Do Direct Payments Have Inter-temporal Effects on U.S. Agriculture?

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Objective: Identify Non-distorting Policy Instruments: Why?

- **Domestic resource saving, if instruments are decoupled**

- **Resources drawn to U.S. agriculture, if payments coupled**
  - **Implies low returns**
- **Non-distorting payments might allow resources to exit**

- **In real economies, markets are incomplete**
  - **risk, informational asymmetries, human capital etc.**
  - **thus, first best instruments might not apply**
      and might not exist

If so, practical policy question for economist:
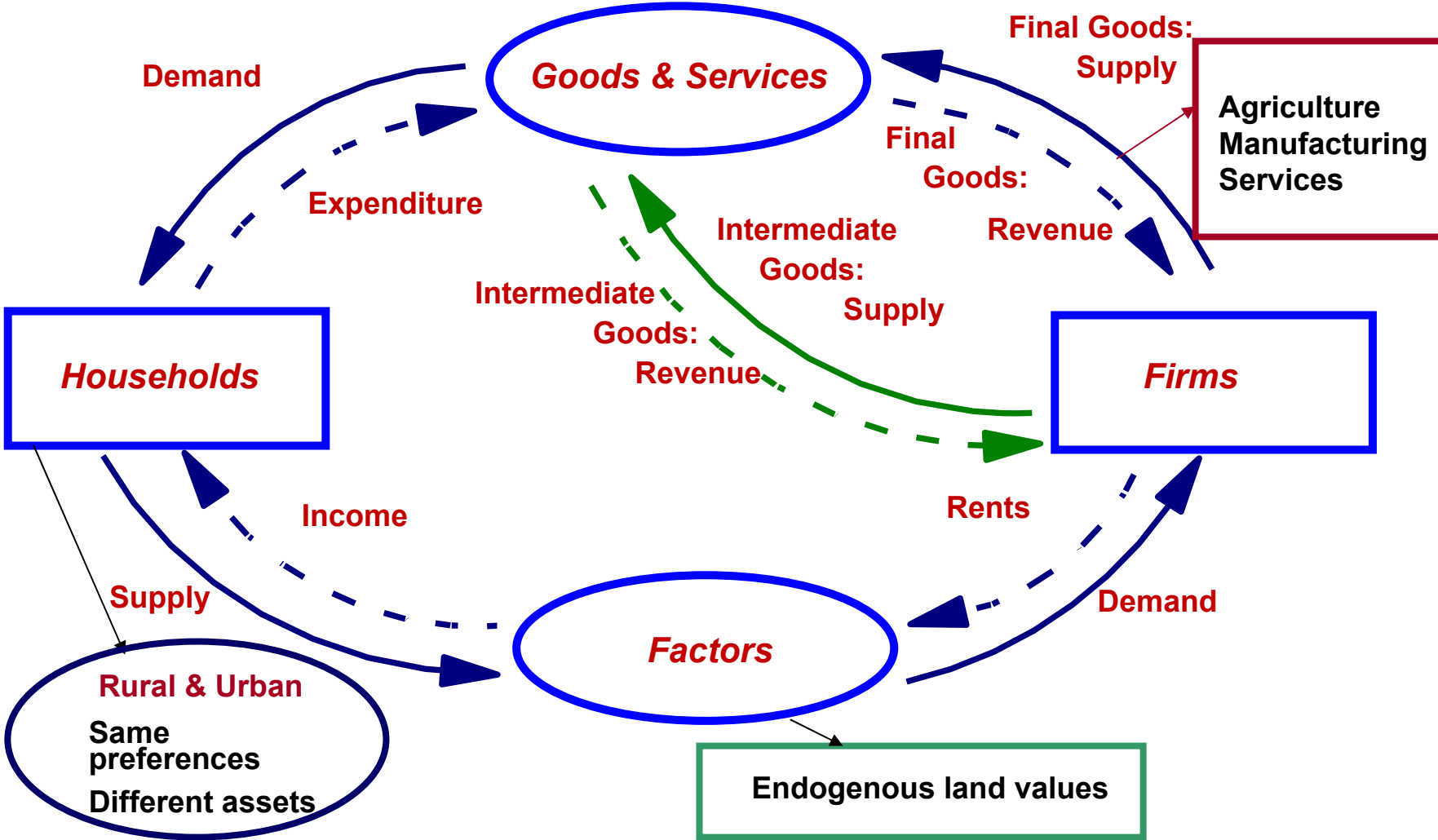- **identify instruments that are least distorting**

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Challenges: Is it Possible for Direct Transfers to be Decoupled?

- **Direct transfers affect temporal and inter-temporal consumption (durable goods) and savings**

- **Capital markets *(segmented capital markets)***
  - **farm financial instruments are limited relative to non-farm economy (stocks, bonds, options)**
  - **farm households hold more assets in their portfolio than urban households**

