

Great Depressions of the Twentieth Century Project

Timothy J. Kehoe and
Edward C. Prescott

www.greatdepressionsbook.com

Cole and Ohanian, “The Great Depression in the United States from a Neoclassical Perspective,” *Federal Reserve Bank of Minneapolis Quarterly Review*, Winter 1999.

Federal Reserve Bank of Minneapolis Conference, October 2000.

Special Issue of *Review of Economic Dynamics*, January 2002.

Great Depressions of the Twentieth Century, July 2007.

15 studies by 26 researchers using the same methodology

Great depressions

1930s

United States, United Kingdom, Canada, France, Germany

Recent

Argentina (1970s and 1980s), Chile and Mexico (1980s), Brazil (1980s and 1990s), New Zealand and Switzerland (1970s, 1980s, and 1990s), Argentina (1998-2002)

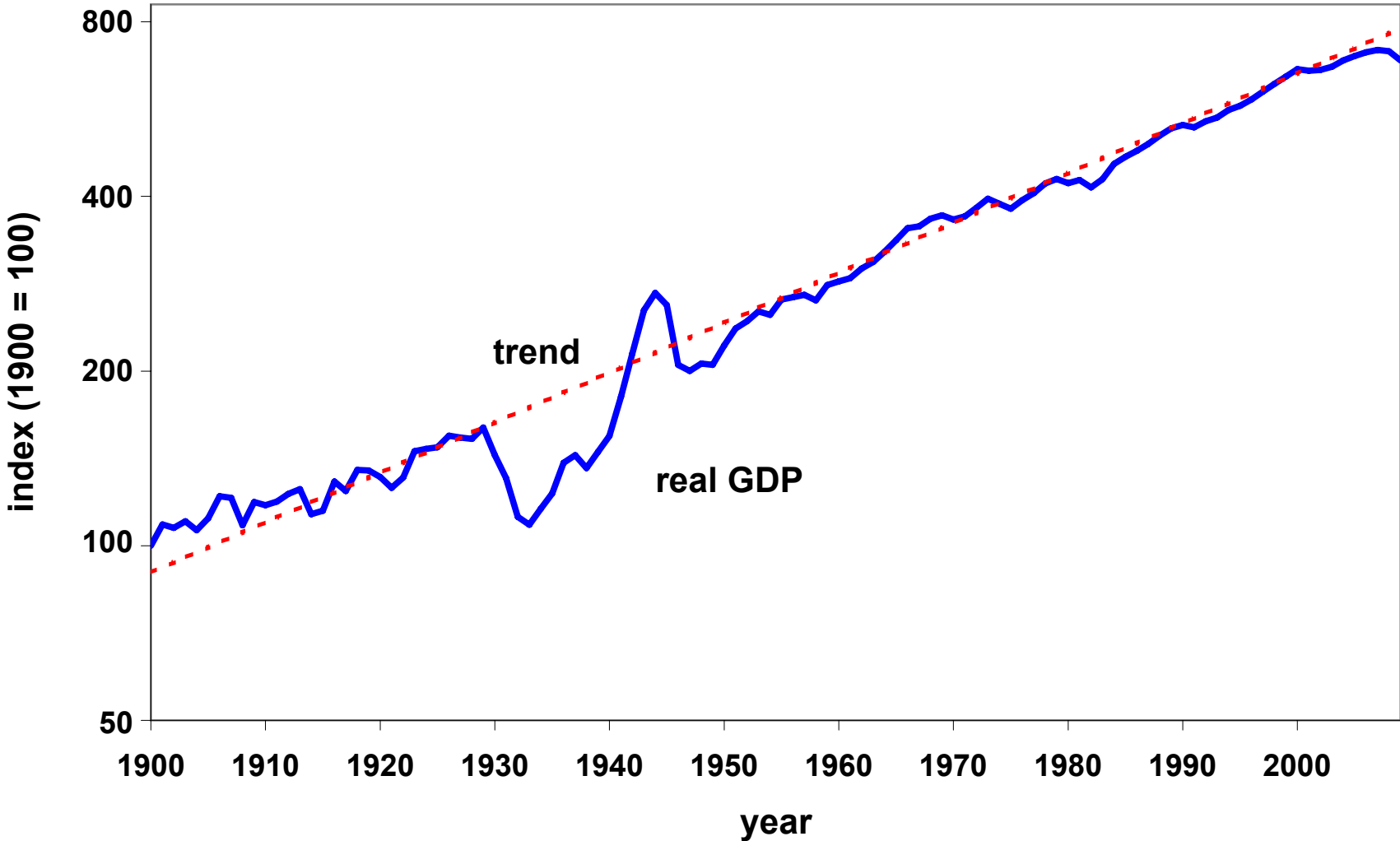
Not-quite-great depressions

Italy (1930s), Finland (1990s), Japan (1990s)

Kehoe and Prescott define a great depression to be a large negative deviation from balanced growth.

They set the growth rate in the balanced growth path to be 2 percent per year, the growth rate of output per working-age person in the United States during the twentieth century.

Real GDP per Working Age Person in the United States, 1900-2009



Trend growth:

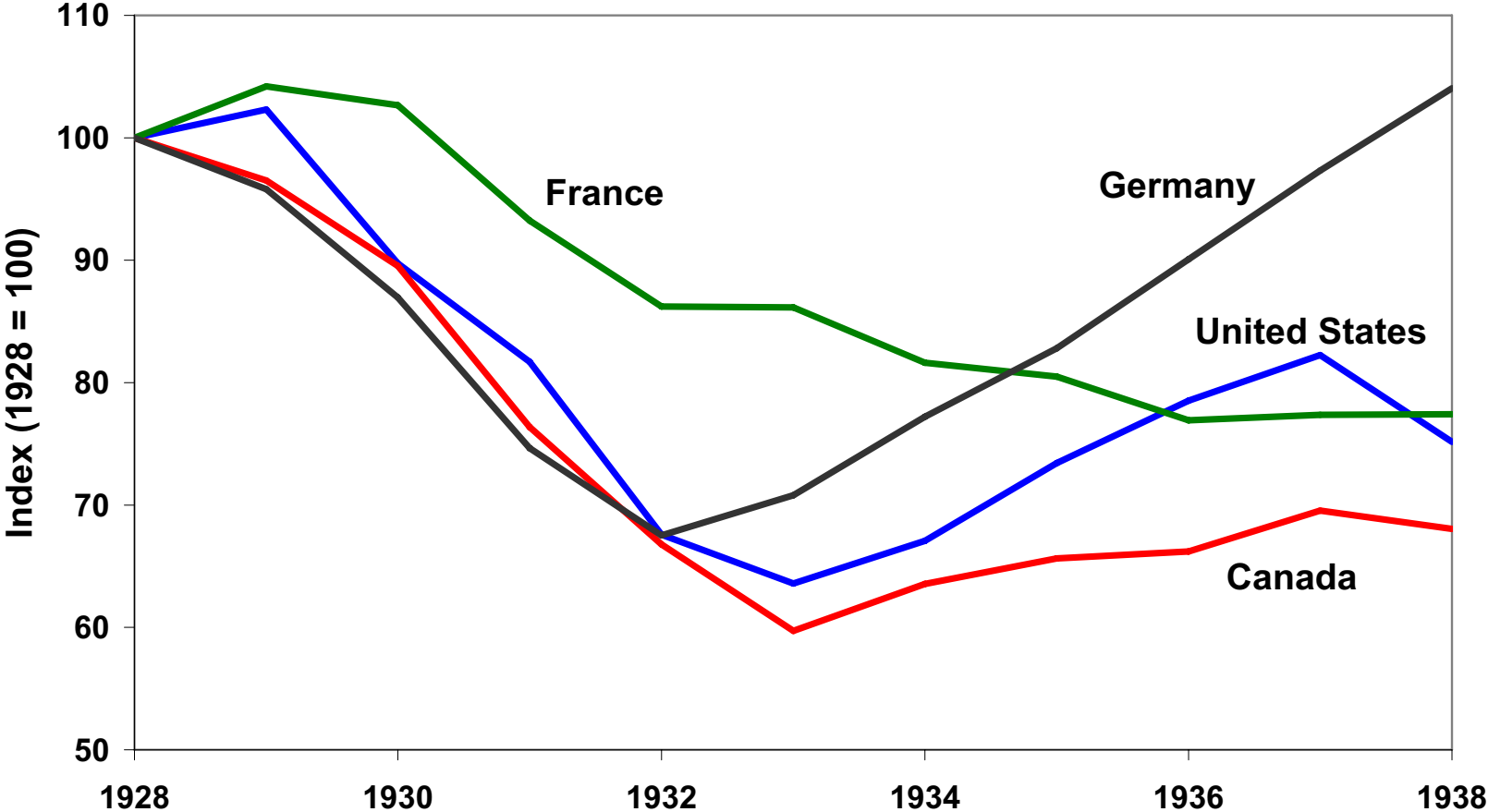
$$\hat{y}_t^i = \gamma^t \hat{y}_0^i, \gamma = 1.02$$

Great depression:

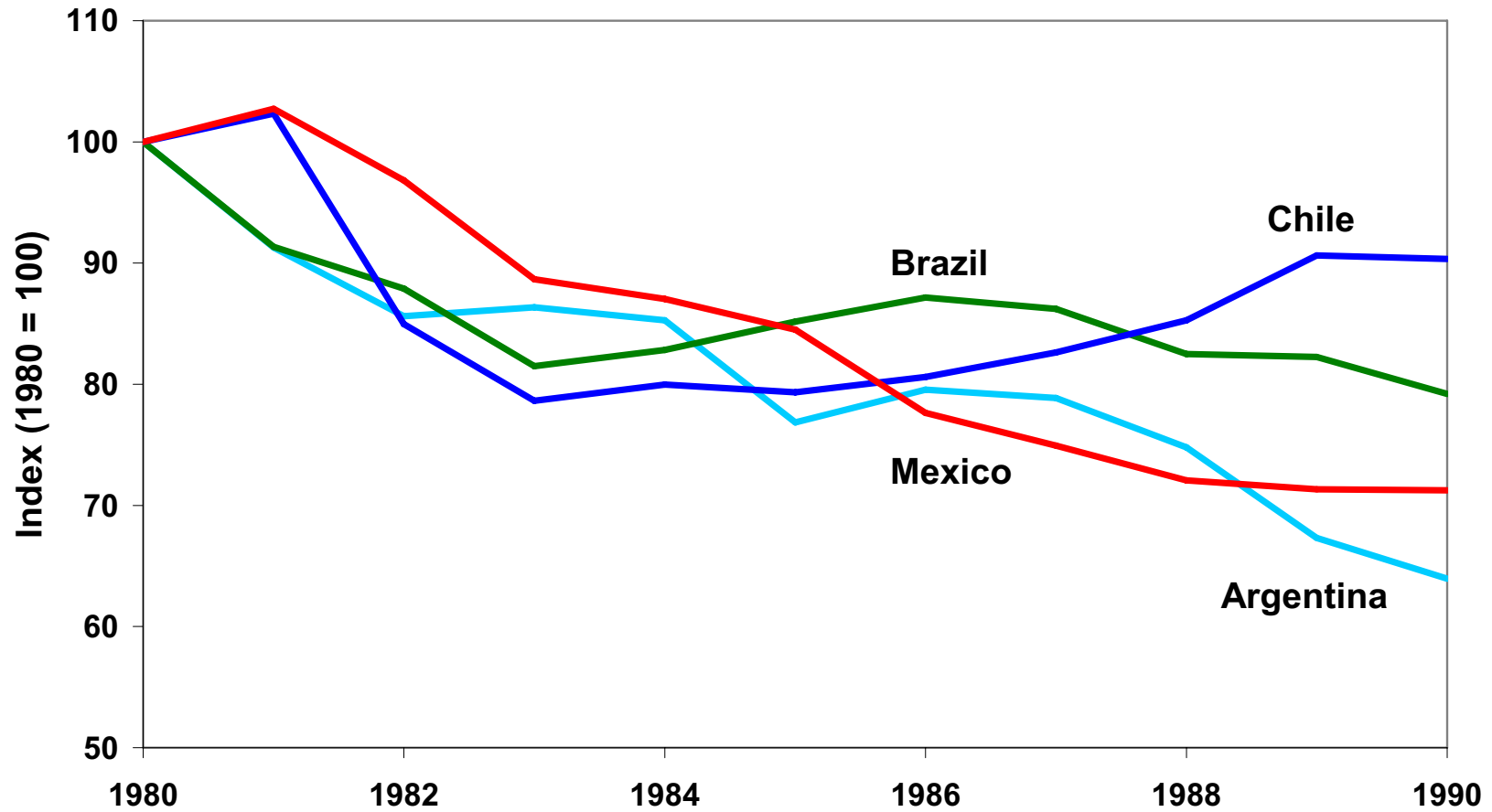
$D = [t_0, t_1]$ such that

1. There is some t in D in such that $\left[y_t^i / \left(\gamma^{t-t_0} \hat{y}_{t_0}^i \right) \right] - 1 \leq -0.20$.
2. There is some $t \leq t_0 + 10$ such that $\left[y_t^i / \left(\gamma^{t-t_0} y_{t_0}^i \right) \right] - 1 \leq -0.15$.
3. There are no t_1, t_2 in D , $t_2 \geq t_1 + 10$, such that $\left[y_{t_2}^i / \left(\gamma^{t_2-t_1} y_{t_1}^i \right) \right] - 1 \geq 0$.

Great depressions in the 1930s: Detrended output per person



Great depressions in the 1980s: Detrended output per working-age person



Great depressions methodology

Crucial elements: Growth accounting and dynamic general equilibrium model

Growth accounting decomposes changes in output per working-age person into three factors:

- a productivity factor
- a capital factor
- an hours-worked factor

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Keynesian analysis stresses declines in inputs of capital and labor as the causes of depressions.

Balanced growth path

In the dynamic general equilibrium model, if the productivity factor grows at a constant rate, then

the capital factor and the hours-worked factor stay constant and growth in output is due to growth in the productivity factor.

Twentieth century U.S. macro data are very close to a balanced growth path, with the exception of the Great Depression and the subsequent World War II build-up.

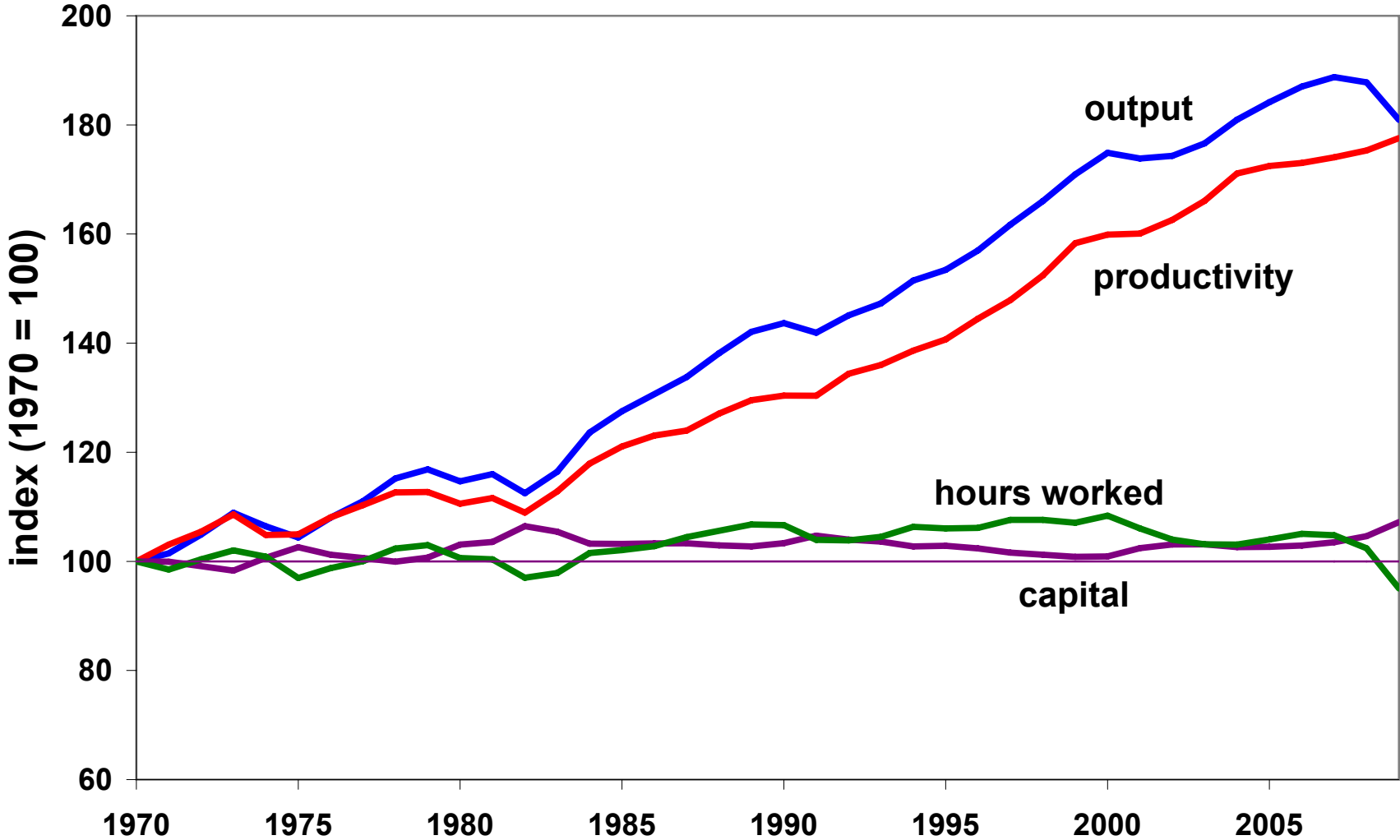
Balanced growth path

$$\frac{Y_t}{N_t} = A_t^{\frac{1}{1-\alpha}} \left(\frac{K_t}{Y_t} \right)^{\frac{\alpha}{1-\alpha}} \left(\frac{L_t}{N_t} \right)$$

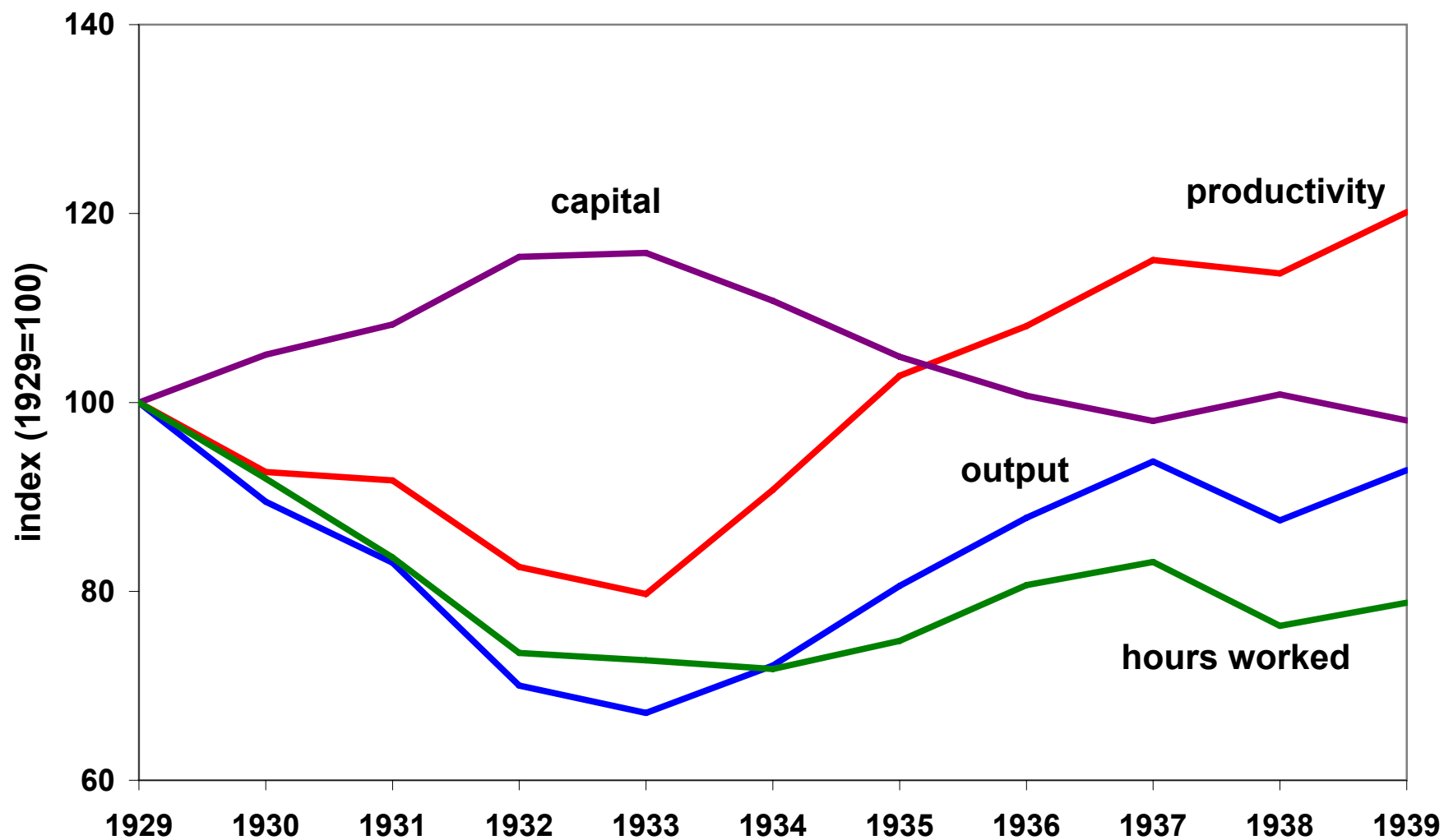
When $A_{t+1} = g^{1-\alpha} A_t$

- $\frac{K_t}{Y_t}$ and $\frac{L_t}{N_t}$ are constant
- $\frac{Y_t}{N_t}$ grows at rate $g - 1$, assume $g - 1 = 0.02$ as in U.S.

