

# OG-IDN: Previous and New Simulations

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# Previous Simulations

Simulations we did in August 2024:

- Corporate tax rate cut
- Energy tax
- Education reform
- Digitization leading to smaller informal sector

## CIT Rate Cut: Scenario

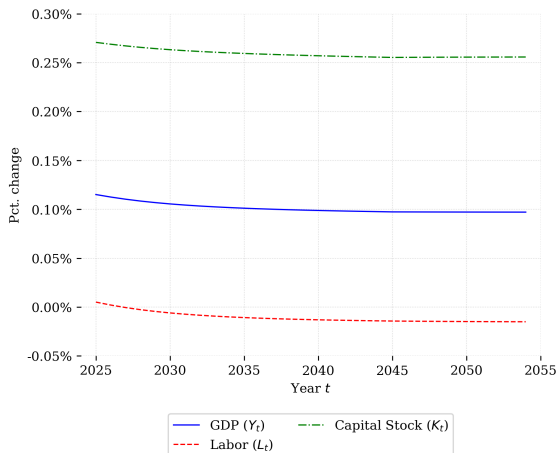
- Hypothetical: Permanent decrease in the CIT rate from 22% to 20%

# CIT Rate Cut: Parameterization

```
1 # Decrease corporate income tax rate to 20% immediately
2 updated_params_ref = {
3     "cit_rate": [[0.20, 0.20, 0.20, 0.20, 0.20, 0.20,
4     0.20]],
5     "baseline_spending": True,
6 }
7 p2.update_specifications(updated_params_ref)
```

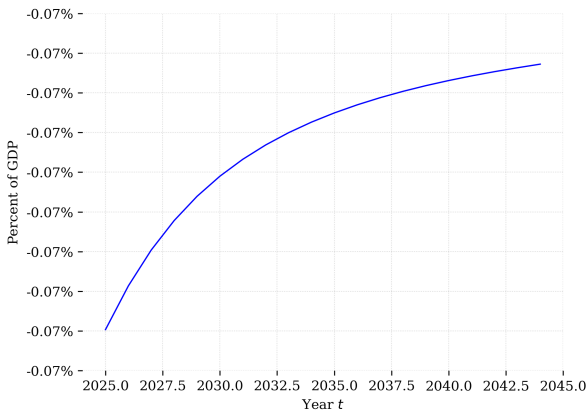
# CIT Rate Cut: Results

## Pct Changes in GDP, Capital Demand, and Labor Demand



# CIT Rate Cut: Results

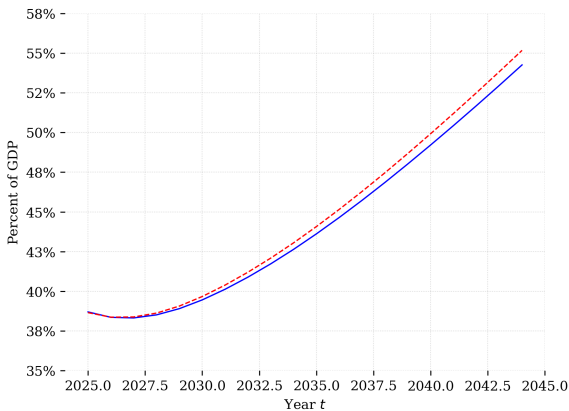
## Tax Revenue



— Tax Revenue-to-GDP ( $Revenue_t/Y_t$ )

# CIT Rate Cut: Results

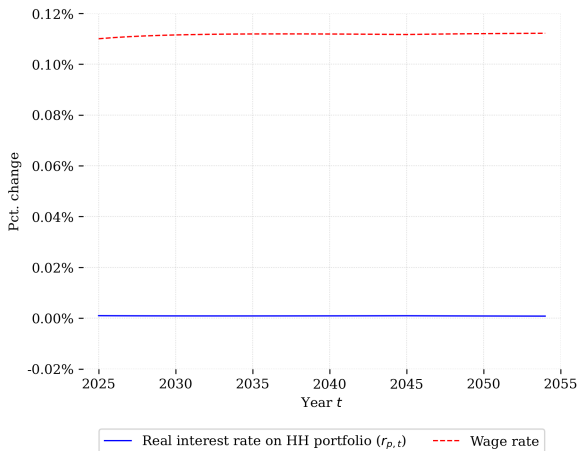
## Debt to GDP Ratio



— Baseline Debt-to-GDP ( $D_t/Y_t$ )    - - - Reform Debt-to-GDP ( $D_t/Y_t$ )

