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Macro-Economic Statistics for Agriculture: New FAO Global Databases on Agricultural Capital Stock (ACS) and Agro-Industry Measurement (AIM)

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Macro-Economic Statistics for Agriculture: New FAO Global Databases on Agricultural Capital Stock (ACS) and Agro-Industry Measurement (AIM)

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Outline of Presentation

     I.   Introduction

     II.   Methodology

     III.   Key findings

     IV.   Questions for discussion

     V.   Proposed recommendations

I. Introduction – key policy issues

- As economies grow and develop, sectors become more interrelated and increasingly integrated into new industrial dynamics

    - Difficult to determine the overall impact of agriculture due to these linkages; measuring only Agriculture value-added understates sector's importance.

> *What is the sector's full contribution to the economy and food security, through its role in the agro-industry value-chain? How does Agriculture link to other industries, such as fertilizer production, food processing, manufacturing, transportation, wholesale and retail distribution? How does it generate jobs and value-added in these downstream industries?*

- Agriculture remains less productive in developing countries, in part due to lower capital investment.

    - Critical issue as investment in capital raises productivity and real incomes.

> *What is the level of capital stock and capital investment (Gross Fixed Capital Formation – GFCF) across countries and time? How does this level and growth impact Agricultural productivity, value-added, food-security and real incomes?*

I. Introduction

To meet the growing need for *consistent statistics* to measure the contribution to the agro-industry value-chain, including agriculture and linked industries and the role of capital in agricultural production, FAO's Statistics Division (ESS) began construction of *GLOBAL MACROECONOMIC STATISTICS* databases on:

- *Agro-Industry Measurement (AIM) (jointly with UNIDO)*

- *Agricultural Capital Stock and Related Structural Statistics*

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Agriculture share of GDP is now highest in Africa, and continues to decline in Asia & Pacific countries

Agricultural Share of GDP by region, 1970-2013
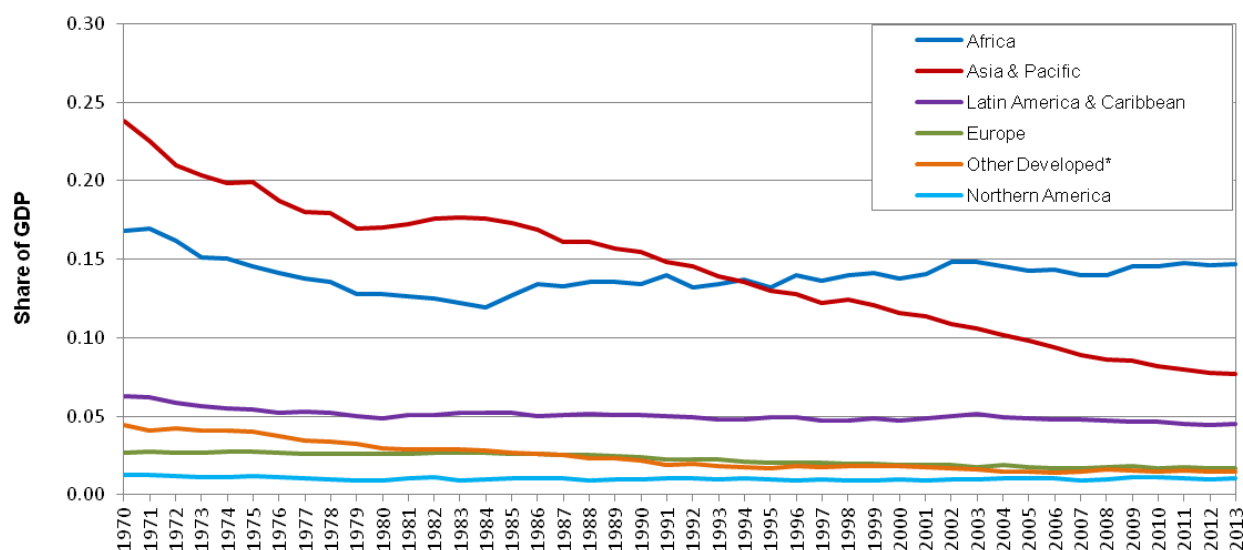
*Other Developed includes Australia, Japan and New Zealand

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> *Asia & the Pacific's contribution to Global Agricultural value-added grew from 35% to 50% between 1970 and 2013 …*

