

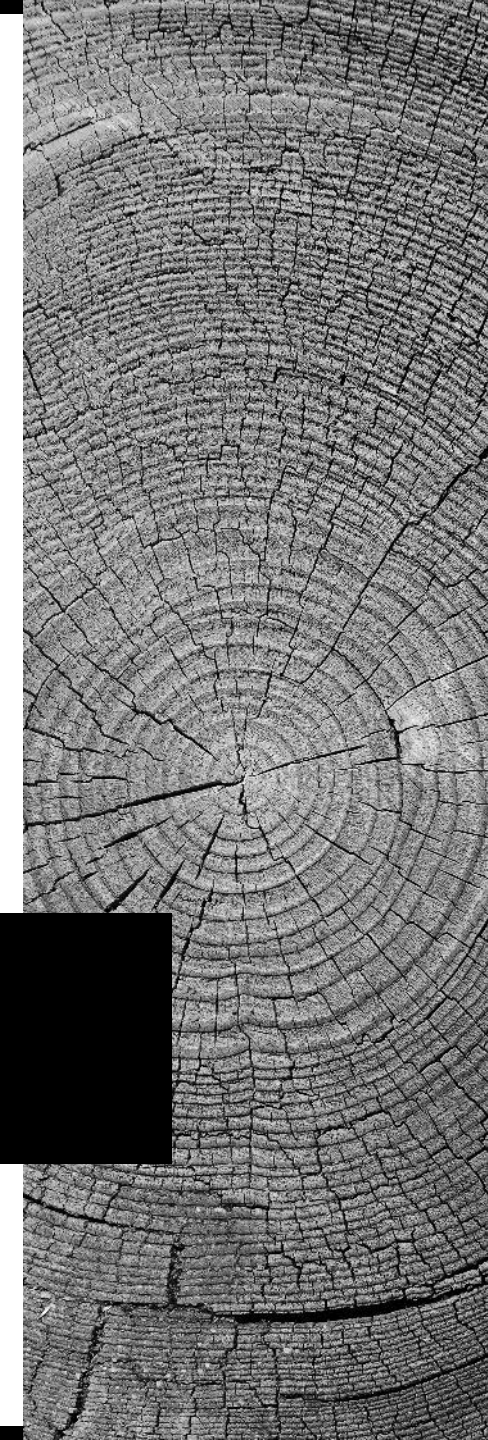


Jonathan Pincus  
Summer 2022

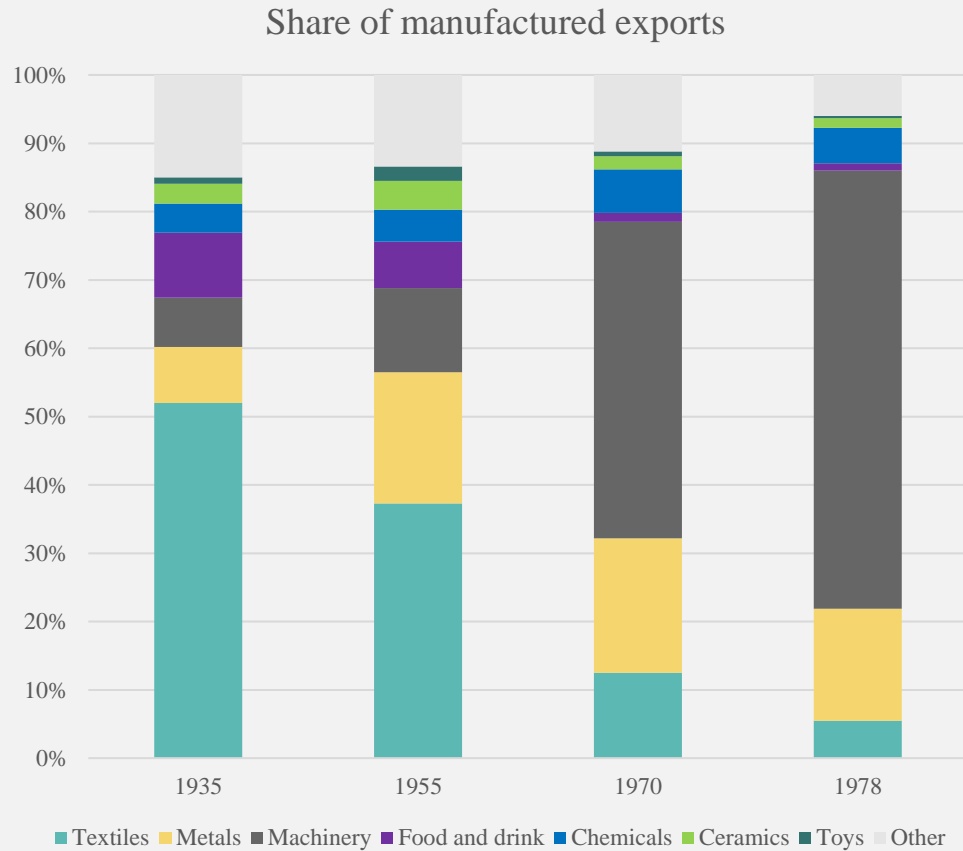
# MANUFACTURING AND ECONOMIC GROWTH

*Development Policy*

*FSPPM*



# JAPAN AS A DEVELOPING COUNTRY 1935-1978



- Manufacturing began to develop in 1890s, beginning with traditional silks and diversifying into other textiles
- 1930s textiles still dominant, also growth of metals, engineering, chemicals
- Machinery and especially automobile and shipbuilding after 1960



