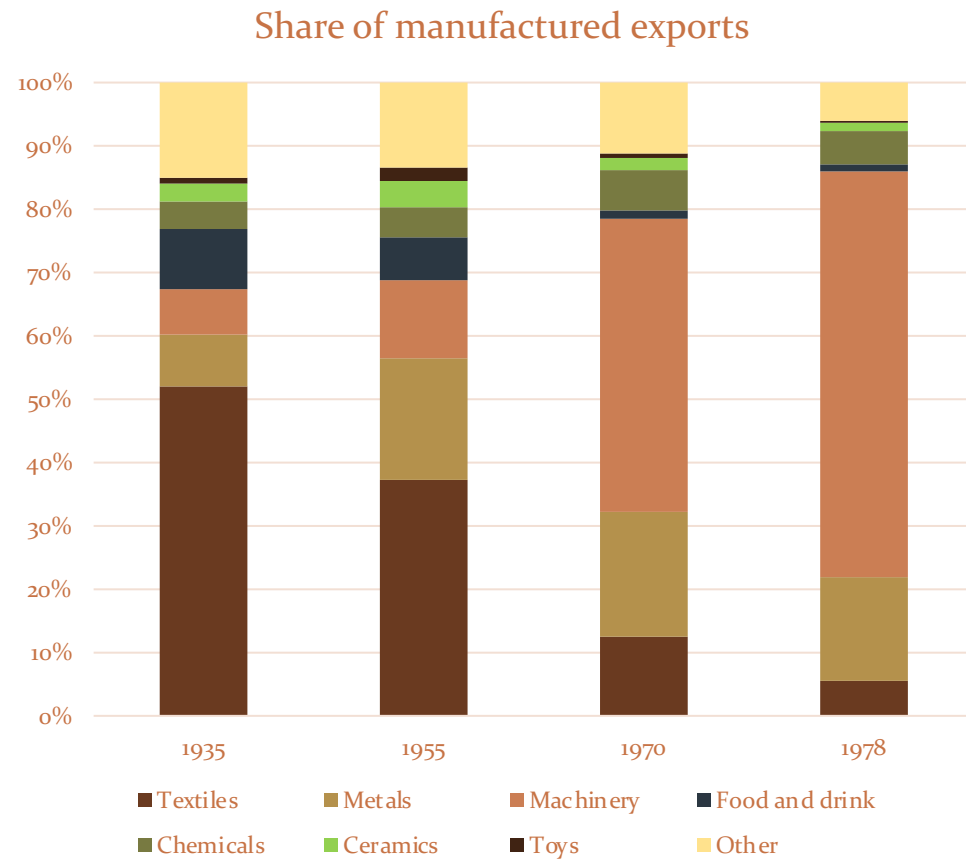




Development Policy

MANUFACTURING AND GROWTH

Japan as a developing country 1935-1978



- Manufacturing began to developing 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