Regional shares of Global Agriculture Value-Added , 1970-2013
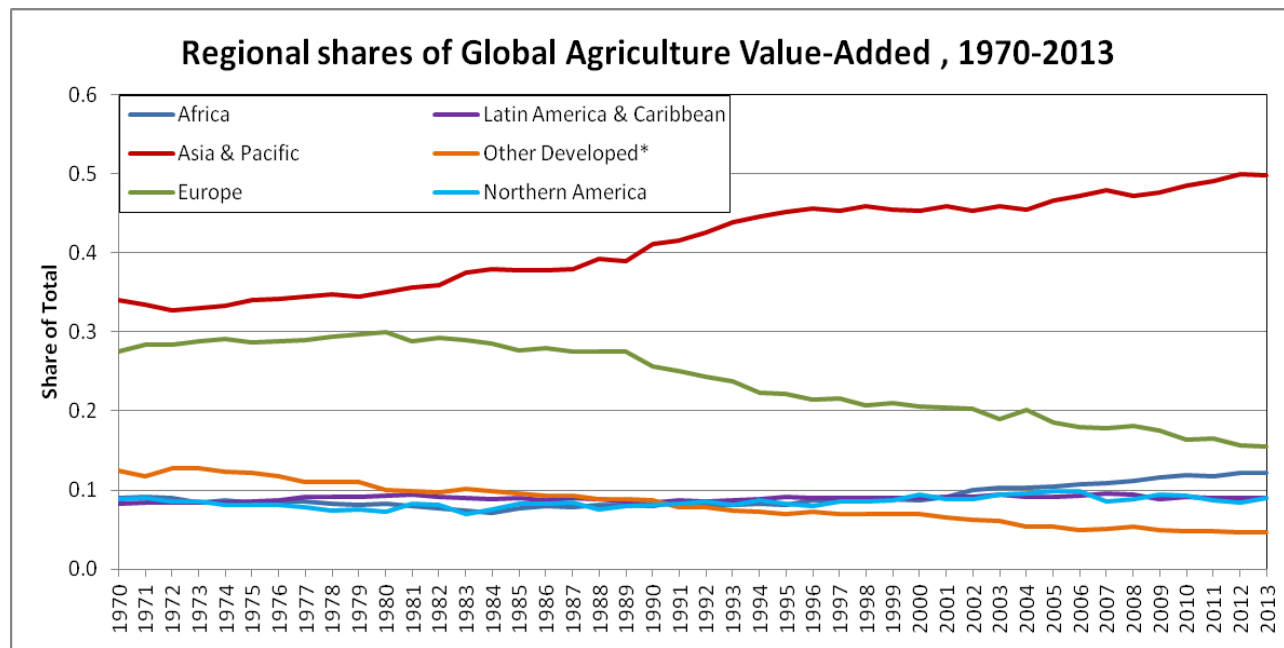
…while Africa's contribution remained around 10%

> *In the agro-food value-chain, food processing rises relative to agriculture as GDP per capita rises.*

GDP PER CAPITA (2005 USD) AGAINST RELATIVE SIZE OF FOOD PROCESSING AND BEVERAGE VS. AGRICULTURE, CROSS-COUNTRY, 1990-2013
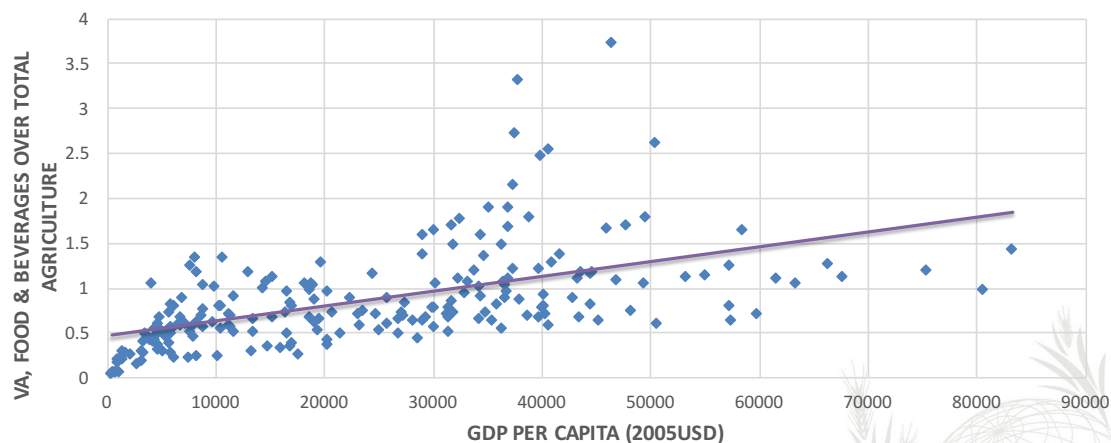
(*) OECD & BRIC countries, Bulgaria, Taiwan, Cyprus, Indonesia, Latvia, Lithuania, Malta, Romania.
For each country, 5-years averages.