# NEO-CLASSICAL GROWTH THEORY

- Assumes that demand always equals supply: no unemployment, and savings always equals investment (investment is endogenous)
- Highly aggregated: One-sector models
- Constant returns to scale and diminishing returns to capital in the Solow model
- Increasing returns to scale in endogenous growth models through technological spillovers and learning by doing



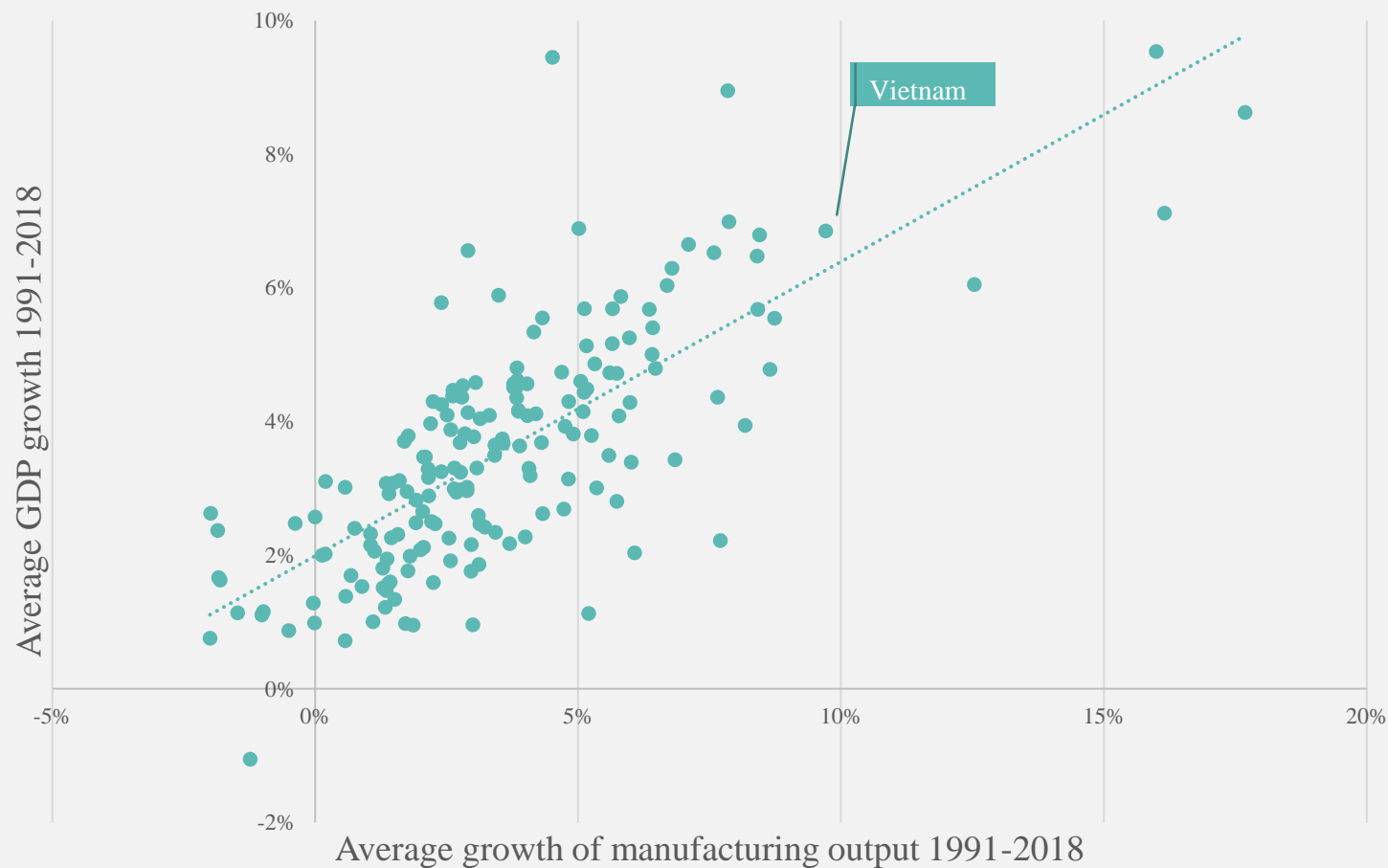
# NICHOLAS KALDOR: MANUFACTURING AND DYNAMIC INCREASING RETURNS TO SCALE

- Kaldor's Laws: Explaining why growth rates differ across countries
  - One-sector models do not differentiate between activities with increasing returns and activities with constant or diminishing returns
  - Manufacturing is unique in its capacity to realize *dynamic* increasing returns: productivity related not just to *level* of output but its *rate of growth*
- Supply does not always equal demand
  - Investment is *exogenous*
  - Export demand for manufactured goods is needed to achieve increasing returns and productivity growth (remember Adam Smith)
  - Growth of agriculture is an important source of demand (remember Munde and the home market for industrial goods)

