

## Issues Examined by Inforum Over the Past Year



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# Introduction

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- The Lift Model: Brief overview
- Disruptions in Port Operations
- Expanding Medical Insurance Coverage
- Energy Prices
- Immigration

# Inforum Interindustry-Macroeconomic (IM) Models

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- Combine input-output structure with econometric equations in a dynamic and detailed framework.
- Like a CGE: Contains detailed industry structure and *bottom-up* accounting.
- Like an (macro) econometric or VAR model: Parameters estimated from actual data. Portray dynamic evolution of economies over actual time periods.
- Lift (Long-term interindustry forecasting tool) is 97 sector flagship model. Under continuous development and use for over 30 years.
- Iliad - detailed 360 sectors.
- International System: BTM bilateral trade model, IM models for all major trade partners including China.

# *LIFT*: Inforum's Model of the U.S. Economy

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*LIFT* stands for **L**ong-term **I**nterindustry **F**orecasting **T**ool.

*LIFT* is an interindustry-macro (IM) model.

- **Sectoral detail** for production, prices jobs, consumer spending, foreign trade and factor income (wages, profits, depreciation, etc).
- **Macrovariables**. Many, such as GDP, net exports, the unemployment rate, and the aggregate price level are aggregates of the underlying industry forecasts. Other macrovariables such as the savings rate and interest rates, complete the model.

*LIFT* is particularly useful in addressing questions involving interactions between industries, as well as the interplay between industry and macroeconomic relationships.

# The *LIFT* Philosophy

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## Bottom-up

Aggregates are summations of detailed industry results.

## Consistent

The NIPA and IO frameworks ensure consistency. The patterns of expenditures by industry affect employment by industry. Prices reflect unit costs of materials, labor and other factor income (profits, depreciation, indirect taxes, etc.)

## Econometric Relationships

LIFT is based on empirically estimated relationships, using detailed historical data, based on long time-series.

## Dynamic

LIFT models economy year by year. The time path of response is important. Many equations use distributed lags, so effects of shocks build up and decay over time. Input-output coefficients change over time, in response to estimated trends or exogenous assumptions.

# Recent Studies Using LIFT

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**Impact of Container Trade Interruptions - CBO**

**Impact of High Natural Gas Prices – Department of Commerce (ESA)**

**Impact of Currency Fluctuations – Department of Commerce (ITA)**

**Sustainability of Long-term Projections - Centers for Medicare and Medicaid Services**

**Static & Dynamic Effects of Trade Liberalization – Manufacturers Alliance**

**The Digital Economy 2000/2005 - Department of Commerce (ESA)**

**Impact of Asian Crisis on the U.S. Industries - Manufacturers Alliance**

**Impacts of Defense Expenditures - Department of Defense**

**Force Mobilization Capabilities - Institute for Defense Analysis**

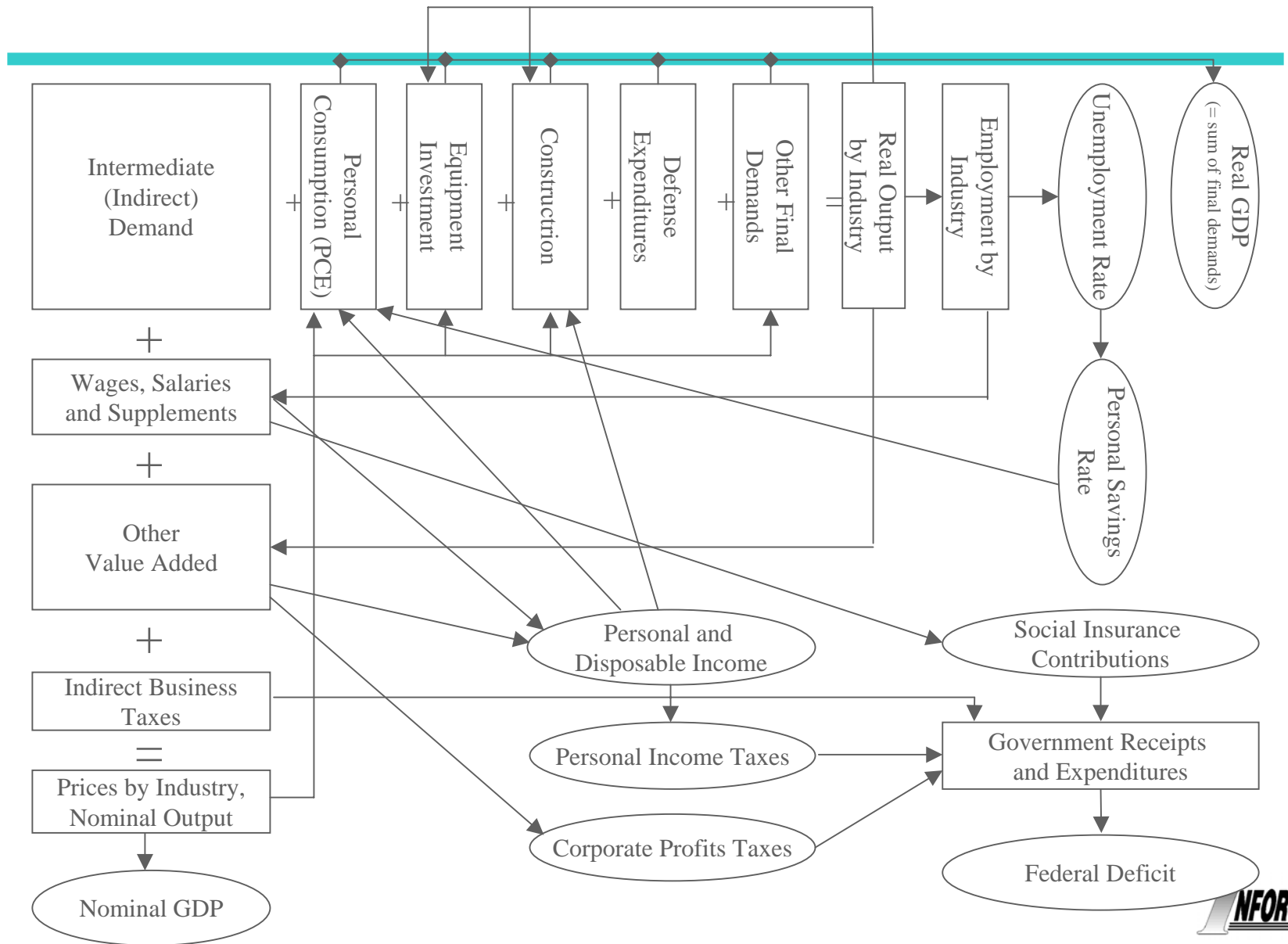
**Local Impacts of Electricity Deregulation - National Rural Electrical Cooperative Association**

**China in the WTO - U.S. Government**

**Effects of Slow Growth in Japan - U.S. Government**

**Clean Energy and Jobs - Center for a Sustainable Economy**

# Schematic of the Inforum Lift Model



# CBO Port Study

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- *The Economic Costs of Disruptions in Container Shipments*, March 2006.
- Disruption of Los Angeles/Long Beach Port over 1 week and 3 years, impact on import side only.
- Set up assumptions:
  - Commodity composition of seaborne trade: [composition.ppt](#)
  - Alternative port usage and transportation modes
- Supply-side shock: main impact is boost to supply chain costs for both intermediate and final goods.
- Raise import prices to reduce imports in by targeted disruption (elasticity), recycle 75% of revenue back through factor exports.
- Correct production spikes by assuming non-price rationing in final demand (apparel, shoes, consumer electronics, etc.)

**CBO Ports Project March 2006**

**3 yr port disruption - percent diff from baseline (unless otherwise noted)**

**REAL ACTIVITY: CHAINED AGGREGATES (Billions of Chained 2000\$)**

	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
<b>GROSS DOMESTIC PRODUCT</b>	<b>-0.35</b>	<b>-0.53</b>	<b>-0.34</b>	<b>-0.10</b>	<b>-0.06</b>
Personal consumption	-1.10	-0.84	-0.50	-0.09	-0.09
Gross priv fixed investment	-3.76	-3.57	-2.25	0.91	1.06
Exports	-1.24	-1.72	-1.81	-0.89	-0.39
Imports	-7.76	-5.29	-3.48	0.76	0.74
Govt. cons & investment	0.03	0.10	0.14	0.15	0.11
<b>PRICE INDICATORS</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
<b>Chained Price Indexes, 2000=100</b>					
GDP deflator	-0.94	-0.26	-0.11	0.16	0.11
PCE deflator	2.27	2.16	1.35	-0.01	-0.11
Export deflator	1.61	1.41	1.10	0.12	0.07
Imports deflator	22.75	17.29	11.49	-0.32	-0.32
<b>Selected product price indexes, 2000=100</b>					
40 Computers	12.20	9.20	6.10	0.00	0.00
83 Private hospitals	1.12	0.86	0.37	-0.21	-0.16

## CBO Ports Project March 2006

3 yr port disruption - percent diff from baseline (unless otherwise noted)

### REAL ACTIVITY: CHAINED AGGREGATES (Billions of Chained 2000\$)

	2006	2007	2008	2009	2010
<b>LABOR FORCE and PRODUCTIVITY</b>					
Total Employment (%)	-0.91	-0.79	-0.44	0.01	0.06
Total Employment (millions)	-1.34	-1.18	-0.67	0.01	0.09
Unemployment Rate (% points)	0.88	0.77	0.43	-0.01	-0.06
<b>Economywide:</b>					
Total Lab Productivity (00\$/hr)	0.56	0.28	0.11	-0.13	-0.13
Average wage (\$/hr)	0.04	-0.09	-0.19	-0.20	-0.03
Average real wage (00\$/hr)	-2.18	-2.21	-1.51	-0.19	0.08
<b>PERSONAL INCOME</b>					
Disposable Income	0.20	-0.14	-0.21	-0.28	-0.02
Real Disposable Income	-2.03	-2.26	-1.53	-0.27	0.09
Pers savings rate (% points)	-0.86	-1.35	-0.96	-0.18	0.13
<b>CURRENT ACCT DEFICIT (bill \$)</b>					
as percent of GDP (% points)	-65.73	-84.96	-72.76	-43.16	-36.78
	-0.59	-0.67	-0.53	-0.28	-0.23

# MITRE Medical Insurance Study

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- What would be the macro and industry impacts of expanding Medicaid for 20 million persons (9 million children, 11 million adults)?
- Use existing expenditure pattern for these demographic groups, estimate increases in expenditures by PCE category (crosswalk from CMS to LIFT).
- Assume every \$1 government expenditure displaces \$0.3 of private expenditure (by category).
- Assume deficit neutrality: fund increase through income tax increase.
- Results show macro feasibility and crowding out of other expenditures.