- **Land as a collateral, makes agricultural capital markets unique**
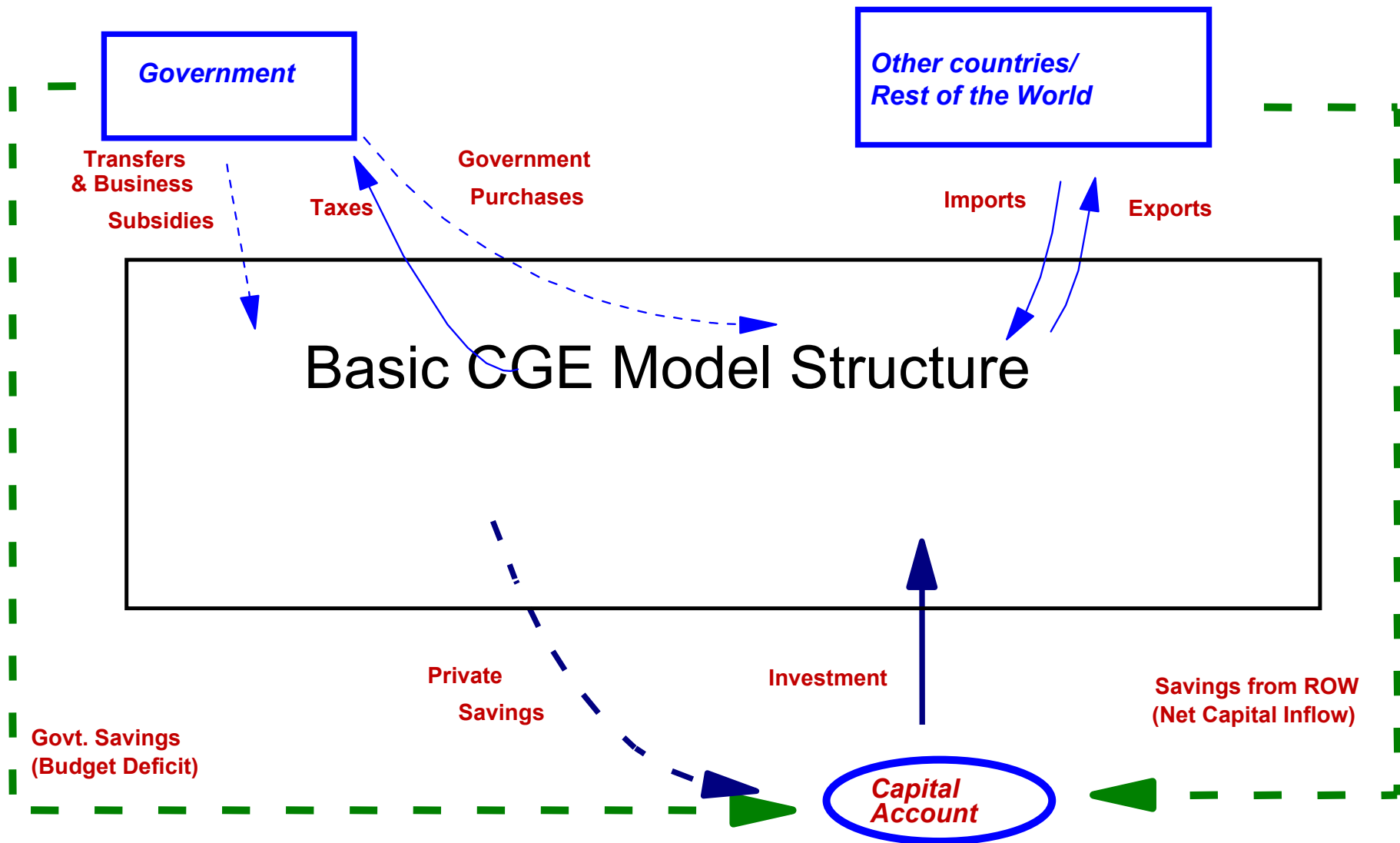
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Challenges: Is it possible for direct transfers to be decoupled?

- **Agriculture is "different"**
  - **market failures might be present**
  - **measure the extent to which policy instruments are decoupled**

- **What are the conditions for transfers to be decoupled?**
  - **to have no impact on market allocations?**
  - **to be inter-temporally decoupled?**

- **This calls for a conceptual framework that**
  - **accounts for all players in an entire economy**
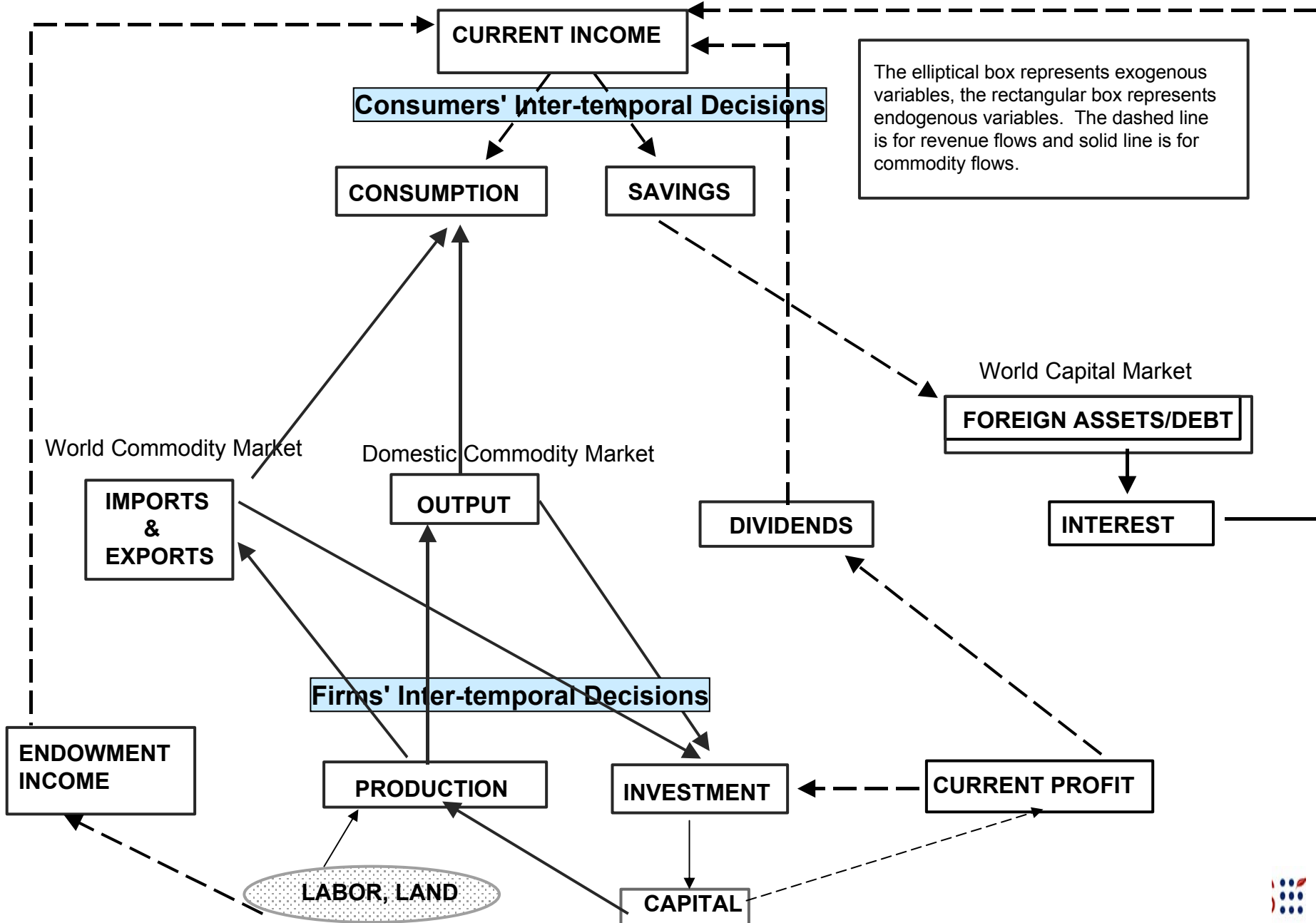 - **includes inter-temporal dimensions**

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A Computable General Equilibrium (CGE): Covers the Entire Economy

Goods & Services

Demand

Expenditure

Final Goods: Supply

Agriculture Manufacturing Services

Final Goods: Revenue

Intermediate Goods: Supply

Intermediate Goods: Revenue

Households

Firms

Income

Rents

Supply

Demand

Rural & Urban
Same preferences
Different assets

Factors

Endogenous land values

A Full CGE with Additional Institutions

Government

Other countries/ Rest of the World

Transfers & Business Subsidies

Taxes

Government Purchases

Imports

Exports

Basic CGE Model Structure

Private Savings

Investment

Savings from ROW (Net Capital Inflow)

Govt. Savings (Budget Deficit)

Capital Account

Inter-temporal Structure

CURRENT INCOME

Consumers' Inter-temporal Decisions

CONSUMPTION

SAVINGS

The elliptical box represents exogenous variables, the rectangular box represents endogenous variables. The dashed line is for revenue flows and solid line is for commodity flows.