II. Methodology - General Approach

UNDERLYING PHILOSPHY:

Use National Accounts framework to harmonize data across countries/time

Minimize respondent burden, duplication & resource requirements

➢ collaborate with other international organizations to use official country data and existing global databases based on official country data

The AIM and Agriculture Capital Stock (ACS) databases are ANALYTICAL databases providing PROVISIONAL data and indicators.

➢ Document data sources, assumptions and underlying methodology in metadata.

➢ Validate approach & results with country officials and other experts

➢ Improve data with validated assumptions and new official statistics

Official country data are the backbone of the databases and proposed indicators

II. Methodology - General Approach, National Accounts Framework

Identify and bridge data across sources.

- OECD: STAN and NA databases
- WIOD: Socioeconomic accounts; World KLEMS
- United Nations: National Accounts Estimates and Official Country Data tables
- UNIDO: INDSTAT databases

Create *complete* time series scaled to National Accounts

- Use official country data where possible
- *Focus on key variables*
- Impute missing values in existing series
- Impute missing series where possible
- Disaggregate by industry sub-sector, where possible

Calculate relevant indicators

- Share indicators: VA share of GDP; sector share of industry (FBT share of Manufacturing; Agriculture share of Agriculture-Forestry-Fishing)
- Other: Investment ratios (GFCF share of VA), Agriculture-orientation index (AOI)

Variables, LCU & USD

- Value-added
- Gross Output
- Employment, Compensation of Employees (wages & salaries)
- Capital Stock and Capital Formation, etc. (for ACS database)
- *Include trade variables (exports, imports) for and GFCF in AIM database, subject to funding*

Sector Coverage

- Agriculture, Forestry and Fisheries (ISIC Rev 3 A+B)
- Agriculture
- Manufacturing, and Food Processing
- *Extend to forestry and fisheries; other agro-based manufacturing; disaggregate FBT by commodity, subject to funding*

Geographic & Time coverage

- 220+ countries for capital stock database
- 46 initial countries (OECD, BRICS+) in AIM database
- 1970-2013 for ACS data
- 1990-2013 for AIM data
- *Extend FBT in AIM database to developing countries reporting data to UNIDO (underway)*

II. Methodology - Agricultural Capital Stock (ACS)

Old FAOSTAT Methodology…

Estimate capital stock using the physical inventory approach, which adds up the sector's components of produced assets: machinery & equipment, livestock, orchards, land improvements

Approach evaluated and abandoned:

- Data quality issues: low response rates, incomplete data reported by countries, particularly for machinery and equipment ;

- Methodological issues in the calculation of components such as land development or machinery and equipment;

- Limited country coverage: only for select countries, and only on narrow agriculture sector, excluding forestry and fisheries.

New FAOSTAT Methodology…

Use existing country data where available.

Where unavailable, estimate capital stock using the *PERPETUAL INVENTORY METHOD* with double declining balances

$$\Rightarrow K_t = K_{t-1} + GFCF_t - Depreciation_t$$

Requires assumptions about *initial capital stock* and *depreciation rates (DR)*.

- OECD: DR = 0.08 (reported data)
- Developing countries: $0.04 < DR < 0.08$ (estimate)

II. Methodology – Agro-Industry Measurement (AIM)

MOTIVATION:

- Assess agriculture's contribution to the economy.

DEFINITION ISSUE

- *AGRO-INDUSTRY VALUE CHAIN* involves all economic activities in the production and distribution of products that originate from or are used in the production of agriculture output. It is Farm-to-Fork +.

- But no clear statistical definition exists, resulting in confusion between agro-industry, agro-food, agro-business concepts

AIM database methodology

- ✓ Start with food-processing sector for select countries; develop complete time series of key variables for select countries, based on UNIDO data.

- ✓ Validate approach

- ✓ Expand coverage to other countries (UNIDO)

- Prioritize next steps, subject to funding:
  - Expand variables (GFCF, trade)
  - Disaggregate food-processing sector
  - Include other relevant manufacturing sectors (e.g. textiles, furniture manufacturing) that use agro inputs
 - Statistically define "Agro-industry"

II. Methodology – Validation & Results to Date

- Databases, methodologies presented evaluated and discussed by national, international and academic experts:

  - UNIDO seminar on Industrial Statistics: Vienna, October 2015

  - FAO workshop on Agricultural Capital Stock and Related Statistics: Rome, November 2015

  - FAO-UNIDO expert group meeting on AIM: Rome, November 2015

  - OECD meeting on Environmentally Adjusted Total Factor Productivity: Paris, December 2015

  - African Commission on Agriculture Statistics (AFCAS): Kigali, December 2015

  - Asia and Pacific Commission on Agriculture Statistics (AFCAS): Thimphu, February 2016

- Key comments and recommendations to date:

  - Methodologies evaluated as robust.