# Medicaid Expenditure Patterns

	Total	Children	Adults	Aged	Disabled	Other
<b>Medicaid totals (2003)</b>						
Enrollees (thousands)	55071	27263	14257	7679	5872	
Total expenditures (million)	233206	39871	26800	55271	102014	9250
Inpatient Hospital	31549	6023	6500	2040	12932	4054
ICF/MR	10861	36	8	753	9990	74
Nursing Facility	40381	46	44	30947	9056	288
Physician	9210	2784	2496	567	3032	331
Outpatient Hospital	9252	2057	2262	554	3896	483
Home Health	4404	211	57	991	3127	18
Prescribed Drugs	33714	3223	3050	8284	18966	191
Other	93835	25491	12383	11135	41015	3811
<b>Expenditures per enrollee (\$)</b>	<b>4235</b>	<b>1462</b>	<b>1880</b>	<b>7197</b>	<b>17374</b>	

# Enhancing Coverage

	Total	Children	Adults	Aged	Disabled	Other
<b>Enhanced Medicaid</b>						
Additional enrollees	20000	9000	11000	0	0	0
Total additional expenditures (million)	33839	13162	20677	0	0	0
Inpatient Hospital	7003	1988	5015	0	0	0
ICF/MR	18	12	6	0	0	0
Nursing Facility	49	15	34	0	0	0
Physician	2845	919	1926	0	0	0
Outpatient Hospital	2424	679	1745	0	0	0
Home Health	114	70	44	0	0	0
Prescribed Drugs	3417	1064	2353	0	0	0
Other	17969	8415	9554	0	0	0
<b>Additional expenditures per additional enrollee (\$)</b>	<b>1692</b>	<b>1462</b>	<b>1880</b>	0	0	0

**Table 2:  
Crosswalk for NIPA/LIFT -- NHE – Medicaid Expenditure Categories**

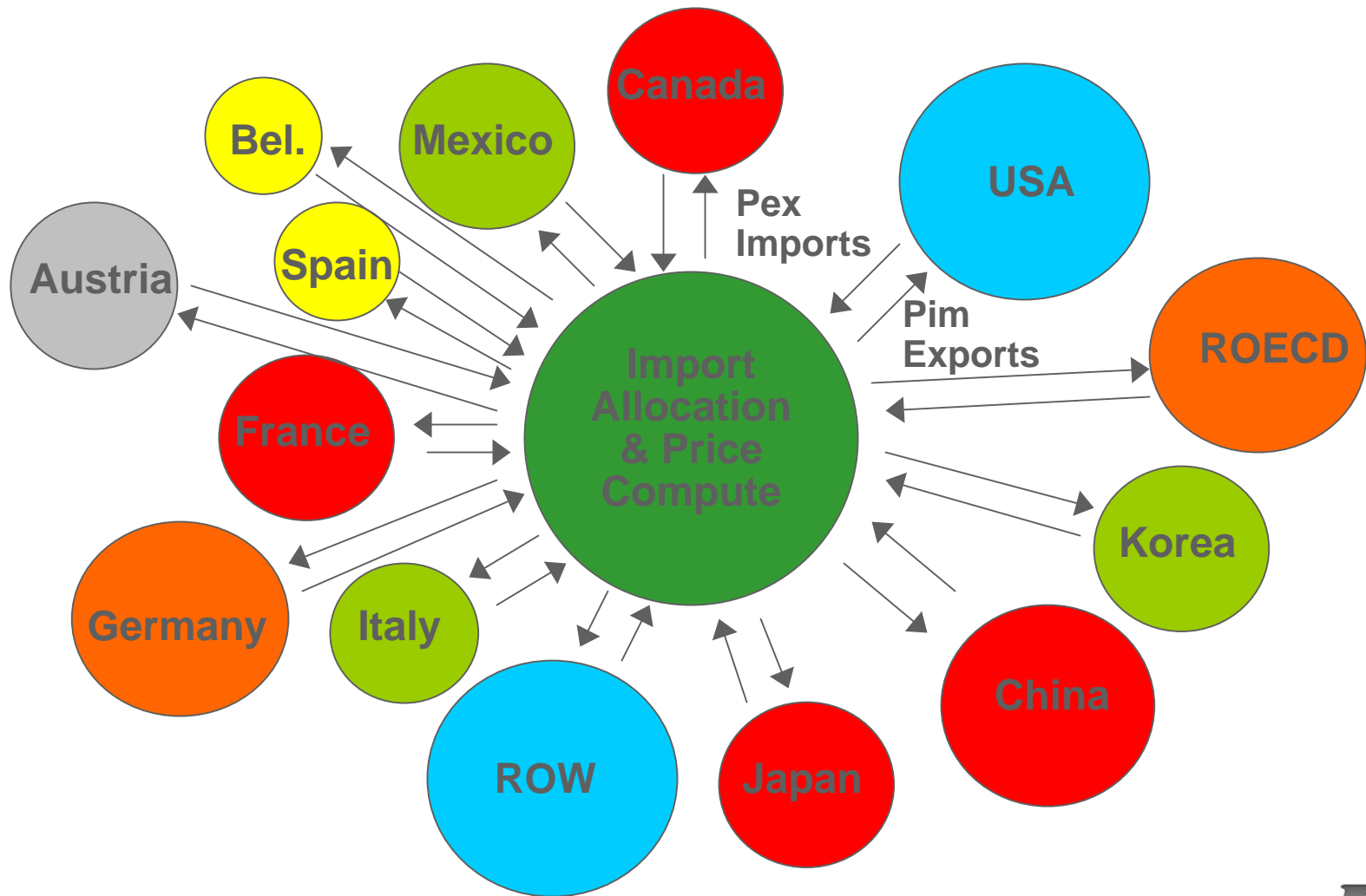
<b><u>NIPA/LIFT</u></b>	<b><u>NHE</u></b>	<b><u>Medicaid Expenditure</u></b>
Prescription drugs & medicines	Prescription Drugs Other nondurable goods	Prescribed drugs
Durable medical goods	Durable medical equipment	
Physicians & clinical services	Physicians	Physicians
Dental services	Dental Services	
Other prof medical services	Other professional care Home health care Other personal health care	Other care Home health ICT/MR
Hospitals	Hospital Care	Inpatient Hospital Outpatient Hospitals
Nursing Facilities	Nursing Home Care	Nursing Facility
Private health insurance	Private health insurance	
Direct govt health expenditures	Public health activity	
Health-related capital investment	Health equipment and structures  Research and development	

# Department of Commerce: Energy Price Shocks

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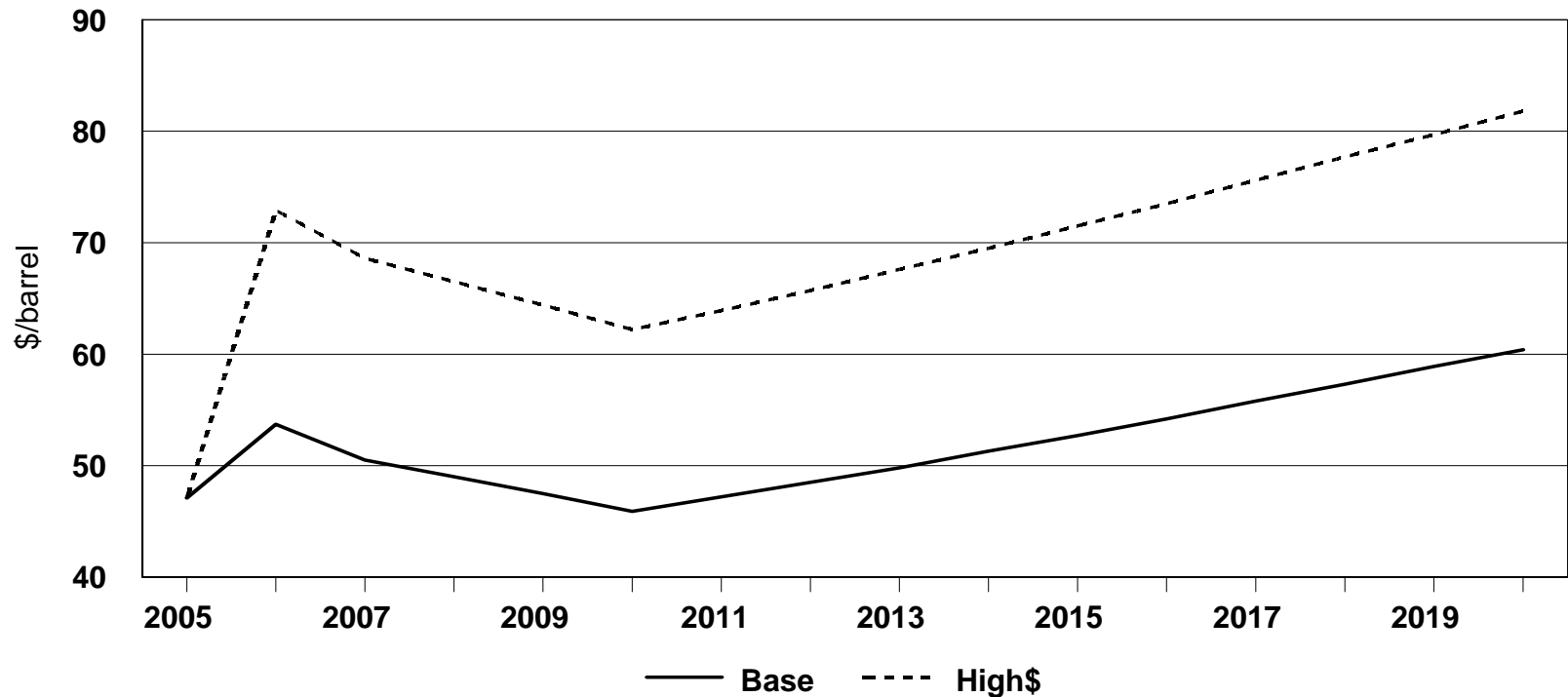
- Application of a dynamic interindustry macroeconomic model (IM): Permanent oil and natural gas price spike of 30 percent.
- Used Global framework: Bilateral Trade Model to gauge relative competitive effects.
- Macroeconomic effects moderate (and familiar), partly dissipate through time. Biggest impact is the OPEC tax on real income.
- Adjustment to lower real income and adverse Terms of Trade impact affects economic structure (modestly in this case).