Growth Accounting for the United States 1970-2009



Growth accounting for the United States 1929–1939



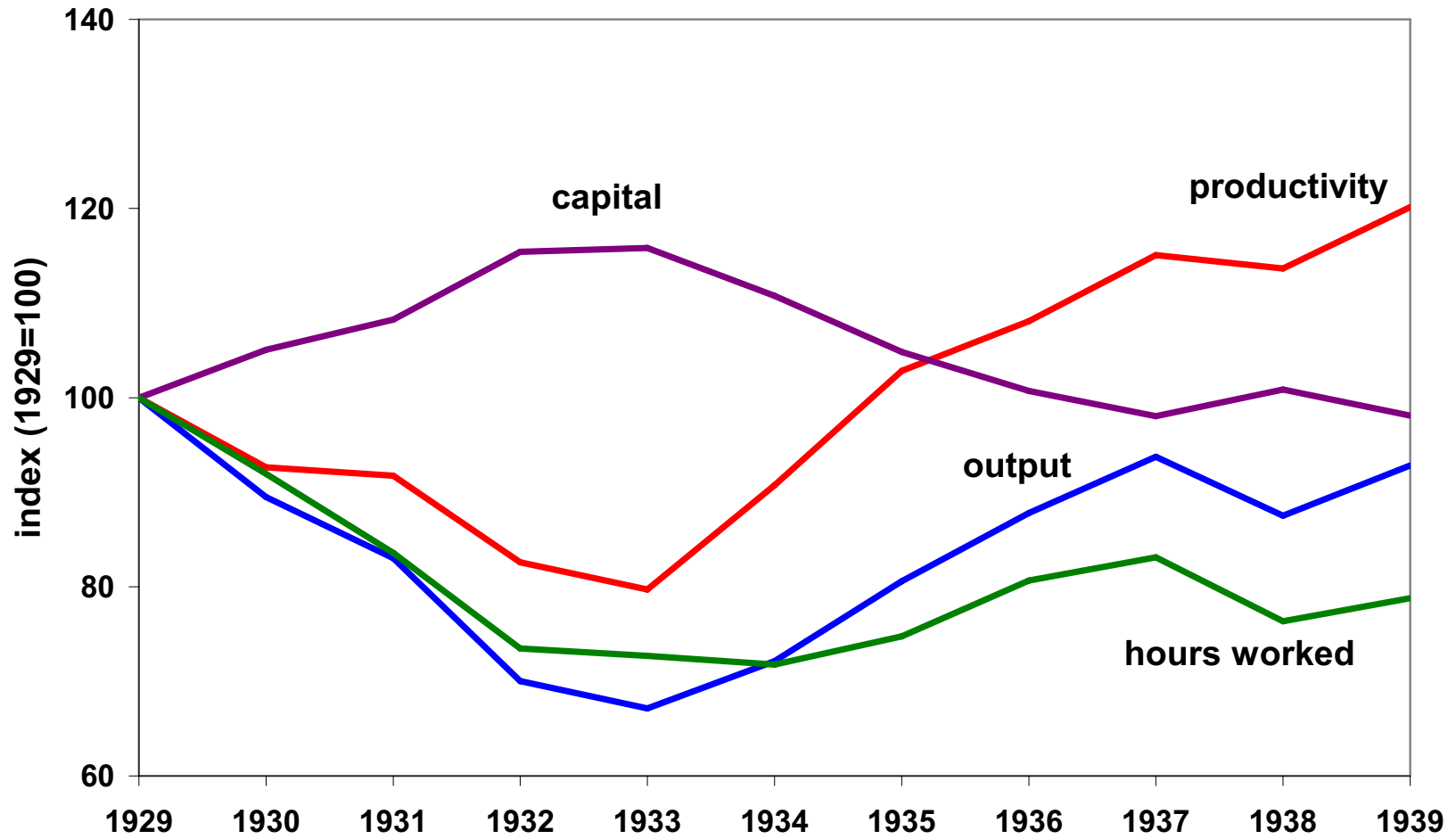
We use a dynamic general equilibrium model to model the responses of households and firms — in terms of capital accumulation and hours worked — to changes in productivity and changes in government policy.

We take the path of the productivity factor as exogenous.

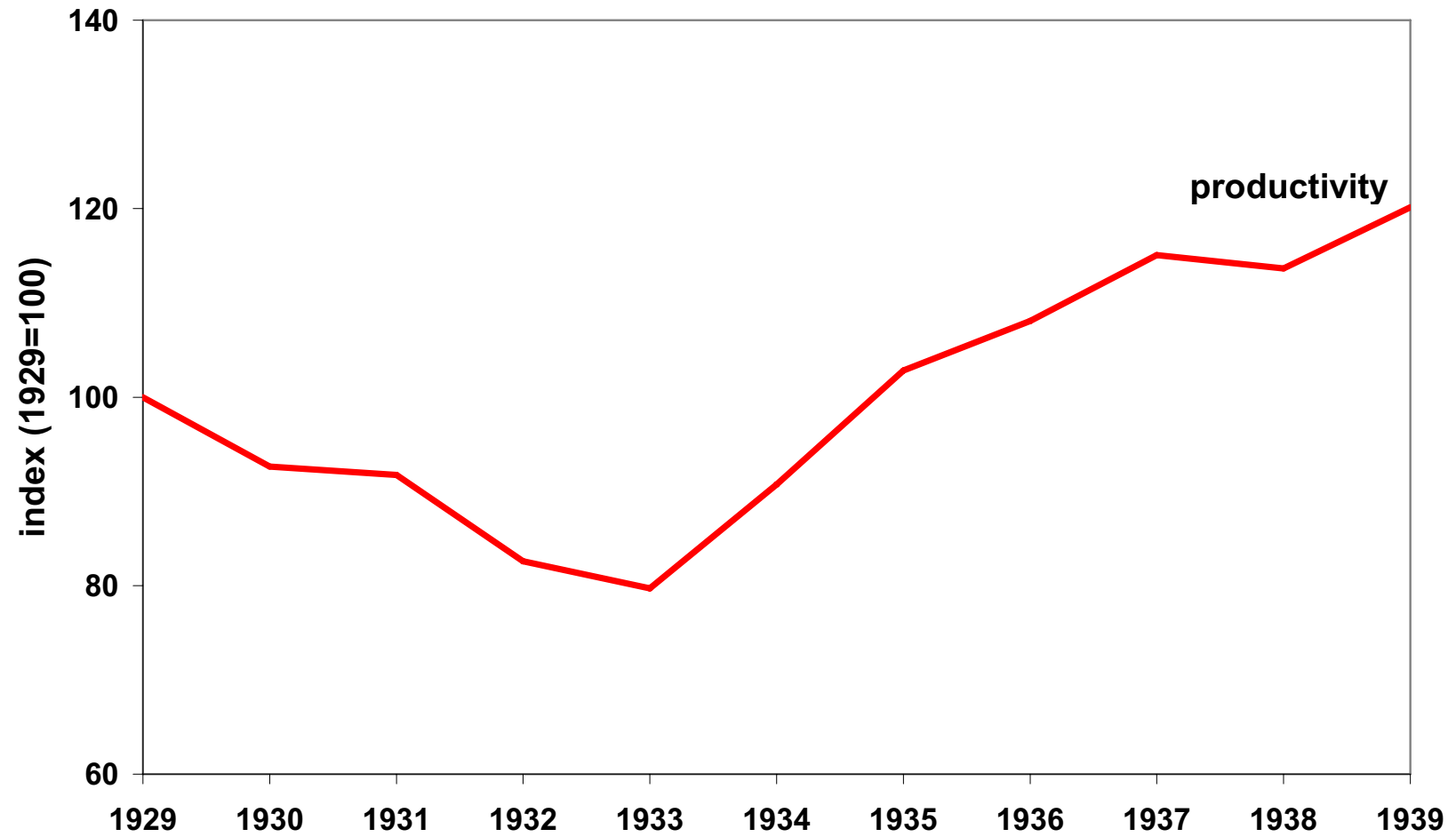
Comparing the results of the model with the data, we can identify features of the depression that need further analysis.

Example: The Great Depression in the United States.