World Commodity Market

Domestic Commodity Market

World Capital Market

FOREIGN ASSETS/DEBT

IMPORTS & EXPORTS

OUTPUT

DIVIDENDS

INTEREST

Firms' Inter-temporal Decisions

ENDOWMENT INCOME

PRODUCTION

INVESTMENT

CURRENT PROFIT

LABOR, LAND

CAPITAL

Basic features of the CGE model

- **Simulates policy changes in counterfactual or "what if" comparisons**

- **Results in percent change from the "base" scenario**

- **Captures economy-wide adjustments to a policy change**

- **Time frame depends on assumptions of factor mobility**

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Accounting for PFC payments in the CGE model

Returns to land without payments:

$$\pi(p_a, \widehat{w}(t), r(t))$$

Returns to land with PFC payments:

$$\pi(p_a, \widehat{w}(t), r(t)) + PFC(t)$$

π = returns to land, p_a = agricultural prices

$\widehat{w}(t)$ = wage rate, $r(t)$ = rate of return to capital services

Model Calibration:
Setting the Base Scenario

- **Need data on savings**
- **Inter-temporal elasticity estimates**
- **Time preference**
- **Since the model is dynamic, it needs validation**
- **This implies**
  - **reproduce the base (1997)**
  - **backcast**
  - **check forecasts**

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Validation: Goodness of Fit
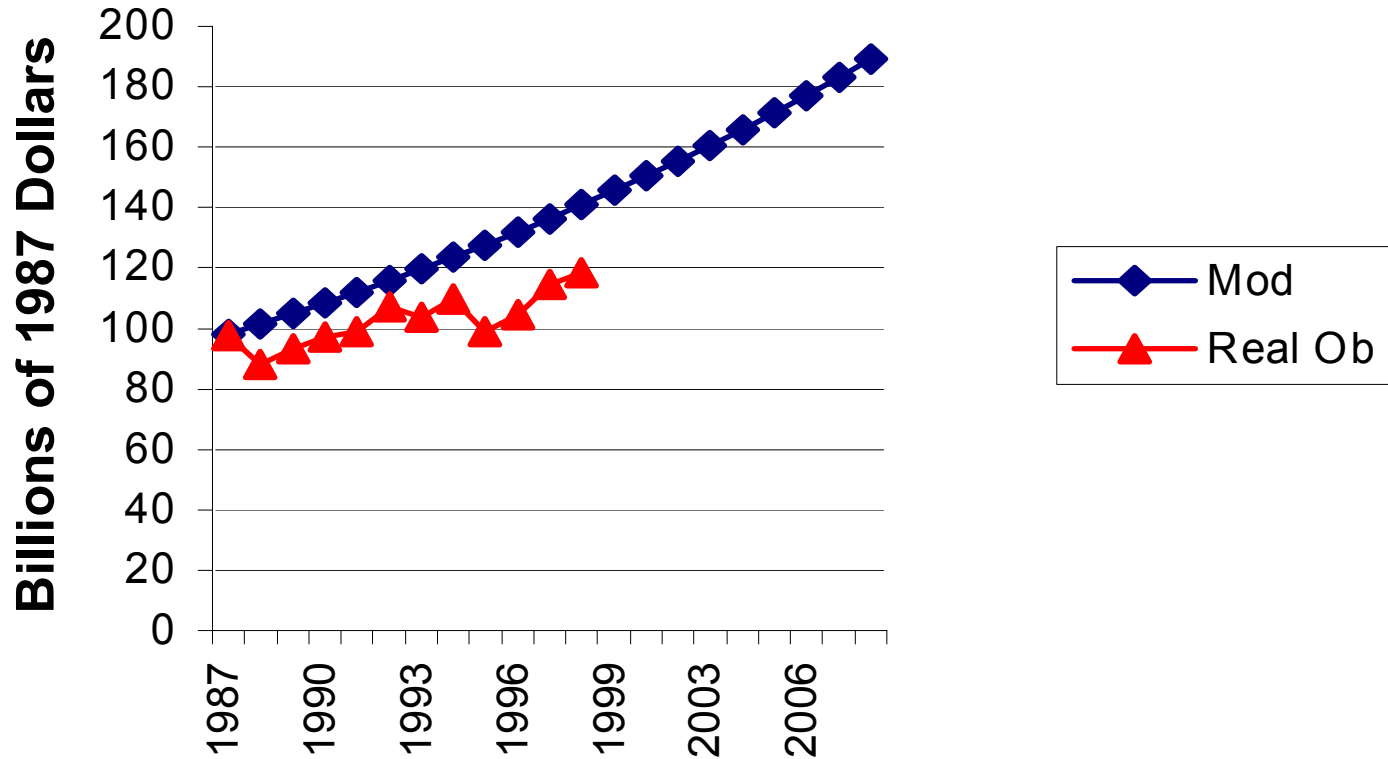