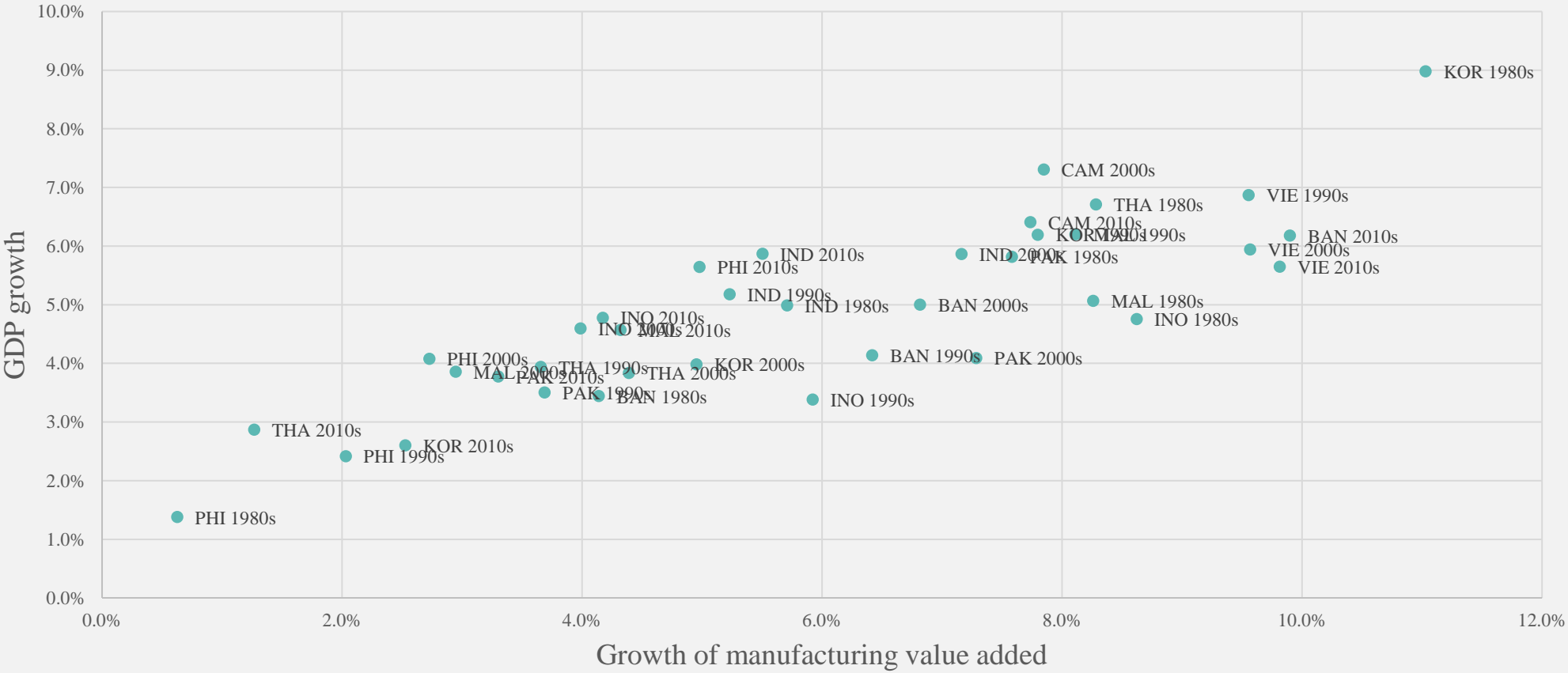


# KALDOR'S FIRST LAW: RAPID GROWTH OF MANUFACTURING OUTPUT ACCELERATES GDP GROWTH

The GDP growth rate is more closely related to the growth rate of manufacturing than the growth rate of agriculture and services.