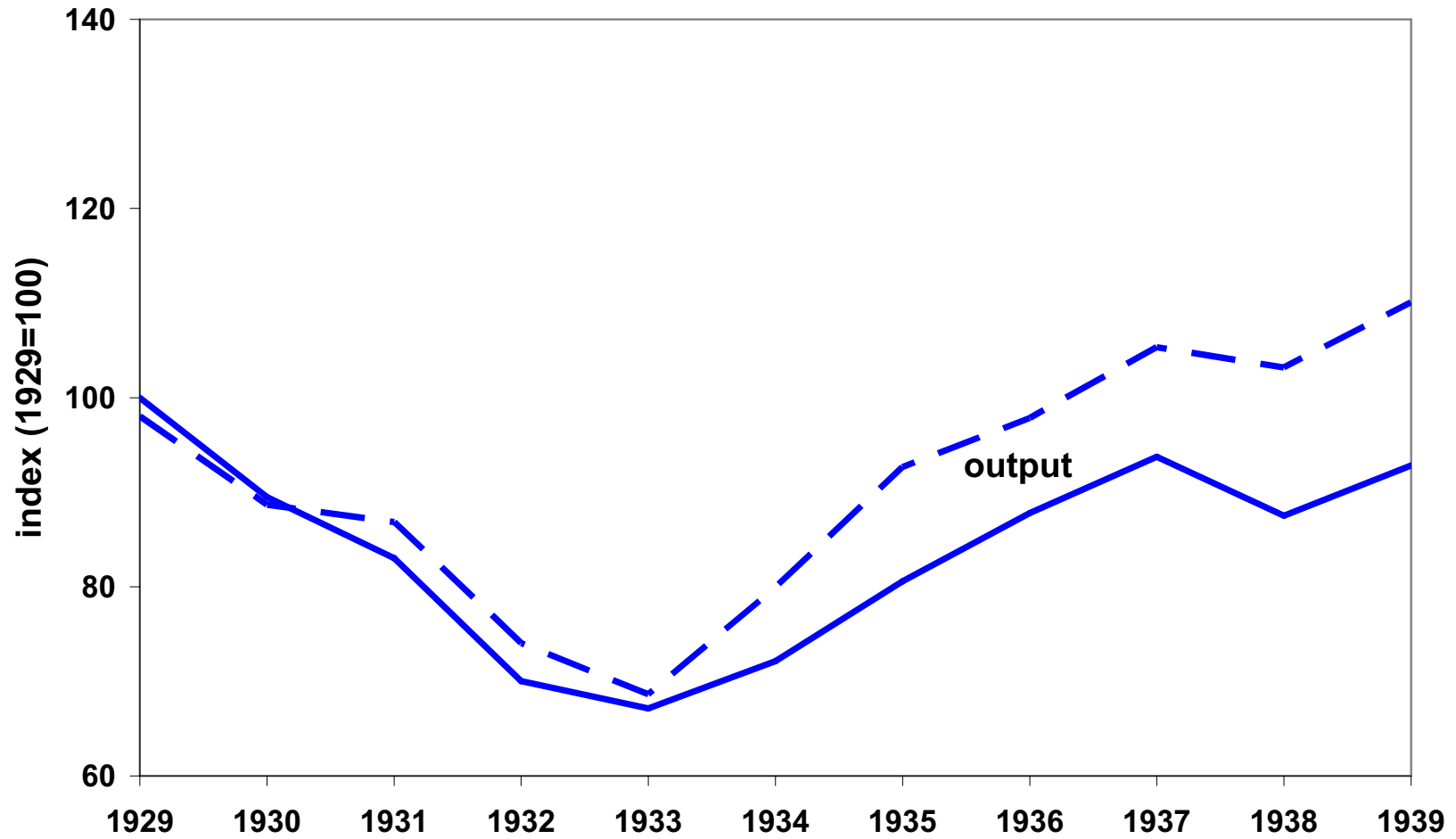
Growth accounting for the United States



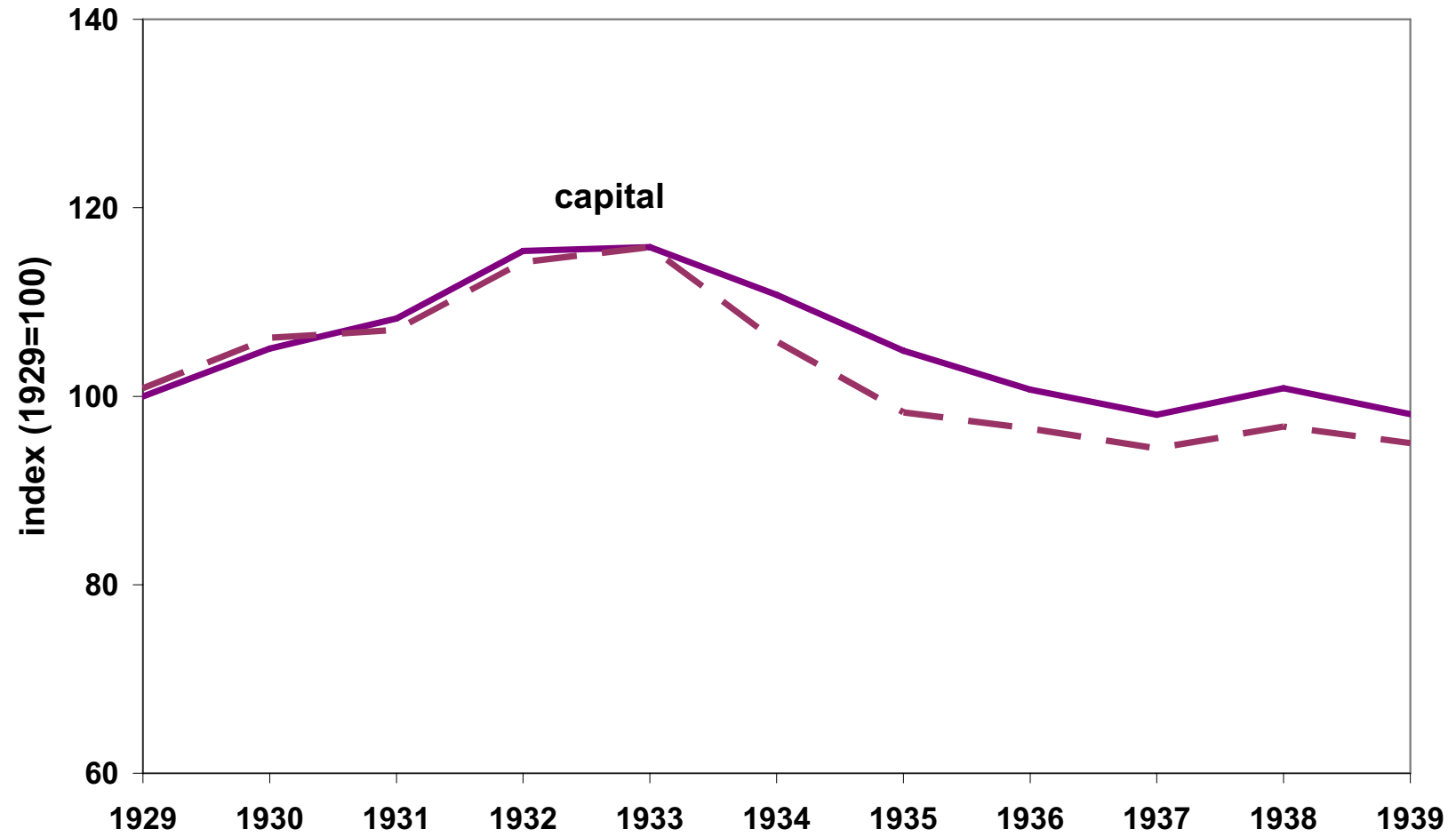
Growth accounting for the United States



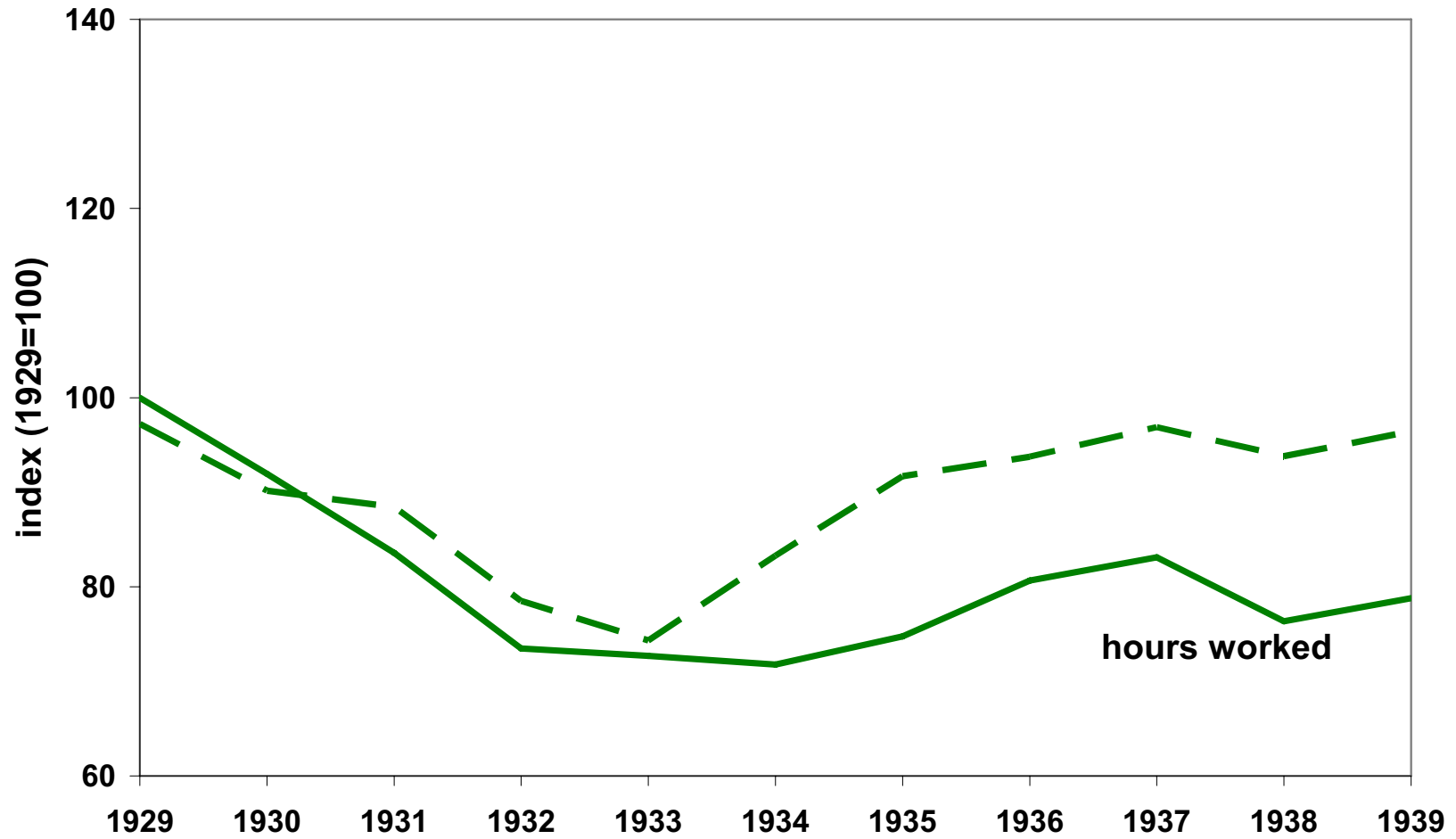
Growth accounting for the United States



Growth accounting for the United States



Growth accounting for the United States



Conclusions

A simple dynamic general equilibrium model that takes movements in the productivity factor as exogenous can explain most of the 1929-1933 downturn in the United States.

The model over predicts the increase in hours worked during the 1933-1939 recovery.

Need for Further Study

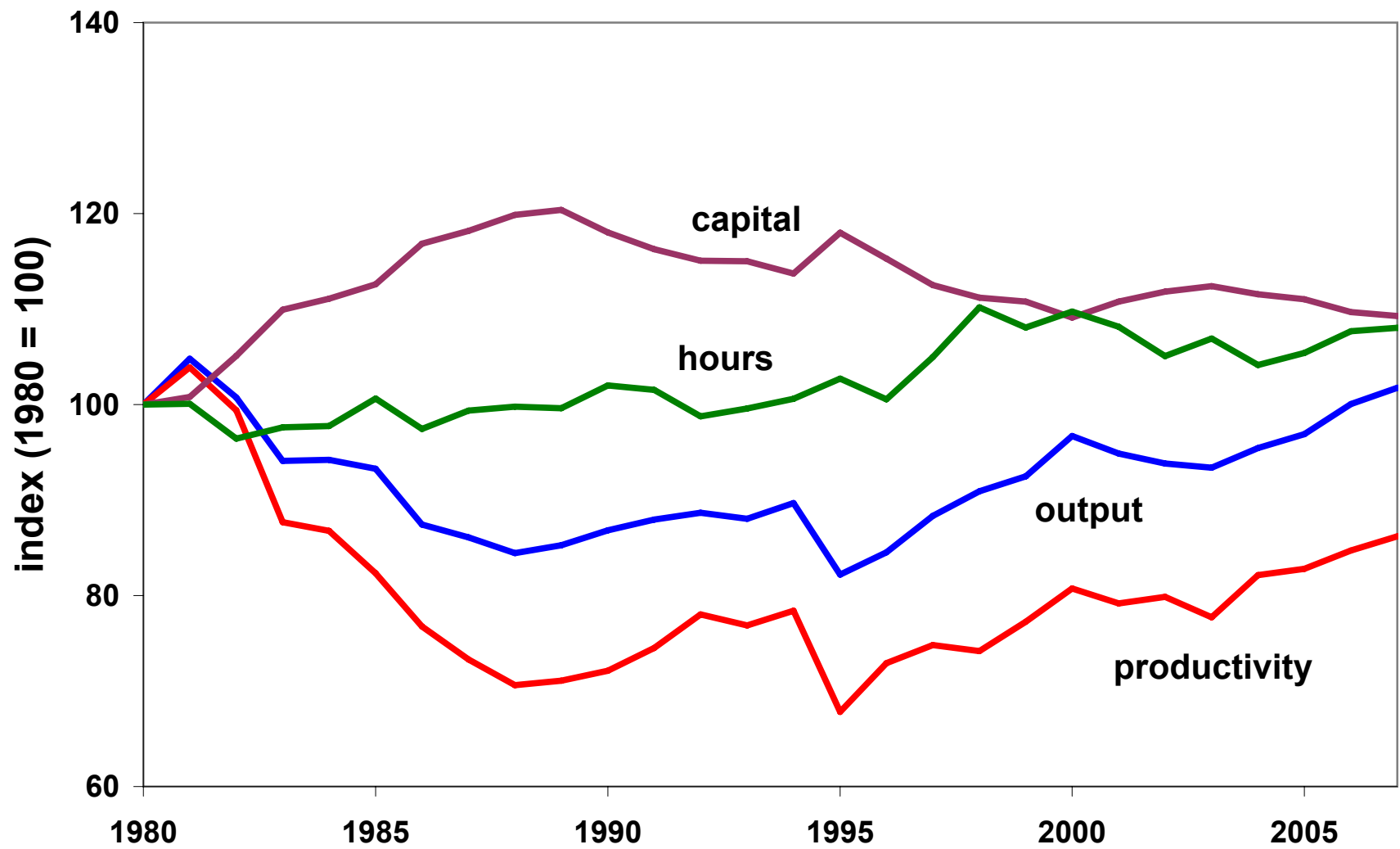
The decline in productivity 1929-1933

The failure of hours worked to recover 1933-1939

Lessons from Great Depressions Project

- The main determinants of depressions are not drops in the inputs of capital and labor — stressed in traditional theories of depressions — but rather drops in the efficiency with which these inputs are used, measured as total factor productivity (TFP).
- Exogenous shocks like the deteriorations in the terms of trade and the increases in foreign interest rates that buffeted Chile and Mexico in the early 1980s can cause a decline in economic activity of the usual business cycle magnitude.
- Misguided government policy can turn such a decline into a severe and prolonged drop in economic activity below trend — a great depression.

