oil and non-oil goods
- Foreign currency speculation by HHs
- CB's intervention in the market

$$f_t + \frac{\text{export}_t}{E_t} = (Q_t - Q_{t-1}) + (1 + \tau^T) (\text{import}_C + \text{import}_I + \text{import}_K)$$

How the Model Works

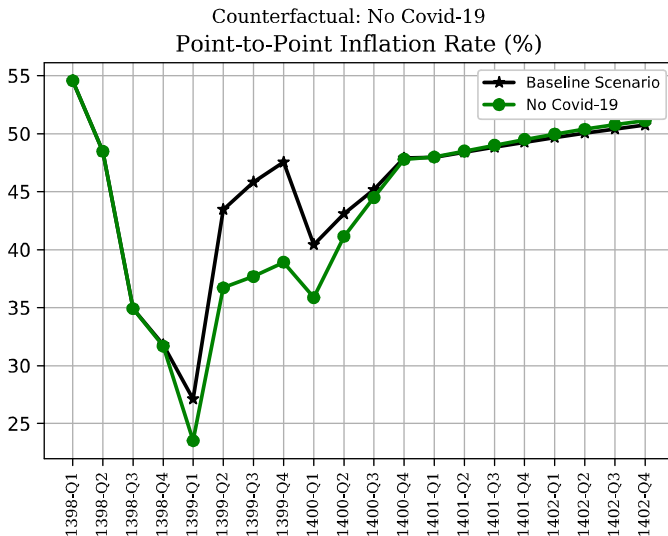
- Covid shock: 4 channels
- Sanctions: 2 channels
- Oil income shock $\Rightarrow$ Budget Deficit $\Rightarrow$ Debt & Monetization $\Rightarrow$ rise in the interest rate, and Inflation
- Oil income shock $\Rightarrow$ Lower Income $\Rightarrow$ Lower Consumption and investment $\Rightarrow$ Lower output
- Trade Shock $\Rightarrow$ Higher Exchange rates $\Rightarrow$ Higher import prices $\Rightarrow$ Less Import of intermediate and capital goods $\Rightarrow$ Lower Output
- Trade Shock $\Rightarrow$ Lower export $\Rightarrow$ Lower Output
- News from Oil Income Shock or and Trade shock $\Rightarrow$ Expectation of higher exchange rates $\Rightarrow$ Speculation $\Rightarrow$ Higher Exchange rates $\Rightarrow$...
- Higher Ex. Rates $\Rightarrow$ Higher Subsidies (4200 toman dollar) $\Rightarrow$ Higher demand for imports

Model Solution Algorithm

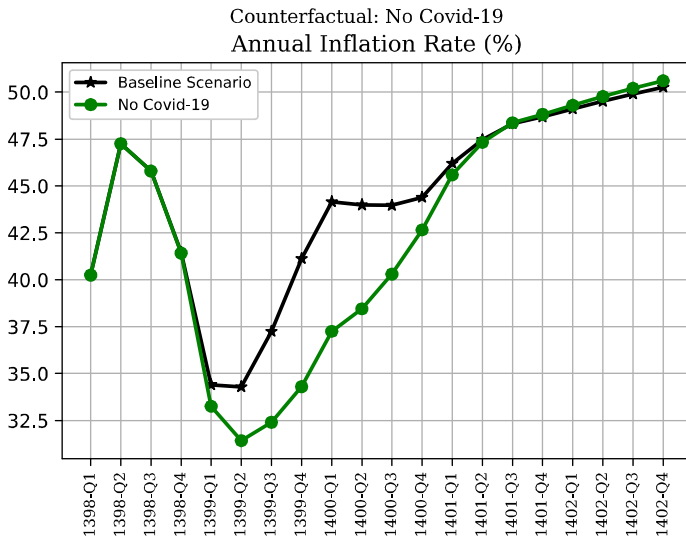
- Solving for the Steady State
- Shooting algorithm
 - Guess a solution and a pattern of speculation: Solve forward to converge to the SS.
 - If not, update the guess for the solution and the pattern of speculation
 - Iterate until convergence

