

Industrialization

Experiences and dilemmas

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Development as dream... or nightmare...?





“Industrialization is integral to economic development. Scarcely any countries have developed without industrializing, and rapidly growing economies tend to have rapidly growing manufacturing sectors”

UNIDO Industrial Development Report 2009

Industrialization – bad or good for public health?

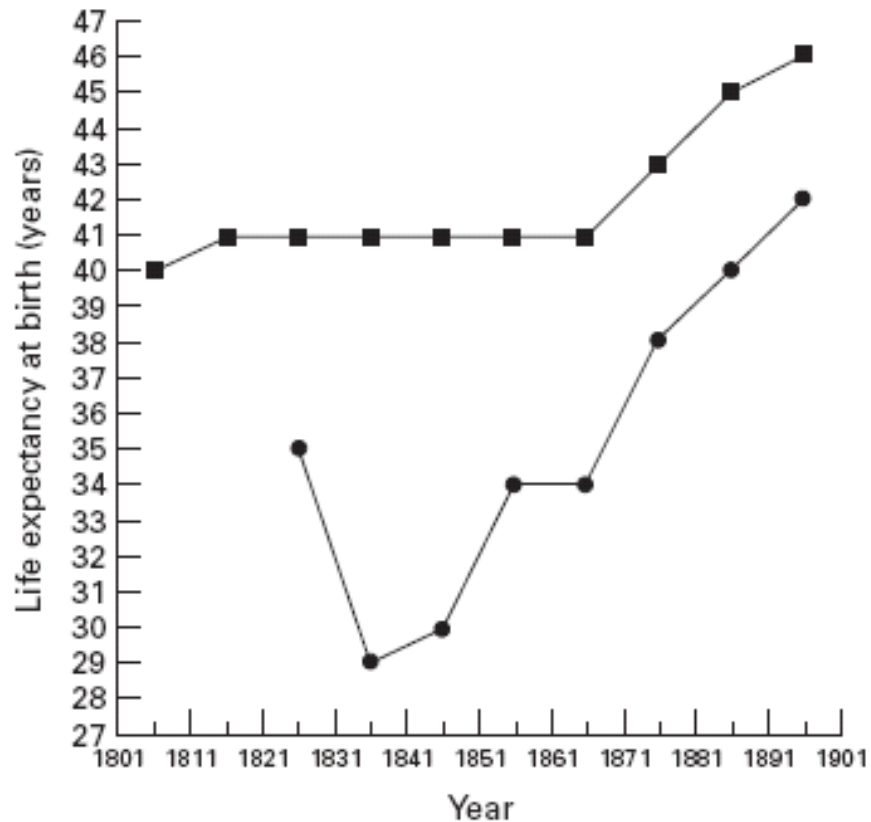
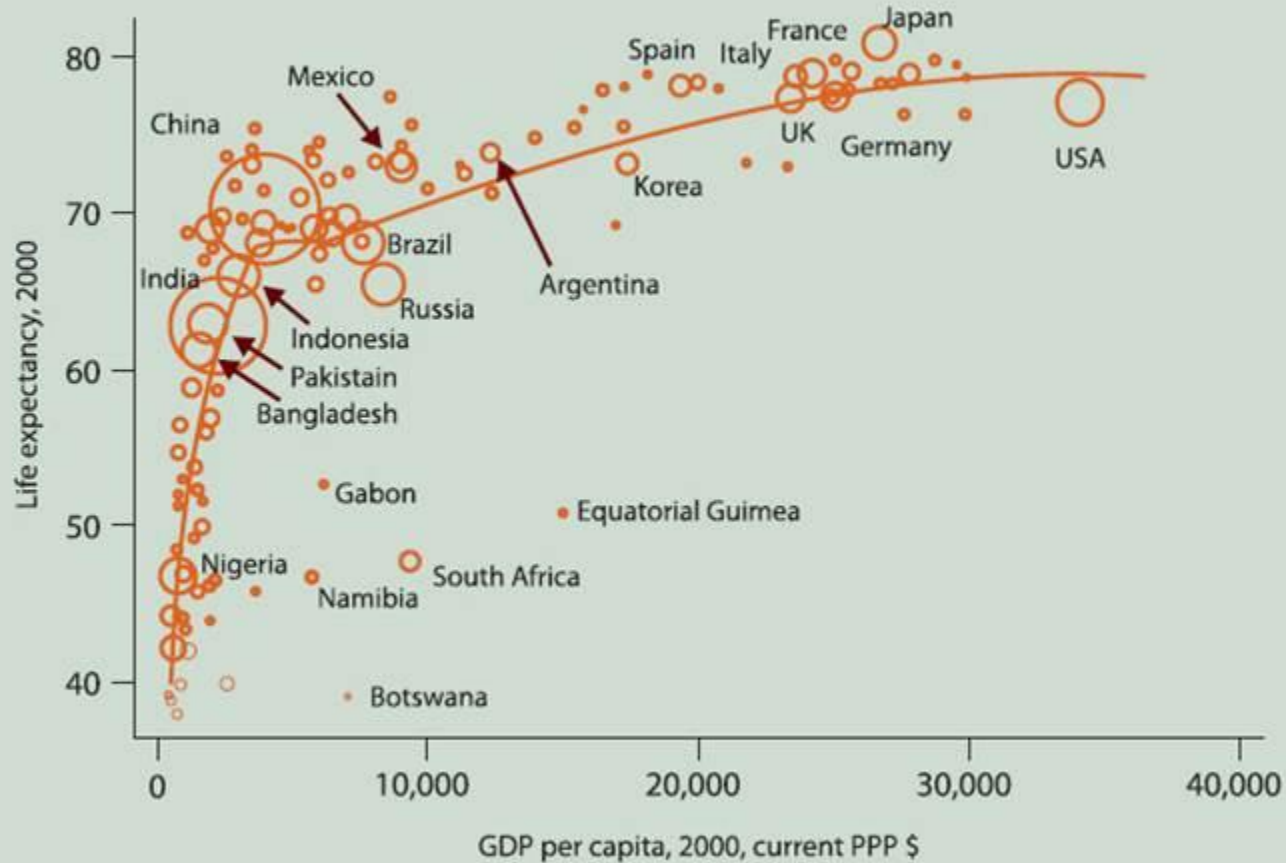


Figure 1 Expectation of life at birth in England and Wales (■) and in provincial cities over 100 000 inhabitants (●).

The Preston curve: life-expectancy versus GDP per capita



Note: Circles are proportional to population.

“God forbid that India should ever take to industrialization after the manner of the West. The economic imperialism of a single tiny island kingdom is today keeping the world in chains. If an entire nation of 300 million took to similar economic exploitation, it would strip the world bare like locusts”

(Ghandi, 1928).