Growth Accounting for Mexico



A Decade Lost and Found: Mexico and Chile in the 1980s

Raphael Bergoeing, Patrick J. Kehoe, Timothy J. Kehoe,
and Raimundo Soto

Similar crises in 1981-1983

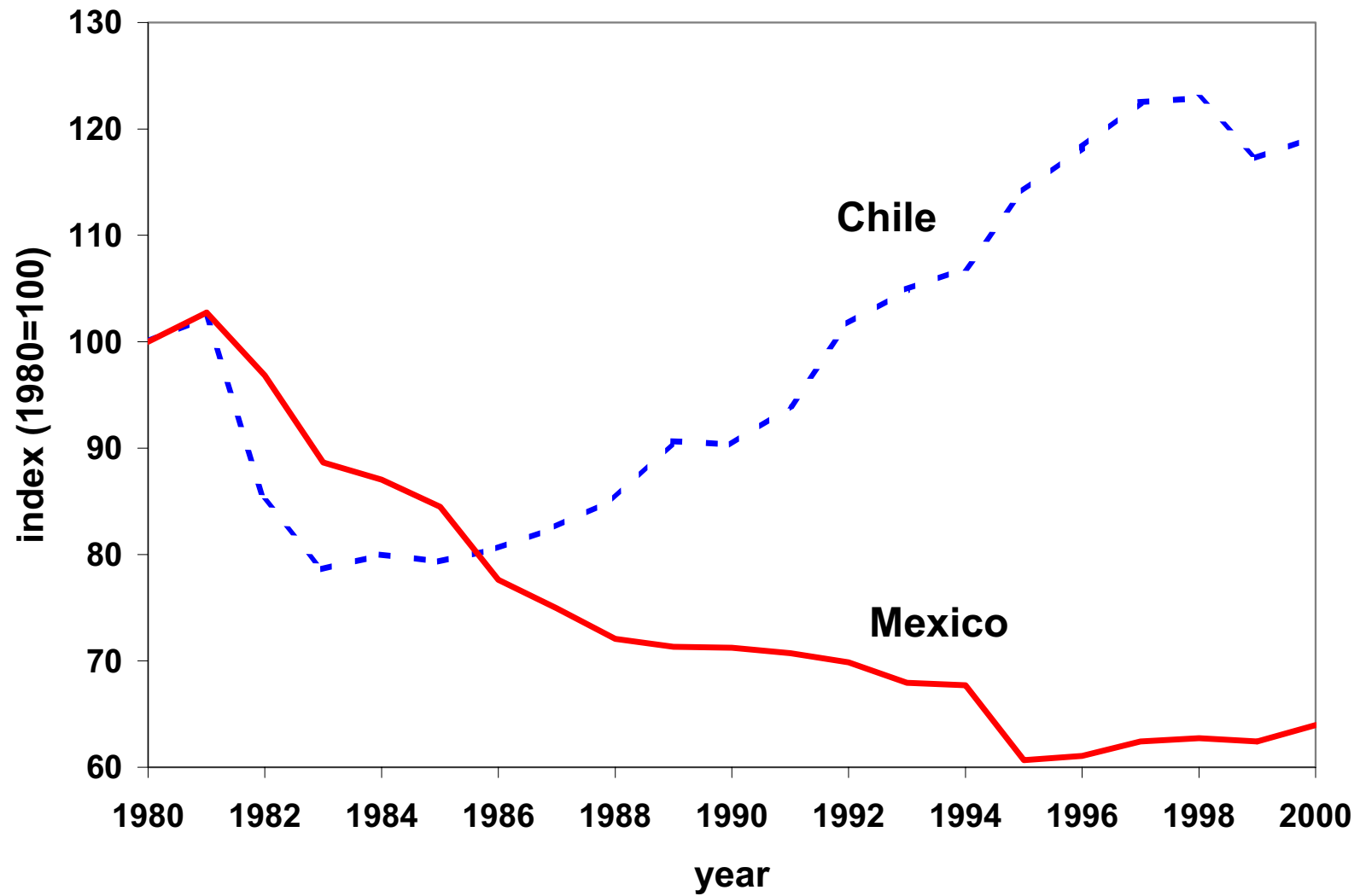
- more severe in Chile than in Mexico

Different recoveries

- much faster in Chile than in Mexico

Why different pattern?

Real GDP per working-age (15-64) person detrended by 2 percent per year



Growth accounting and applied dynamic general equilibrium model

Two numerical experiments with model:

Base case model: takes series for productivity factor as given.

Model with tax reform: takes series for productivity factor as given and imposes tax reform that lowers tax on capital income in 1988 in both countries.

Applied dynamic general equilibrium model

The representative consumer maximizes

$$\sum_{t=1980}^{\infty} \beta^t \left[\gamma \log C_t + (1-\gamma) \log(\bar{h}N_t - L_t) \right]$$

subject to

$$C_t + K_{t+1} - K_t = w_t L_t + (1 - \tau_t)(r_t - \delta)K_t + T_t$$

where $T_t = \tau_t(r_t - \delta)K_t$ is a lump-sum transfer.

Feasibility:

$$C_t + K_{t+1} - (1 - \delta)K_t = A_t K_t^\alpha L_t^{1-\alpha}.$$

Calibration

First order conditions:

$$\frac{1}{C_{t-1}} = \frac{\beta}{C_t} \left[1 + (1 - \tau_t)(r_t - \delta) \right]$$

$$\frac{1 - \gamma}{\bar{h}N_t - L_t} = \frac{\gamma w_t}{C_t}.$$

Look at 1960-1980 data

$$\beta = 0.98, \quad \tau = 1 - \frac{C_t - \beta C_{t-1}}{(r_t - \delta)C_{t-1}} \Rightarrow \tau = 0.45 \text{ in Mexico, } \tau = 0.56 \text{ in Chile;}$$

$$\gamma = \frac{C_t}{C_t + w_t(\bar{h}N_t - L_t)} \Rightarrow \gamma = 0.30 \text{ in Mexico, } \gamma = 0.28 \text{ in Chile .}$$

Numerical experiments

Base case:

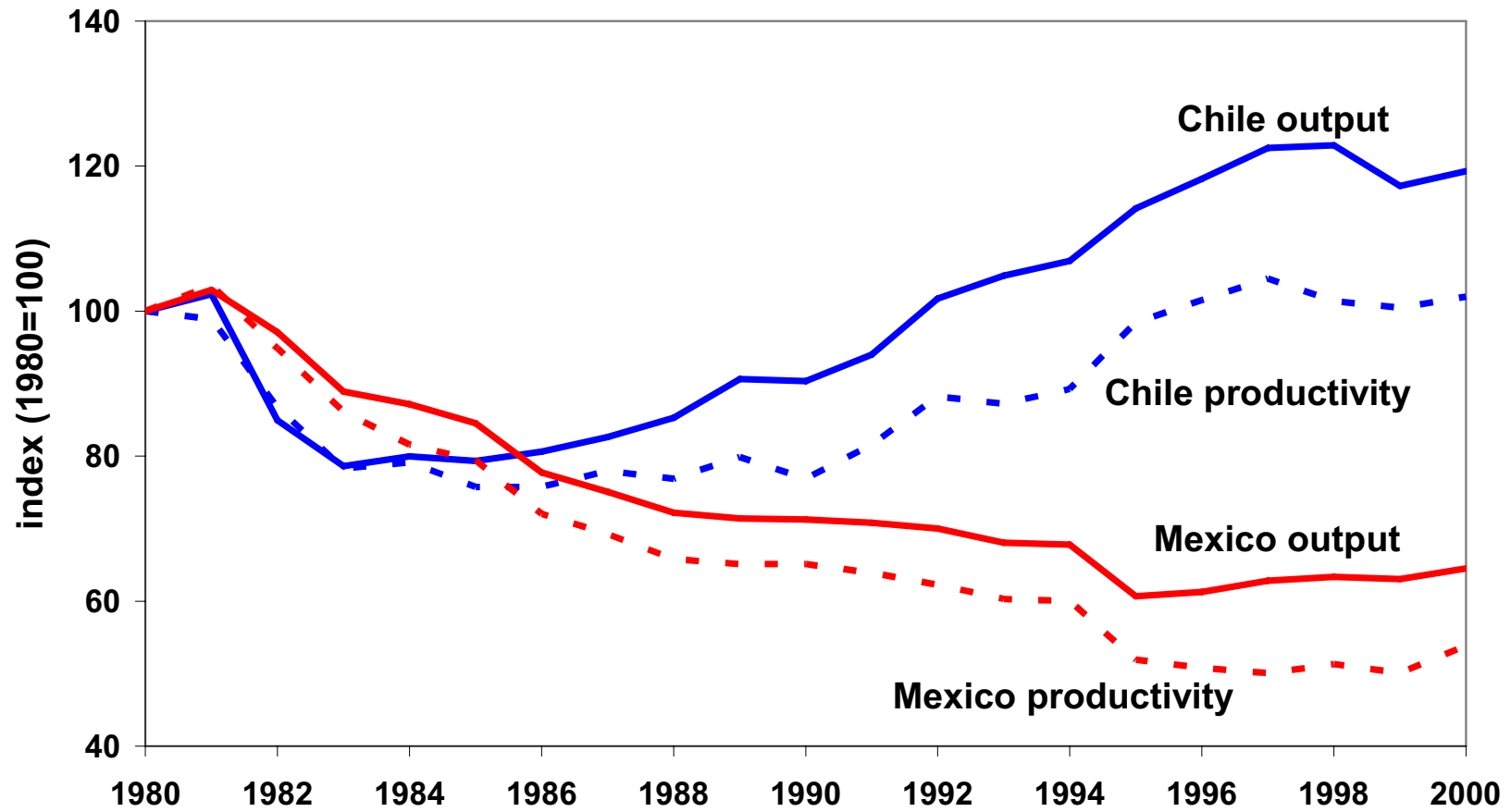
$\tau_t = 0.45$ in Mexico, $\tau_t = 0.56$ in Chile, 1980-2000.