- Match long-run moments from Iran's macro data with the model
- Match the data of inflation, exchange rates, oil income, Gov. budget, .. for the last 2 years with the model to calibrate the levels of the shocks

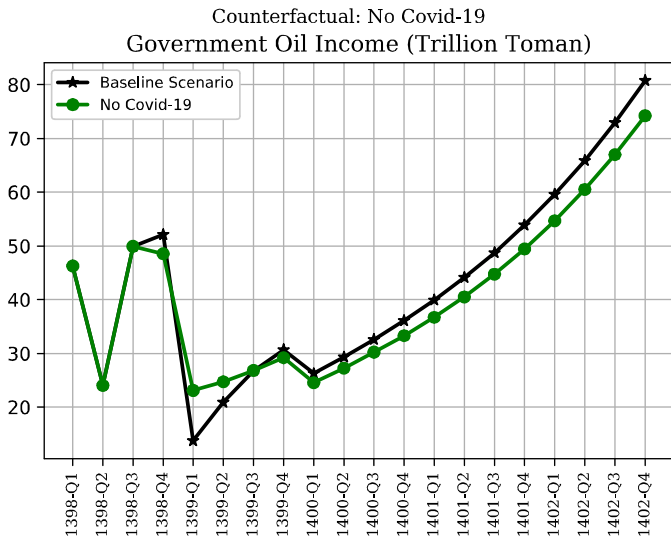
Results: Counterfactual Scenario



