

How Agri-food Value Chain Employment and Compensation Evolve with Structural Transformation

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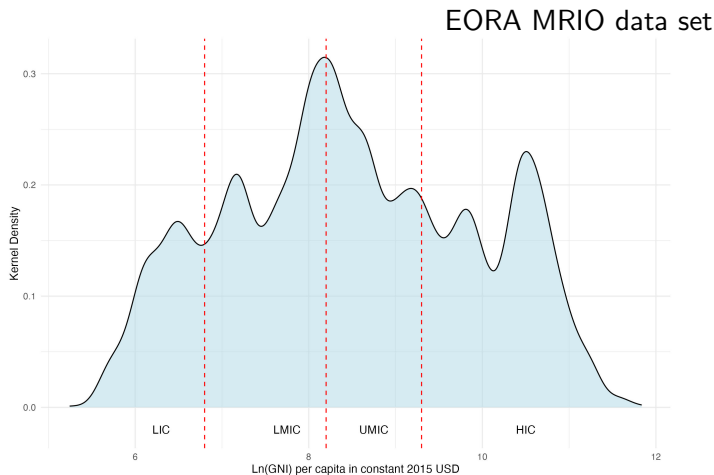
Motivation

- The traditional narrative about the “structural transformation” associated with economic development emphasizes labor reallocation from agriculture toward manufacturing and services.
 - Models typically include two (or three) distinct sectors: agriculture and manufacturing (sometimes services)
- This traditional structural transformation narrative, however, falsely equates agriculture (a production activity) with the food people consume, most of which undergoes post-harvest value addition.
 - Thus ignoring the central role played by post-farmgate agri-food value chain manufacturing and service industries

This Paper

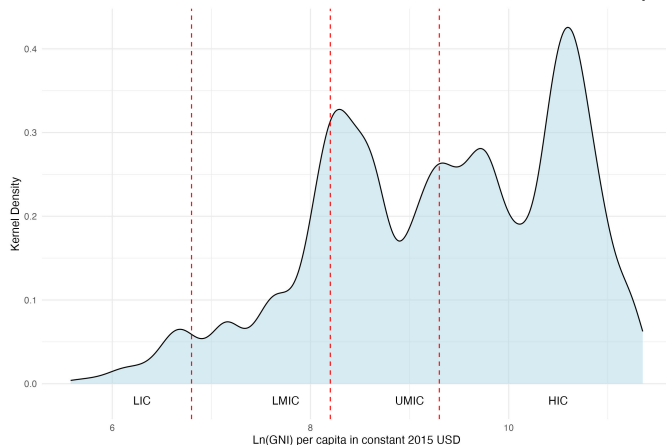
- We show that post-farmgate agri-food value chain segments are central to the story of structural transformation
- To do this we...
 - We use multi-regional input-output tables generated from national accounts data, extending the 'food dollar' methodology internationally
 - We decompose (money-metric) value addition by...
 - AVC industry (i.e., primary production, food processing, transportation, wholesale, food service, or retail trade)
 - Final consumer market (i.e., domestic food at home, domestic food away from home, or exports)
 - We combine these data with International Labor Organization (ILO) employment data
- Generate ten stylized facts that sharpen the traditional narrative about the structural transformation and the role of post-farmgate agri-food value chain manufacturing and services

Data Coverage



- We use Input-output data from EORA Global Supply Chain Dataset, covering 189 countries for 29 years.
- Process 3 billion data points per year \times 29 years.
 $N > 80$ billion
- Together, all countries in this dataset represented 99% of the global economy.