Tax reform:

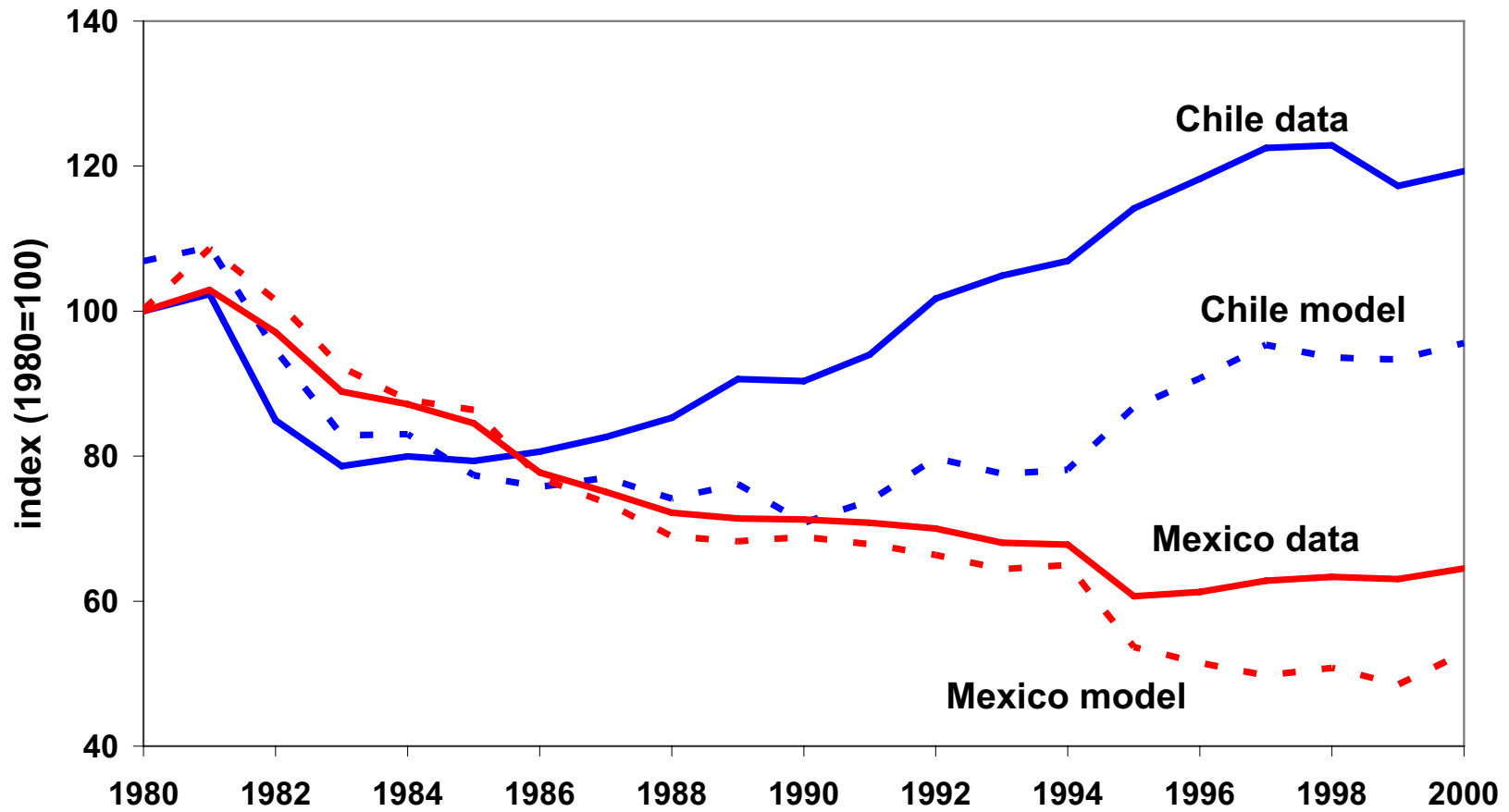
$\tau_t = 0.45$ in Mexico, $\tau_t = 0.56$ in Chile, 1980-1988;

$\tau_t = 0.12$ in Mexico, $\tau_t = 0.12$ in Chile, 1988-2000.

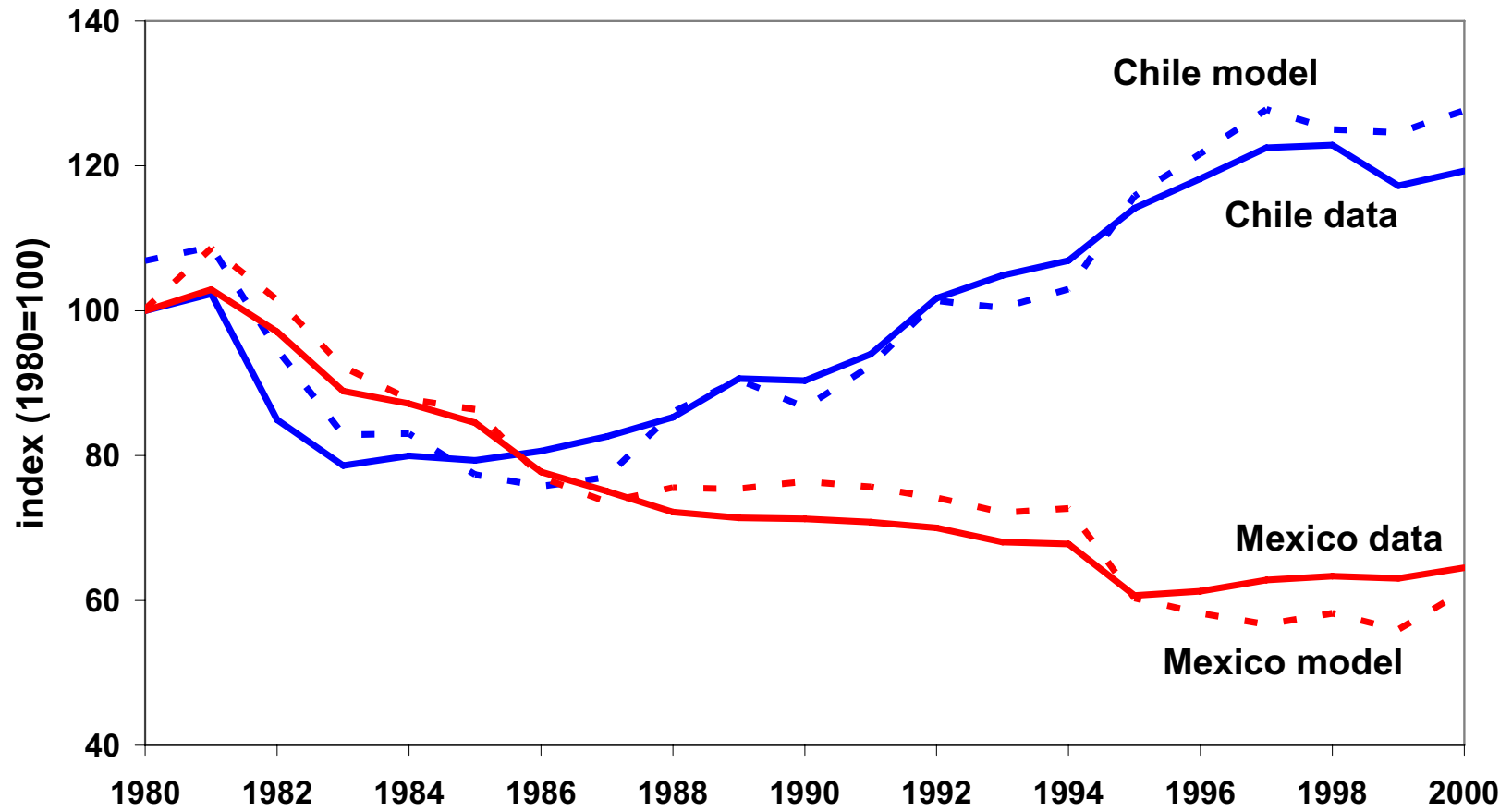
Detrended real GDP per working-age person and productivity factor



Detrended real GDP per working-age person: base case model



Detrended real GDP per working-age person: model with tax refrom



What do we learn from growth accounting and numerical experiments?

Nearly all of the differences in the recoveries in Mexico and Chile result from different paths of productivity.

Tax reforms are important in explaining some features of the recoveries, but not the differences.

Implications for studying structural reforms story:

- Only reforms that are promising as explanations are those that show up primarily as differences in productivity, not those that show up as differences in factor inputs.
- Timing of reforms is crucial if they are to drive the differences in economic performance.

Fiscal reforms

Chile:

- tax reforms 1975, 1984
- social security reform 1980
- fiscal surpluses

Mexico:

- tax reforms 1980, 1985, 1987, 1989
- fiscal deficits

Important, but not for explaining the differences!

Trade reforms

Chile: by 1979

- all quantitative restrictions eliminated
- uniform tariff of 10 percent
- tariff hikes during crisis — tariff back below 10 percent in 1991

Mexico: in 1985

- 100 percent of domestic production protected by import licenses
- nontariff barriers and dual exchange rates

Massive trade reforms in Mexico 1987-1994, culminating in NAFTA

Timing seems wrong!

Privatization

Chile

- major privatizations 1974-1979

Mexico

- major nationalization 1982
 - expropriated banks' holdings of private companies
 - government controlled 60-80 percent of GDP
- major privatizations after 1989

Timing seems wrong?

Banking

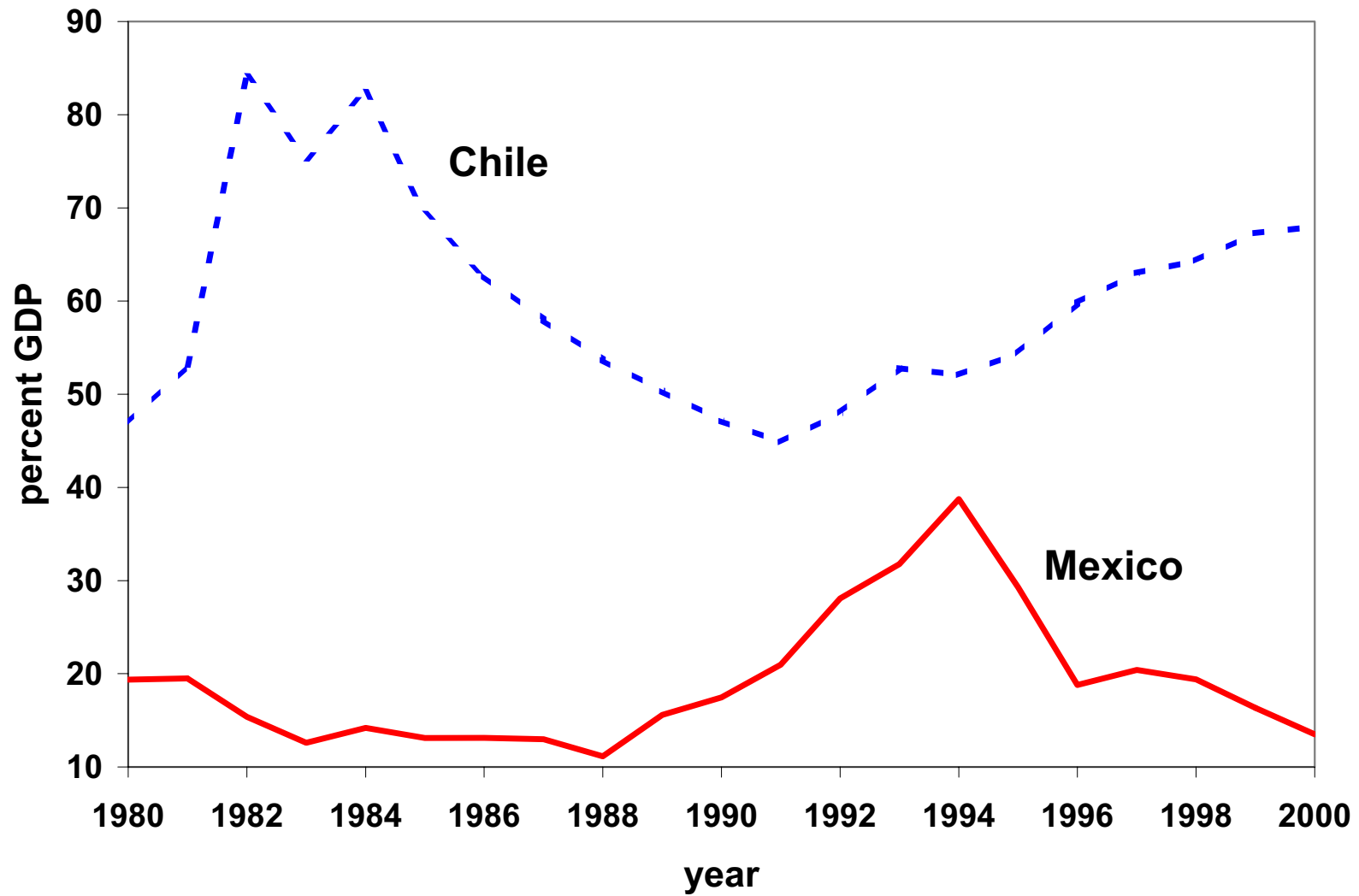
Chile: 1982 and after

- took over failed banks
- market-determined interest rates
- lowered reserve requirements.