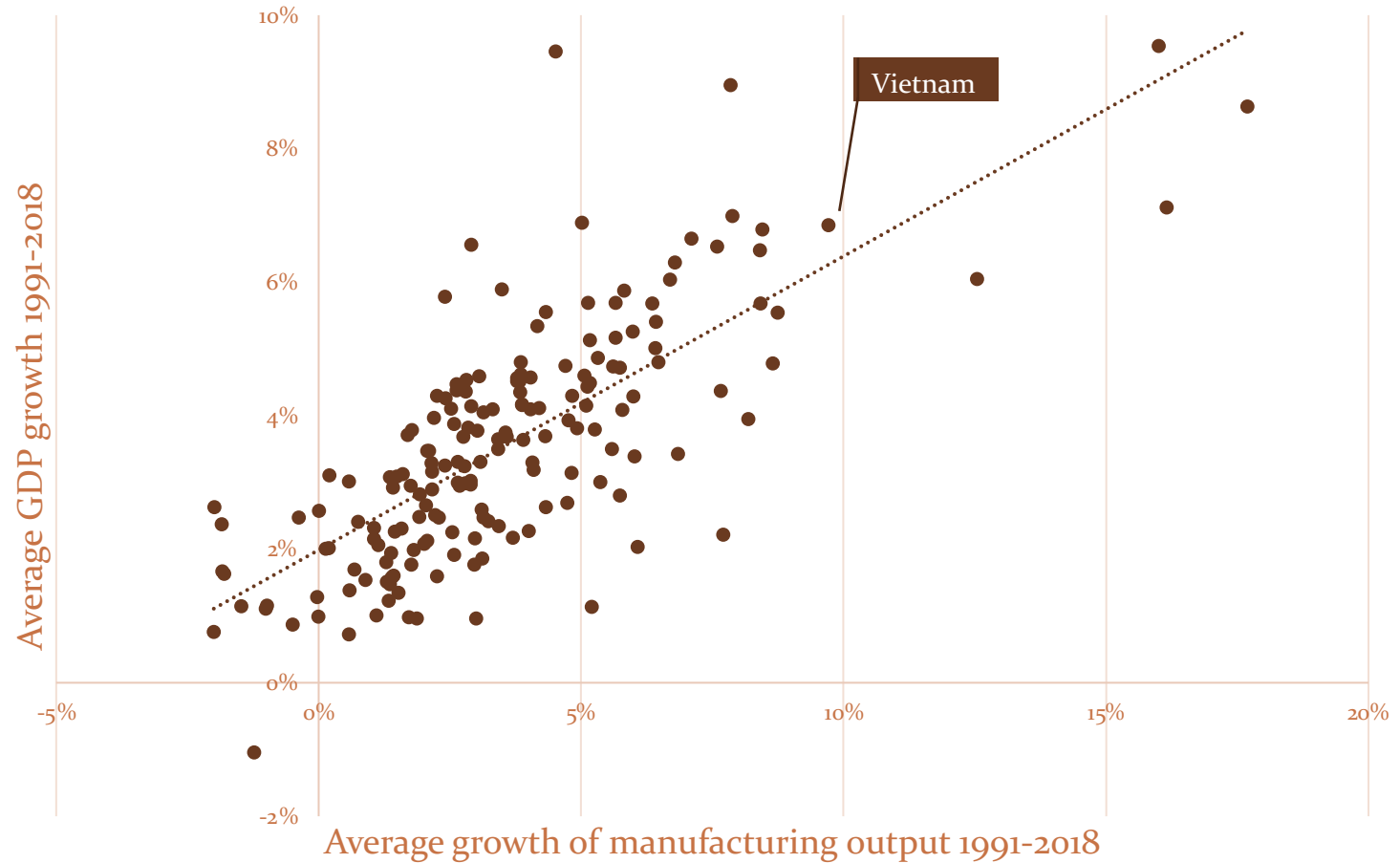
- Assumes that demand always equals supply: no unemployment, and savings always equals investment (investment is endogenous)
- Highly aggregated: One-sector models
- Constant returns to scale and diminishing returns to capital in the Solow model
- Increasing returns to scale in endogenous growth models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