# Energy price shocks simulated using Bilateral Trade Model ( 120 commodities)



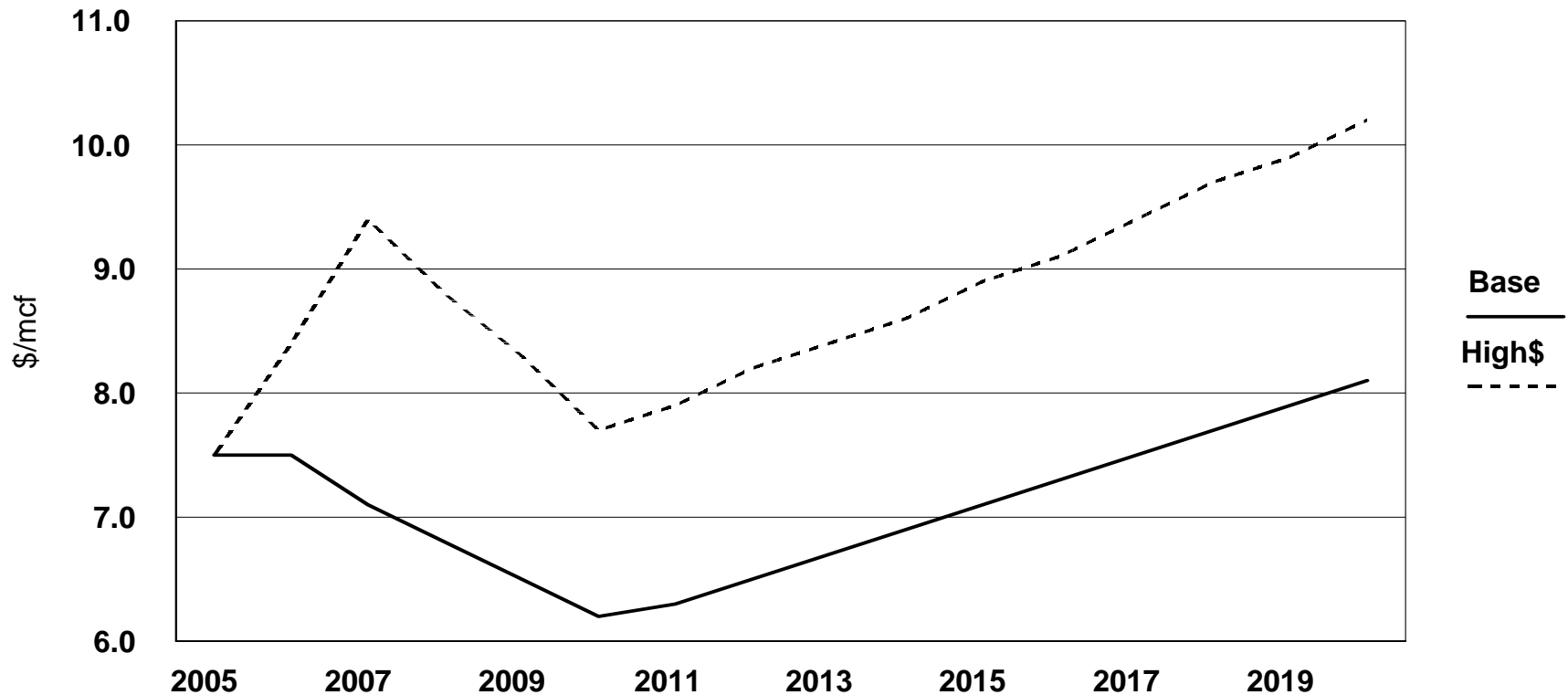
Permanent (global & nominal) oil price spike:  
~30% in 2006