‘... economic development as a long-term process of structural change, as a historical process, poses awful and awesome moral and political dilemmas which, even to be confronted adequately, require hard and informed thinking and for the policy makers themselves considerable moral and political courage and self-discipline... development is an awful process. It varies only, and importantly in its awfulness.’

Why look at industrialization in a health course?

- Industrialization associated with a profound array of changes in health outcomes
- Industrial capacity needed to create medical technology / pharmaceuticals (see Tanzania case study)
- Provides us with some difficult policy dilemmas, especially from a public health perspective
- Might like to think about this in relation to last week's debates on sustainability and aid dependence.

Lecture overview

- What do we mean by industrialization, and to what extent is the world industrialized?
- What facilitates industrialization?
- Examples: South Korea and pharmaceutical production in sub-Saharan Africa / Tanzania
- Dilemma: should a poor country start up its own pharmaceutical industry?

Industry

- Definitions
 - “not agriculture”
 - mining, manufacturing, energy
 - a particular way of producing things:
 - complex techniques and sophisticated machinery, processing a wide range of raw materials
 - complex division of labour, with range of skills within the workforce
 - use of technology rather than people

Source: Hewitt et al. (1992) “Introduction”. In *Industrialization and Development*



To take an example, therefore, from a very trifling manufacture; but one in which the division of labour has been very often taken notice of, the trade of the pin-maker; ... in the way in which this business is now carried on, not only the whole work is a peculiar trade, but it is divided into a number of branches, of which the greater part are likewise peculiar trades. One man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; ... I have seen a small manufactory of this kind where ten men only were employed, and where some of them consequently performed two or three distinct operations. But though they were very poor, and therefore but indifferently accommodated with the necessary machinery, they could, when they exerted themselves ... make among them upwards of forty-eight thousand pins in a day. ... But if they had all wrought separately and independently, and without any of them having been educated to this peculiar business, they certainly could not each of them have made twenty, perhaps not one pin in a day...

Adam Smith (1776) The Wealth of Nations



AK16 677482

Twenty Pounds

£20

ADAM SMITH 1723-1790

The division of labour in pin manufacturing:
(and the great increase in the quantity of work that results)

Bank of England

AK16 677482

Manufacturing in more detail

- Food products
- Drink and tobacco
- Textiles
- Clothing and footwear
- Wood products and furniture
- Paper and printing
- Chemical and petroleum products
- Bricks, glass and cement
- Basic metals
- Metal products
- Electrical machinery
- Transport equipment
- Pharmaceuticals
- Others...

Table 9.1 Manufacturing value added share within developing country groups of selected countries, 2000 and 2005 (Percentage)^a

Country group and region	2000	2005
Industrialized countries	74.3	69.4
Countries with economies in transition	1.4	1.7
Developing countries	24.3	29.0
Sub-Saharan Africa	0.7	0.7
excluding South Africa	0.3	0.3
South Asia	1.5	1.8
excluding India	0.3	0.4
Middle East and North Africa	1.9	2.2
excluding Turkey	1.4	1.7
Latin America and the Caribbean	6.6	6.4
excluding Mexico	4.7	4.7
East Asia and the Pacific	13.3	17.5
excluding China	6.7	7.7
Least developed countries	0.3	0.3
World	100.0	100.0

Source: UNIDO database.

^a MVA is in constant 2000 dollars.

Why industrialize?

- **Economic reasons** – industrialization and growth appear to go together
 - many poor economies characterized by low agricultural productivity
 - industry a more stable form of production, with higher value attached
 - creates dynamism within economies – **economies of scale** and **linkages**
- **Political reasons** – economic independence boosts political power

Stalin in 1931 on why the Soviet Union should undertake rapid industrialization...

- ‘To slacken the tempo [of industrialization] would mean falling behind. And those who fall behind get beaten. But we do not want to be beaten. No, we refuse to be beaten! One feature of the history of old Russia was the continual beatings she suffered because of her backwardness. She was beaten by the Mongol khans. She was beaten by the Turkish beys. She was beaten by the Swedish feudal lords. She was beaten by the Polish and Lithuanian gentry. She was beaten by the British and French capitalists. She was beaten by the Japanese barons. All beat her because of her backwardness, military backwardness, cultural backwardness, political backwardness, industrial backwardness, agricultural backwardness. Such is the law of the exploiters – to beat the backward and the weak. It is the jungle law of capitalism. You are backward, you are weak – therefore you are wrong; hence, you can be beaten and enslaved. You are mighty – therefore you are right; hence, we must be wary of you. That is why we must no longer lag behind.’
 - Stalin JV (1953). *Problems of Leninism*. Moscow, Foreign Languages Publishing House

What *type* of industry?

- **Industrial processing of primary goods**
 - e.g. food processing
 - low capital, technology and skill requirements
 - adds value by decreasing volume, lengthening shelf-life and decreasing cost of transport
 - growth constrained by the output of primary goods

What *type* of industry?

- **Production of consumer goods**
 - e.g. toys, textiles, clothing, cars, televisions
 - simple technology
 - may be labour-intensive
 - constrained by limits of domestic market

What *type* of industry?

- **Capital-intensive intermediate and final products**
 - e.g. steel and chemicals (intermediate); ships and machinery (final)
 - helps stimulate the development of other industries
 - but generally needs large-scale investment and imports to get the technology off the ground
 - not labour-intensive (therefore does not create large amounts of jobs)