US GDP: Observed Real and Modeled
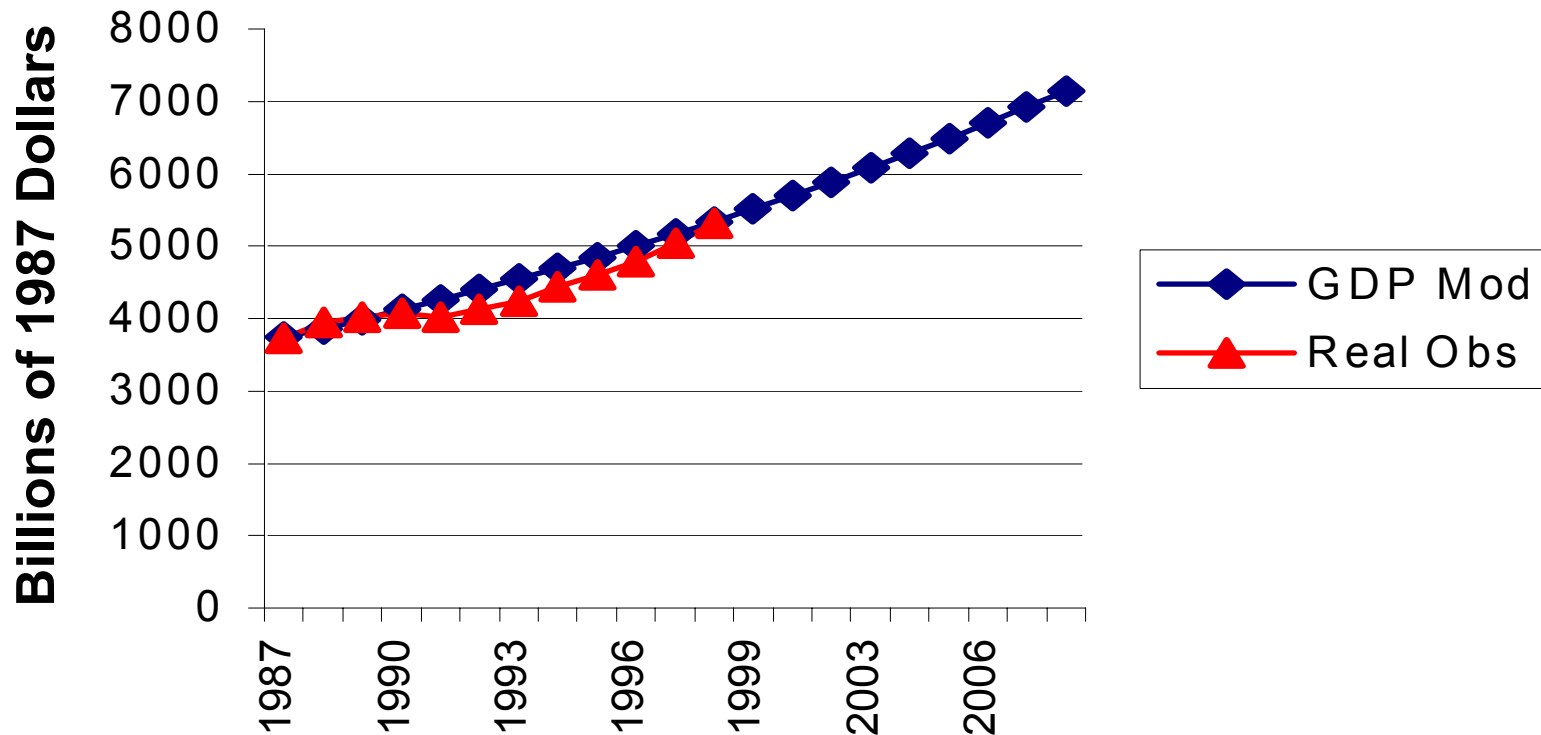
Validation: Goodness of Fit

Manufacturing Gross Product: Observed Real, Modeled
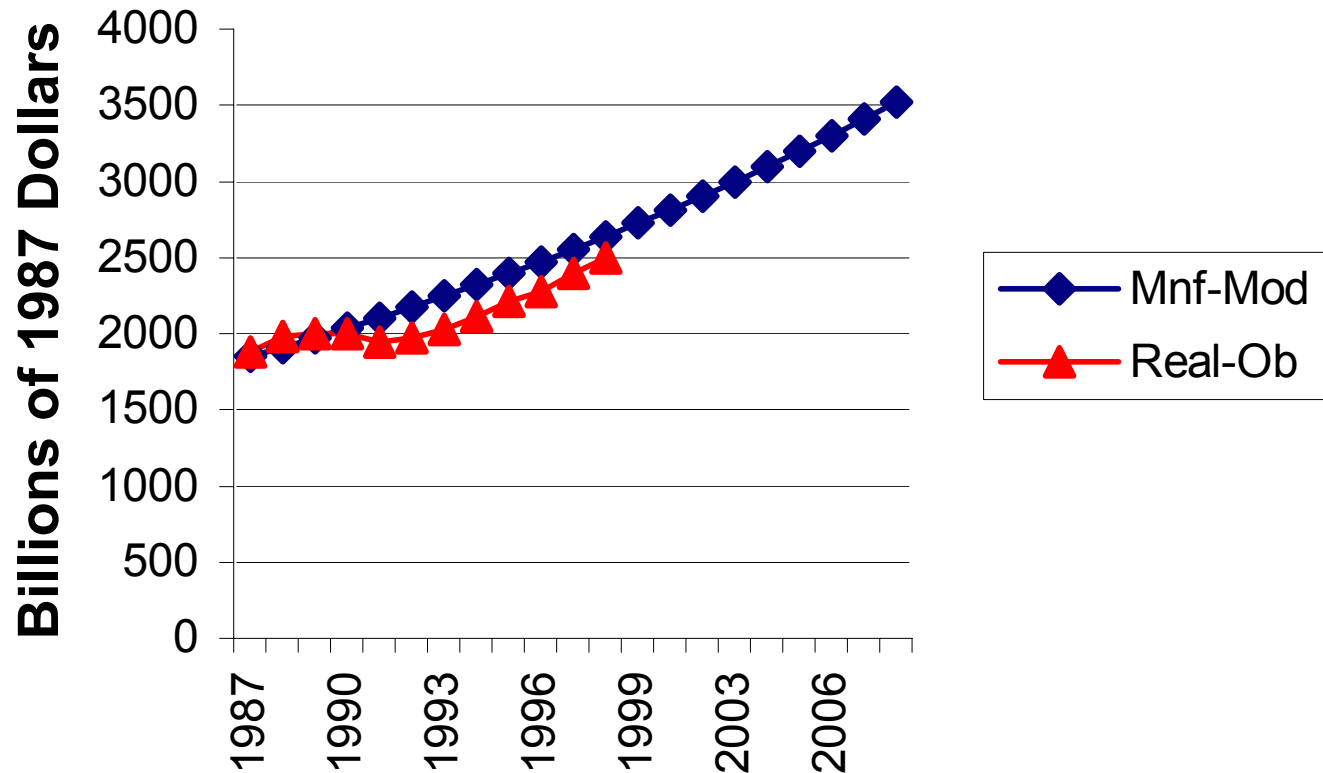
Validation: Goodness of Fit