## Oil Prices \$20 Above EIA Baseline

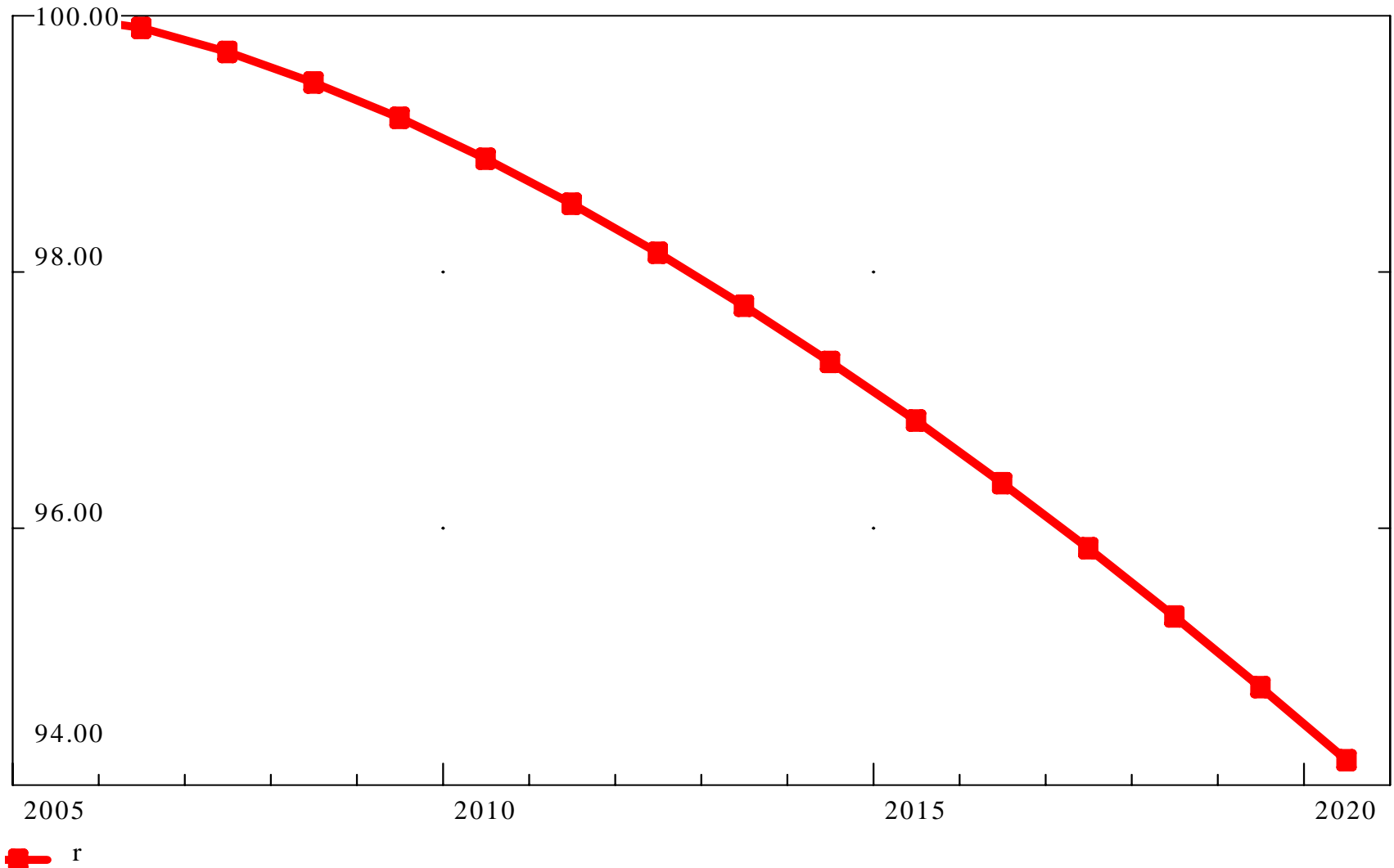


# Permanent (nominal) natural gas price spike: ~30% in 2006

## Natural Gas Prices \$2 Above EIA Baseline

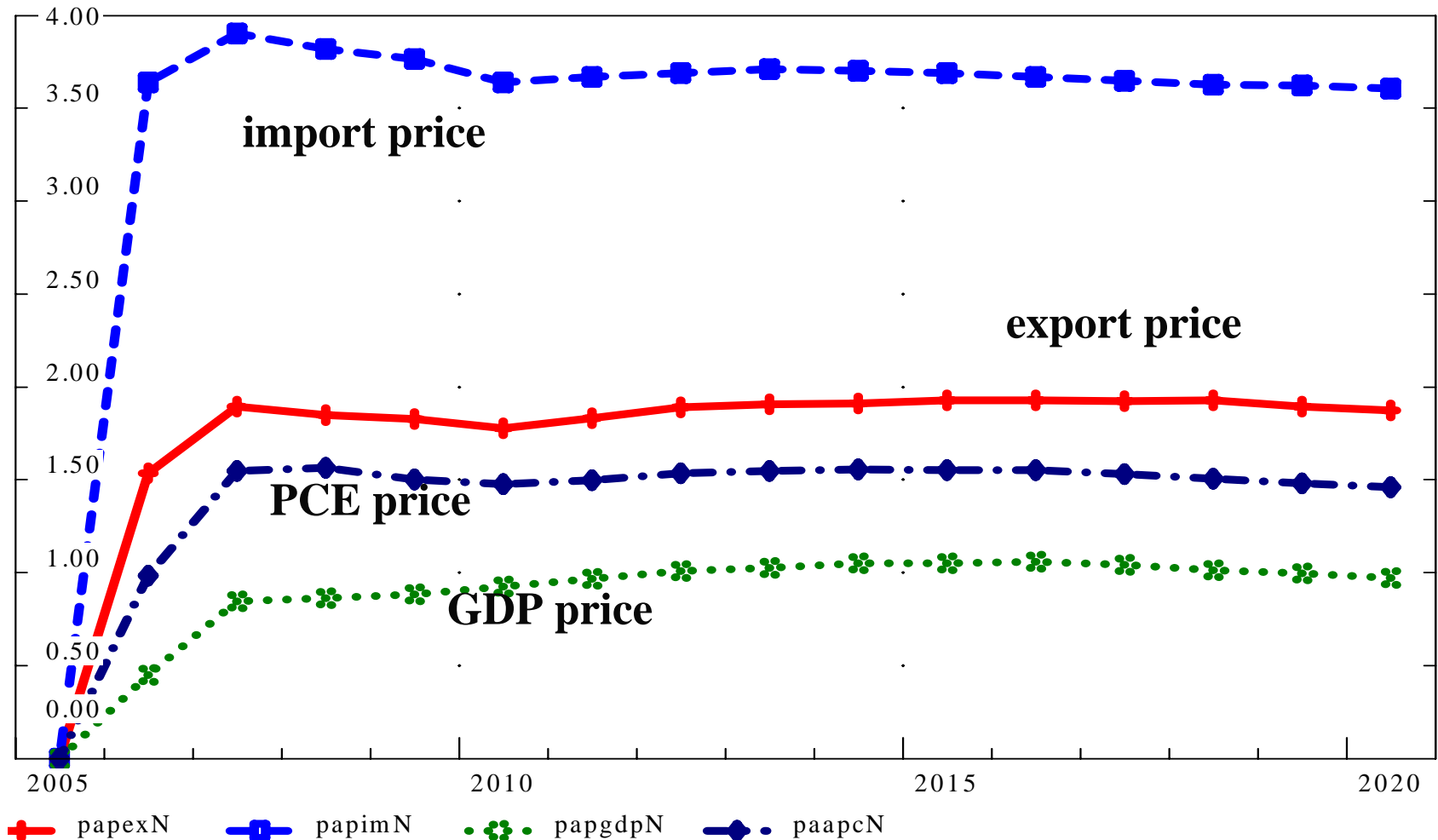


# Production Efficiency (A-matrix): 30% increase in energy price induces ~6% increase in efficiency through 2020.



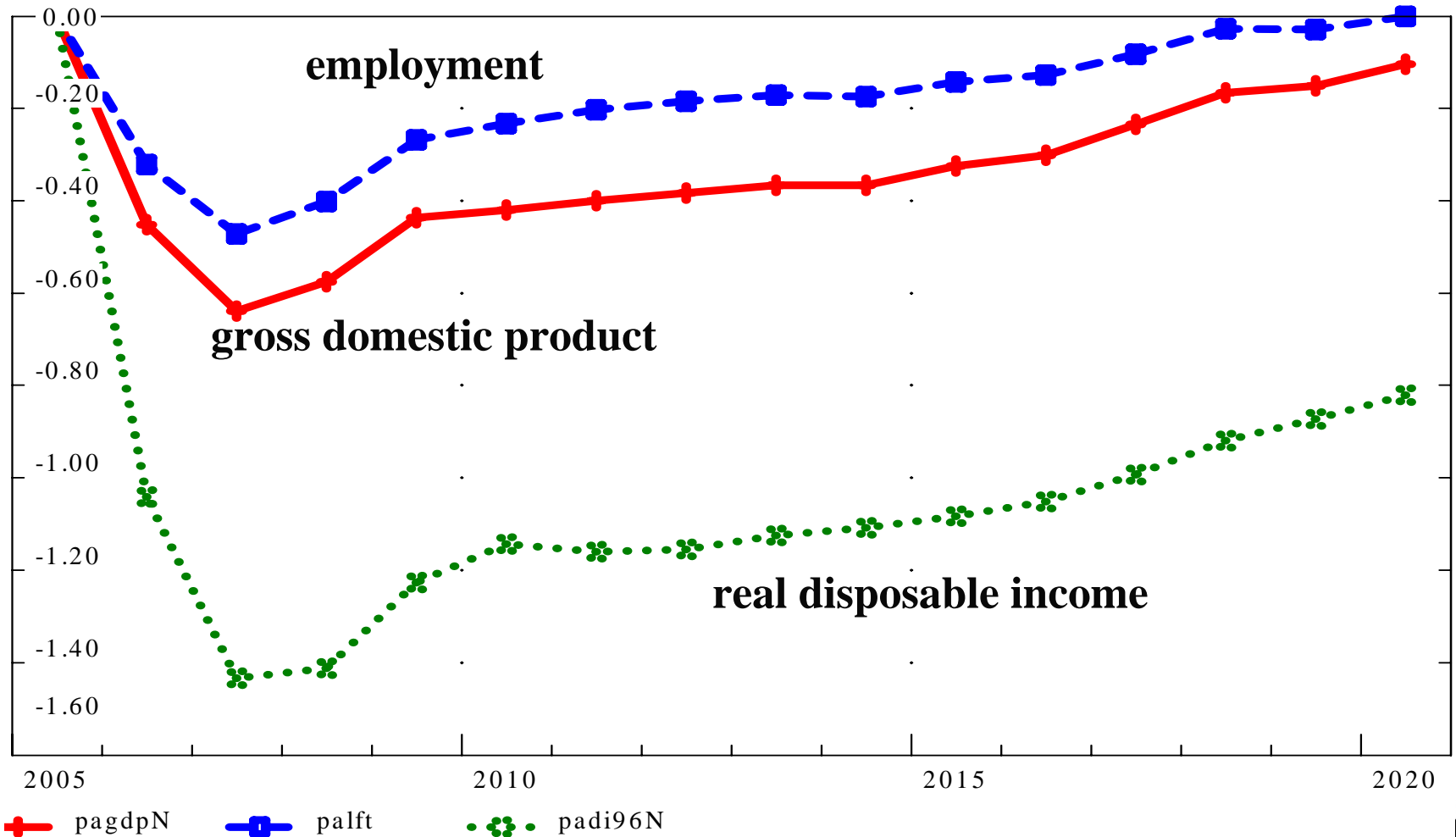
# Price results: Pass-through to domestic production, consumption and export (tradable) prices

percent difference from baseline



# Real macro results: Real Personal Income is major casualty (the “OPEC tax”)

percent difference from baseline

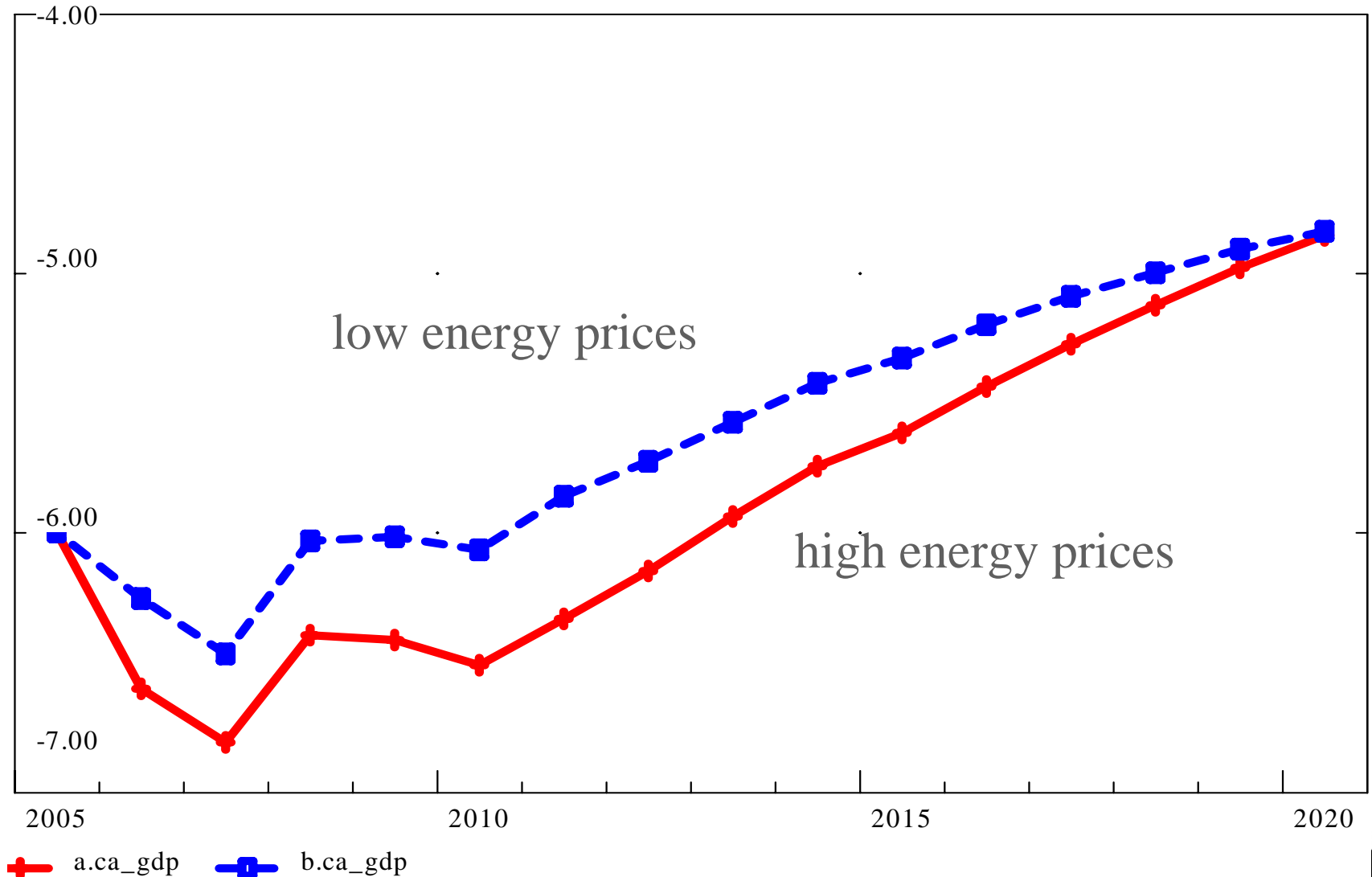


# Higher Oil Prices represent an adverse turn in Terms of Trade

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- When Terms of Trade ( $p_m/p_x$ ) turn against you, for any given level of current account deficit: Real exports must be higher, Real imports must be lower.
  - expenditure switching: currency depreciation,
  - expenditure reduction: lower domestic absorption.
- Relative magnitude of these effects determine subsequent production patterns:
  - output in pce-orientated and energy intense sectors fall,
  - trade-orientated and non-energy intense sectors gain.
- “OPEC tax” affects structure of economy.

# Current Account Deficit: Lower dollar and lower growth gradually close the initial widening.



# Sectoral gross output: percent difference from base

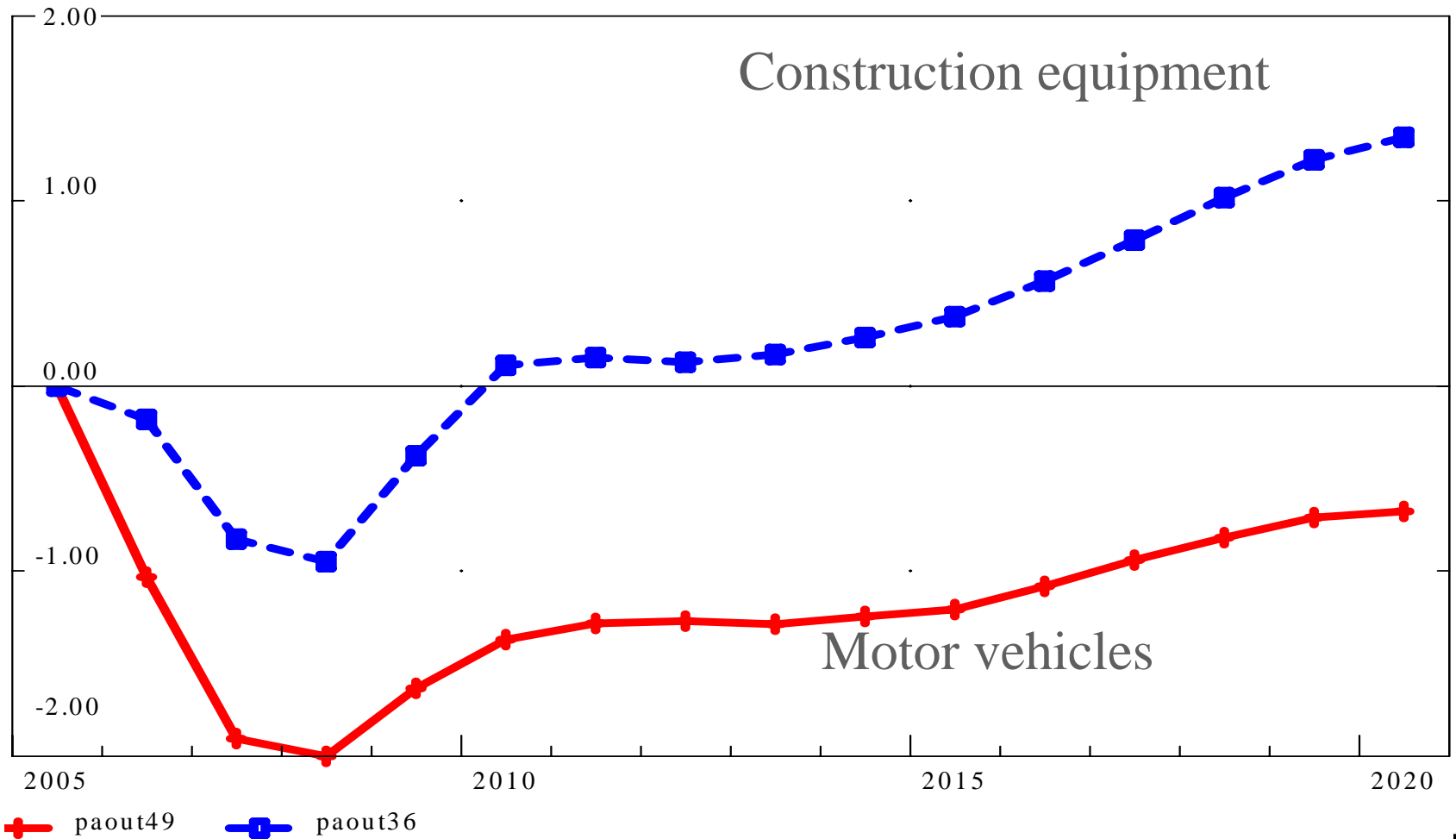
	2006	2007	2008	2010	2012	2015	2020
Agriculture,forestry,fish	-0.2	-0.3	-0.3	-0.1	0.0	0.2	0.6
Mining	-0.7	-1.4	-1.4	-1.0	-1.2	-1.6	-2.4
Construction	-0.6	-0.7	-0.3	0.1	0.1	0.0	0.1
Manufacturing							
Non-Durables	-0.8	-1.1	-1.1	-0.9	-0.9	-1.0	-0.8
Durable material & prods	-1.0	-1.3	-1.1	-0.5	-0.5	-0.4	0.1
Non-electrical machinery	-0.5	-1.2	-1.2	0.0	0.0	0.1	0.8
Electrical machinery	-0.4	-0.7	-0.6	-0.1	-0.1	0.0	0.4
Transportation equip	-0.8	-1.4	-1.4	-0.9	-0.8	-0.7	-0.1
Instruments & misc	-0.2	-0.7	-0.7	-0.4	-0.4	-0.3	0.0
Transportation	-1.0	-0.9	-0.8	-0.6	-0.5	-0.4	0.0
Utilities	-0.2	-0.7	-0.8	-0.5	-0.4	-0.3	0.0
Trade	-0.5	-0.9	-0.9	-0.7	-0.7	-0.6	-0.5
FIRE	-0.8	-1.1	-1.1	-1.0	-0.9	-0.8	-0.6
Services	-0.6	-0.9	-0.9	-0.7	-0.7	-0.7	-0.5