Mexico: 1982 and after

- nationalized all banks
- government set low deposit rates
- 75 percent of loans either to government or directed by government.

Private credit as a percent of GDP

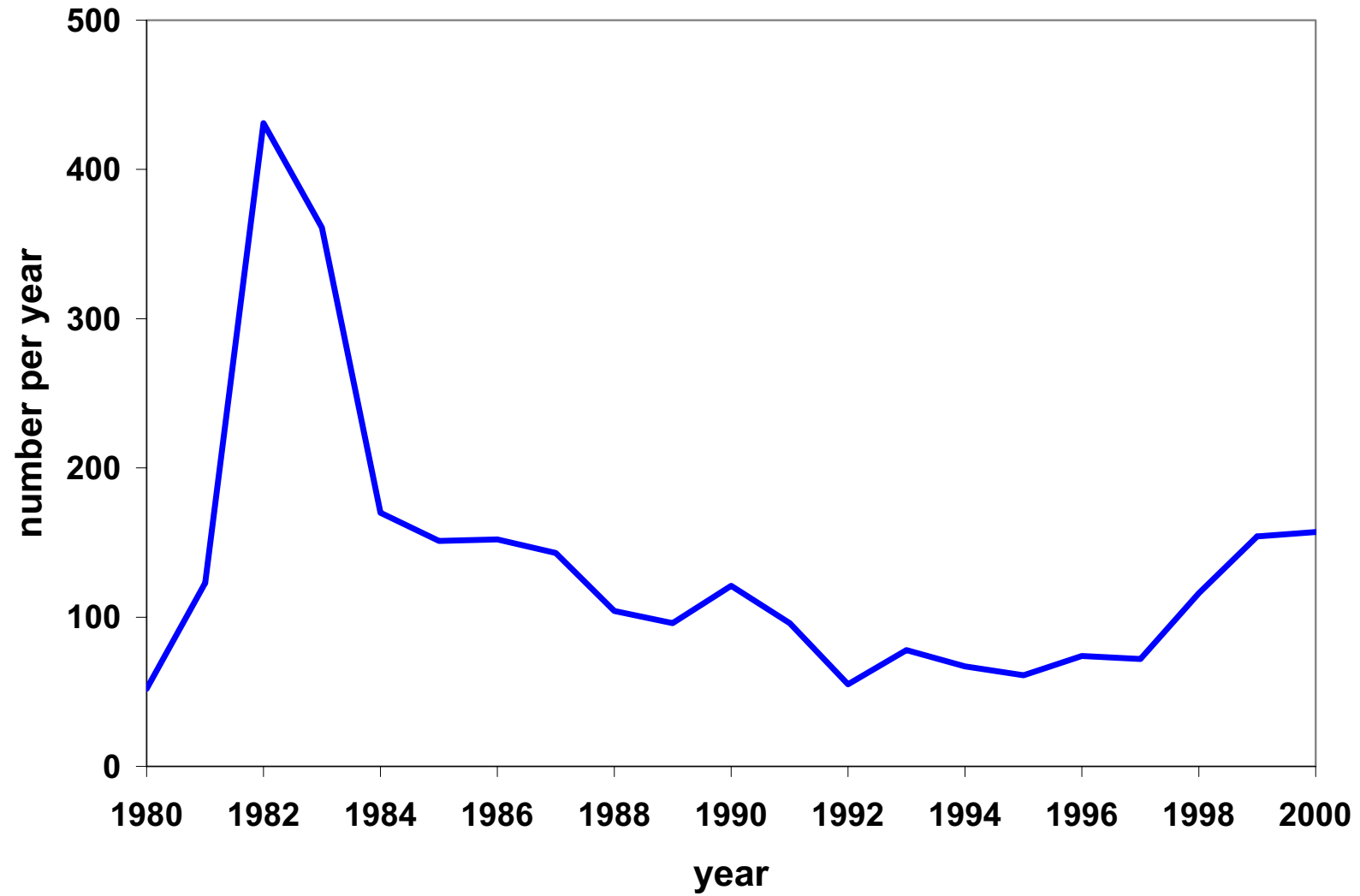


Bankruptcy laws

Chile had reformed the administration of its bankruptcy procedures in 1978. In 1982 it reformed its bankruptcy laws to look much like those in the United States.

Mexico reformed its bankruptcy procedures in a similar way only in 2000. (Maybe not so similarly!)