Agriculture Gross Product: Observed Real and Modeled

Decoupled Programs: Analysis

- **Perform two alternative simulations to base scenario**
  - **first, perfectly integrated capital markets**
  - **second, the case of segmented capital markets**
- **In the alternative cases, we assume**
  - **decoupled payments, equal to $6.1 billion in 1997, are made each year from 1997 onward at that level**
- **In the segmented capital market case**
  - **two separate capital markets**
  - **two different rates of return to capital in transition equilibrium, but equal rates in long-run**

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Results: The Case of Integrated Capital Markets

- The rate of return to agricultural capital (which is endogenous) is the same as in the rest of the U.S. economy

- Consumption and investment behavior of the recipients of decoupled payments are exactly counter balanced by taxpayers

- As a result: no NET resource re-allocation

- Direct PFC payments thus "appear" nearly fully decoupled EXCEPT for land values

- Since land is used as collateral, the model may underestimate this source of possible effects

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Effects of decoupled payments on land values: Integrated capital markets

Percent increase in crop land values

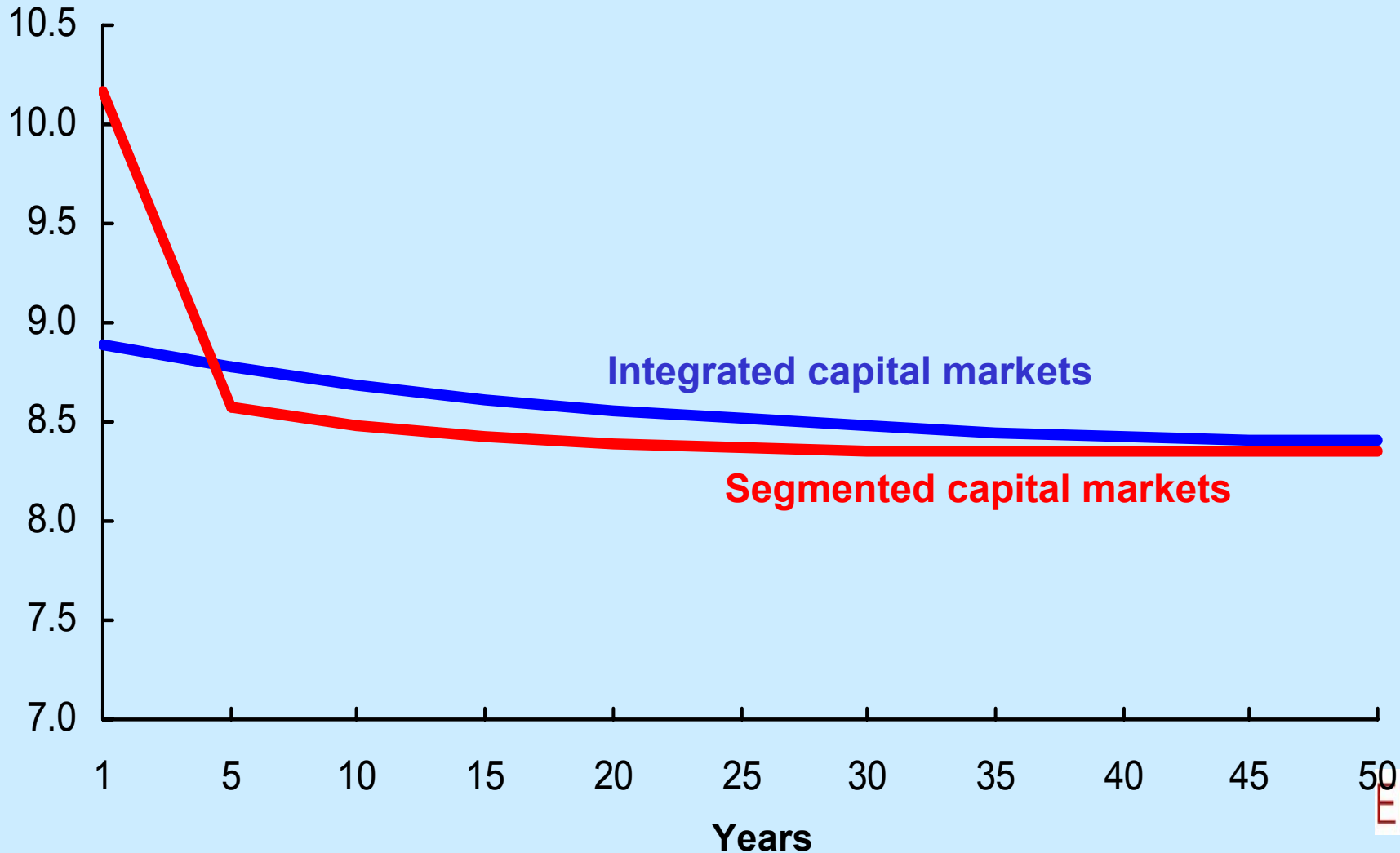Integrated capital markets

Years

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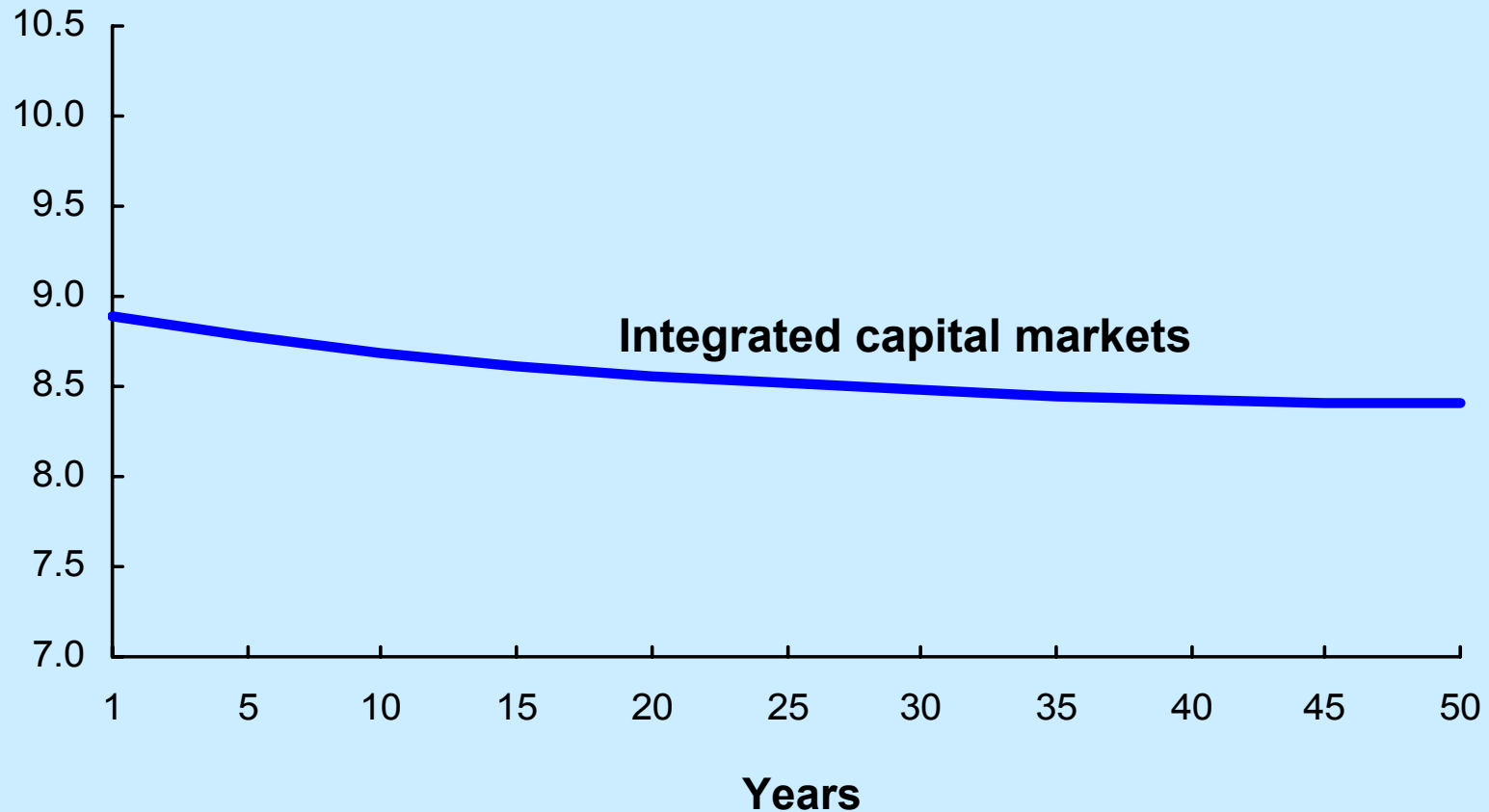
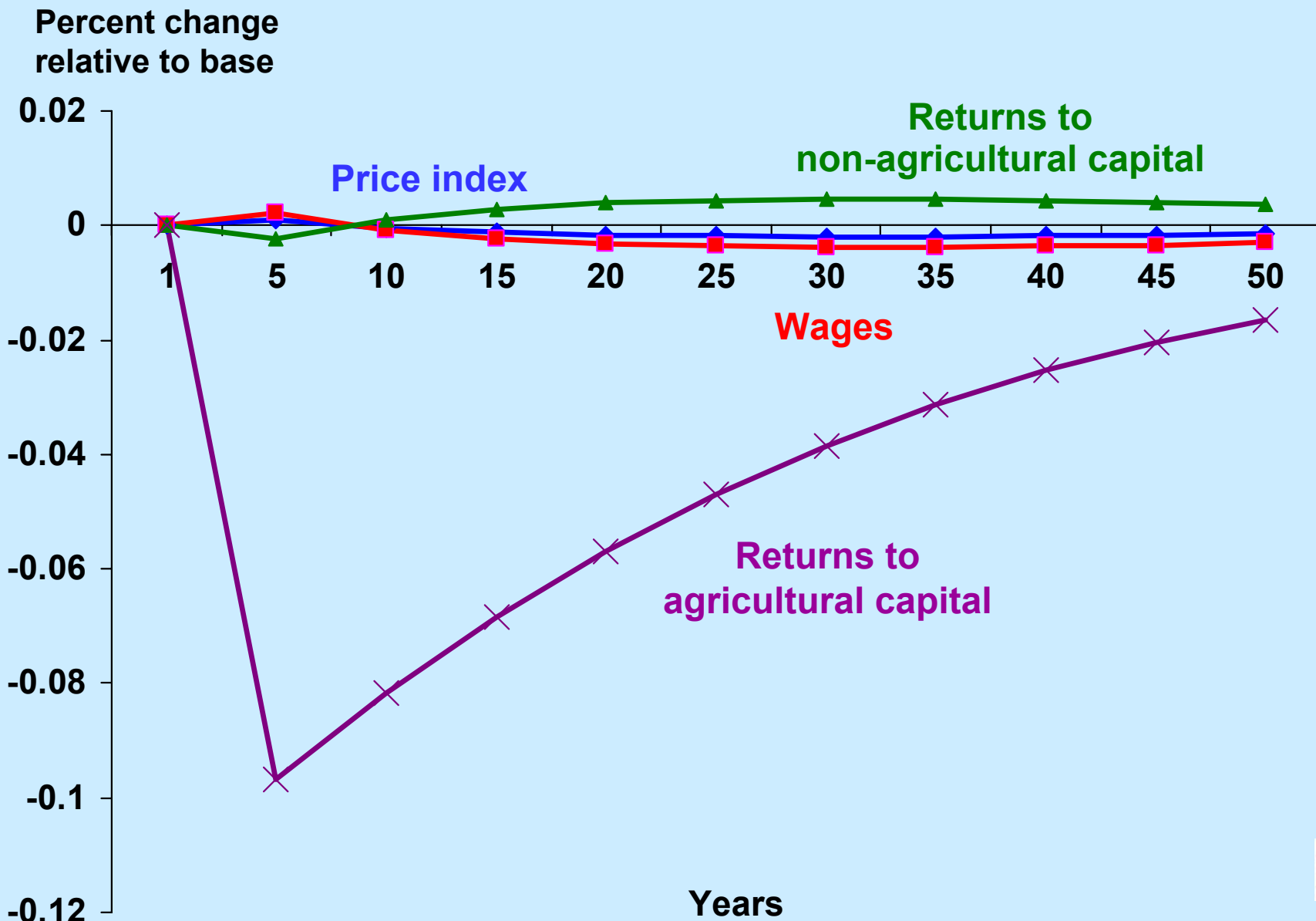# Results: The Case of Segmented Capital Markets

- Under imperfect markets, farmers assumed to **invest** their savings in agriculture
- **In the first 5 years**, land prices rise more than in the case of non-segmented markets
- Two different rates of return to capital
- Small re-allocation of farm resources and effects on output