KICKING AWAY THE LADDER

DEVELOPMENT STRATEGY
IN HISTORICAL PERSPECTIVE

Ha-Joon Chang

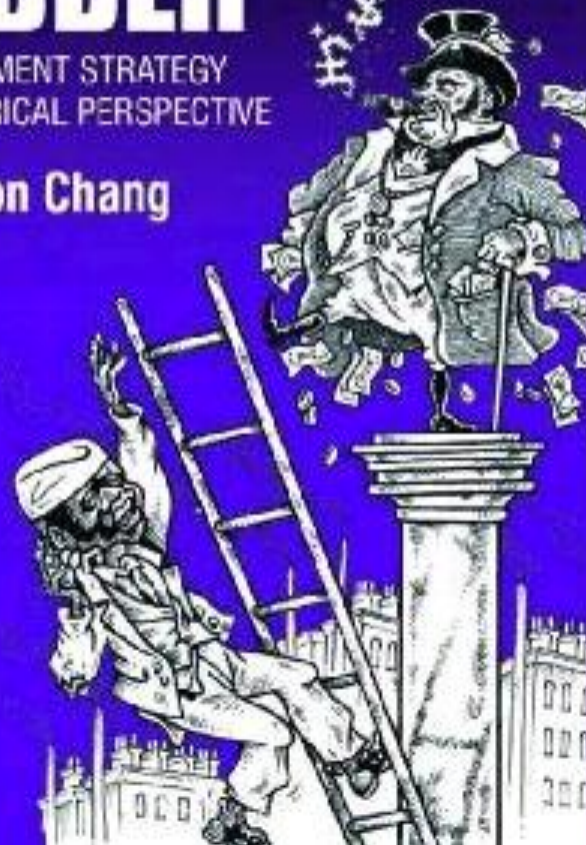
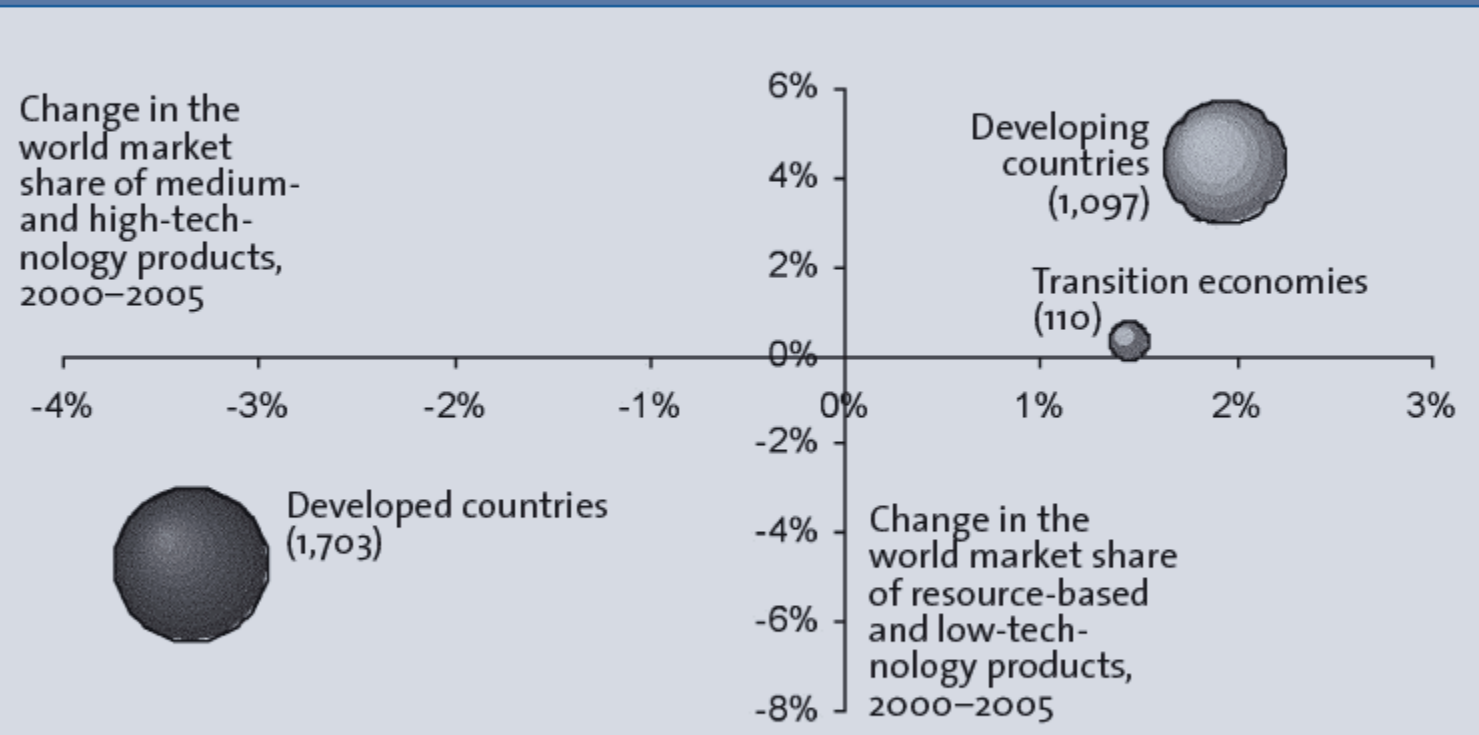


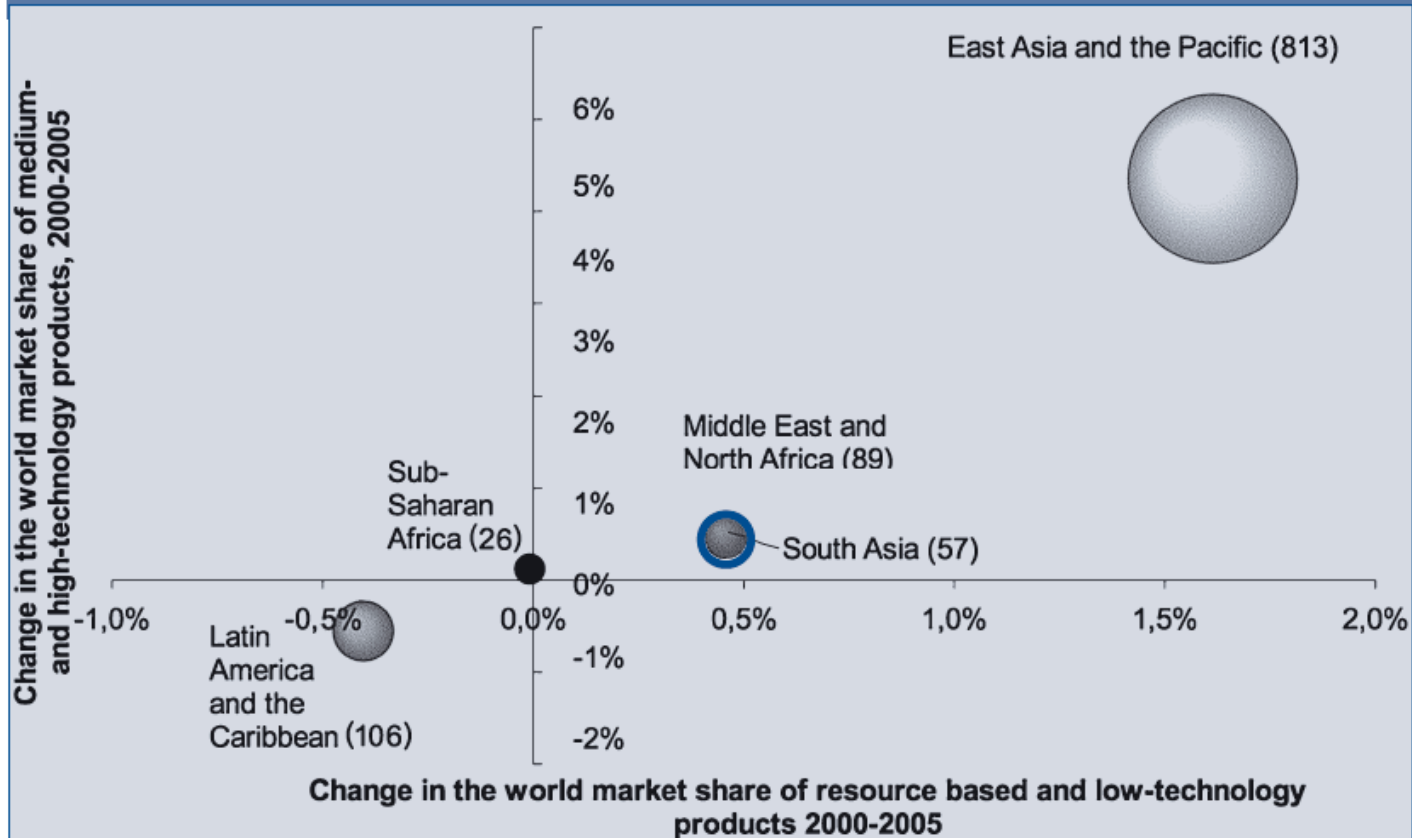
Figure 10.6 Market share of developing countries in all categories of manufactured exports, 2000-2005 (Percentage)^a