## Sectoral employment: difference from base (thousands of jobs).

	2006	2007	2008	2010	2012	2015	2020
Agriculture,forestry,fish	-4.3	-9.6	-9.7	-3.4	1.2	6.6	20.2
Mining	-3.6	-6.7	-6.5	-4.4	-5.2	-7.6	-12.7
Construction	-49.3	-52.2	8.1	73.5	75.5	78.2	100.4
Non-durable manufacturing	-24.1	-50.8	-53.2	-43.4	-37.0	-30.8	-8.3
Durable manufacturing							
Durable material & prods	-22.3	-66.3	-50.5	-26.3	-23.4	-20.3	-1.9
Non-electrical machinery	-5.7	-18.4	-24.2	-5.2	0.2	2.4	23.7
Electrical machinery	-3.4	-5.9	-8.3	-3.0	-1.5	-0.6	7.2
Transportation equip	-7.4	-18.3	-22.2	-16.3	-14.6	-13.0	-3.2
Instruments & misc	-1.0	-5.2	-7.8	-6.4	-5.1	-4.5	-1.7
Transportation	-45.1	-48.1	-41.2	-30.9	-27.2	-21.8	-0.8
Utilities	0.5	-3.0	-5.5	-6.7	-8.5	-12.1	-17.5
Trade	-152.5	-253.8	-263.8	-228.4	-216.8	-210.2	-195.4
FIRE	-59.0	-51.1	-26.3	-9.7	0.1	15.5	46.6
Services	-97.7	-114.5	-93.8	-49.2	-27.4	-9.4	47.1
Total	-474.9	-703.9	-604.9	-360.0	-289.7	-227.5	3.8

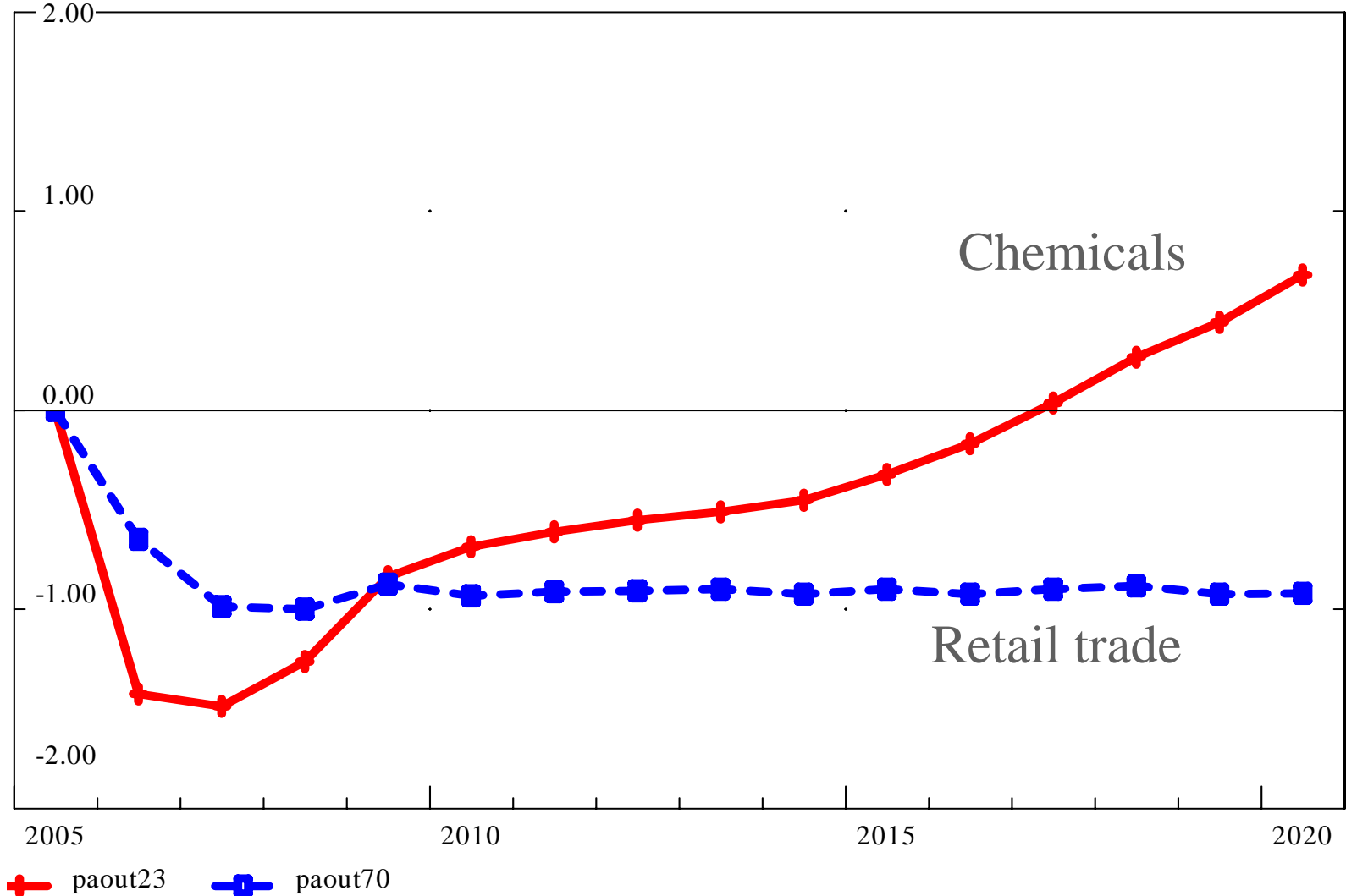
# Output example: Domestic output of Motor vehicles vs. Construction equipment

percent deviation from baseline



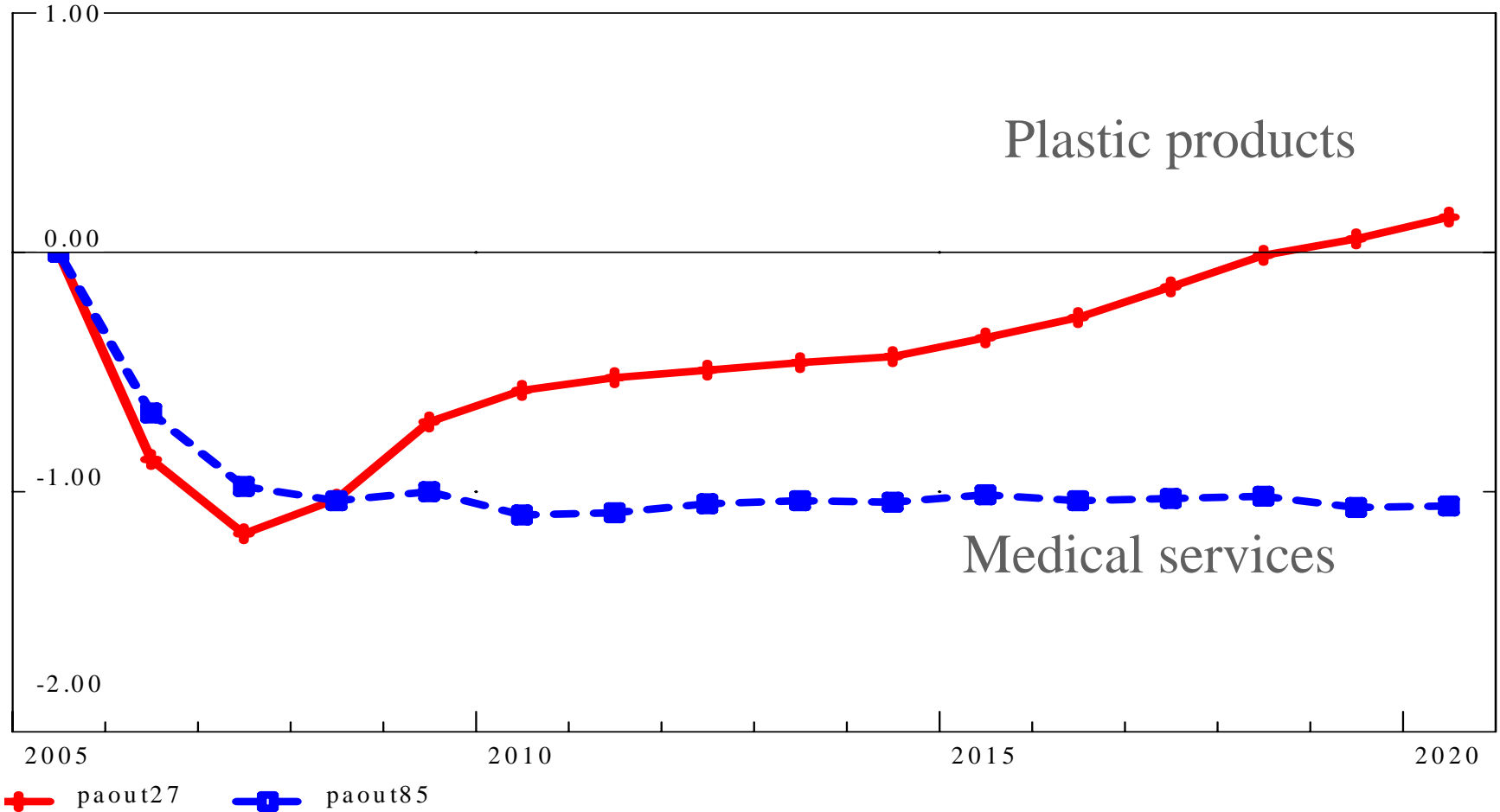
# Output example: Chemicals vs. Retail trade

percent deviation from baseline



# Output example: Plastic products vs. Medical services

percent deviation from baseline



# Immigration Analysis is Similar to Foreign Trade Analysis

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- In many ways, quantitative analysis of immigration is similar to looking at free trade.
- Static comparative advantage: Does immigration's impact on relative prices enhance a more efficient distribution of (global/national) resources?
- Dynamic impacts: Does immigration help induce productivity enhancing "x-efficiencies"? (economies of scale, competition, monopoly power erosion, etc.)
- Other enhancements that are hard to quantify: Diversity, quality, flexibility, opportunity, technology dispersion.
- Benefits are large and diffused widely. But costs are very narrowly borne and often large and durable for specific groups.