Nicholas Kaldor: Manufacturing and *dynamic* increasing returns to scale

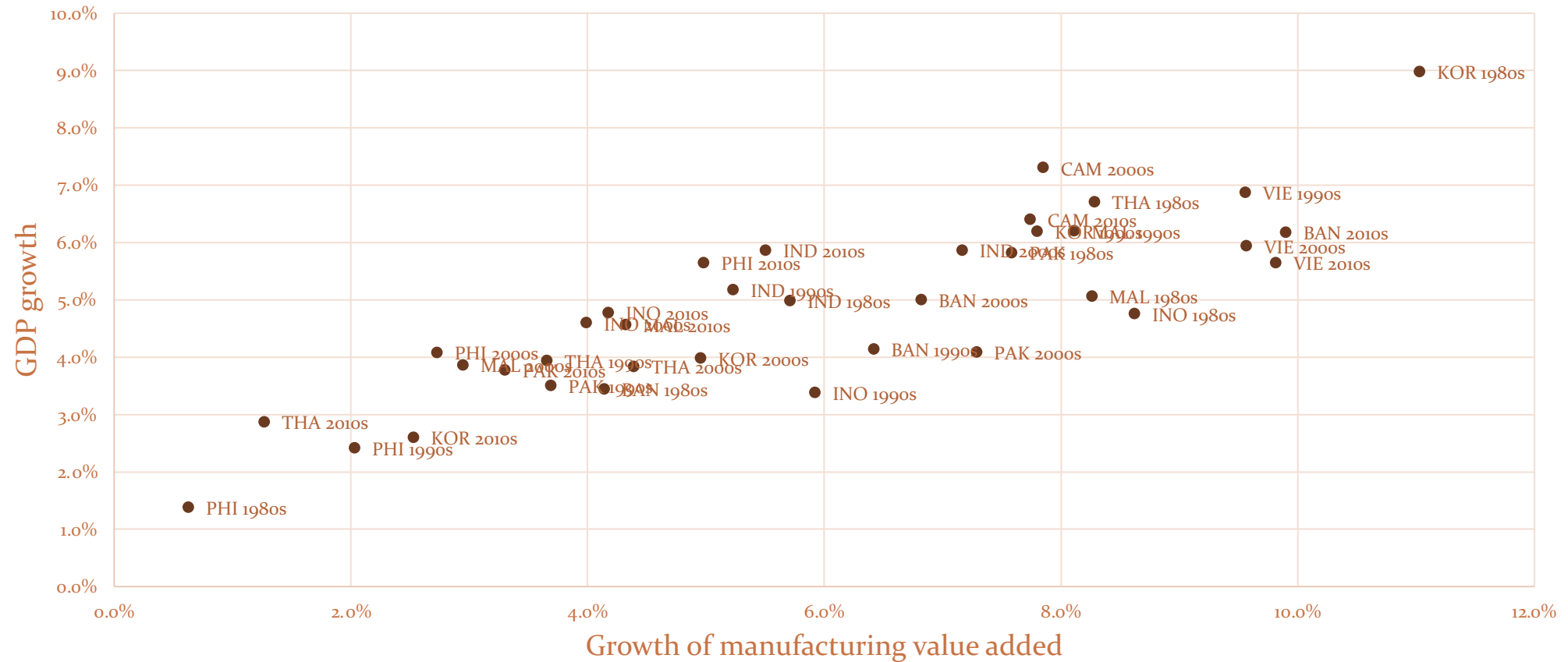
- Kaldor's Laws: Explaining why growth rates differ across countries
 - One-sector models do not differentiate between activities with increasing returns and activities with constant or diminishing returns
 - Manufacturing is unique in its capacity to realize *dynamic* increasing returns: productivity 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 Mundle and the home market for industrial goods)