  - Recommended continued use of official country data, where possible.

  - Document methodology, estimation procedures, data limitations.

  - Publish data, metadata , documentation for further validation /feedback.

  - Continue dialogues with countries to fill data gaps and improve estimations.

Capital Stock by Region, USD billions, constant 2005 prices
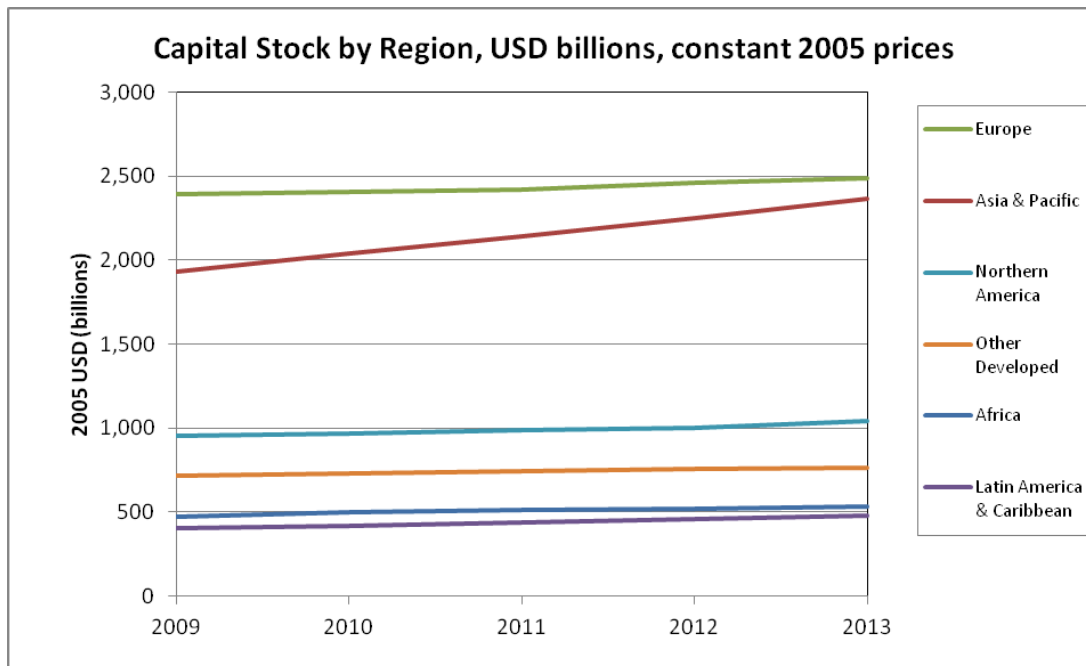
III. Key Findings – AIM: Agriculture and food processing share of GDP vary by level of economic development