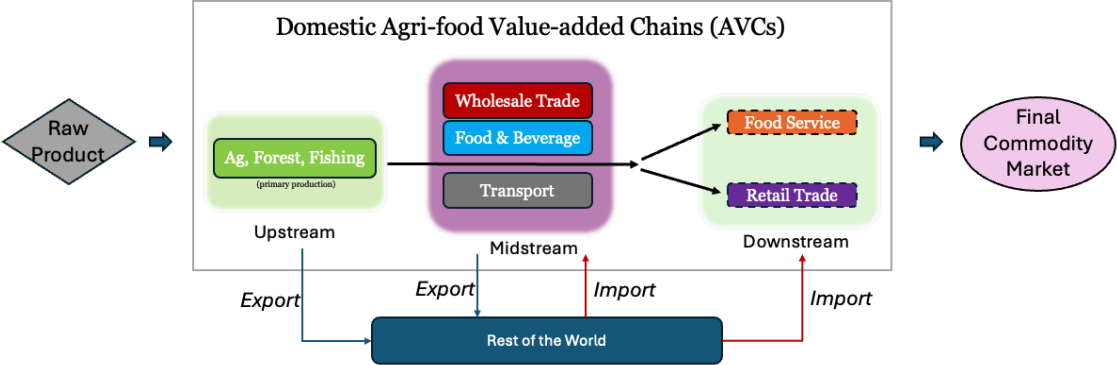
EORA-ILO Unbalanced panel data set



- We merge with sex-disaggregated employment data from ILO. The final unbalanced panel data cover **112 countries** over **29 years** (1993-2021).
- Together, all countries in this study represented **59%** of the global economy and **31%** of the global working age (15-64) population.
- Of 1,328 country-year observations in data set, **3.7%** LIC, **15.3%** LMIC, **27.7%** UMIC and **53.3%** HIC.

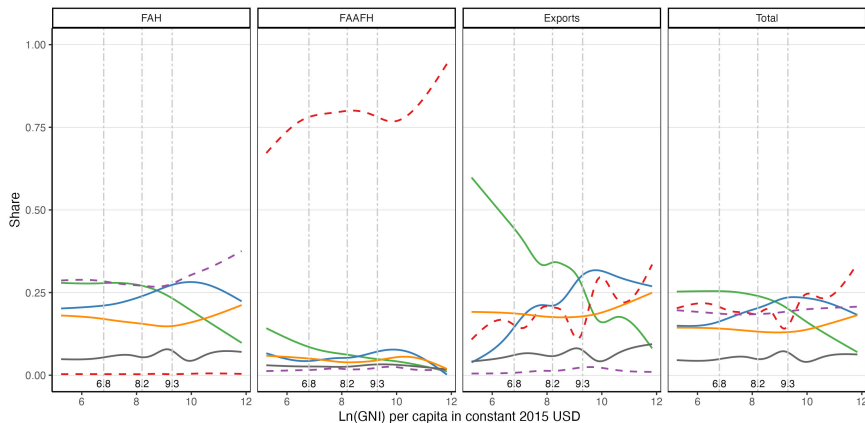
Agri-food Value Chains

AVC comprised of six distinct industries. We include international trade flows.



Results - Industry Share of Total AVC Value Added

1. The share of total AVC value added attributable to primary production (AFF) falls as income grows, while the share of total value added tied to food service (FAFH) rises.



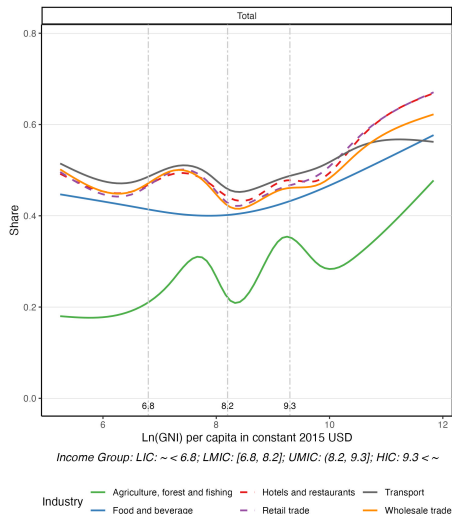
Income Group: LIC: ~ < 6.8; LMIC: [6.8, 8.2]; UMIC: (8.2, 9.3]; HIC: 9.3 < ~

Industry

- Agriculture, forest and fishing
- Food and beverage
- Hotels and restaurants
- Retail trade
- Transport
- Wholesale trade