Kaldor's First Law: Rapid growth of manufacturing output accelerates GDP growth

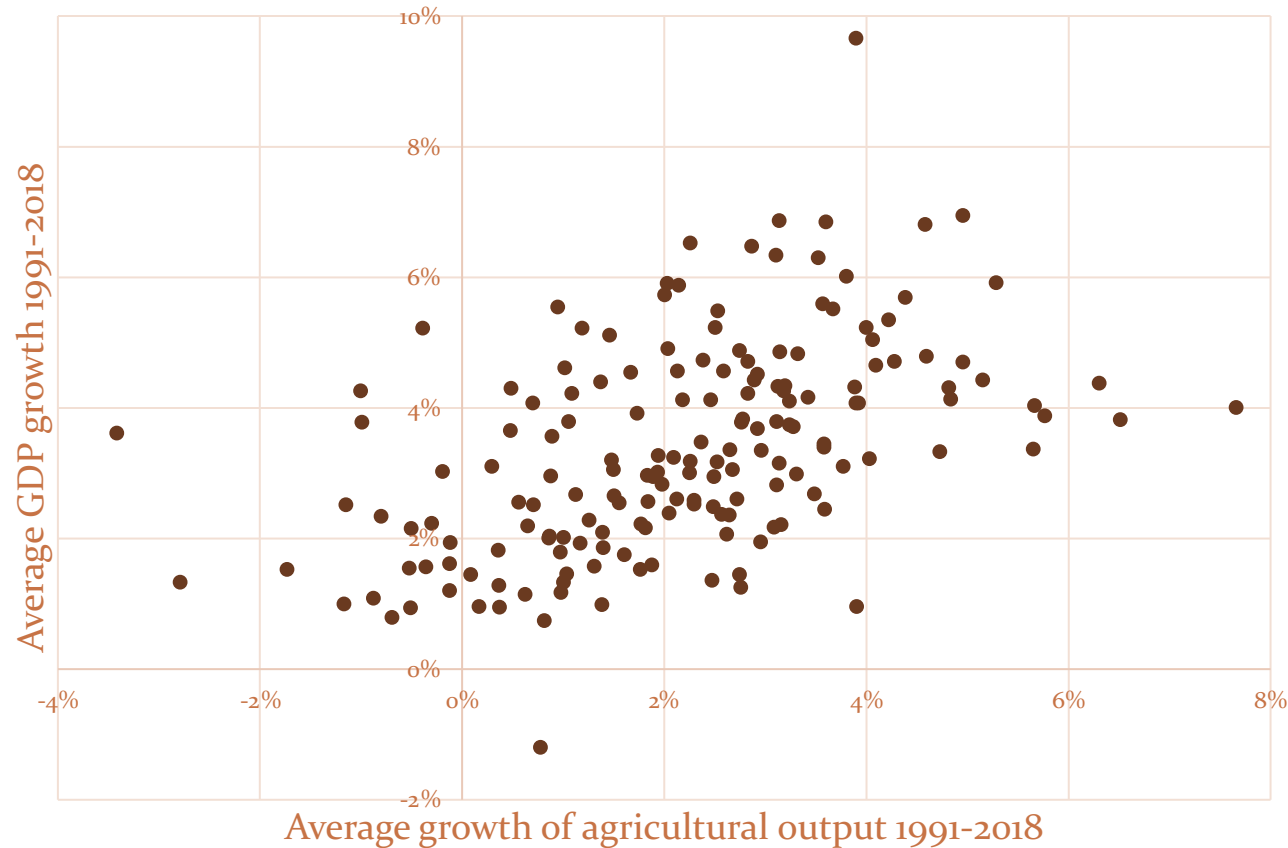
The GDP growth rate is more closely related to the growth rate of manufacturing than the growth rate of agriculture and services.



Relationship between GDP growth and growth of manufacturing output, Asia 1980-2019