# Illegal U.S. Immigration as Special Case

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## LIFT Simulation:

- Assume that 7.2 million workers are deported for labor force over 2007. With dependents, population falls by 12 million.
- Wages rise and employment reduced most dramatically in most effected sectors (using Pew study): Agriculture, Food, Construction, Hospitality, Apparel, Domestic, etc.
- These are relatively low-productivity positions ( $\sim 1/2$  avg).
- Domestic demand (consumption, construction, trade) adjusted accordingly.

# Comparative “Static” Results

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Short-term (through 2010):

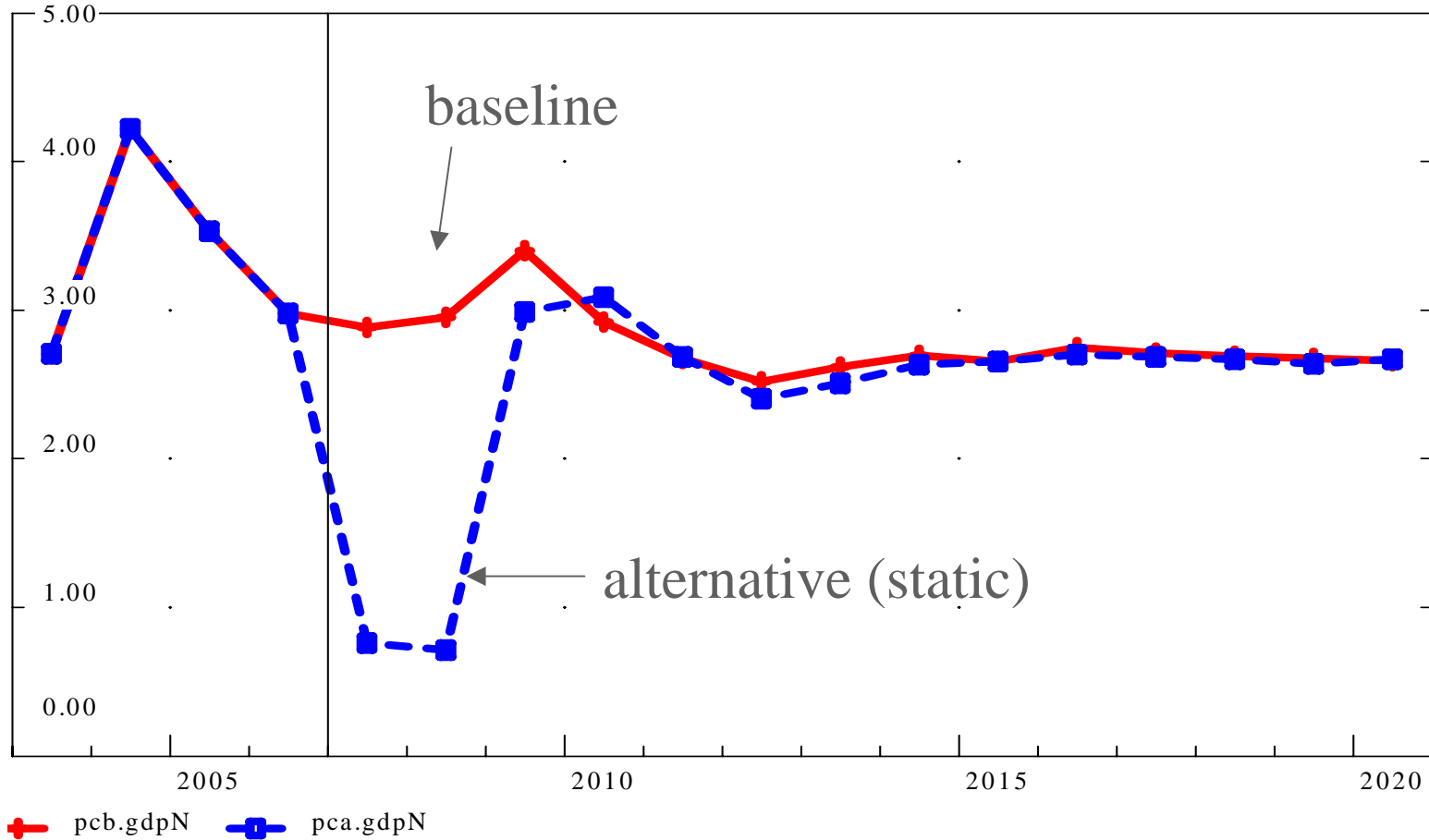
- Abrupt adjustment creates trauma (potential recession).
- Lower investment (housing particularly hit).
- Higher wages, inflationary conditions.

Long-term (through 2020):

- Adjustment to lower levels of employment and GDP
- Higher labor force participation
- Higher aggregate productivity (reallocation of labor to more productive sectors)
- Mildly higher income per capita (for remaining population).
- *Concentration on low-skilled immigrants skews results negatively.*

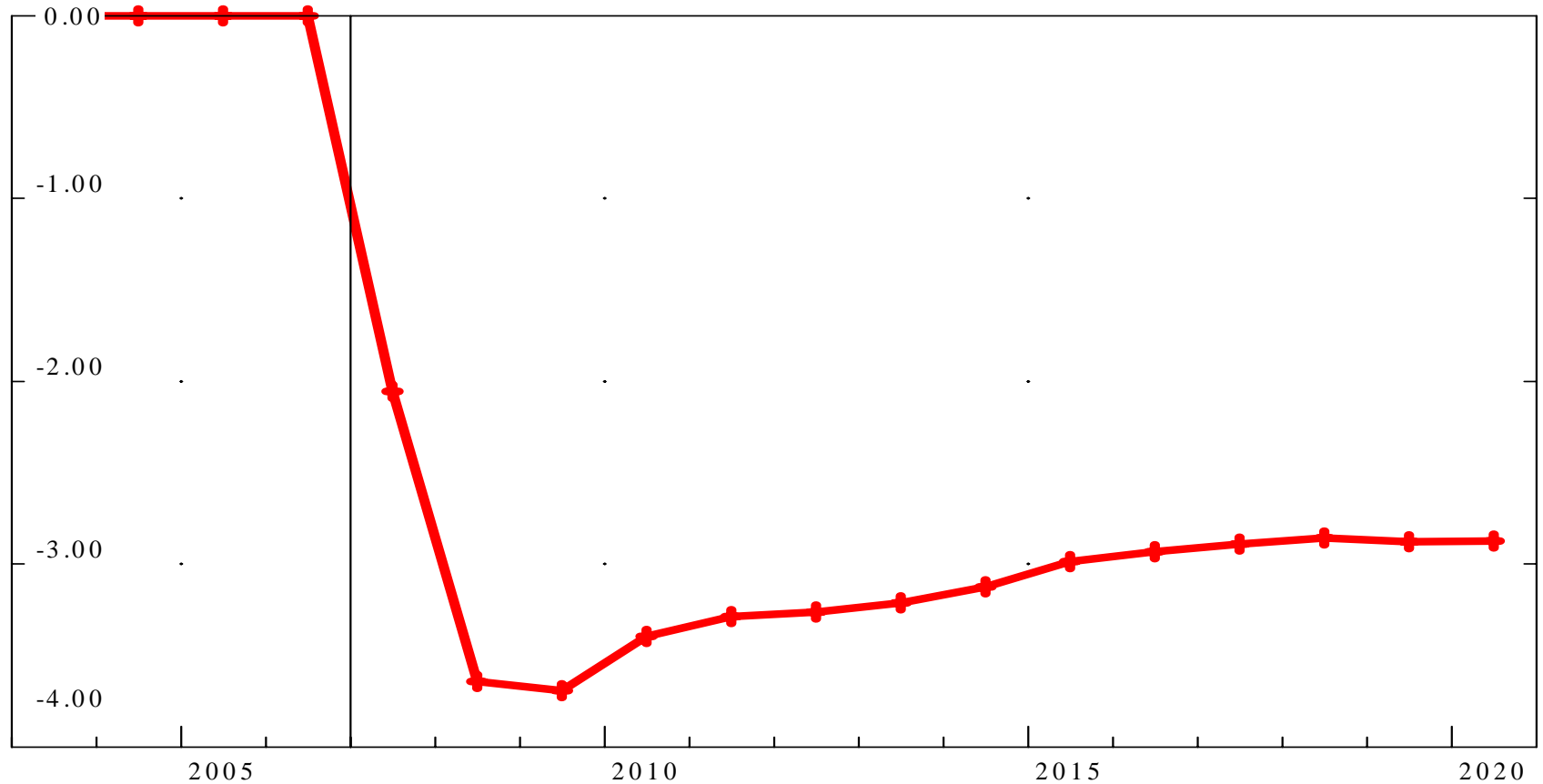
# Difference in GDP Growth (static)

growth (percent)