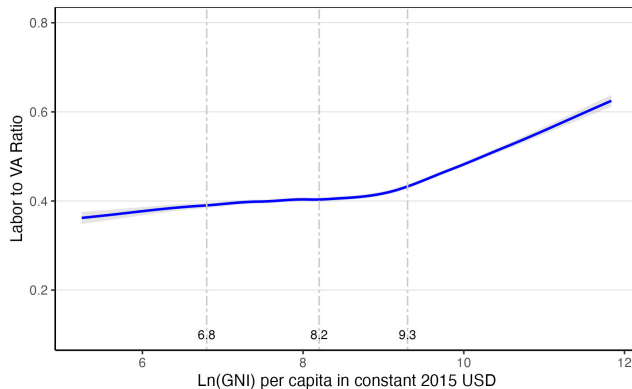
Results - Labor Share by Industry

2. Downstream AVC segments are more labor-intensive than primary production at all national income levels.



Results - Labor Share of Total AVC Value Added

3. The labor share of total AVC value addition rises steadily with per capita incomes.

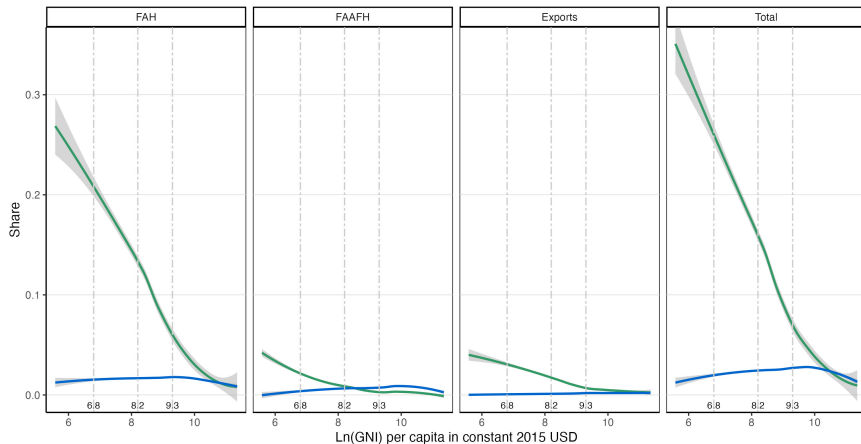


Income Group: LIC: $\sim < 6.8$; LMIC: $[6.8, 8.2]$; UMIC: $(8.2, 9.3]$; HIC: $9.3 < \sim$

Across the full span of our data, the labor share of total value addition in consumer food expenditures rises by 3.5% for every doubling for real per capita income.

Results - Employment Share of Labor Force

4. The share of employment in primary production falls as incomes rise, but the employment share of other AVC segments remains stable over the course of structural transformation.

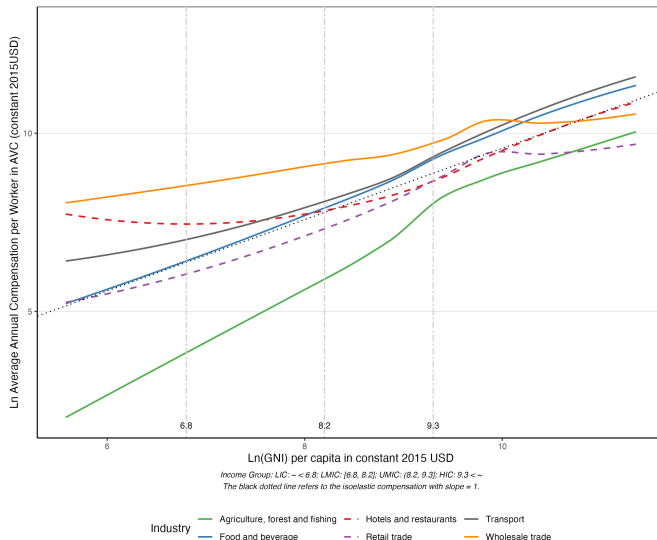


Income Group: LIC: $\sim < 6.8$; LMIC: $[6.8, 8.2]$; UMIC: $(8.2, 9.3]$; HIC: $9.3 < \sim$