Growth of agricultural output and GDP growth

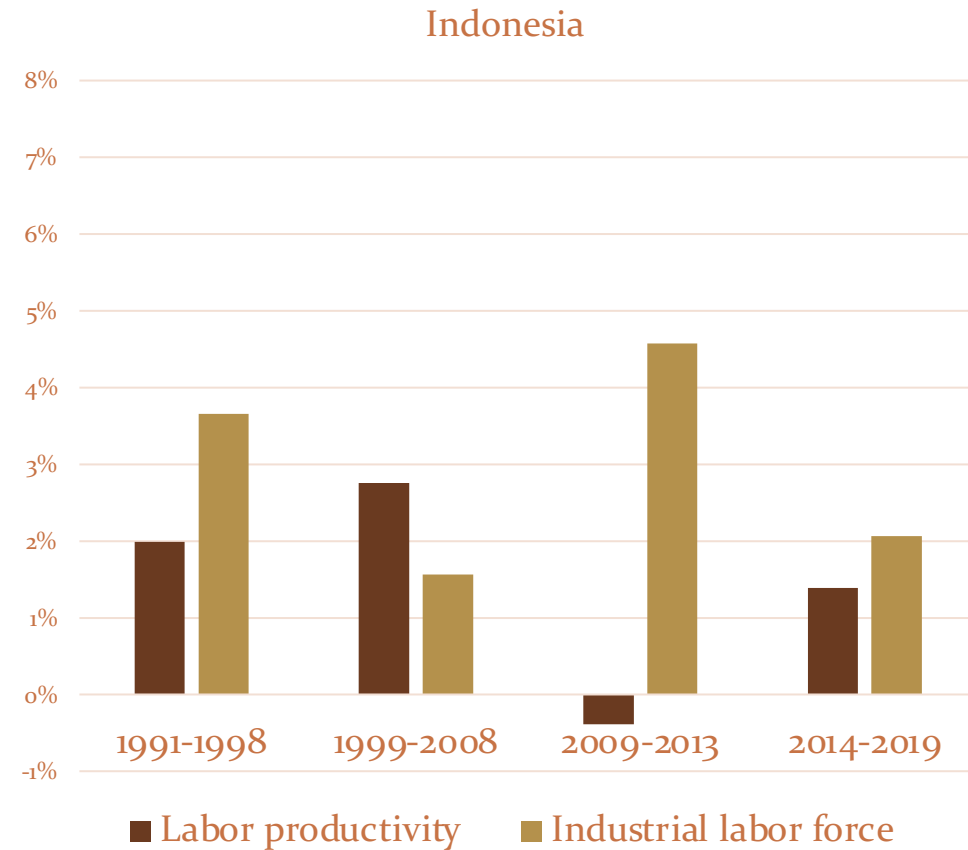
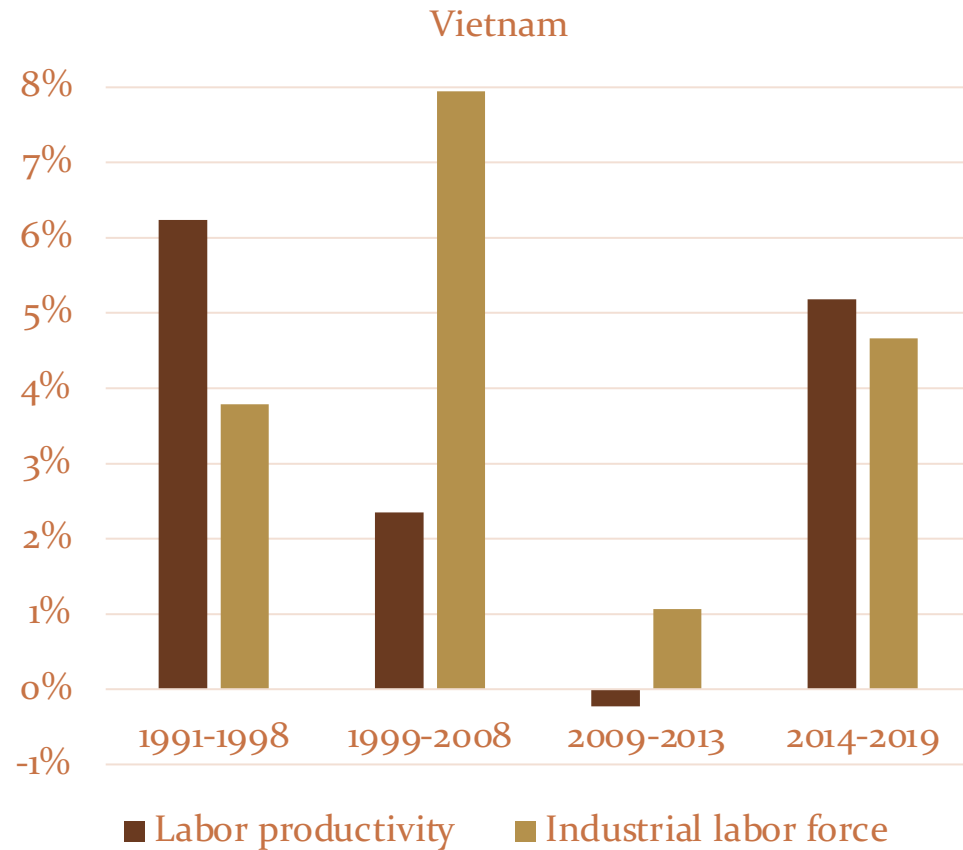