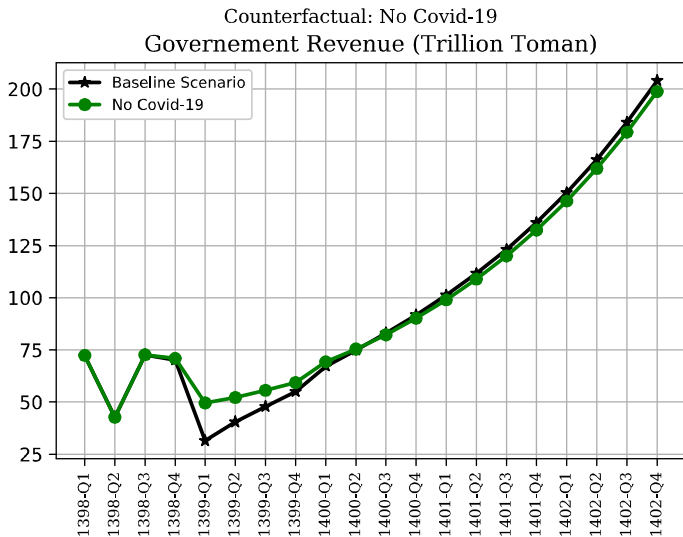
Results: Counterfactual Scenario



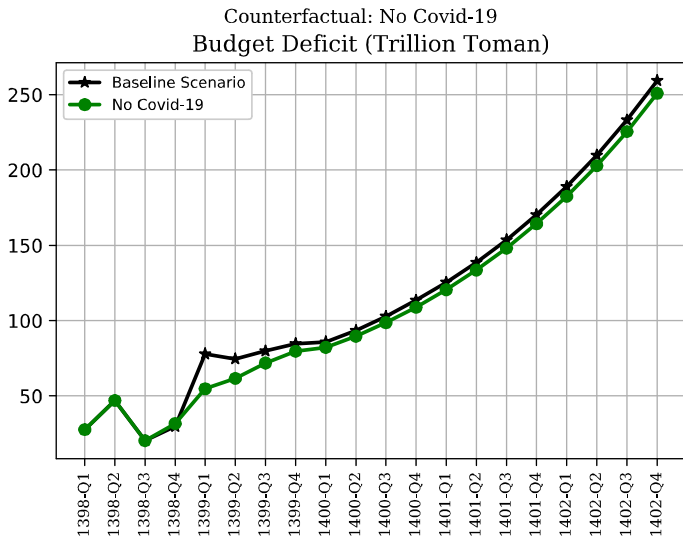
Results: Counterfactual Scenario



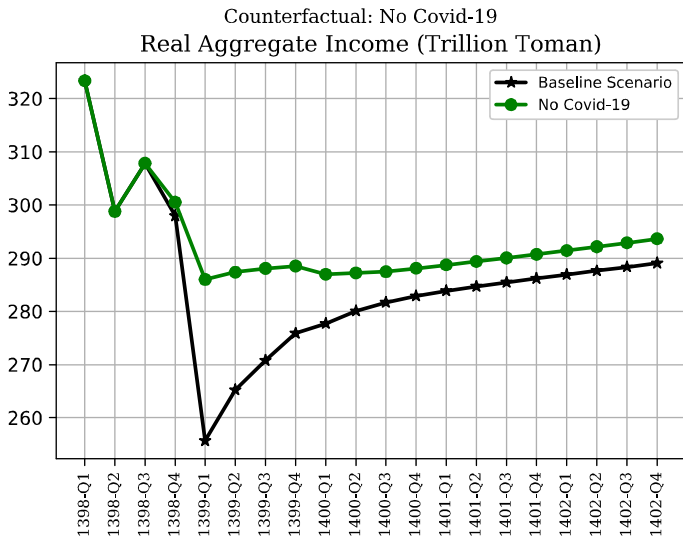
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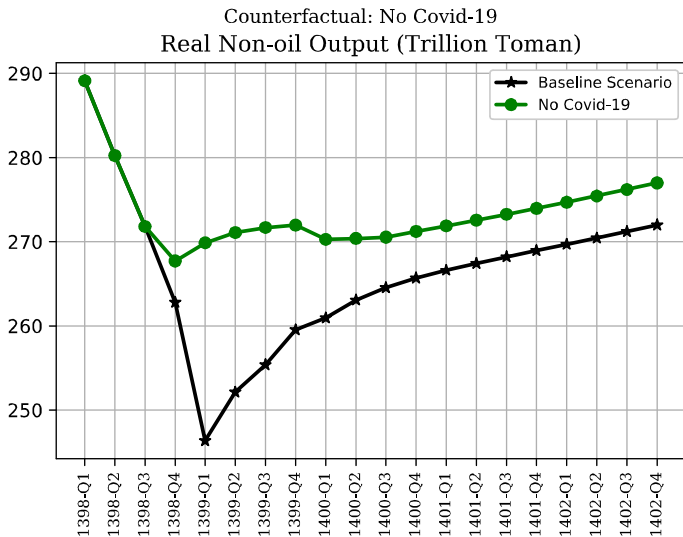
Results: Counterfactual Scenario