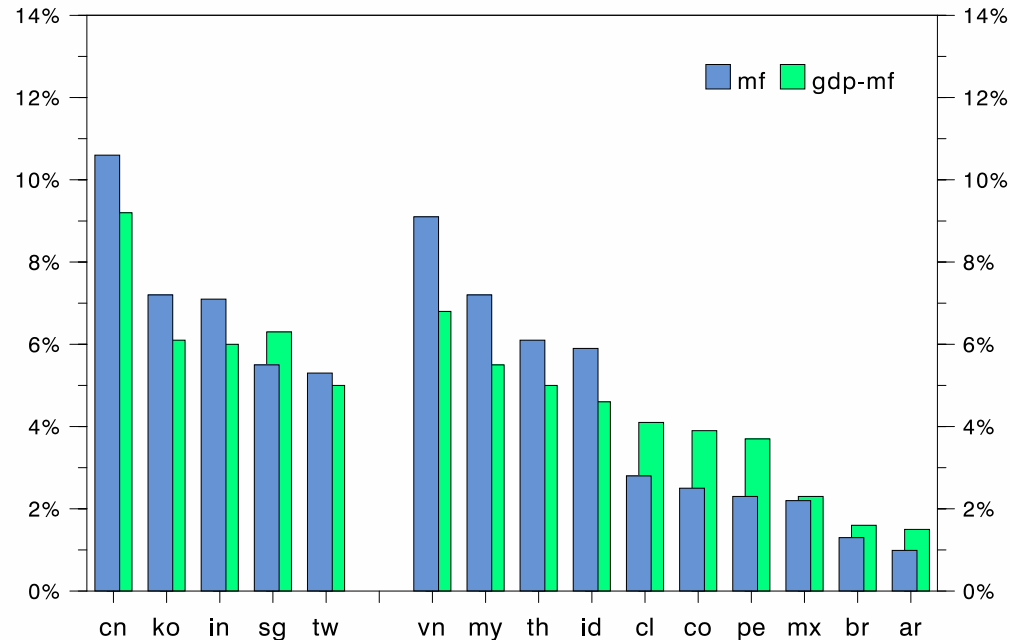


# RELATIONSHIP BETWEEN GDP GROWTH AND GROWTH OF MANUFACTURING OUTPUT, ASIA 1980-2019



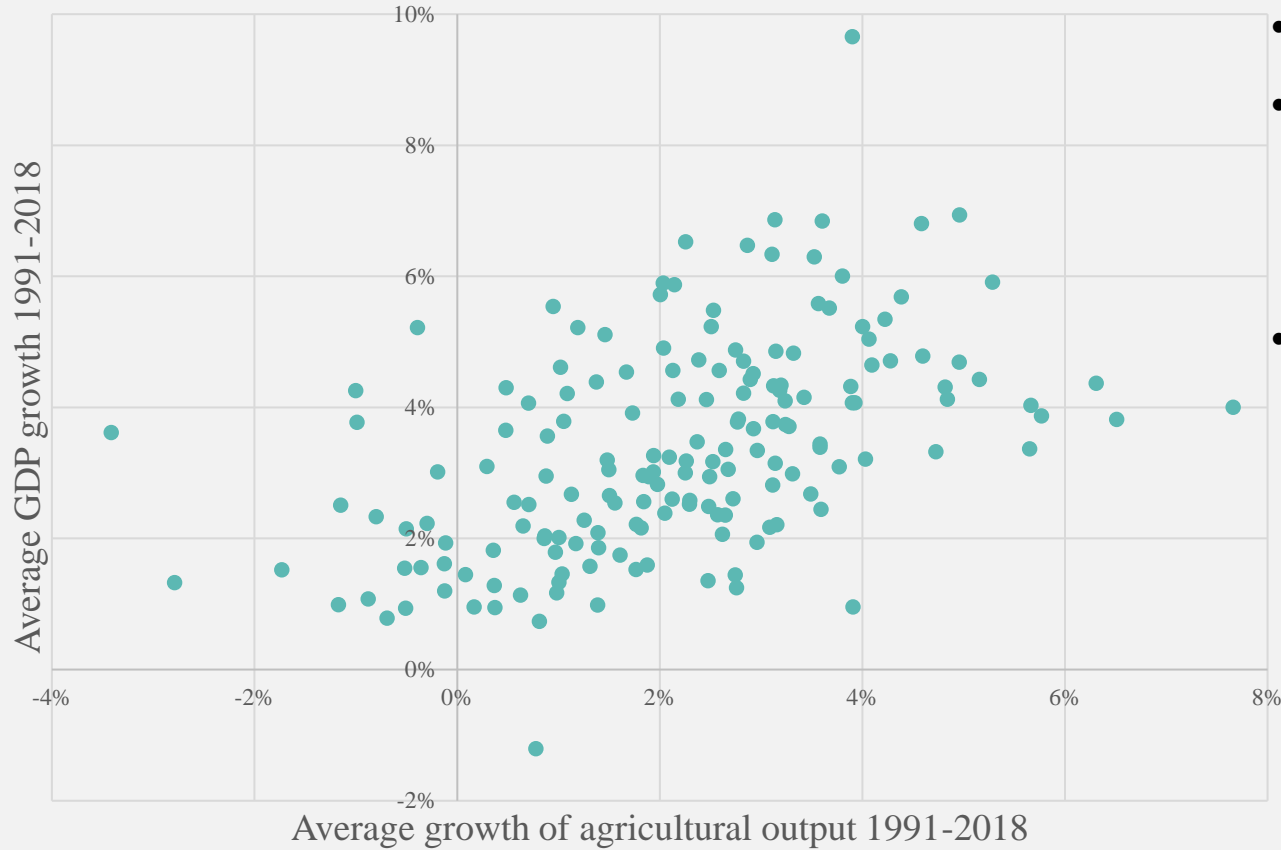
# KALDOR'S FIRST GROWTH LAW

Kaldor's first law: rate of growth of manufacturing and of GDP\*, 1980-2018



- Relationship holds if we plot growth of manufacturing against non-manufacturing GDP
- Clear difference between Asia and Latin America