Direct Ag Employment Share Non-Ag Direct AVC Employment Share

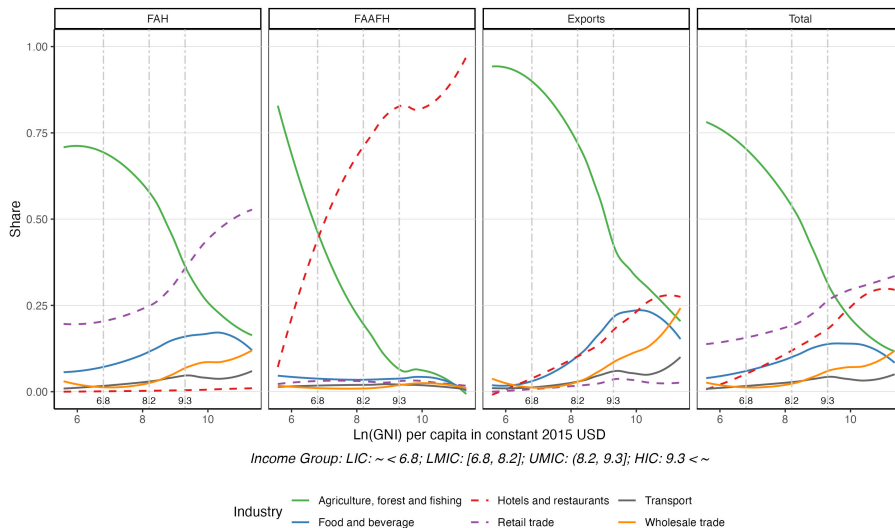
Results - Average Compensation per AVC Worker

5. The best compensated AVC jobs are in off-farm, post-harvest segments.



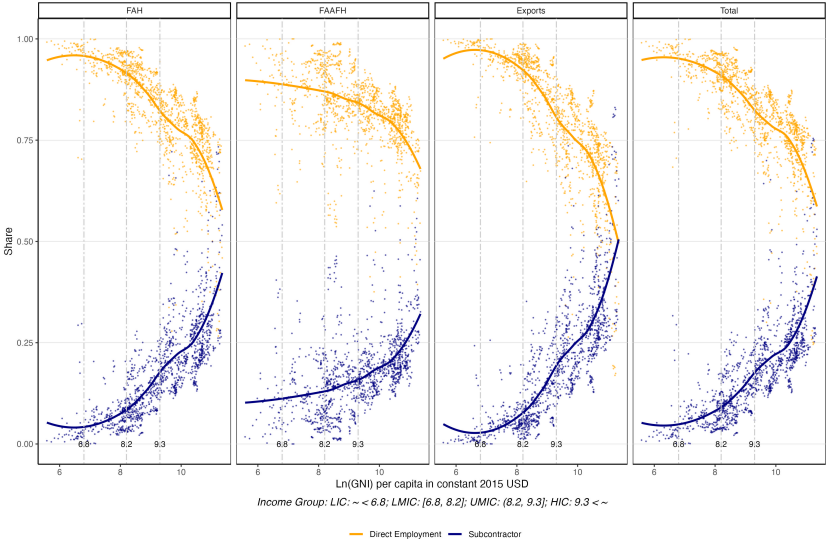
Results - Industry Share of AVC Employment

6. AVC employment growth is concentrated in midstream and downstream segments.



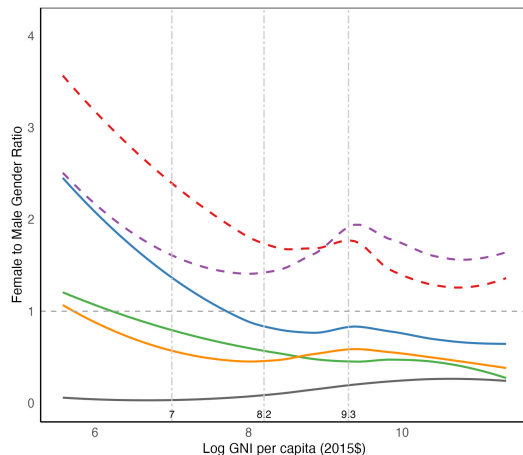
Results - Direct Employment and Subcontractor Shares