Results: Counterfactual Scenario

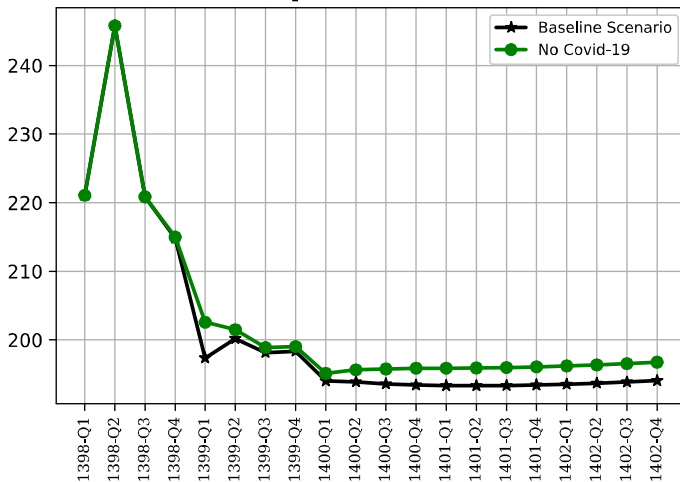


Results: Counterfactual Scenario

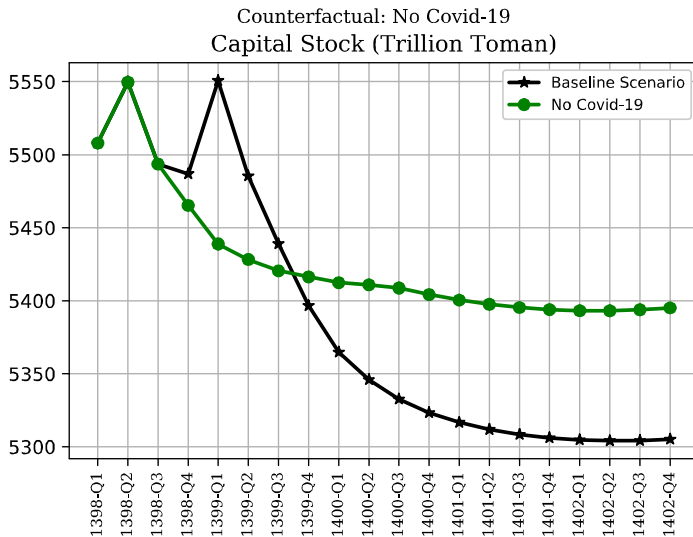


Results: Counterfactual Scenario

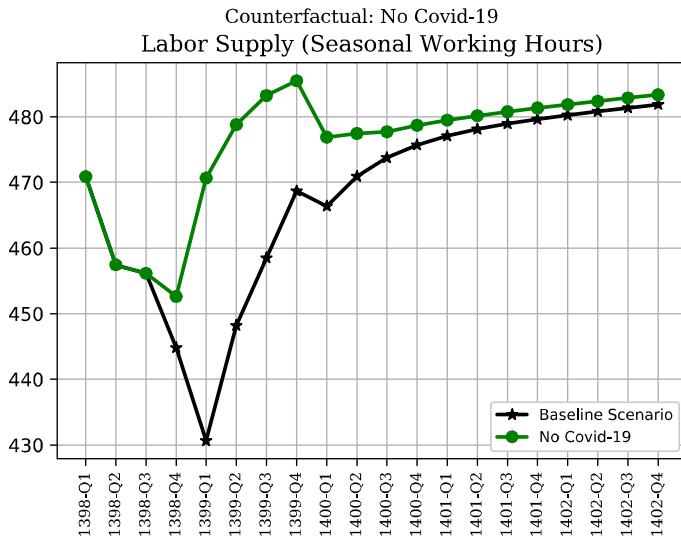
Counterfactual: No Covid-19
Consumption (Trillion Toman)