# GROWTH OF AGRICULTURAL OUTPUT AND GDP GROWTH



- Less clear relationship
- Services closely related to GDP growth but causation is reversed (higher GDP increases demand for services)
- DOES NOT mean that agriculture and services are not important to growth

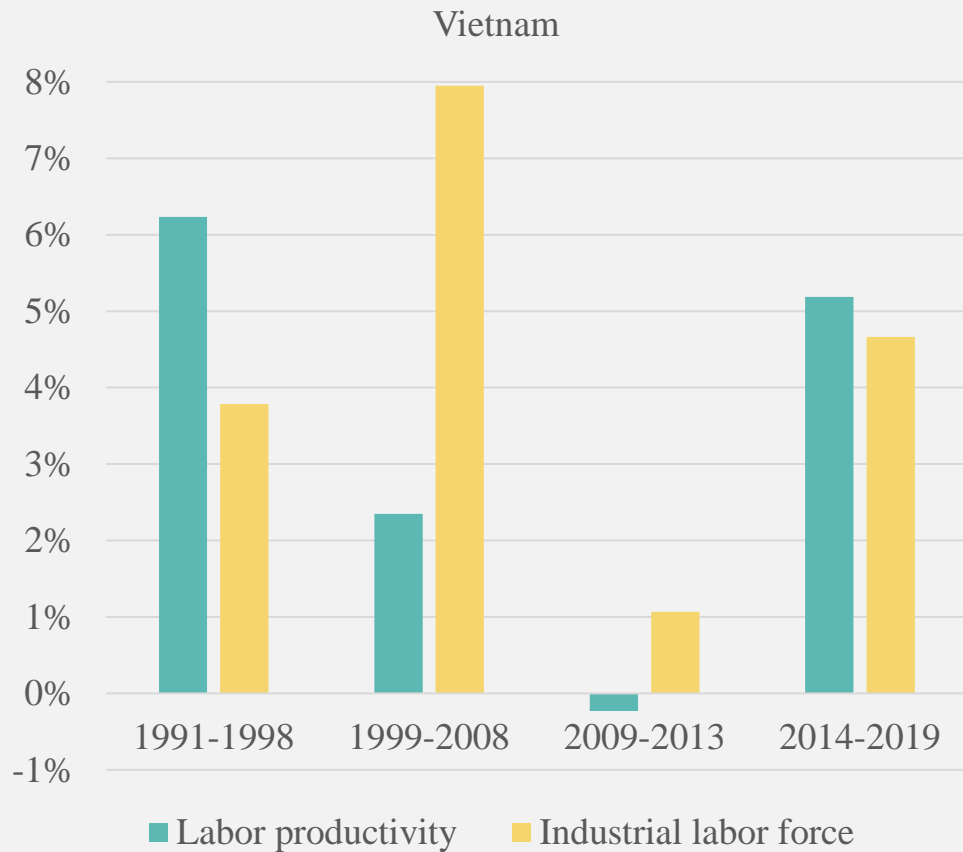


# WHY DOES THE GROWTH OF MANUFACTURING DRIVE GDP GROWTH?

- Movement of labor between sectors:
  - Lewis processes of labor moving from tradition to modern sectors
  - Labor moves from low productivity occupations in agriculture and traditional services (domestic service) to higher productivity manufacturing.
- Static productivity gains within manufacturing: Increasing returns to scale using the same technology
- Dynamic productivity gains: Spillover effects and learning by doing (remember endogenous growth theory)
- Rapid economic growth when sectors with rising productivity create jobs
- Slow growth when sectors with rising productivity create few jobs (mining, financial services)



# SUSTAINING MANUFACTURING INVESTMENT TO INCREASE PRODUCTIVITY AND SIZE OF THE LABOR FORCE IN INDUSTRY



# KALDOR'S SECOND LAW: RAPID GROWTH OF MANUFACTURING OUTPUT CAUSES RAPID GROWTH OF LABOR PRODUCTIVITY IN MANUFACTURING

- Verdoorn's Law: Faster output growth in manufacturing is associated with faster productivity growth