# Difference in GDP level (static)

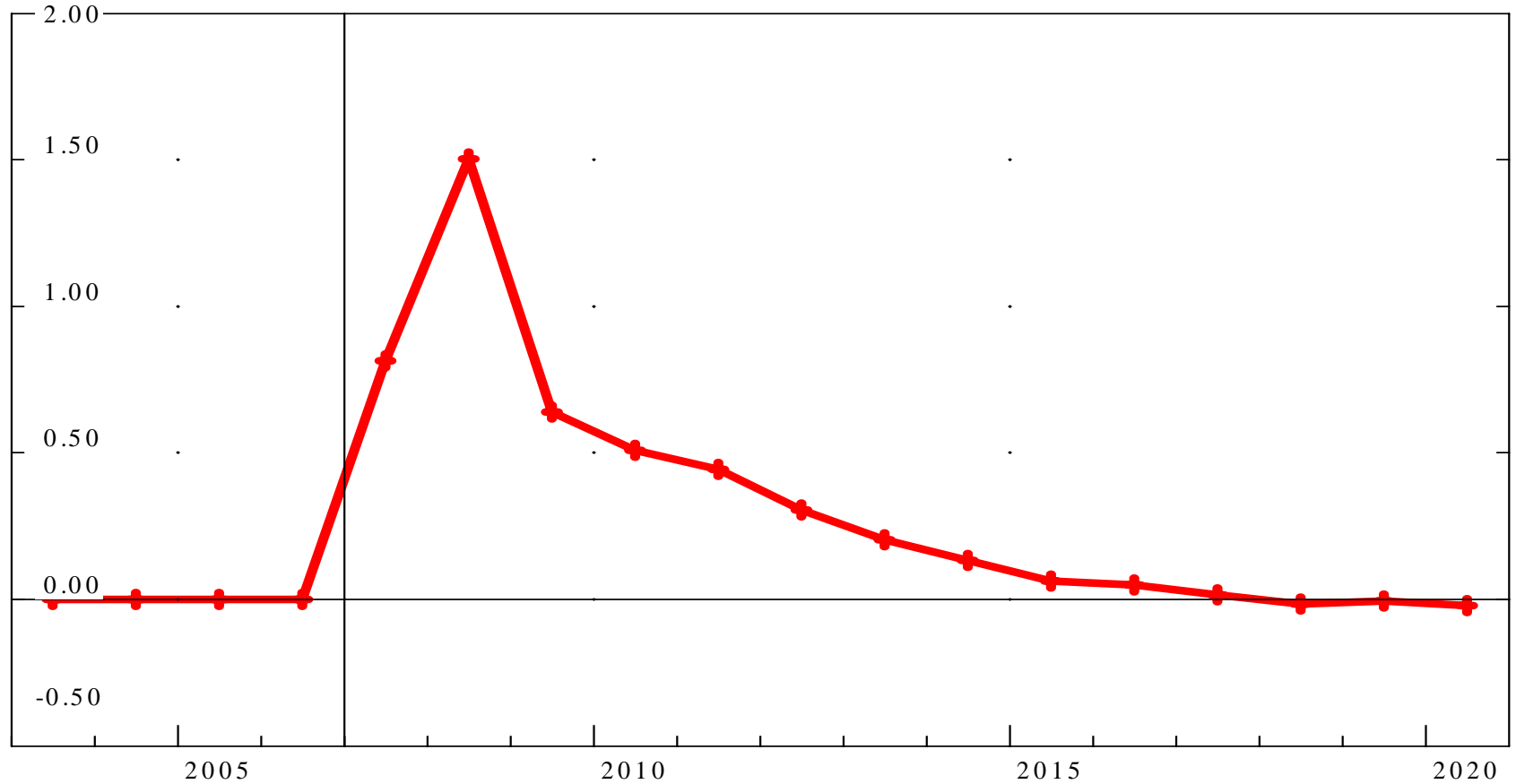
percent difference



pdagdpN

# Difference in GDP inflation (static)

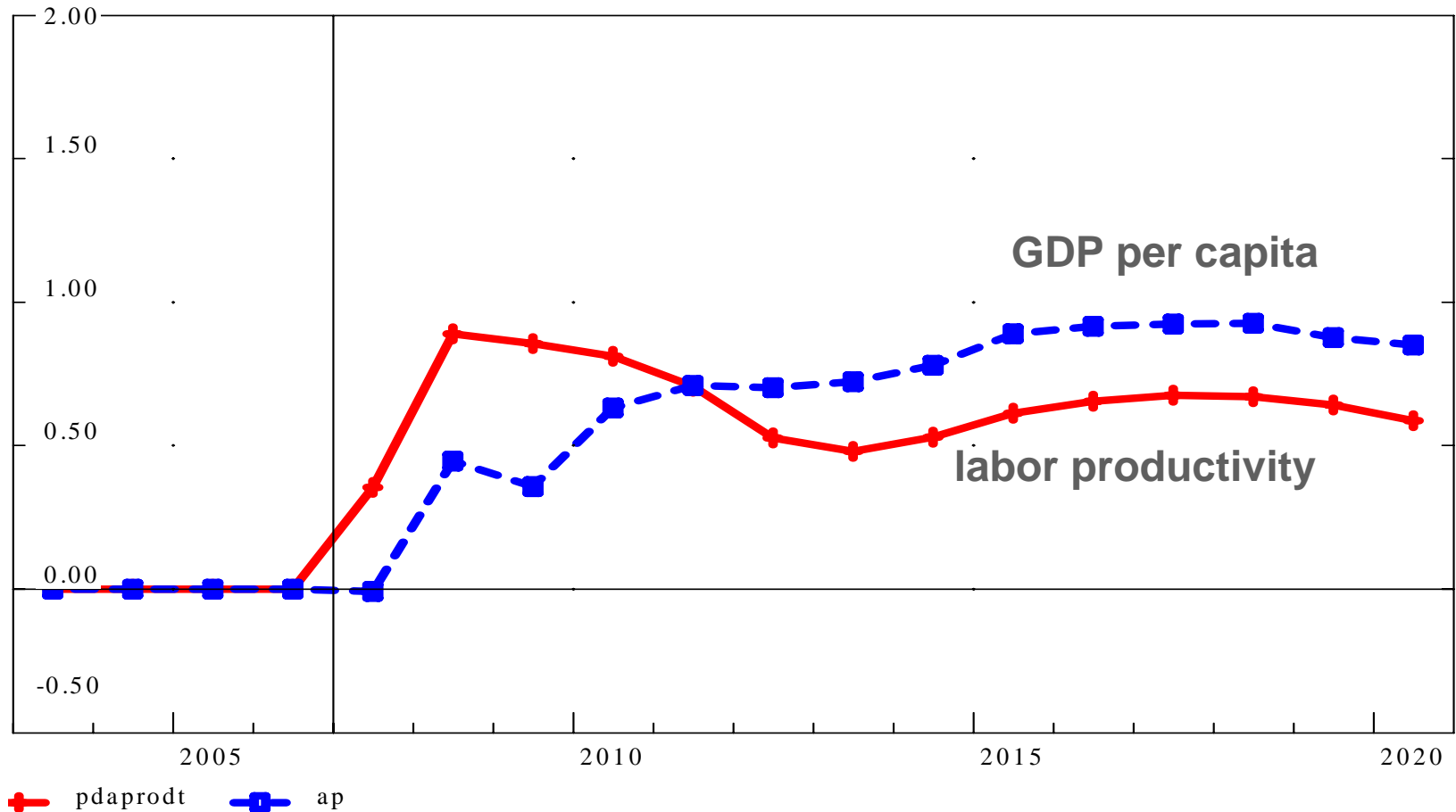
difference in inflation rate



—+— difinfl

# Difference in Labor productivity and GDP per capita (static)

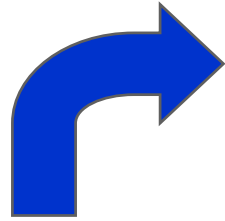
percent difference



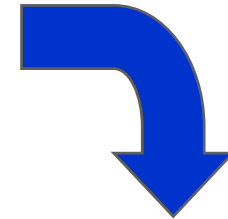
# A new economy?

Intensified competition induces “creative destruction.”

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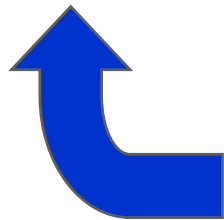


Globalization  
Market liberalization  
Technological change  
*Immigration*

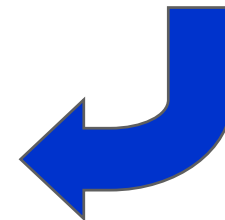


Economic growth  
Low inflation  
Full employment

*Competition*



Investment + new mgmt  
techniques+ training +  
greater effort = *productivity*  
*increases (TFP)*



*X-efficiencies* are TFP enhancing factors not accounted for in typical comparative static exercise.

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X-efficiencies of immigration:

- Larger labor force encourages economies of scale (construction, leisure).
- Erosion of monopoly power (unions) and other rent-seeking behavior (taxes).
- Lower relative wages increases investment in technology enhanced capital (FDI).
- Competition in labor market induces harder and longer work (especially by natives).
- Immigrants have important embedded qualities (risk-taking, creative).
- ***Implies very significant distributional consequences.***

# Assume X-efficiencies go away with the illegal immigrants: “Dynamic” results

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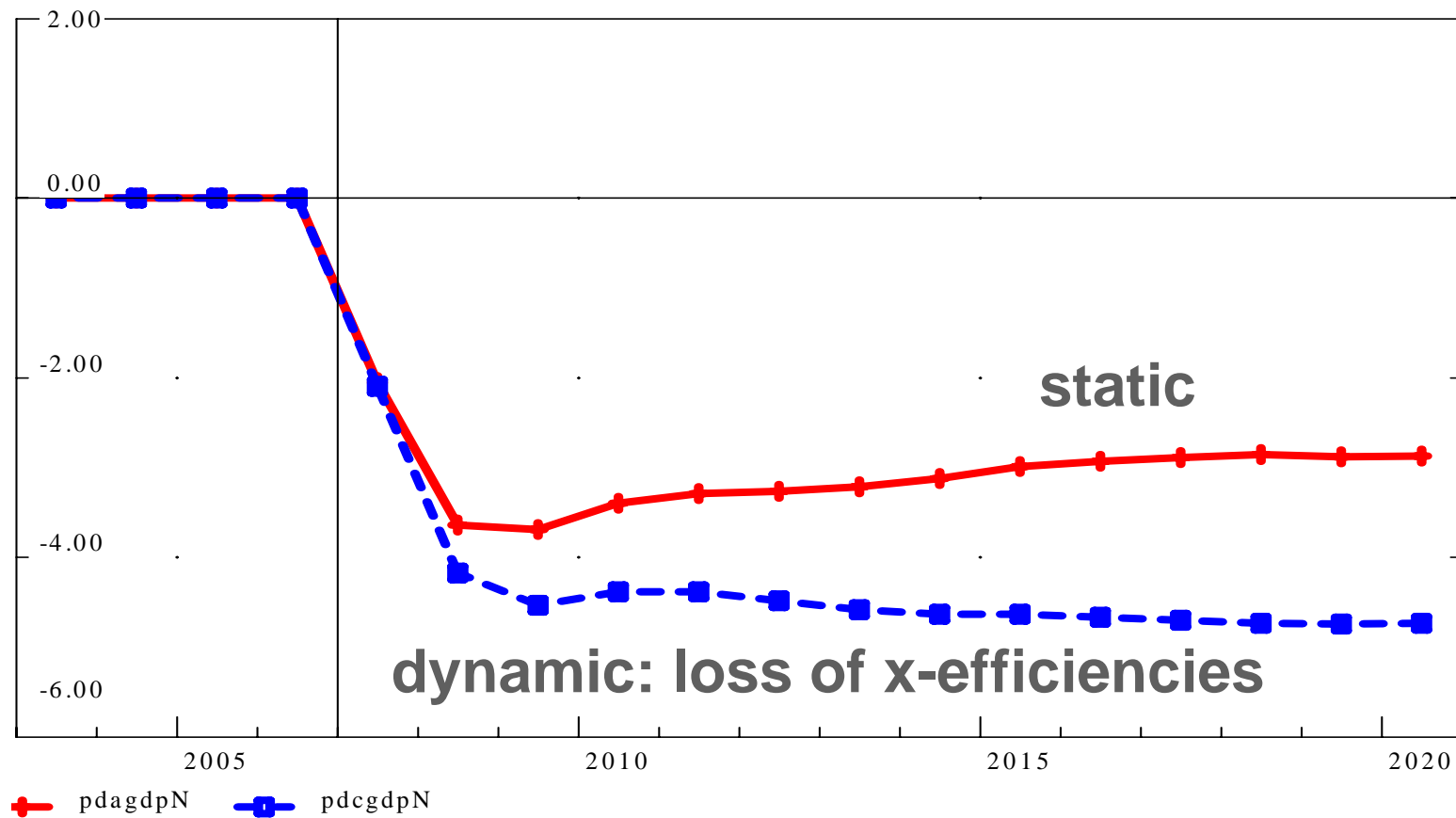
Reduce productivity growth across economy, particularly in most effected sectors (construction, services) *The magnitude of this improvement is speculative (with trade we often find some estimates).*

Immediate shock is similar, but in intermediate to long term:

- GDP doesn't “heal,” it remains significantly lower.
- Higher inflation entrenched longer.
- Exports less competitive.
- Lower aggregate productivity.
- Lower higher income per capita.