- Less clear relationship
- Services closely related to GDP growth but causation is reversed (higher GDP increases demand for services)
- DOES NOT mean that agriculture and services are not important to growth

Why does the growth of manufacturing drive GDP growth?

- Movement of labor between sectors:
 - Lewis processes
 - 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)

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

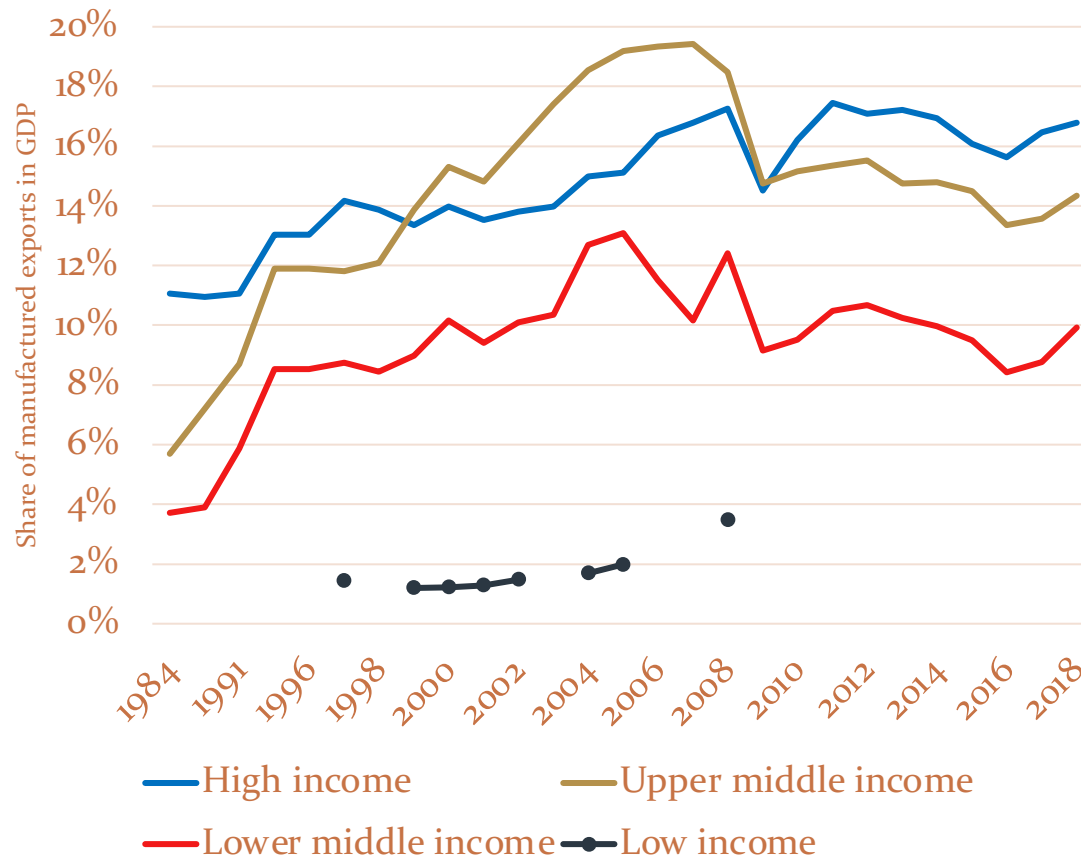
- Verdoorn's Law: Faster output growth in manufacturing is associated with faster productivity growth