$$\text{Productivity growth} = a_1 + b_1 * \text{manufacturing output growth}$$

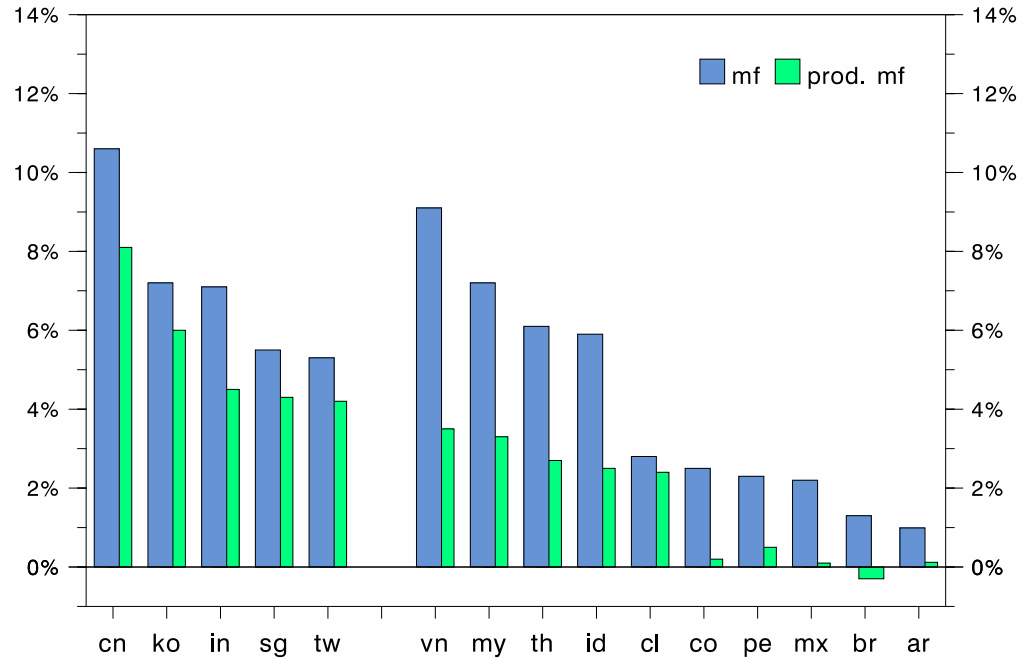
$$\text{Employment growth} = a_2 + b_2 * \text{manufacturing output growth}$$

- The first equation says that productivity growth is a function of output growth
- Second equation:  $b_2$  less than one  $\rightarrow$  meaning that we are adding labor at a rate that is less than the rate of output growth
- Faster output growth induces investment in new machines (with new technologies)
- Workers learn how to use the new machines and improve processes when they are called on to produce more



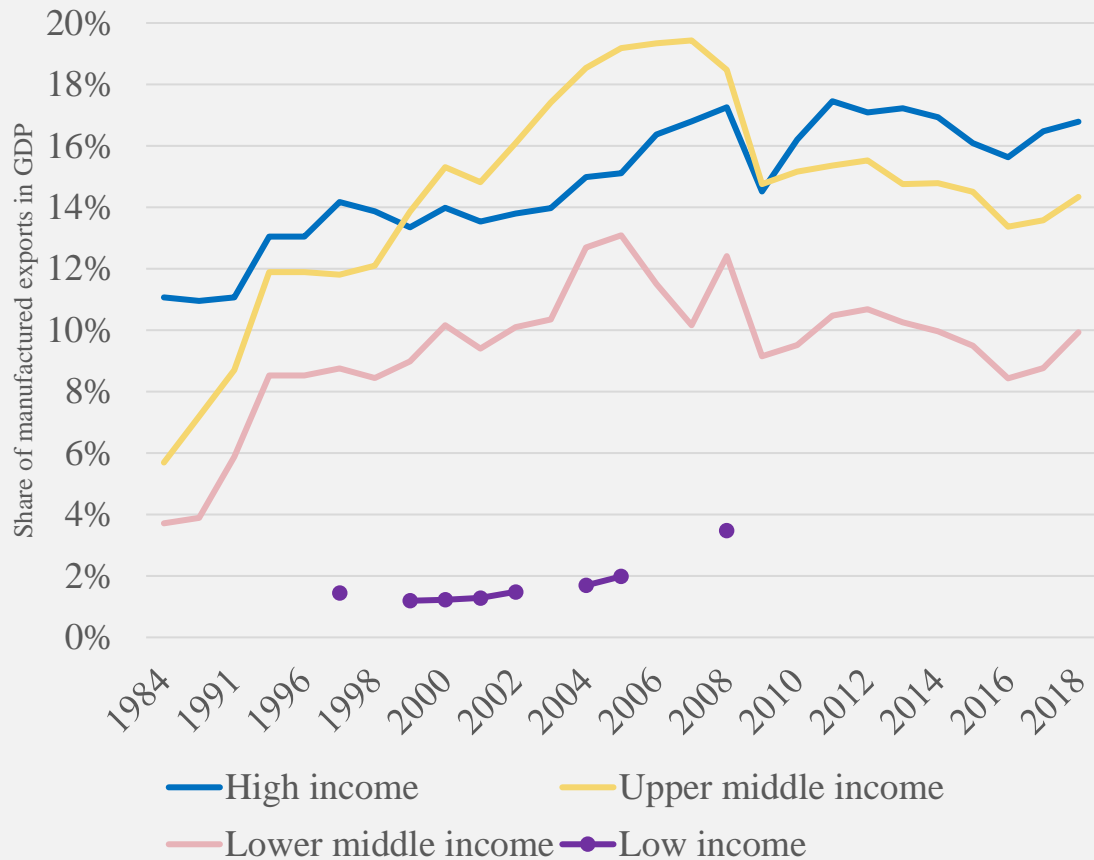
# KALDOR'S SECOND GROWTH LAW

Kaldor's second law: rate of growth of manufacturing and of productivity in manufacturing, 1980-2018