Contribution of Agriculture (blue) and Food Processing (red) to GDP
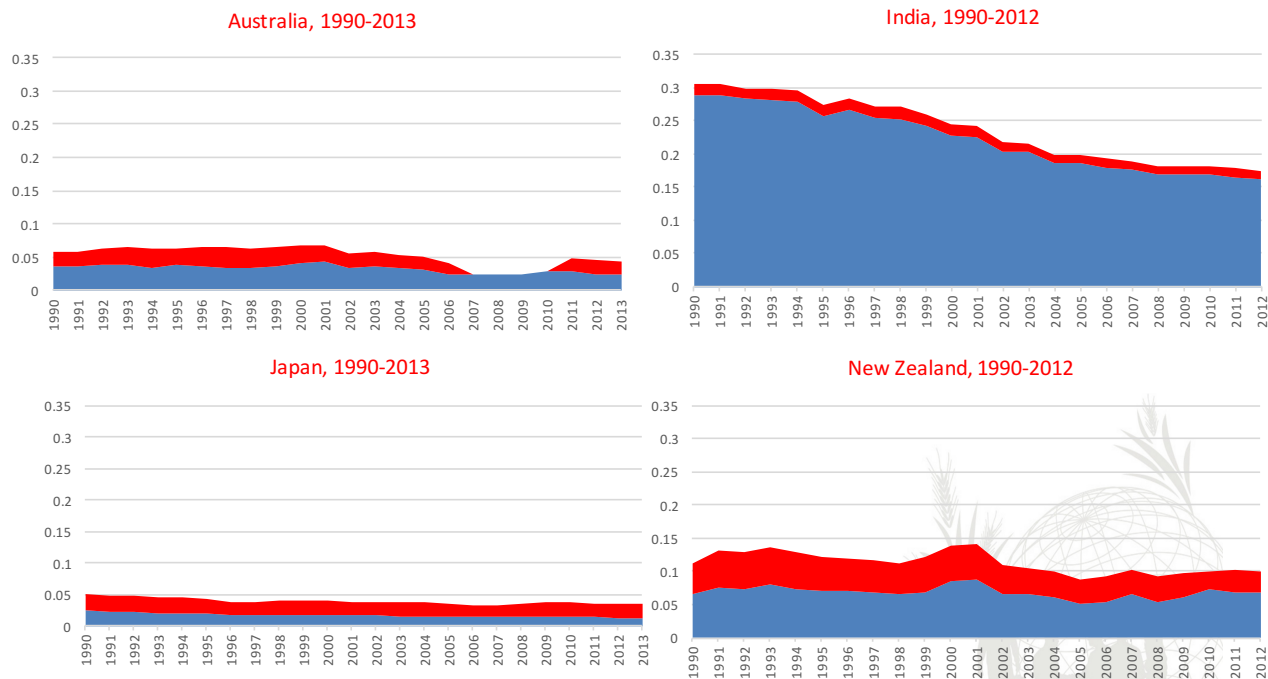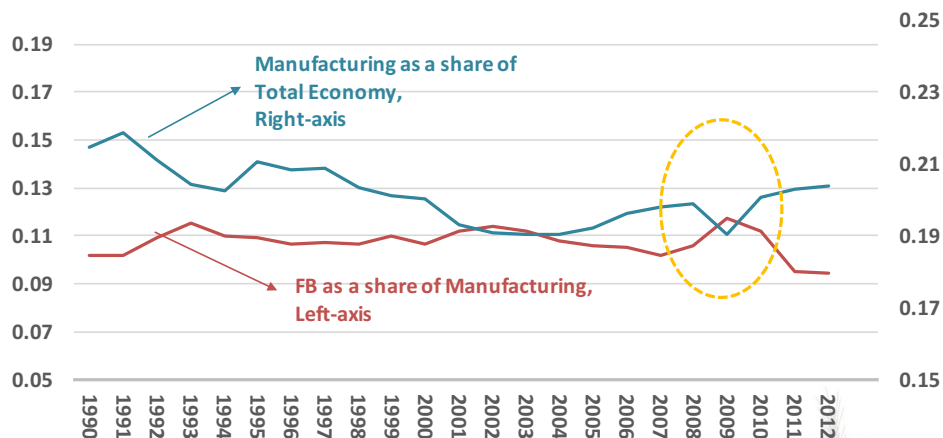

France, 1990-2013

Spain, 1990-2013

Brazil, 1990-2013

China, 1995-2013

Contribution of Agriculture (blue) and Food Processing (red) to GDP

Australia, 1990-2013

India, 1990-2012

Japan, 1990-2013

New Zealand, 1990-2012

EXAMPLE OF COMPOSITION EFFECT - THE 2008-2010 ECONOMIC CRISIS

Manufacturing as a share of Total Economy, Right-axis

FB as a share of Manufacturing, Left-axis

(*) Cross-country weighted shares along the time dimension

III. Questions for discussion

- *Are there other sources of official country data that could be used?*

- *Is information available on appropriate depreciation rates for agricultural capital stock and, in particular, for agriculture machinery and equipment?*

  - *Are there countries willing to collaborate with ESS to share this type of data/information/studies for their country, and assess its impact on the resulting estimates?*

- *If funding is available, what do member countries suggest as priority next steps in developing the AIM database and improving the capital stock database?*

IV. Proposed recommendations

APCAS member countries support the ESS approach to constructing the Agricultural Capital Stock and AIM databases, and encourage ESS to publish these data as provisional analytical databases, to enable validation and feedback.

APCAS members agree to provide official country estimates on agricultural capital stock and other variables, where possible, or information to improve estimates, such as agriculture depreciation rates.

APCAS member countries agree to participate in a FAO-UNIDO process to develop an international statistical definition of "agro-industry", based on existing classification systems, and to share definitions used at country level.
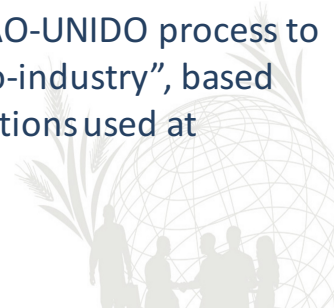
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