- This increase in capital investments leads to diminishing returns to the growth of agriculture's capital stock
- **After five years,** land values, still above base, become slightly lower than in the non-segmented case
- Agriculture's return to capital **slowly converges** to its long run equilibrium and to the rest of the economy
- **Direct payments speed up agriculture's capital accumulation but do not distort the rate of return to capital in agriculture in the long run**

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Effects of decoupled payments on land values are similar for integrated and segmented capital markets
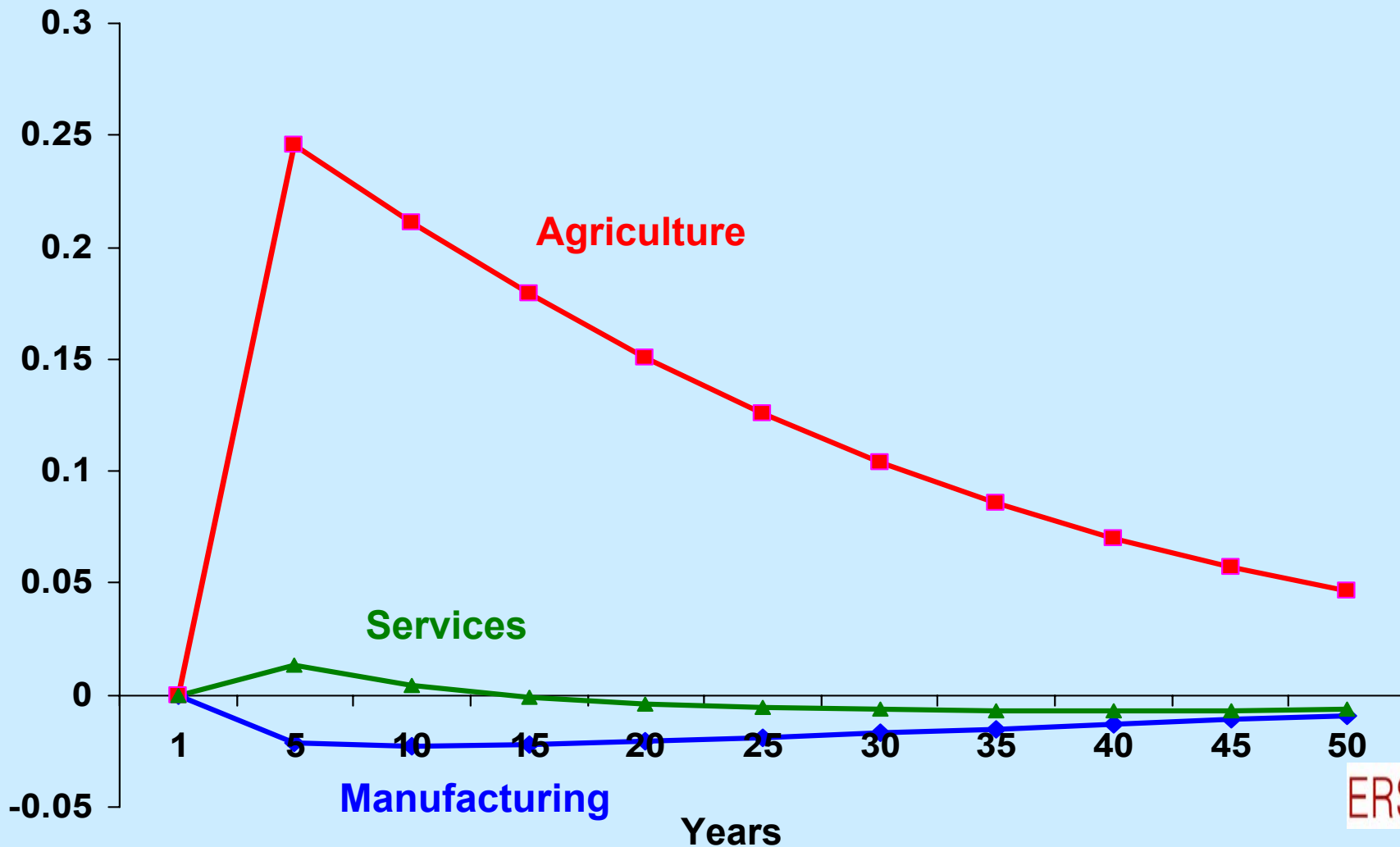
Percent increase in crop land values

Integrated capital markets

Segmented capital markets

Years

Decoupled payments have negligible effects on returns to capital: segmented capital markets

Percent change relative to base

0.02

Returns to non-agricultural capital

Price index

0

Wages

-0.02

-0.04

-0.06

Returns to agricultural capital

-0.08

-0.1

-0.12

1   5   10   15   20   25   30   35   40   45   50

Years

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Decoupled payments have small effects on agricultural capital stock: segmented capital markets