Accelerating the rate of manufacturing growth tends to be associated with faster productivity growth in manufacturing

# INCOME LEVEL AND SHARE OF MANUFACTURED EXPORTS IN GDP – RICHER COUNTRIES EXPORT MORE MANUFACTURES



- Role of exports: Size of the domestic market may be too small to enable producers to realize economies of scale
- Rapid growth of output drives productivity growth
- Manufactures are still the largest category in trade by value added



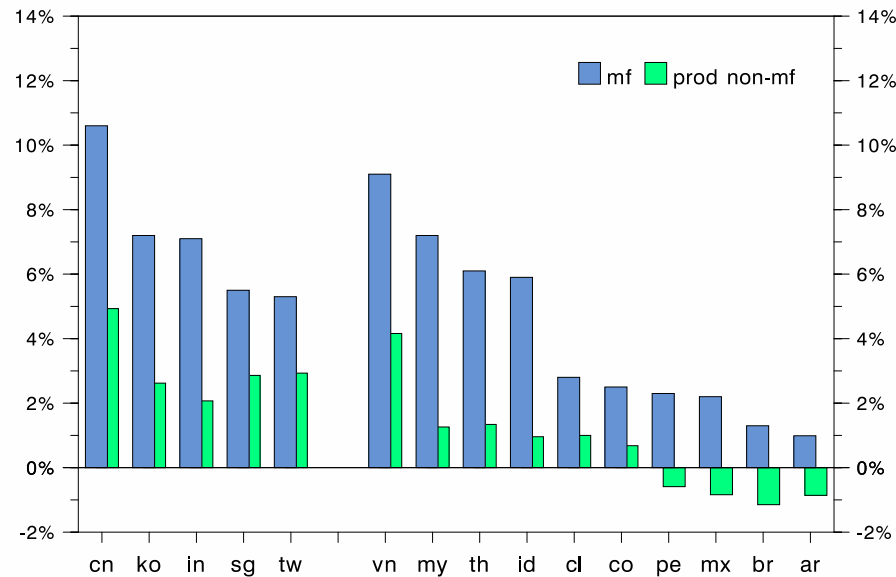
## **KALDOR'S THIRD LAW: RAPID GROWTH OF OUTPUT IN MANUFACTURING CAUSES PRODUCTIVITY GROWTH IN AGRICULTURE AND TRADITIONAL SERVICES**

- Diminishing returns to scale in agriculture and traditional services
- When labor moves into manufacturing, labor productivity (output per person) rises in agriculture because fewer people are crowding in
- But as surplus labor is exhausted in agriculture, the gap in productivity between manufacturing and agriculture closes.
- This is why low income countries grow faster than rich countries (recall the Lewis model and what happens when surplus labor is exhausted).



# KALDOR'S THIRD GROWTH LAW

Kaldor's third law: rate of growth of manufacturing and of productivity in non-mf., 1980-2018



- Countries where manufacturing is growing rapidly record higher rates of productivity growth outside of manufacturing
- Where manufacturing is growing slowly labor gets “stuck” in agriculture and traditional services

# A SIMPLE TEST OF KALDOR'S LAWS

- Growth of manufacturing and transfer of labor from agriculture drive productivity growth in developing countries
- For 61 developing countries 1990-2017 (for which we have data)

$$\text{Prod growth} = 0.4 \text{ (growth of manuf VA)} - 0.3 \text{ (growth of ag employ)}$$

(6.8)(4.0)