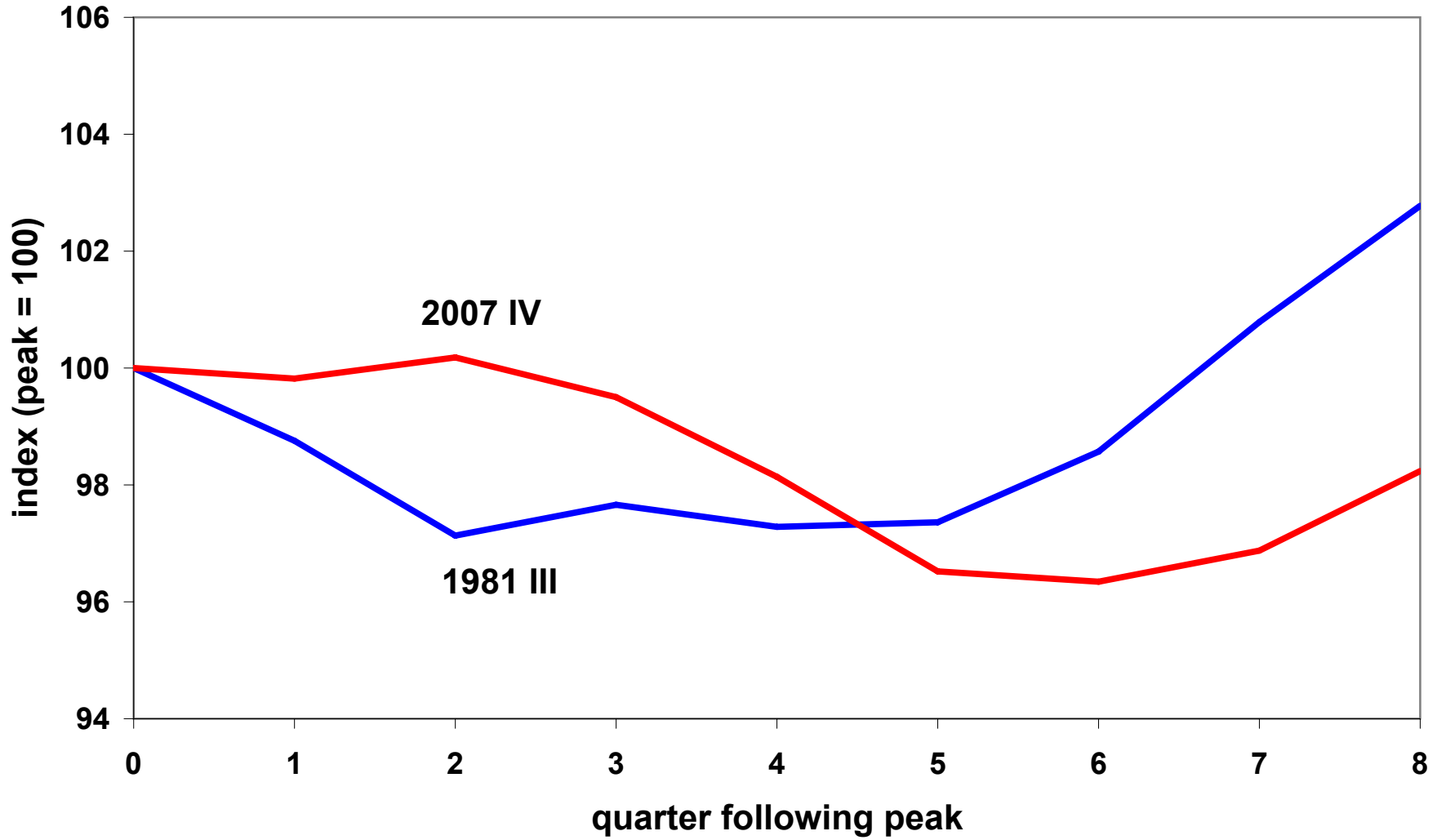
Business bankruptcies in Chile



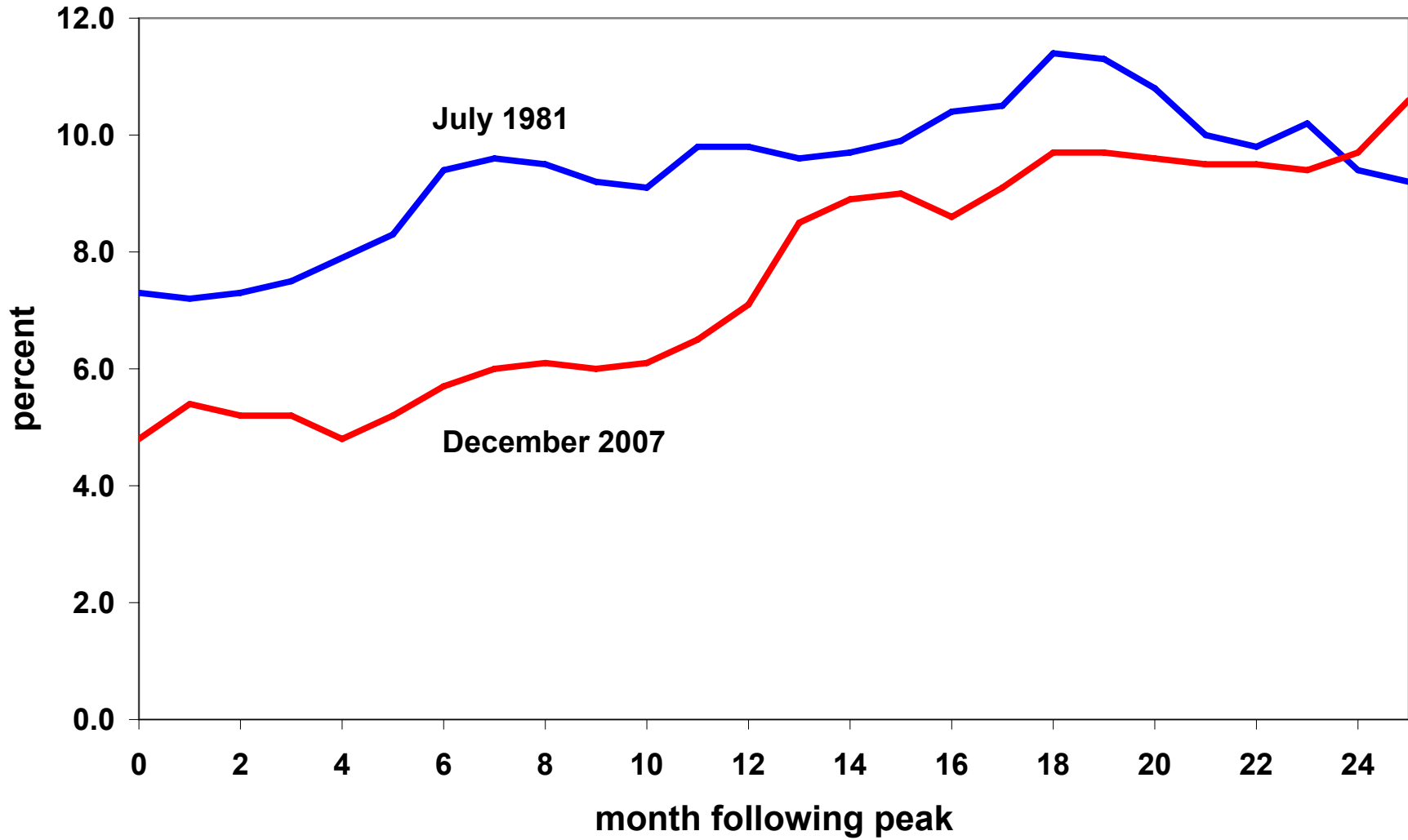
Studying the experience of countries that have experienced great depressions during the twentieth century teaches us that massive public interventions in the economy to maintain employment and investment during a financial crisis can, if they distort incentives enough, lead to a great depression.

**Comparison of the 2007–2010 U.S. recession
with the 1981–1983 U.S. recession**

U.S. Real GDP



U.S. Unemployment Rate



Comparison of the 2007–2009 U.S. recession with the 1981–1983 U.S. recession

Using conventional measures — real GDP, unemployment rate — the 2007–2010 recession is not noticeably worse than the 1981–1983 recession.

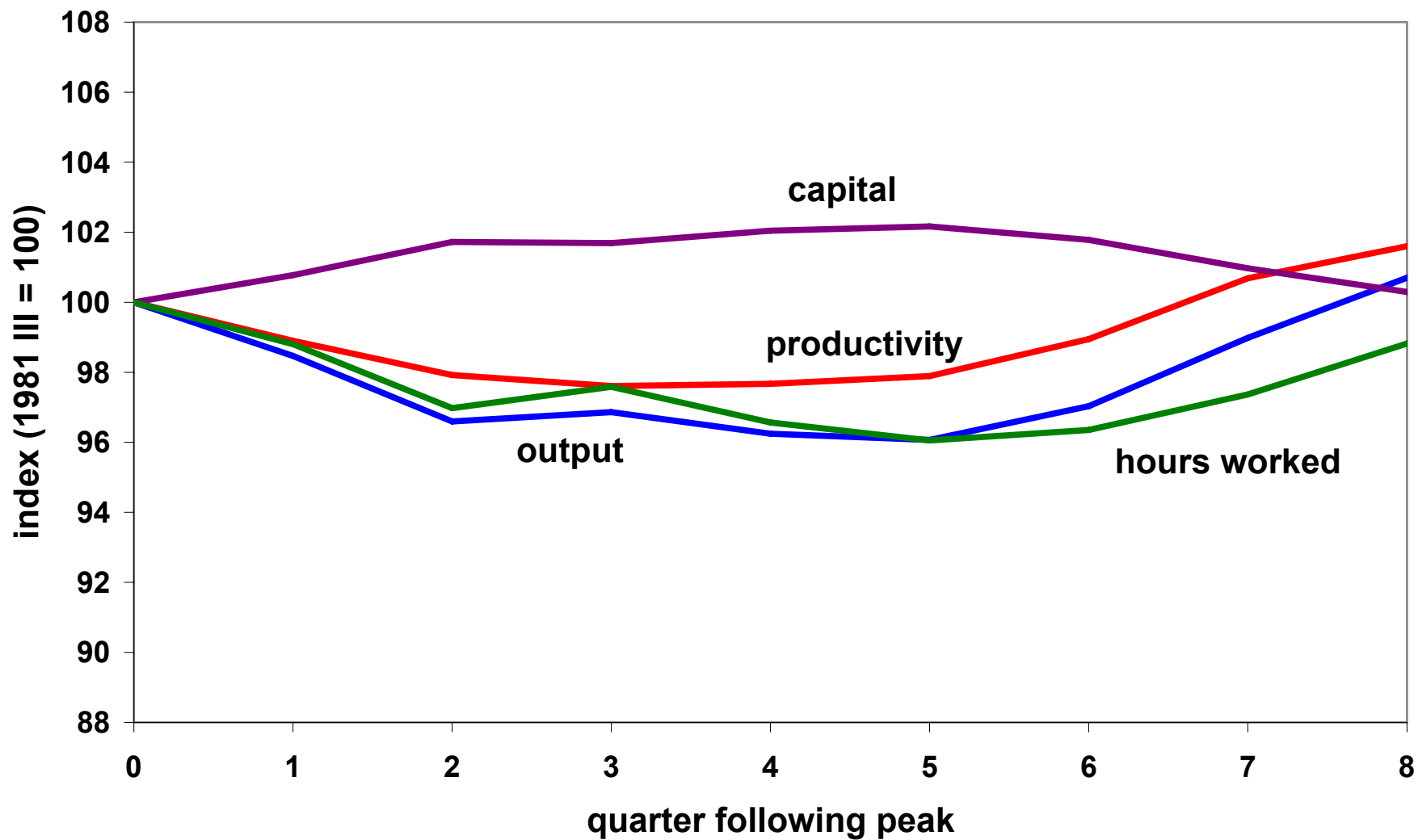
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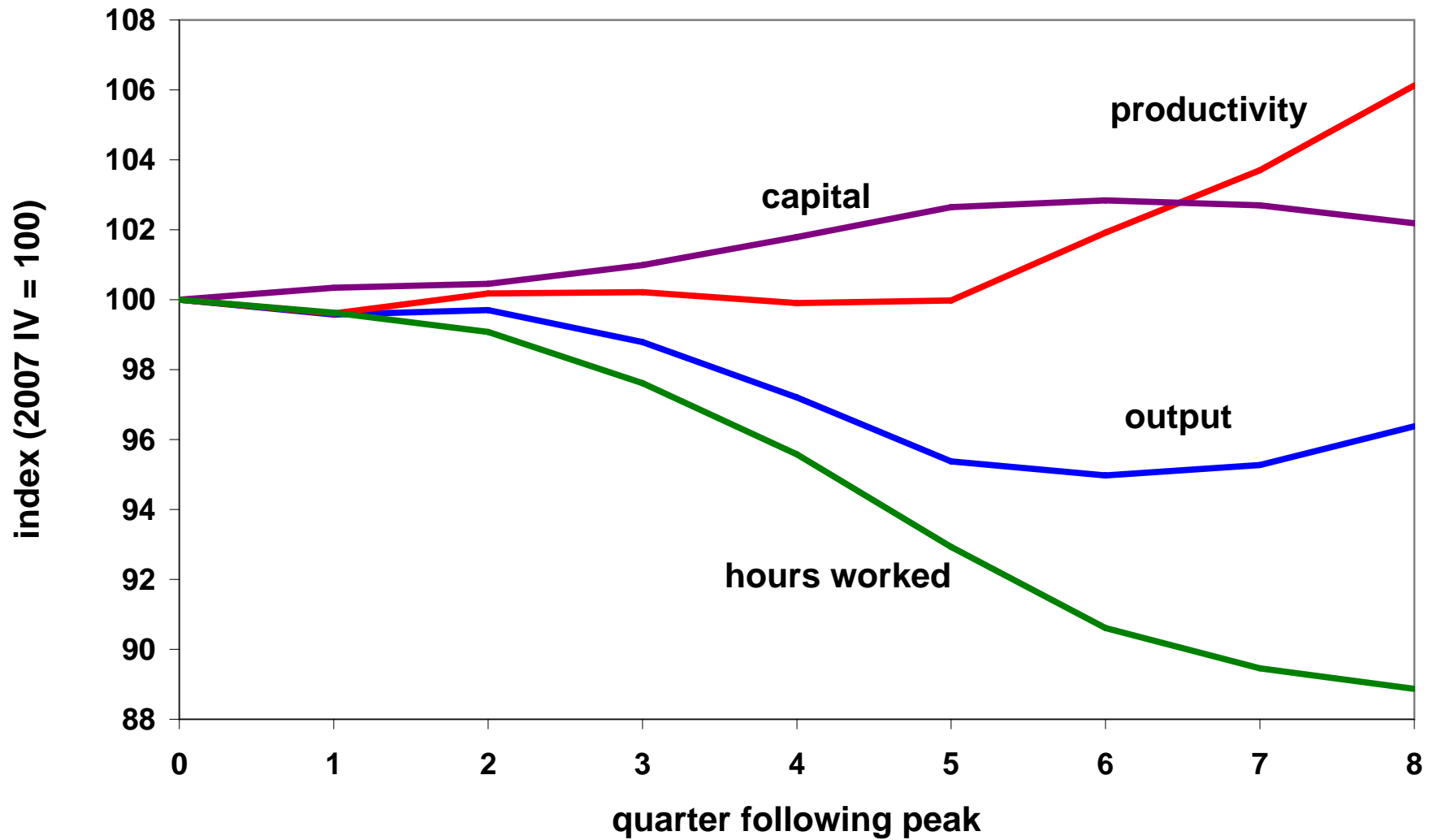
The recovery during the 2007–2010 recession has been slower, and there is still a danger that the current recession could turn into a “double-dip” recession.

What about growth accounting?

Growth Accounting, 1981-1983 Recession



Growth Accounting, 2007-2009 Recession



What about growth accounting?

The 1981-1983 recession(s) is an example of the standard “real business cycle” downturn, where the driving force is a drop in productivity. The current recession is different. This warrants further research.

What did we economists do wrong?

If the risk of a fall in housing prices had been understood and priced correctly, higher interest rates on lending for construction projects and mortgages would have corrected the problem.

The lack of understanding of systemic risk on the part of banks, regulators, and bond ratings agencies calls for reform and, perhaps, new regulations.

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Mistakes like this happen. We cannot be constantly over regulating our economy to prevent the previous crisis from occurring again.

What did we economists do right?

Kareken-Wallace and Stern-Feldman: Efficiently allocating risk requires that any insurance should be accompanied by regulation. Any institution that is too big to fail needs to be regulated.

Kehoe-Prescott (and others!): We need to study crises of the past to be prepared to deal with them in the future.

Those who try to justify the sorts of Keynesian policies implemented by the Mexican government in the 1980s often quote Keynes's dictum from *A Tract on Monetary Reform*:

“The long run is a misleading guide to current affairs. In the long run we are all dead.”

Studying past great depressions turns this dictum on its head:

“If we do not consider the consequences of policy for productivity, in the long run we could all be in a great depression.”