Source: UN COMTRADE.

a Bubble size (number in parenthesis) indicates the increase in the value of total manufactured exports between 2000 and 2005 in billions of dollars.

Figure 10.9 Gains in manufactured exports of East Asia, 2000-2005 (Percentage)^a



Source: UN COMTRADE.

a Bubble size (number in parenthesis) indicates the increase in the value of total manufactured exports between 2000 and 2005 in billions of dollars.

Industrialization needs...

- Investment – from public and private sources
- Access to technology
- An educated, healthy and productive workforce
- A large domestic market or access to overseas markets
- Protection from foreign competition?
- A “developmental state”?... or free markets?
- Historical / political /cultural / geographical factors conducive to industrialization?

Example of South Korea



Big themes...

- What is the appropriate role of government in industrialization?
- To what extent can **liberalization** (diminished intervention by government, and greater use of markets in the industrialization process) be beneficial or harmful to industrialization?
- To what extent can another aspect of liberalization – **openness** to **world** markets through trade – be beneficial or harmful to industrialization?

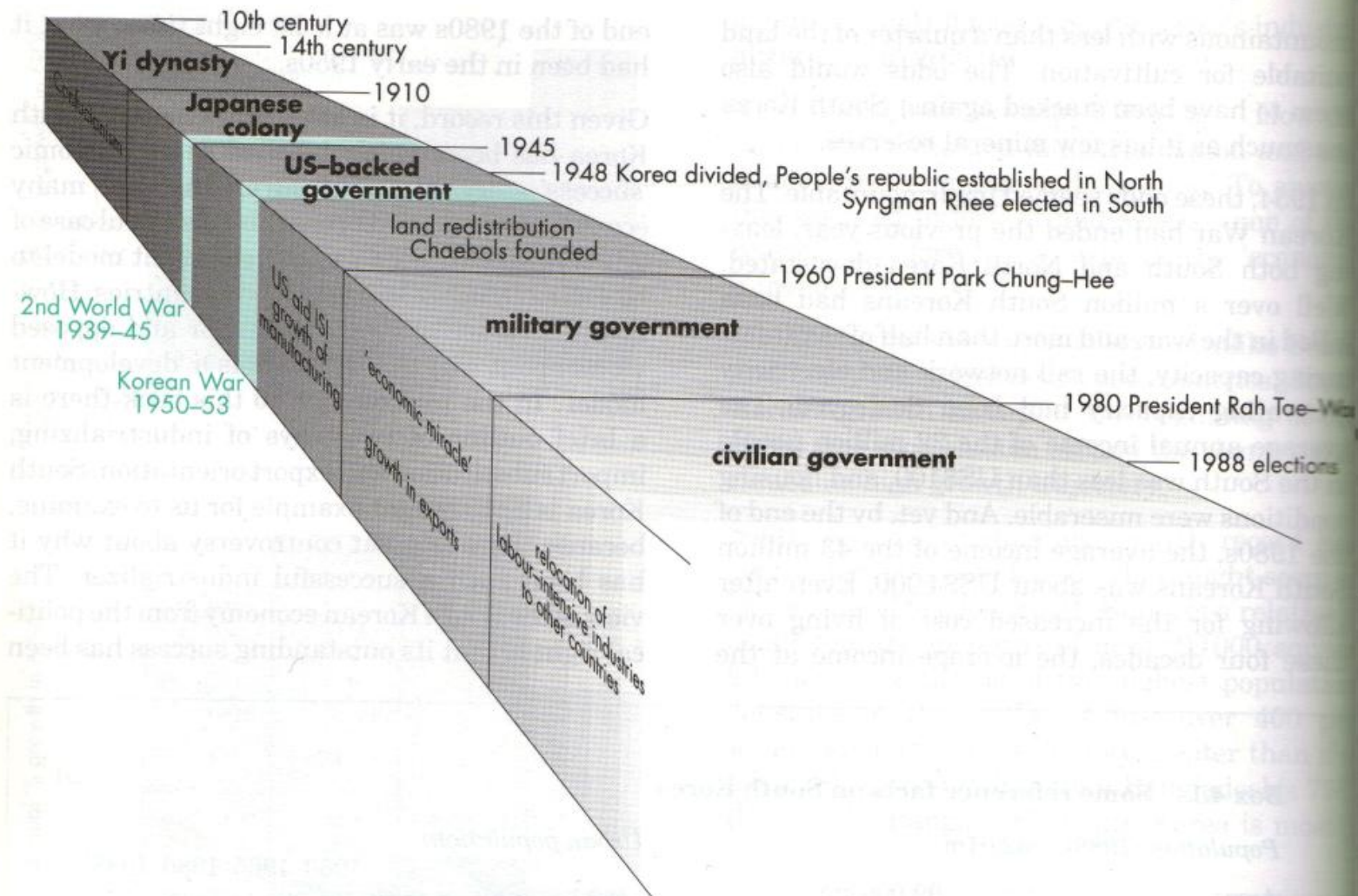
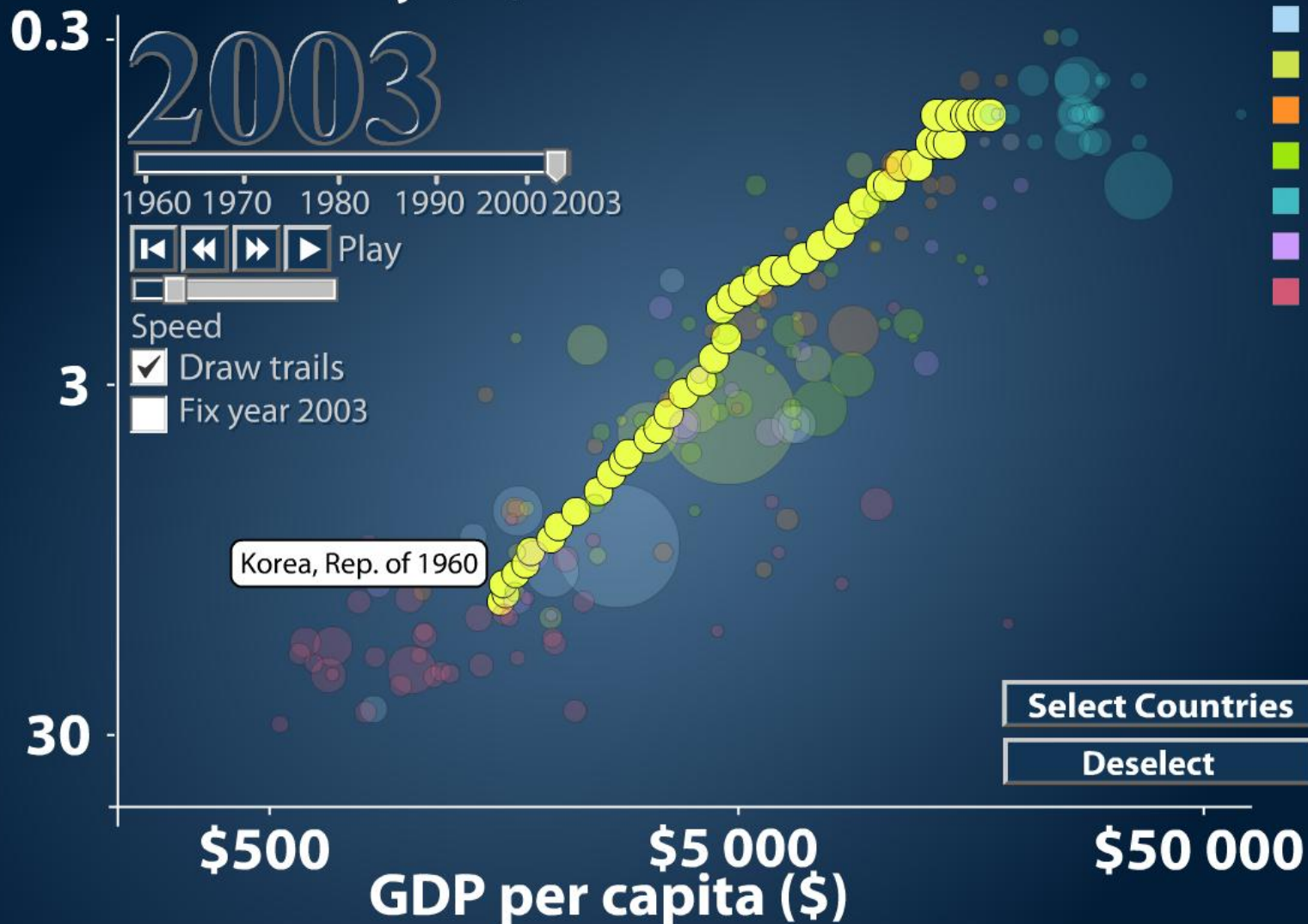