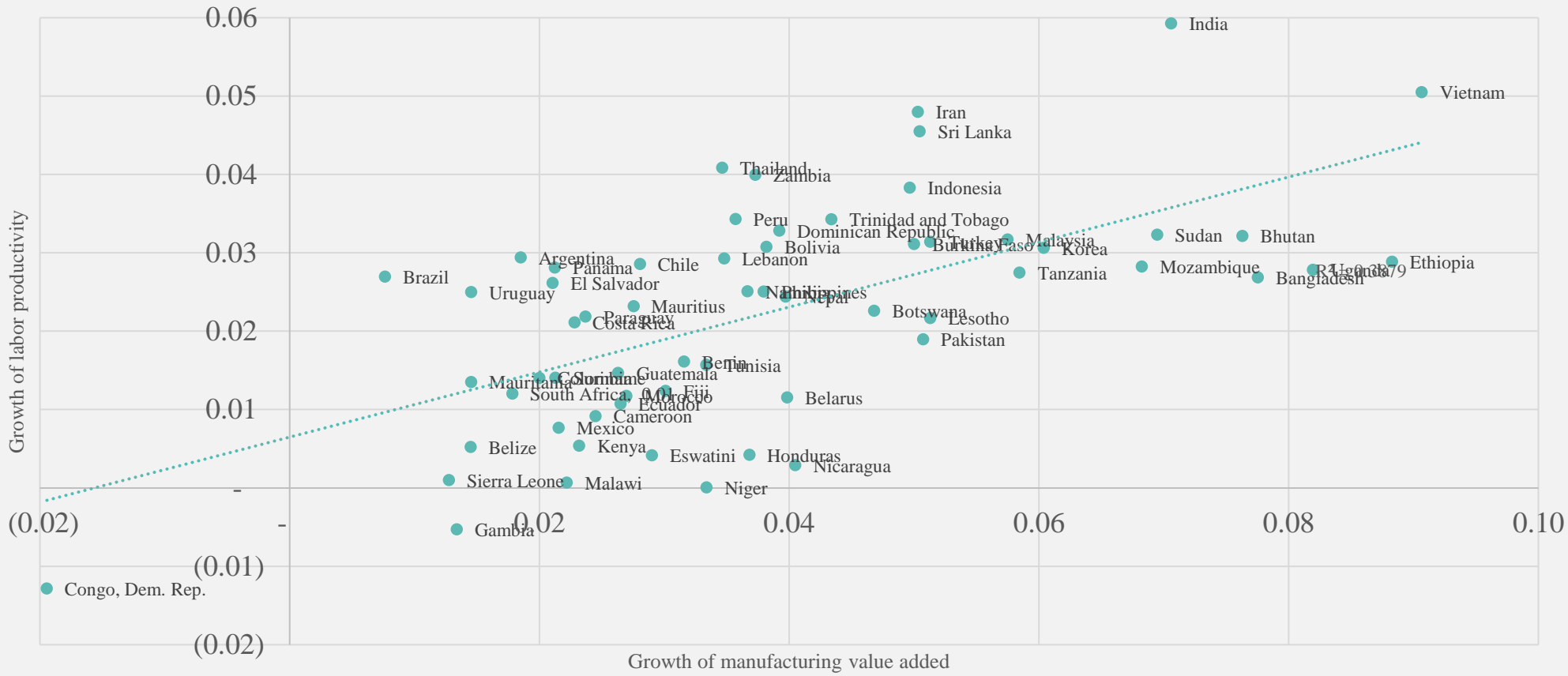
$$R^2 = 0.50$$

Figures in parentheses are t-stats





# PRODUCTIVITY GROWTH AND GROWTH OF MANUFACTURING VALUE ADDED, 1990-2017



# SUSTAINING INVESTMENT IN MANUFACTURES

- Requires government support in the form of physical and social infrastructure
  - Ports, airports, roads, power
  - Universal access to education, health care
- Removing barriers to investment
  - Access to long-term finance at reasonable cost
  - Predictable and fairly enforced rules and regulations
  - Help with acquiring and mastering new technologies
  - An overvalued exchange rate makes manufactured exports uncompetitive
  - India: reserved some products for small businesses in the name of fairness, but hurt the poor because of slow job creation and productivity growth



# GETTING INCENTIVES RIGHT

- Natural resource exporters: Investors crowd into mining where profits are high and technological barriers low (Indonesia)
- Speculation and rents: Policies are needed to reduce windfall gains from speculating in property and financial assets
- Oligopolistic economies: When economic power is concentrated, big businesses make profits through monopoly pricing and turn away from manufacturing (Philippines)
- Foreign direct investment is important at the early stages of development for access to foreign markets and to move labor from agriculture to industry



# DYNAMIC INCREASING RETURNS TO SCALE IN AGRICULTURE AND SERVICES?

- Some economists argue that manufacturing is no longer unique: dynamic increasing returns to scale are available in agriculture and services.
  - “Servicification” of manufacturing and digital technology: Where does manufacturing end and services begin on your iPhone?
  - Some activities previously regarded as manufacturing are now listed as services because they are subcontracted (research, design, testing)
  - Increasing returns to scale in financial services, wholesale and retail trade, communications
  - Modern agricultural technology: Factory farming



# POLICY IMPLICATIONS

- Manufacturing is unique in its capacity to realize productivity growth through increasing returns to scale
- Demand side factors are important—Say's Law does not hold
- Sustaining productivity growth in agriculture is vital to sustain growth of manufacturing
- Learning new technologies is not easy: government must support social overhead and technology development
- Growth is fastest when sectors achieving high rates of productivity growth are also creating new jobs



# DISCUSSION QUESTIONS

- Do Kaldor's three growth laws apply to conditions in Vietnam?
- What policies are needed to ensure that Vietnam can continue to achieve high rates of growth in the manufacturing sector?