7. Subcontracting rises sharply with gross national income per capita.



Results - Gender Ratio by Industry

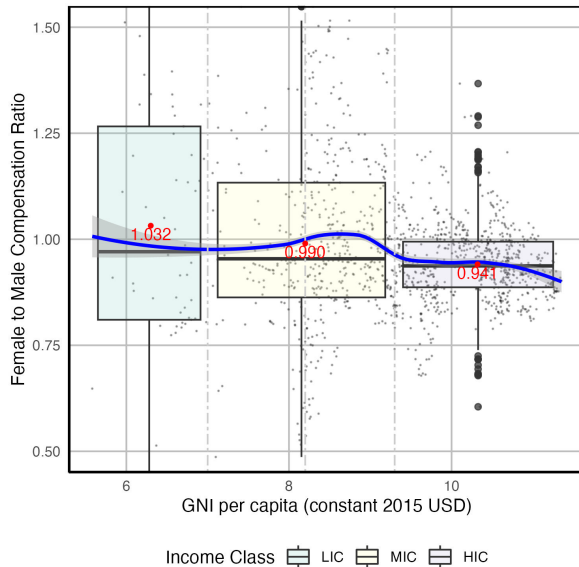
8. Women migrate relatively more from agriculture to downstream retail and food service employment, while men migrate disproportionately from farming to midstream AVC jobs.



Industry

Agriculture, forest and fishing	Hotels and restaurants	Transport
Food and beverage	Retail trade	Wholesale trade

Results - Female to Male Compensation Ratio



9. Given inter-industry compensation differences, gendered occupational sorting translates into increasing within-AVC gender pay gaps as incomes rise.

Abstract from gender pay differences w/n AVC industries (impose "same pay for same job"). Falling female/male compensation ratio results **purely** from gendered labor transitions.

Results - Estimated marginal expected changes by AVC industry

10. Labor reallocation within AVCs is far more strongly associated with demand-side forces linked to income growth than with supply-side factors related to agricultural total factor productivity growth.

	<i>Industry Share of Total Work Force</i>		<i>Ln Ave Compensation per Worker (2015USD)</i>	
	LnGNI	AgTFP	LnGNI	AgTFP
Ag, forest and fishing	-0.066	-0.039	1.376*	0.195
Food and Beverage	-0.006	0.002	1.069	-0.459
Hotels and restaurants	-0.002	0.016	0.768	0.013
Retail trade	-0.009	-0.007	0.805	0.073
Transport	-0.007	0.008	1.016	0.196
Wholesale trade	-0.003	0.006	0.390**	0.156

Negative:	***p < 0.01	**p < 0.05	*p < 0.10	insignificant
Positive:	***p < 0.01	**p < 0.05	*p < 0.10	insignificant

Summary of the ten stylized facts

- As real incomes rise, consumers demand more convenience, quality, safety, and variety in their diets
- This shift in preferences leads to a corresponding shift in consumer food expenditure shares away from primary production toward midstream and downstream value addition
- Labor follows this shift in expenditures, off farms and toward post-farmgate agri-food value chain industries
- Midstream and downstream agri-food value chain industries provide steady employment and pay better than primary production
 - Both male and female workers benefit from this labor transition
 - Women, however, disproportionately move into customer-facing, downstream retail and food service jobs
 - Men disproportionately move into midstream manufacturing, transport, and wholesaler jobs
 - Midstream jobs pay more than downstream jobs, contributing to the gender pay gap

Thank you for listening!

Comments welcome: J.R.Bloem@cgiar.org or J.Jiang@cgiar.org

Definitions - Employment

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	Description	Source
Employment	a) paid employment (whether at work or with a job but not at work); b) self-employment (whether at work or with an enterprise but not at work)	ICLS (2013)
Labor force	$Employment + Unemployment = \text{Age15+ population}$	ICLS (2013)
Compensation of employees	wages and salaries + social insurance contributions payable by employers	SNA (2008)
Total EMP in AVC	$\sum_{i=1}^6 (\text{Females}_i + \text{Males}_i - \text{Other}_i)$	in this paper

Table: Definitions of Key Variables

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Sector	Description
A01T02	Agriculture, forest and fishing
A04	Manufacture of food products and beverages
A16	Wholesale trade
A17	Retail trade
A18	Accommodation, food and beverage service activities
A19	Transport

Table: Definitions of AVC Sectors