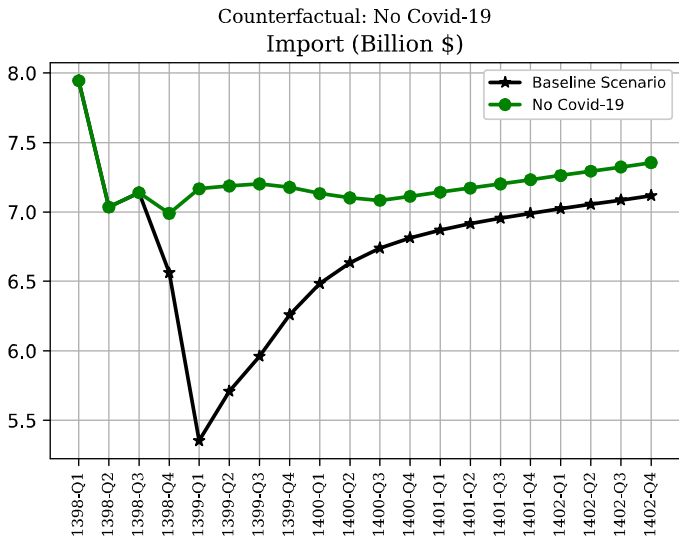
Results: Counterfactual Scenario



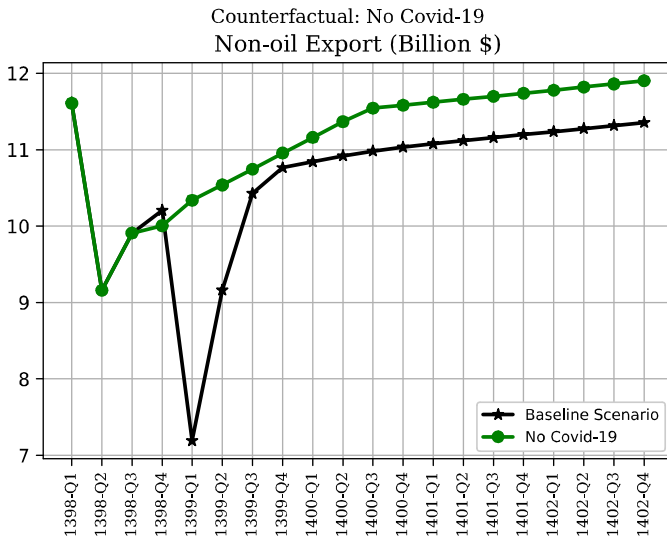
Results: Counterfactual Scenario



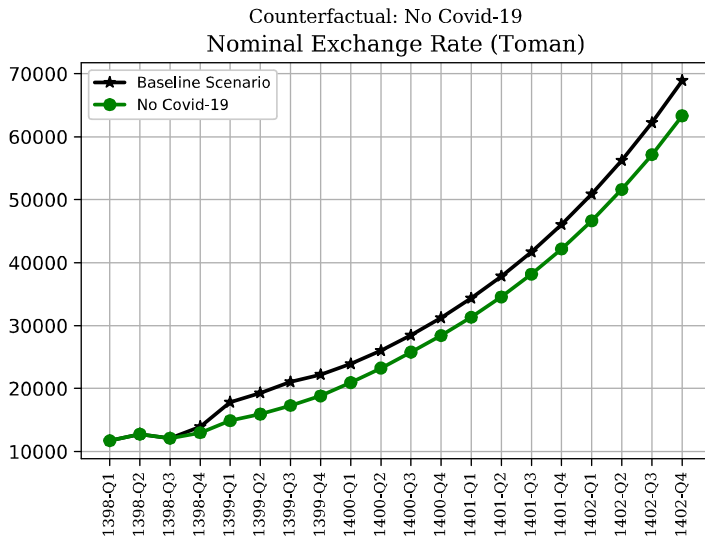
Results: Counterfactual Scenario



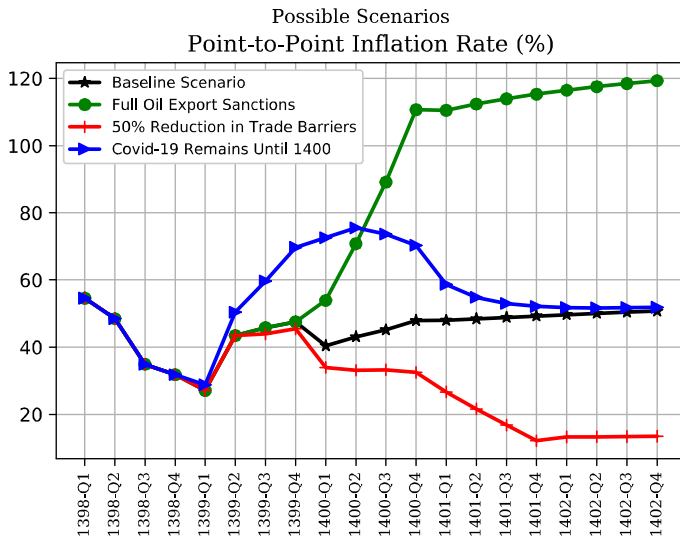
Results: Counterfactual Scenario



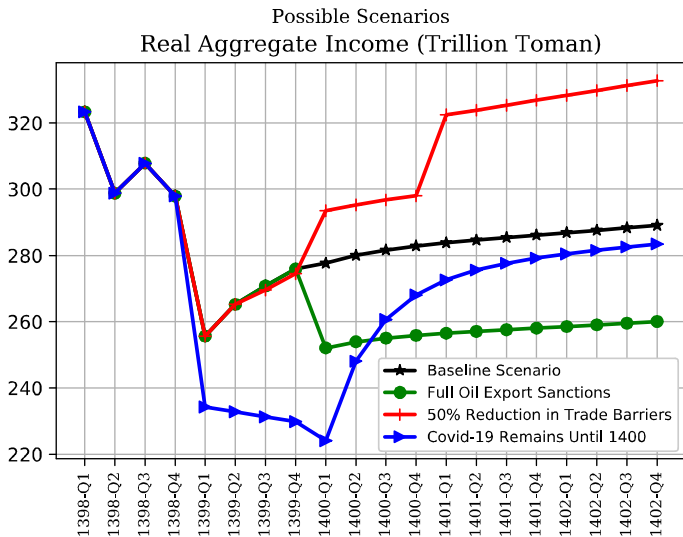
Results: Counterfactual Scenario



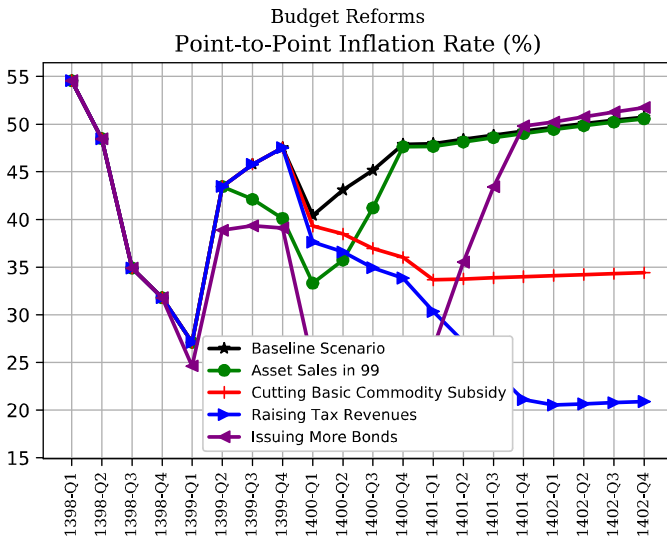
Results: Possible Future Scenarios



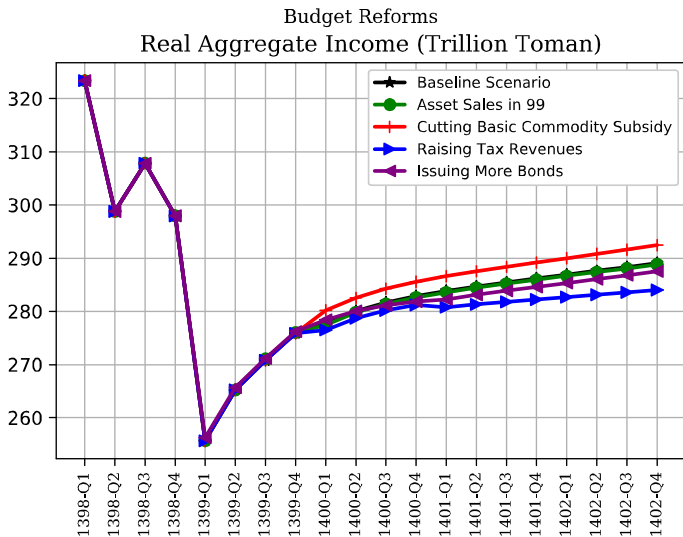
Results: Possible Future Scenarios



Results: Policy Scenarios



Results: Policy Scenarios



What happened in the last year

- CB allowed a sharp drop the interbank rates
- Government motivated people toward the stock market and signalled an implicit sovereign insurance for the investors
- High-rocket rise in the SP. index, making a bubble due to a high expected inflation and rates of returns
- Bubble bursts
- Finance Ministry forced banks to grant loan and buy stocks to support the market and prevent larger drop
- Speculative attack on the exchange rate market: Ex rate rises sharply until the end of Trump era.
- Government grant loans to 20 million HHs using partially financed by the central bank
- CB was forced to finance the Department of Health to combat Covid-19 by buying the blocked dollars of National Development Fund

- Having a dependent central bank with fully discretionary policies results in higher inflation with almost no gain in real terms.
- Having no policy rule would end up with a totally volatile and dependent nominal economy and every shocks would raise inflation and exchange rate as budget deficit would always be financed by CB.
- Stock Market should not be insured and/or financed by banks' loans.
- Government should combat the inflation by rising taxes and lowering costs especially the subsidies on the import of basic goods anchored by dollar rates..

ThankYou