# CIT Rate Cut: Results

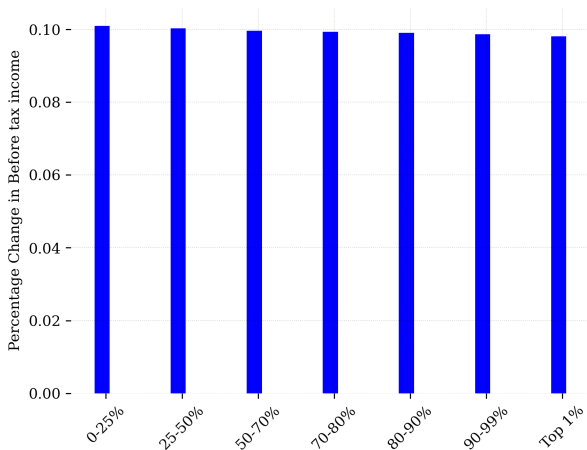
## Interest Rates and Wages





# CIT Rate Cut: Results

Pct Change in Income by Skill Group



# Energy Tax: Scenario

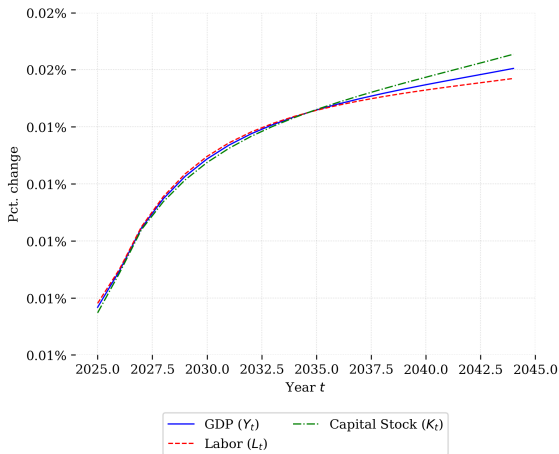
- Hypothetical: Phase in a tax on energy goods, as an increase in VAT rate
- Specifically: Tax begins at 15%, then 17%, then to 20% permanently

# Energy Tax: Parameterization

```
1 # Increase VAT rate on energy goods, which are second in
   the list of consumption goods
2 updated_params_ref = {
3     "tau_c": [
4         [0.10, 0.10, 0.10, 0.10, 0.10],
5         [0.10, 0.12, 0.10, 0.10, 0.10],
6         [0.10, 0.14, 0.10, 0.10, 0.10],
7     ],
8     "baseline_spending": True,
9 }
10 p2.update_specifications(updated_params_ref)
```

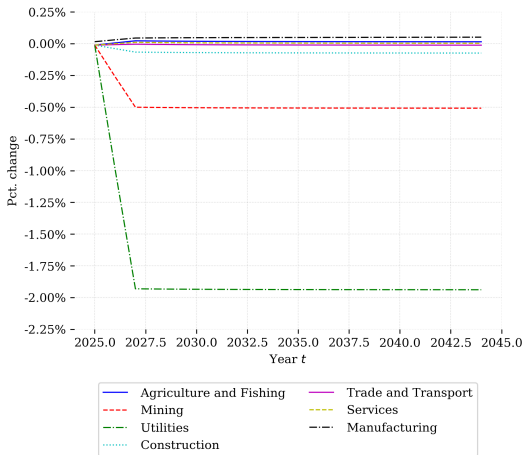
# Energy Tax: Results

## Pct Change in GDP, Capital Demand, and Labor Demand

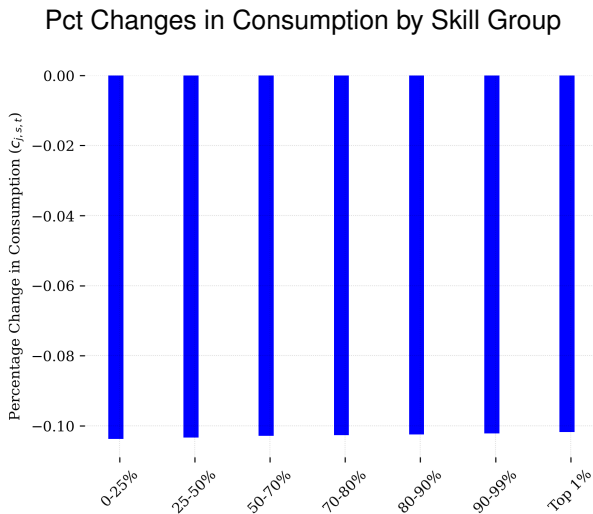


# Energy Tax: Results

## Pct Changes in GDP by Sector



# Energy Tax: Results



# Education Reform: Scenario

- Hypothetical: Increase public spending to improve test scores in public schools in Indonesia
  - Based on [Jasmina \(2016\)](#), “Public Spending and Learning Outcomes of Basic Education at Public Spending and Learning Outcomes of Basic Education at the District Level in Indonesia”
- Increased education → increase labor productivity
  - Specifically, productivity of bottom 70% increases by 16
  - This takes time to phase in as school age children now as in progress, don't find full benefit (assume 20 years)
  - Affects only bottom 70% since studies suggest those from higher income groups already attending high quality schools
- The spending affects the gov't budget: this education reform costs additional 1.0% of GDP **permanently**