Percent change relative to base
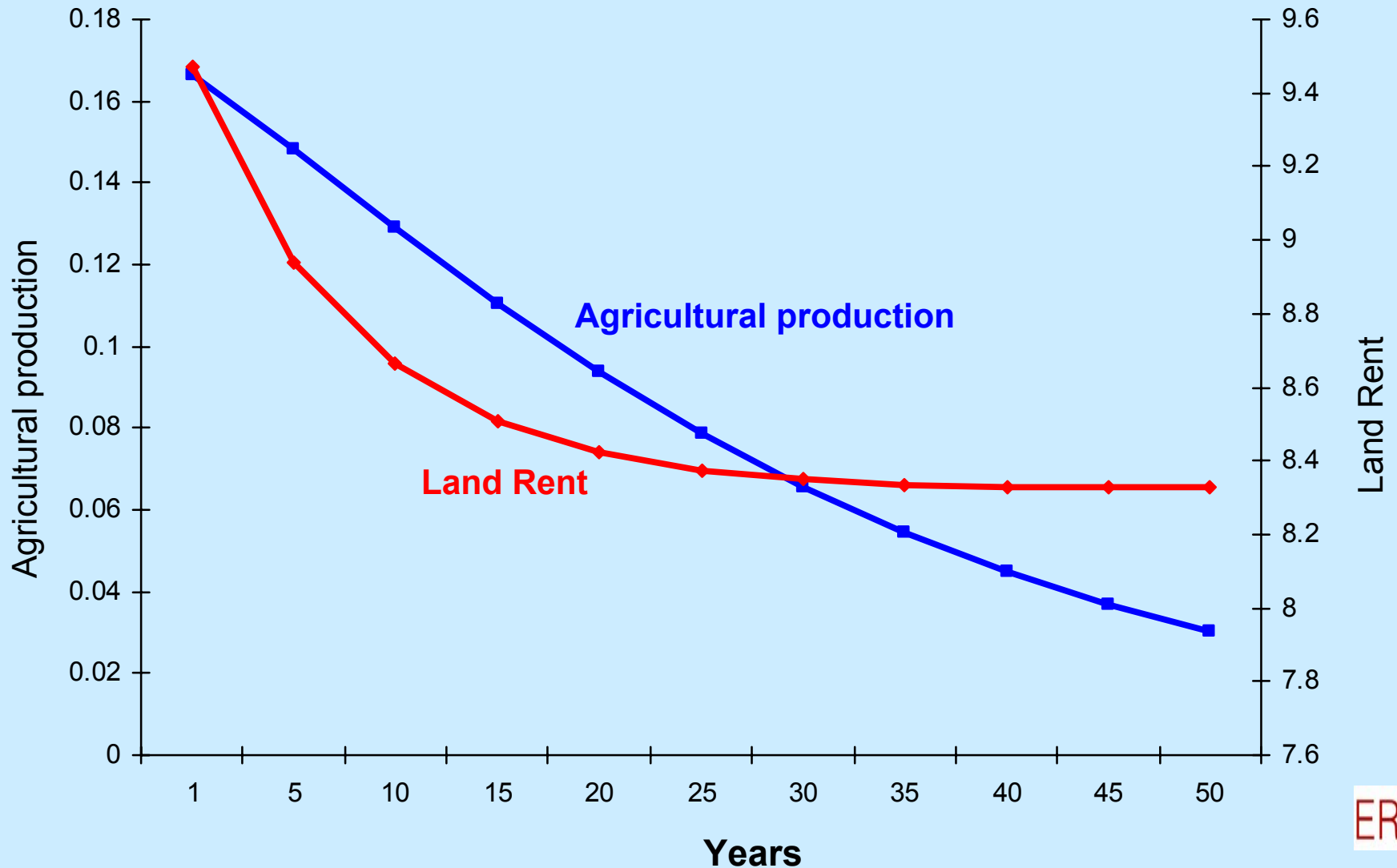

Agriculture

Services

Manufacturing

Years

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Decoupled payments cause a small increase in agricultural employment: segmented capital markets

Percent change in labor demand relative to base
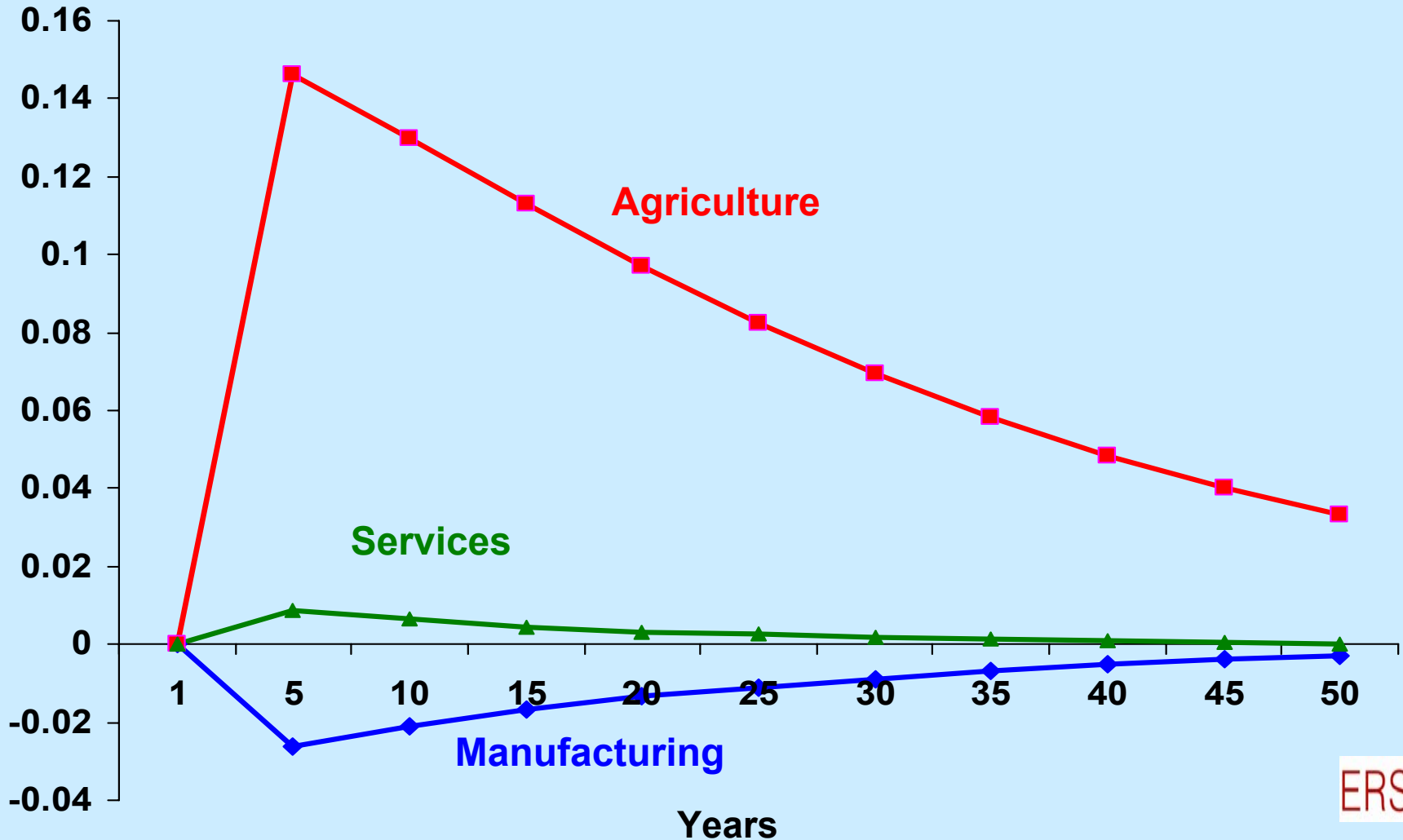
Decoupled payments have small effects on output but lasting effects on land values and rental rates: the segmented case

Conclusions

- **Allocation of resources are unaffected by direct payments (integrated markets) when**
  - **preferences are inter-temporally identical and homothetic**
  - **markets are complete**
- **If segmented capital markets (imperfect markets)**
  - **Payments increase agriculture's capital stock**
  - **small impacts on output in the short run**
- **Land values are affected in either case**

- **In sum, since all economies have imperfect markets**
  - **instruments like decoupled policies can have some effects, mostly on land values**
  - **decoupled policies are the least distorting with respect to resource allocation**

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