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

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

- 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

Income level and share of manufactured exports in GDP – Richer countries export more manufactures

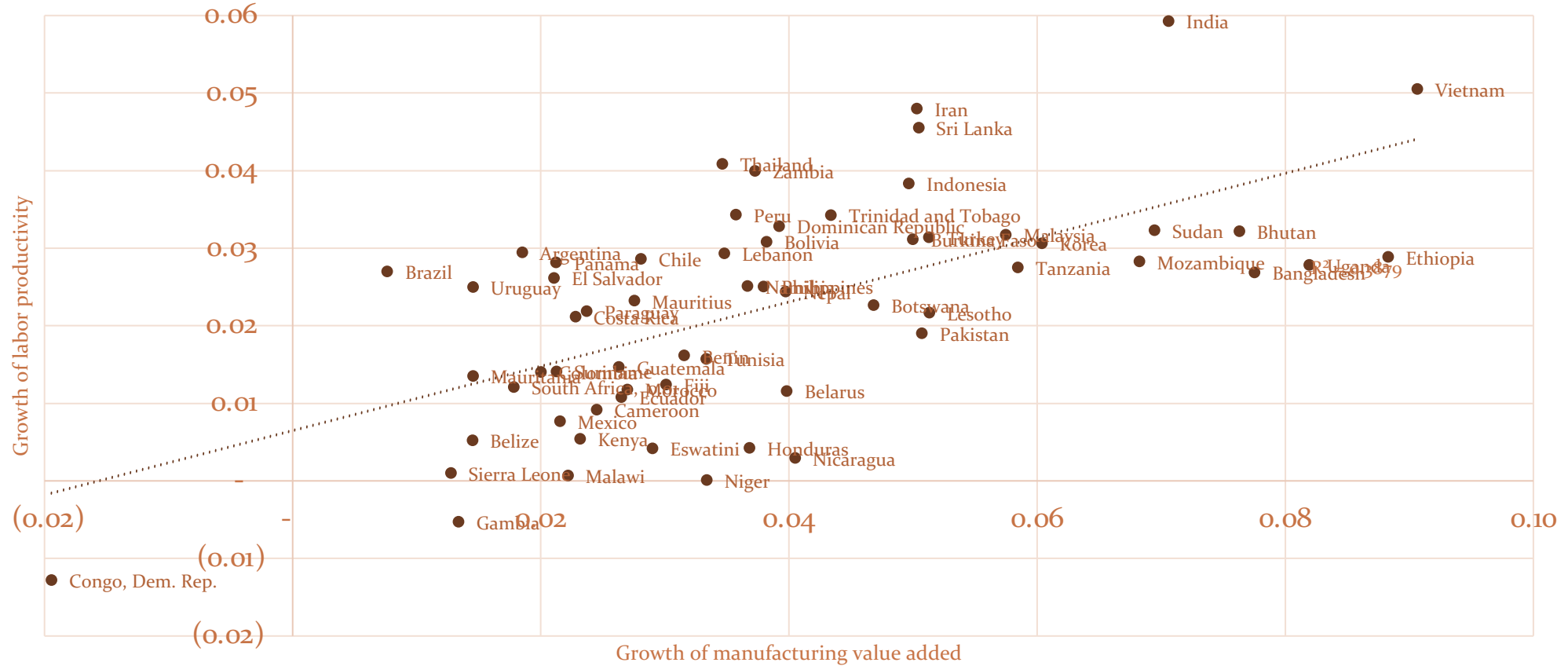


- Role of exports: Size of the domestic market may be too small to enable producers to realize economies of scale
- Rapid growth of output drives productivity growth
- Manufactures are still the largest category in trade by value added

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).

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