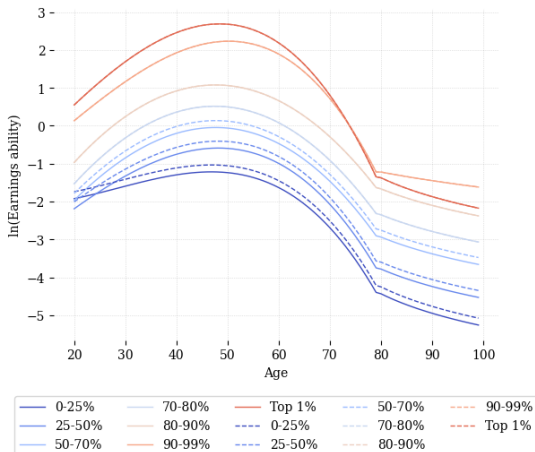
# Education Reform: Parameterization

```
1 num_years = 20 # 20 years to phase in
2 total_benefit = 0.16 # total effect on productivity
  when fully phased in
3 benefits = np.linspace(0, total_benefit, num_years)
4 for t, benefit in enumerate(benefits):
5     p2.e[t, :, :3] = p.e[t, :, :3] * (
6         1 + benefit
7     ) # just apply to bottom 70%
8 p2.e[num_years:, :, :3] = p.e[num_years:, :, :3] * (1 +
  total_benefit)
9 # Education spending currently about 2.6% of GDP
10 # Let's assume this increases to 3.6% of GDP
11 p2.alpha_G = (
12     p2.alpha_G + 0.01
13 ) # counterfactual 3.6% of GDP - current 2.6% of GDP
```