Figure 4.3 Reference dates in Korean history.

8 Interactive trails

Child mortality (%)



South Korea

- **Investment**

- large amounts of US aid in 1950s
- proceeds from land redistribution found their way to manufacturing (domestic savings)
- the state controlled the banking system so could direct investment
- Large family-owned firms (the *Chaebols*) set up

- also investment in physical infrastructure such as roads, rail, electricity

South Korea

- **Technology**

- legacy of Japanese colonial rule
- learning from US technical assistance
- reverse engineering
- Government commitment to proceeding up the technology ladder: shift from labour-intensive (e.g. garments) to capital-intensive production (steel and ship manufacture)

South Korea

- **Education, health, productivity**
 - Rapid expansion of access to education (health services came later)
 - Focus on productivity of workers
- **Access to markets & ‘openness’ to trade**
 - South Korea did not have a large domestic market
 - Needed to focus on **export-driven industrialization**
 - World economic growth also good in run-up to 1970s
 - Openness to world economy also promoted foreign direct investment and also competition, but there was also some level of protection from foreign competition at least initially for South Korean firms...

South Korea

- **Protection from foreign competition**
 - Government protected industries it wanted to “grow”;
 - Used tariffs and subsidies
 - But it made sure it got something in return for the investment – companies had to meet export-targets
- **A developmental state? Or free markets?**
 - Industrialization requires co-ordinated state intervention
 - But restricting markets restricts the disciplinary force of competition
 - South Korea had to balance both state intervention and use of markets

South Korea

- **Historical / political / cultural factors**
 - Japanese colonialism, war, US aid...
 - dictatorship?
 - regional development (flying geese)
 - Confucianism?

Example of pharmaceutical production in Tanzania



Data on Tanzania

Total population	43,739,000
Gross national income per capita (PPP international \$)	1,260
Proportion of population below national poverty line	33%
Life expectancy at birth m/f (years)	53/58
Probability of dying under five (per 1 000 live births)	108
Probability of dying between 15 and 60 years m/f (per 1 000 population)	456/311
Total expenditure on health per capita (Intl \$, 2009)	68
Total expenditure on health as % of GDP (2009)	5.1

Tanzania proportional mortality (% of total deaths, all ages)