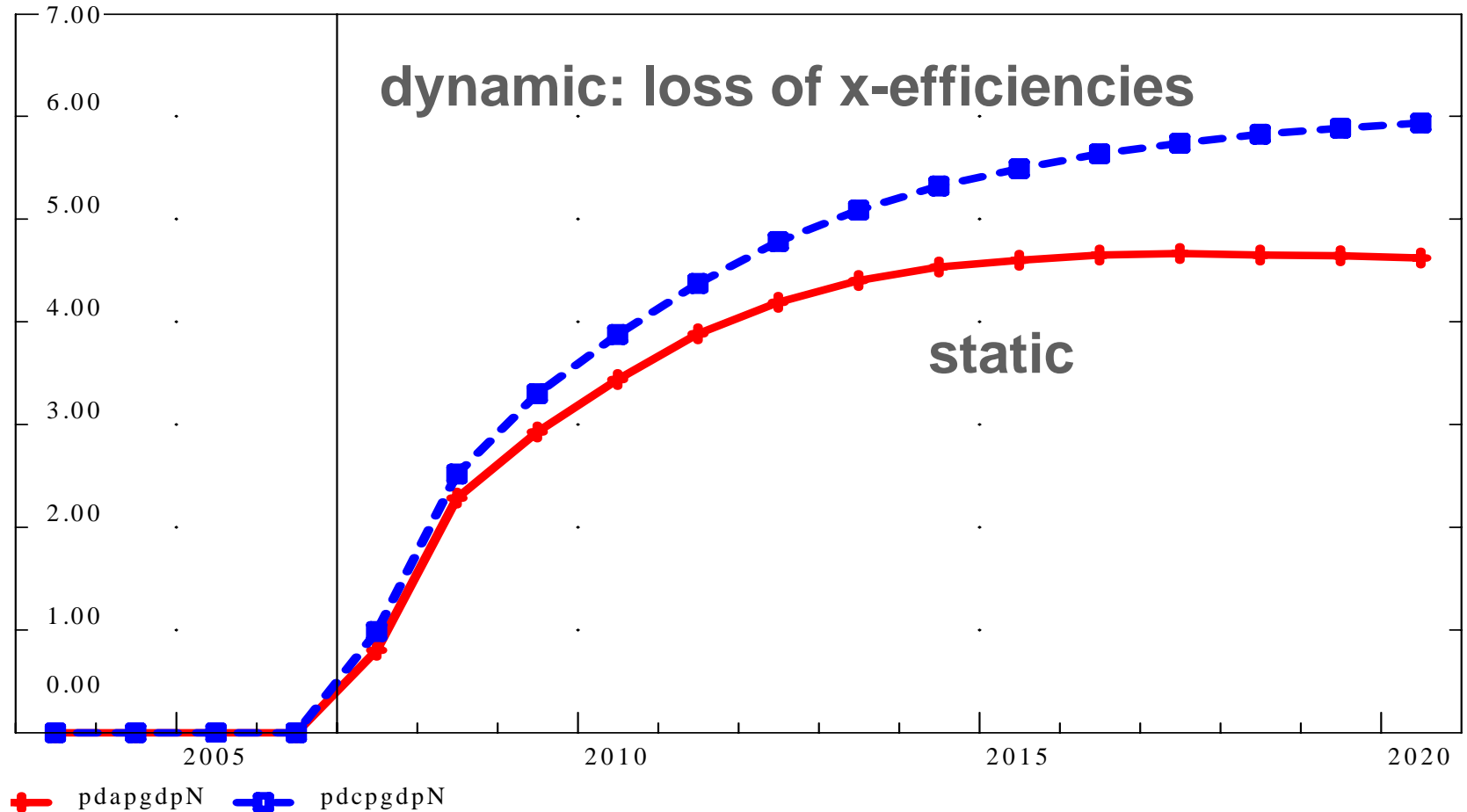
# Difference in GDP level (static vs. dynamic)

percent difference



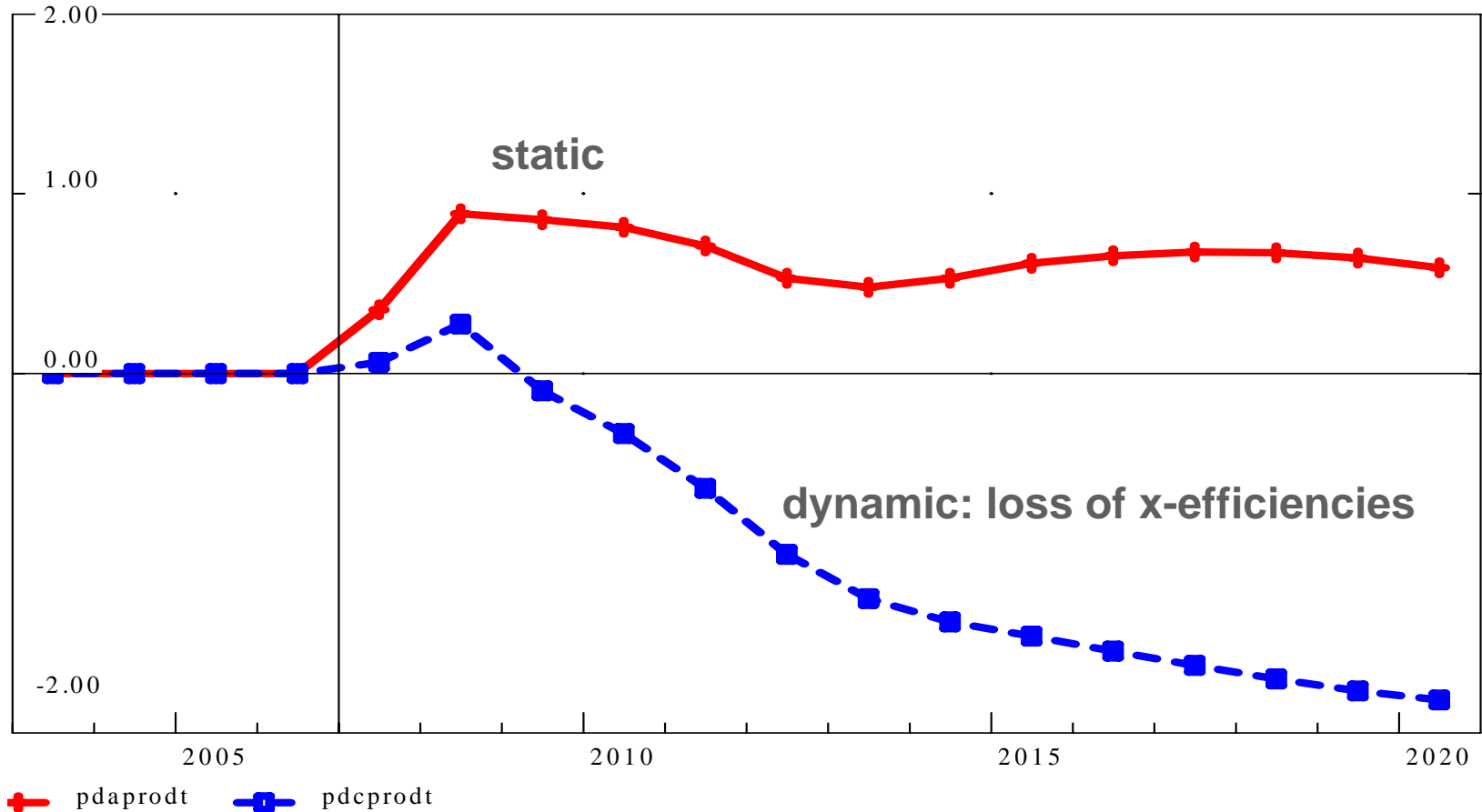
# Difference in GDP prices (static vs. dynamic)

difference in price level

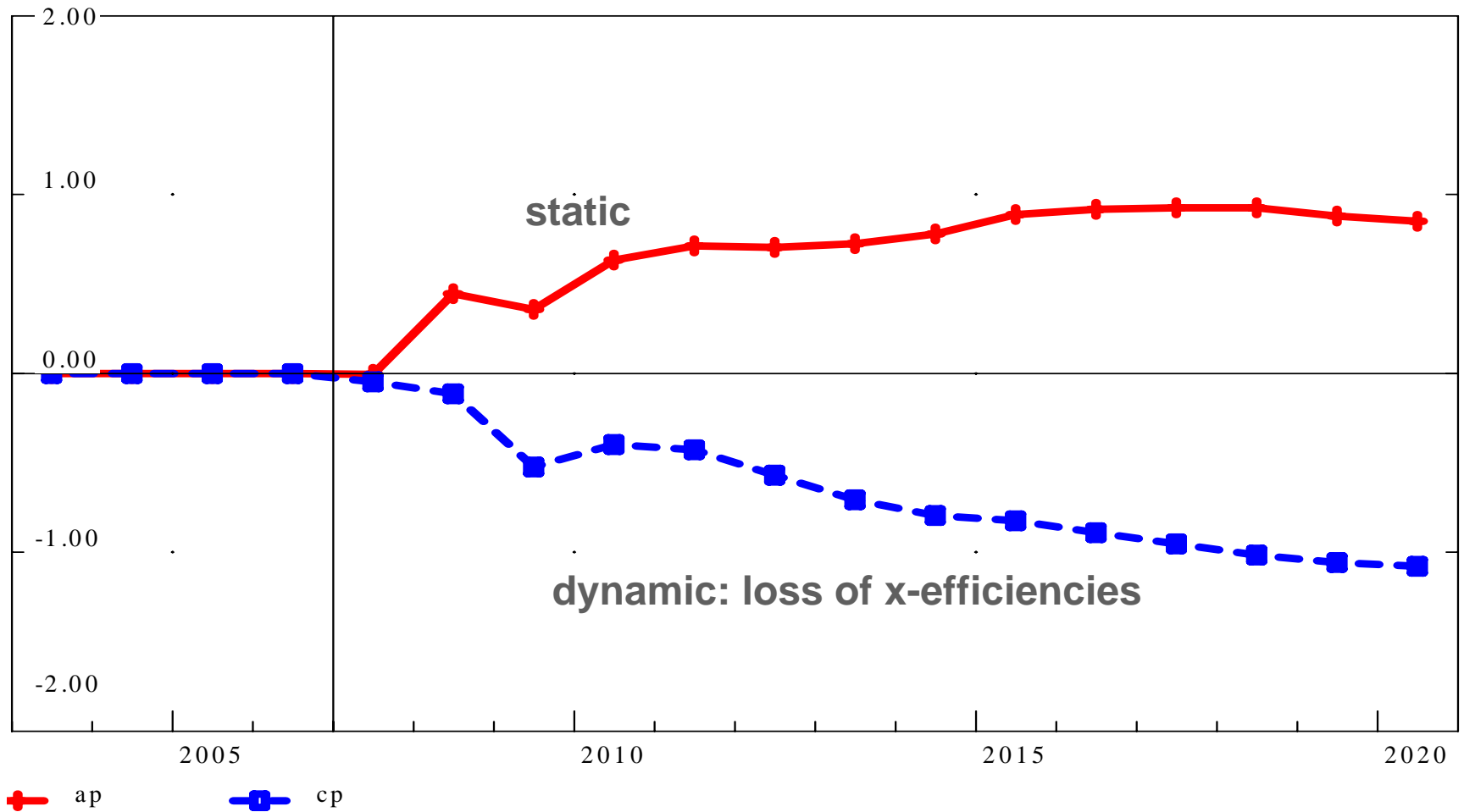


# Difference in Labor productivity (static vs. dynamic)

percent difference



# Difference in GDP per capita (static vs. dynamic)



# Immigration Conclusions

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- Difficult to find large positive net benefits of immigration in comparative “static” scenarios.
- Largest potential impacts of immigration depend on X-efficiencies introduced through greater competition.
- Nonetheless, even large positive impacts of immigration imply negative and durable costs for many.