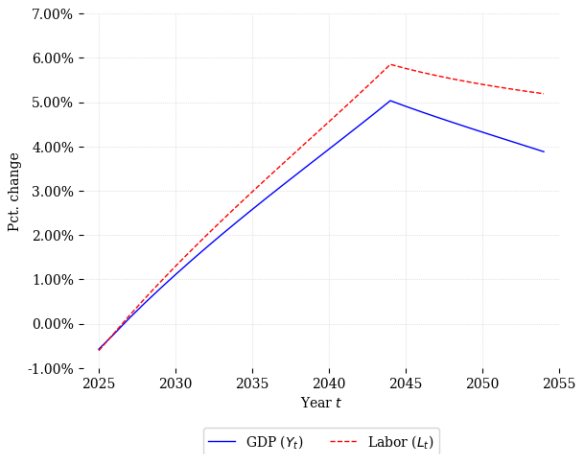
# Education Reform: Parameterization

## Labor Productivity Profiles



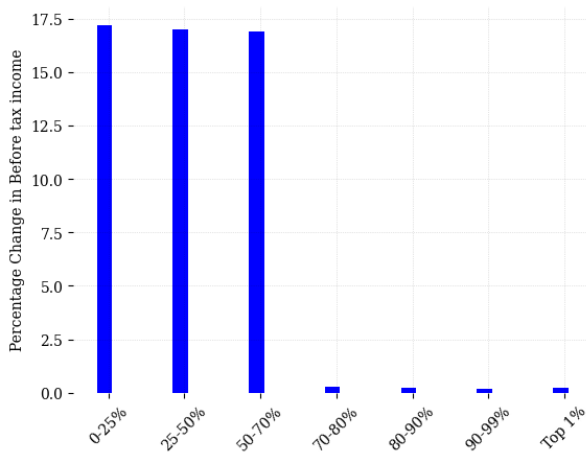
# Education Reform: Results

## Pct Changes in GDP and Labor Demand



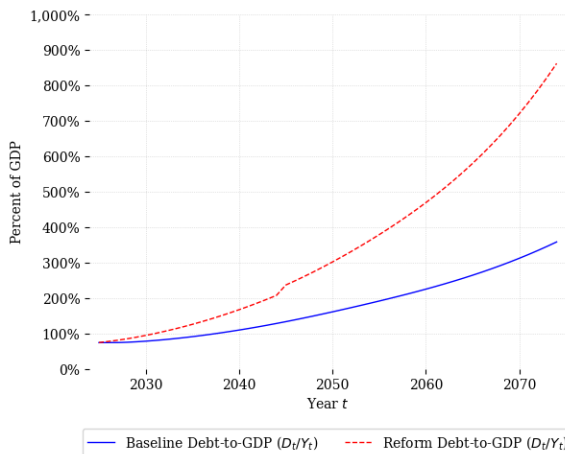
# Education Reform: Results

Pct Changes in Income by Skill Group



# Education Reform: Results

## Debt to GDP Ratio



# Digitization Reform: Scenario

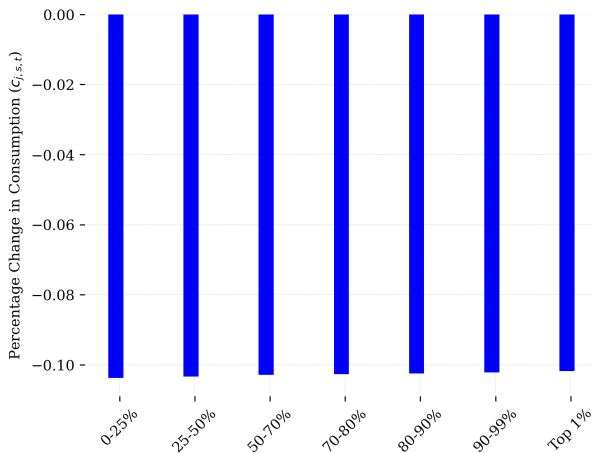
- Hypothetical: Increase in digitization results in it being harder to operate in informal economy
- As informat sector formalizes, it:
  - Pays taxes (corporate income and VAT)
  - It experiences capital deepening
  - There is a substitution among households away from the informal sector (because now more directly competing with the formal sector)

# Digitization Reform: Parameterization

```
1 formalize_spec = {
2     "gamma": [0.3, 0.41], # capital deepening in the
    informal sector
3     "cit_rate": [[0.22], [0.22]], # informal sector now
    pays CIT
4     "tau_c": [[0.11], [0.11]], # informal now pays VAT
5     "alpha_c": [
6         0.25,
7         0.75,
8     ], # Consumption shifts away from informal since
    now compete with established formal sector
9     "io_matrix": np.eye(2),
10 }
11 p2.update_specifications(formalize_spec)
```

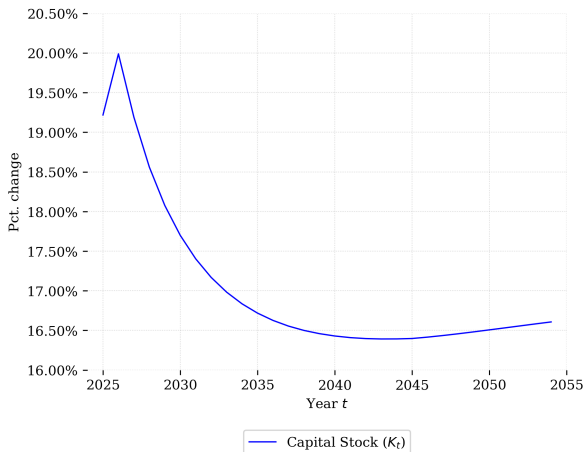
# Digitization Reform: Results

## Changes in GDP



# Digitization Reform: Results

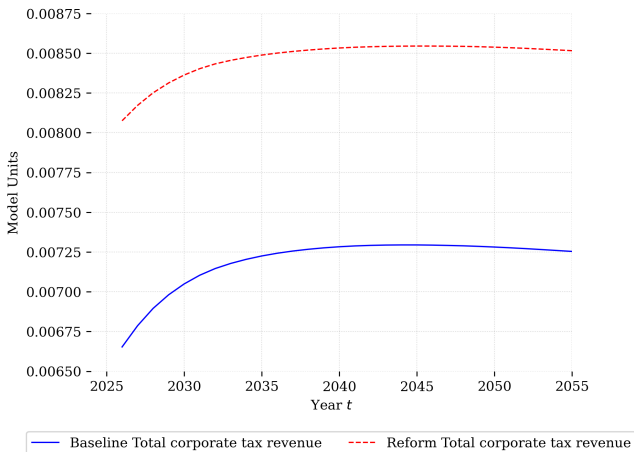
## Pct Changes in Capital Stock





# Digitization Reform: Results

## Tax Revenue



## Recent simulations in USA model

- Regulatory reform
- Effect of anti-aging therapeutic breakthroughs
- Debt stability

# Simulations we could work on this week

- Changes to the social transfer system
- Tax reform
- Education funding
- Infrastructure investment