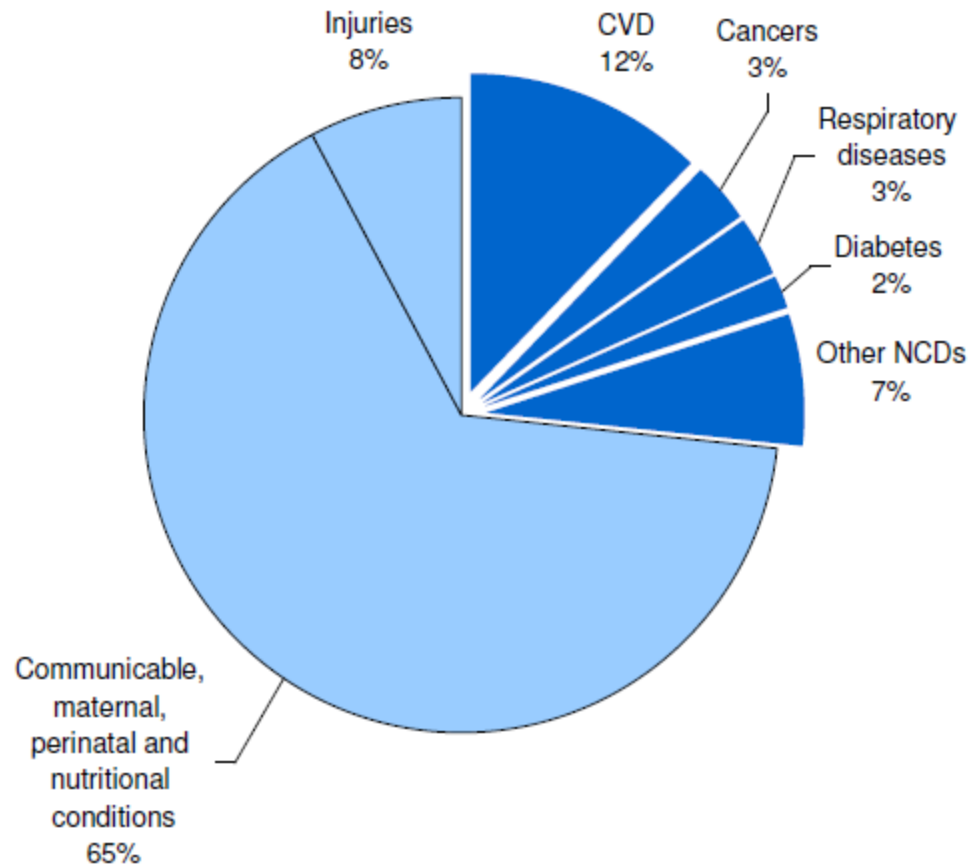
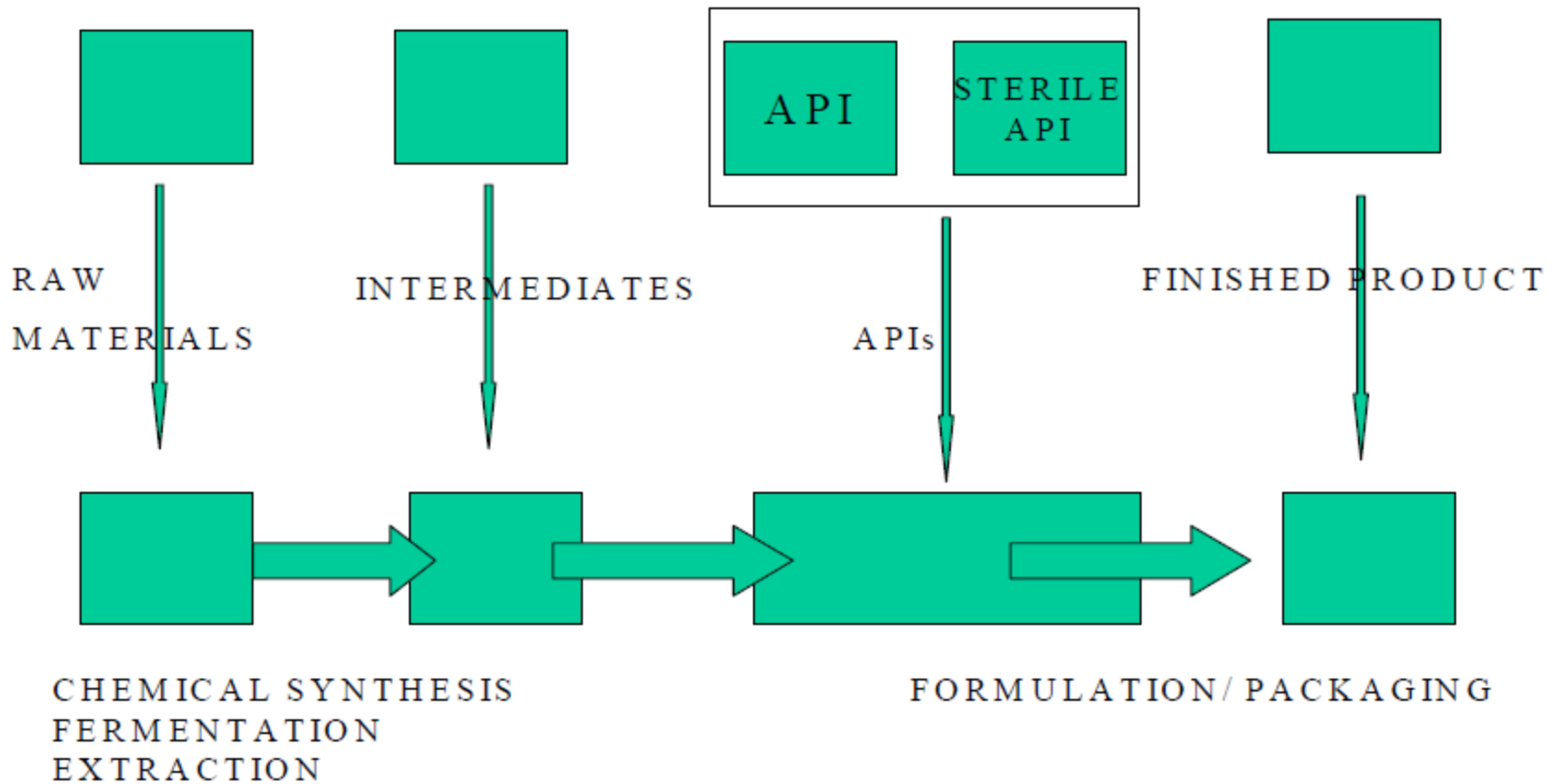


Figure 1: Schematic block diagram of a pharmaceutical manufacturing process



Stages of pharmaceutical manufacturing

- **Chemical synthesis:** processes of extraction or fermentation create the active pharmaceutical ingredient (API). Technically the most demanding step in pharmaceutical manufacture.
- **Formulation:** the API is blended with filling materials, compressed and coated. Technically less demanding but must be done with precision.
- **Packaging:** blister-packed or bottled, then labelled. Least technically demanding (and value-adding) step.

Actors in the pharmaceutical manufacturing process

- **Multinational companies** (e.g. Pfizer, GSK, Novartis) and their subsidiaries producing branded products
- **Generics manufacturers operating globally** (e.g. Cipla, Ranbaxy). Core business focussed on developed countries and middle-income countries.
- **Generics manufacturers with predominately national operations**
- **Small-scale local manufacturers** importing APIs and formulating the final product in-house, or producing a branded drug under license from an MNC.

A picture of global pharmaceutical manufacturing

- 2/3rds of global value of pharmaceutical products produced in 5 countries: USA, Japan, France, Germany and UK
- Only in China, Brazil, Korea, India, Egypt and Poland is industrial capacity sufficient for local production to be greater than \$1 billion annually (i.e. similar to Sweden, Germany, Ireland and Austria)
- From 1975 to 2004 only 1.3% of the 1556 new chemical entities were meant for use in tropical diseases and TB even though these account for 12% of the global disease burden.

Context of sub-Saharan Africa

- Africa has 11% of the world's population and 25% of the disease burden (and just 1% of the global health care expenditure)
- It has an estimated 1% share of the world's pharmaceutical markets

Local production capacity in sub-Saharan Africa (2005)

Table 5: Local production capacity, based on WHO/AFRO 2005 data⁵⁸

Capacity for local production	Number of Countries
None; import all pharmaceutical products	9
Import API, product packaging and labelling; repackage bulk forms	34
Import API; produce finished dose forms; reformulate products (e.g. FDC)	25
Manufacture API and intermediates	1
All pharmaceutical industry activity	37

Context of Tanzanian drug manufacture

- Very limited manufacturing capacity – no manufacturer producing APIs; they are involved in formulating and packaging a relatively narrow range of medicines (see scenario)
- Huge dependence on imports for essential needs
- Medicine costs are a real burden on the population, when they can afford to access them at all.
- Quality deemed poor by better-off Tanzanians – need an increase in quality or focus on marketing or re-focussing of local industry on the needs of poor groups

Arguments for developing local production capacity

- Helps achieve self-sufficiency and thus reliability in drug supply (India and Brazil examples of producing cheap medicines could be cited. Availability of generics tends to bring down prices).
- Helps governments safeguard quality
- Creates jobs through forward and backward linkages
- Replaces imports and thus saves foreign exchange; may promote exports
- Recognises need to respond to future changes in disease burden and demography – a **dynamic** approach is needed

Arguments against developing local production capacity

- Developing local production will not necessarily improve **access** to medicines
- Drugs available elsewhere at a cheaper cost – they should be imported (self-sufficiency for any country is rare, and where is the evidence that such an objective will improve access?)
- New entrants face high competition in global markets
- Countries without industries might spend large amounts of foreign exchange on machinery / materials needed to develop the industry

Fundamental clash between industrial policy and health policy?

“[There is] an inherent tension between a health policy directed to the access problem of making available low cost and quality-assured medicines and an industrial (primarily private sector) policy of optimizing profits and growth by promoting a local industry whose products may be more expensive than those on the international market”

Remember: Industrialization needs...

- Investment – from public and private sources
 - Access to technology
 - An educated, healthy and productive workforce
 - A large domestic market or access to overseas markets
 - Protection from foreign competition?
 - A “developmental state”?... or free markets?
 - Historical / political /cultural / geographical factors conducive to industrialization?
-
- To what extent are these present in Tanzania in relation to the development of the pharmaceutical industry?

Investment?

- Significant amounts of donor money flowing into purchasing ARVs (also for anti-malarials) in Eastern and Southern Africa (could be diverted into local production instead of flowing to MNCs and Indian generic manufacturers)
- General increase in health aid
- May be seed capital available from government
- Private capital loaned through banks is quite constrained
- Tanzania is experiencing quite rapid economic growth

Investment in physical infrastructure?

- Increase in road building not just in Tanzania, but in the region
- Cost of electricity is the highest in the region
- Much of water supply does not meet drinking water standards
- Storage facilities not good
- Costs for individual businesses of maintaining quality will be very high.

Access to technology?

- General lack of technology, though may have access through relationships with Indian manufacturers and some Western companies.
- Less possibility to ‘reverse engineer’ than previously in history?

Workforce: healthy, educated, productive?

- Productivity low; education levels poor; how far in terms of sophistication of the manufacturing process can TZ go?
- But to what extent is education needed, e.g. in packaging parts of manufacturing process? And do you need a large number of technical specialists to kick-start an industry?

Figure 6: Local Production and Secondary School Enrollment

LOCAL PRODUCTION AND SECONDARY SCHOOL ENROLLMENT

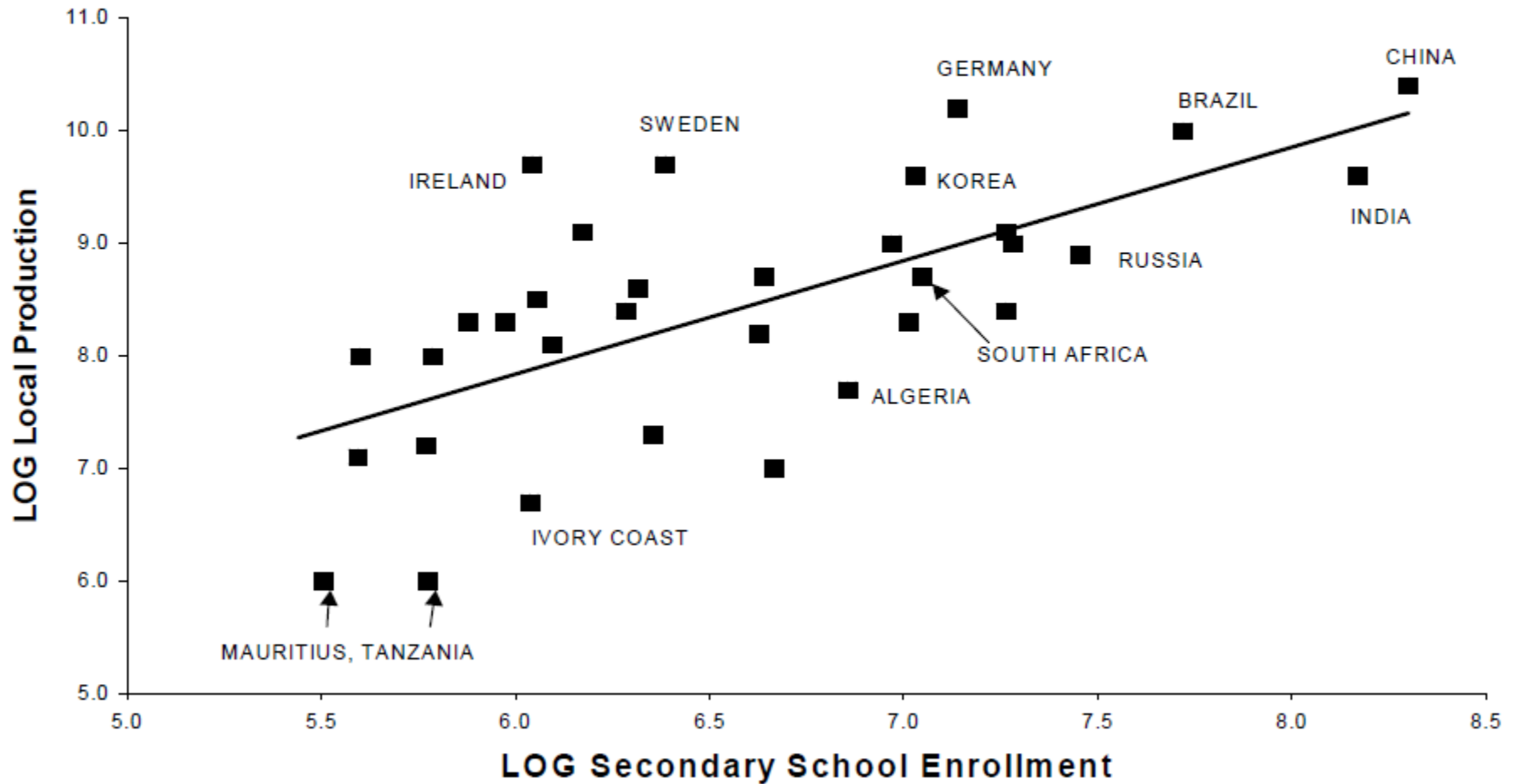
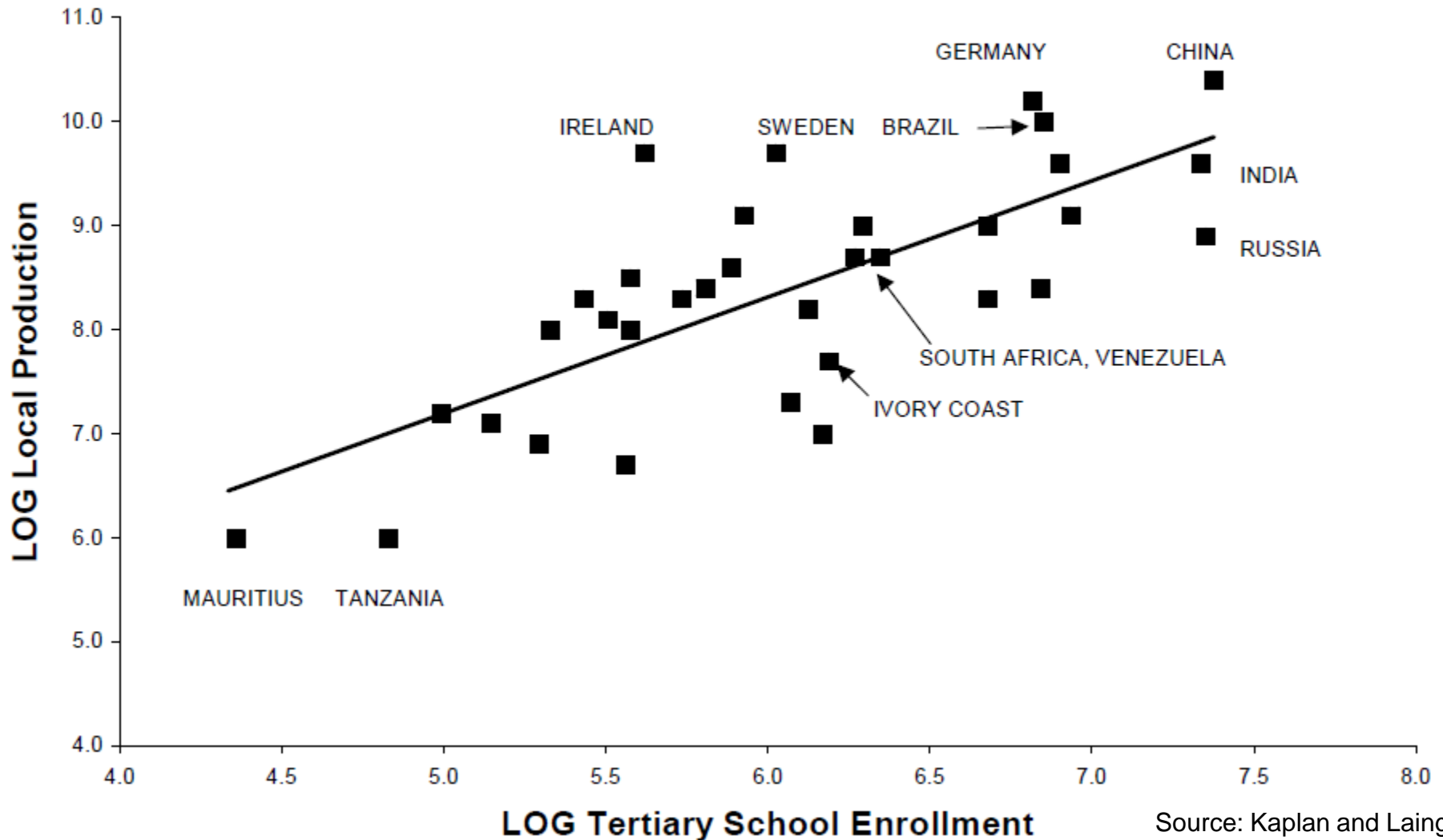


Figure 7: Local Production and Tertiary School Enrollment

LOCAL PRODUCTION AND TERTIARY SCHOOL ENROLLMENT



Source: Kaplan and Laing 2005.

Size of domestic market and access to foreign markets?

- Tanzania has large population; high burden of disease (esp HIV/AIDS)
- However, purchasing power is very low due to widespread poverty; which drugs are ‘essential’?
- Regional markets are accessible; larger numbers of people, also with high levels of disease
- Competition from more established Kenyan pharmaceutical industry (though Kenya also highly import dependent too)

Protection from competition?

- Some protection available for local manufacturers (e.g. in tendering)
- Also some subsidies available from government
- Government has suggested banning the import of some technologically simple products
- But intense competition from Indian manufacturers who already have a key position in the market.
- Some quality concerns with Indian drugs, but in reality quality concerns across the industry.
- Danger of inefficiency resulting from govt protection?

Effects of trade agreements?

- TZ Has extended period (until 2016) with which to comply with TRIPS agreement, which enforces patents on pharmaceutical products
- But has not taken advantage of this, nor of flexibilities in the TRIPS agreement namely:
 - Compulsory licensing (through a third party)
 - Parallel imports (obtaining drugs being sold cheaper on foreign markets than they are in Tanzania)
 - ‘Early working’ provisions for generic manufacturers
- All of these need incorporating into Tanzania’s law on patenting
- Most ‘essential’ drugs are no longer patented so how important is this factor?

The broader context? Historical, political, cultural, geographical etc.

- An industry is in place already!
- Political support from TZ government and from the African Union for developing local production
- Regional free-trade area being developed, including collaboration on drug manufacture
- Rich biodiversity in sub-Saharan Africa which could be exploited by nascent manufacturers
- Very poor regulation of medicines quality and health care system in general
- Governance in general poor but (possibly) improving.

Your task

- To judge for yourselves the desirability and feasibility of developing local pharmaceutical production in Tanzania
- Either – split into opposing groups to draw up a list of reasons why or why not this should happen, then debate
- Or – assume that local production is going to increase, and map out the barriers to and opportunities for it happening; as well as the ambition of what they should attempt.