

Food Manufacturing: Can it be an Effective Economic Ladder?

Section 1: Motivation and Research Question

Can increasingly advanced methods of food manufacturing still act as a manufacturing method to create structural change in a developing country's economy, preventing premature deindustrialization? Developing countries today have fewer opportunities to use manufacturing as a growth method than high-income countries (HIC) had at the same stage in their development. In the late 20th century, the world saw many success stories for Asian economies that used industrialization to become developed nations.

In today's world of highly automated manufacturing, developing countries are having a harder time replicating the same process to go from an agriculturally based economy to a manufacturing-based economy. Today, automation has reduced the need for cheap labor, reducing the opportunity for developing countries to absorb large amounts of labor and gaining the positive externalities that industrialization has on human capital. Developing nations now are skipping industrialization that classically led to a developed economy. These countries are denied the chance to build a more advanced manufacturing economy, leading them to prematurely deindustrialize before they can benefit from unconditional productivity convergence that is unique to manufacturing and accumulate the human capital required for a service economy (Ing & Rodrik, 2026).

This is an important question to ask, because manufacturing today is highly automated and does not absorb a large labor force as it did in the past. LIC in the world are also experiencing a commodity trap, where they produce a large volume of primary agricultural goods, but extract very little of the value of the final good. LICs capture less than 2% of global food processing value, Europe alone captures over 42% (WTO, 2023). LICs have been relegated to being raw material suppliers for HICs. Is there an opportunity to leverage the commodities already being produced in LIC to create a labor-intensive manufacturing path?

Section 2: Conceptual Structure

Because food processing continues to be labor intensive at many technology levels and only needs incremental technology upgrading, it can absorb surplus agricultural labor while gradually building managerial, logistical and quality control capabilities that will have spillover effects on other sectors (Rodrik & Stiglitz, 2026). Many commodity-producing LICs have climbed the first rung of the GVC by introducing very simple agricultural processing. Many times, this is necessary to transform agricultural goods into a state in which they can be exported. However, once exported much of the products' value is extracted in the next steps of food manufacturing, and countries get stuck in the commodity trap. With so few labor-intensive manufacturing options left, food manufacturing may be a plausible path for the sequential transition up the GVC ladder from commodities to limited manufacturing to advanced manufacturing and finally innovation.

Food manufacturing extends well beyond basic transformation of agricultural goods and is highly incremental. Kerry Group continues to expand their coffee roasting and extraction plants in the United States. They use advanced technology to create a long shelf-life product that is the base for many national brand ready-to-drink coffee products (Muschick, 2025). This illustrates incremental growth opportunities within a single commodity.

While "Asian Tiger" economies, such as South Korea and Taiwan, were able to create large growth through a manufacturing-based path, a lot of modern manufacturing is increasingly capital and skill intensive and does not absorb a large swath of laborers. As Rodrik and Stiglitz show, the manufacturing-based path used by Asian countries is no longer a secure driver of growth for modern LICs (Rodrik & Stiglitz, 2026). However, food manufacturing firms often adopt a "low road" strategy, relying on a low wage work force rather than innovation (Wickham, 2011). However, this "low road" strategy is a central risk. It can lead to a country being stuck in a low-skilled labor trap. Countries must be aware of this when attracting investments to large food companies to build plants.

LICs would be able to start with labor intensive old technology and still be competitive on the world stage. This will provide an outward shift to their production possibility frontier (PPF). As the country grows, the potential of innovation rents should grow encouraging innovation. Because the innovation required to be competitive in food manufacturing is small, the eco-system for the Schumpeterian growth paradigm is viable with relatively cheap investments.

Moving into food manufacturing will also allow LIC to move beyond their specialty crop comparative advantage, capture more value from these crops, and kickstart true structural change. Exporting raw commodities can be a good first boost to LIC growth, but commodity-based growth stagnates quickly (Rodrik & Stiglitz, 2026). Without introducing new technology, a country will hit a plateau because of the law of diminishing returns, where each sequential input creates less benefit. Total Factor Productivity (TFP) can remain stagnant or drop. Food manufacturing utilizes inputs a country has already invested in, and provides new technology for the LIC economy, while being relatively cheap and requires low skilled labor.

Section 3: Empirical Evidence

Food manufacturing has been successful in the past as a mechanism for growth for LIC. Using a dataset of 155 countries from 1991-2015, Lim (2021) studied the structural transformation caused by participation in the agricultural global value chain (AGVC). The AGVC specifically refers to the activities required to bring agricultural goods from raw products to final consumer goods. Figure 1 shows the findings of this study broken out by country's income. The findings show that for LICs participation in the AGVC is associated with a statistically significant 10 percentage point increase in industrial manufacturing while agricultural employment fell. Lim concludes that this study finds that LICs participating in the AGVC are using food manufacturing to achieve traditional structural changes consistent with Rodrik and Stiglitz's transformational framework discussed in section 2 (Lim, 2021).

The GDP data in figure 1 show the limits of early-stage food manufacturing on a country's growth. The data show a 28.038 percentage point decrease in manufacturing GDP, even as manufacturing employment rose, indicating that the manufacturing that was introduced was mainly low value-added processes. Many of the LICs in this study introduced basic agricultural processes that pay very little but require a large amount of labor. This creates many jobs but does not contribute a lot to the country's GDP. However, we can see the spillover effects in the increase in GDP share from services and agriculture. As more processing is taking place, the agricultural and service sectors get the biggest income gains (Lim, 2021). This illustrates the importance of continuing up the AGVC Ladder.

More advanced food manufacturing continues to employ a high number of workers. In Ireland, Denmark, and Spain, this sector accounts for about a quarter of manufacturing jobs (Wilkinson, 2004). Food manufacturing goes against the high skilled and automated manufacturing trends assumed by Rodrik and Stiglitz (Rodrik & Stiglitz, 2026). Figure 2 shows that while food products have a similar ability to being manufactured by robots as cars, the industry has not adopted this automation even in developed nations (Goldberg & Ruta, 2025).

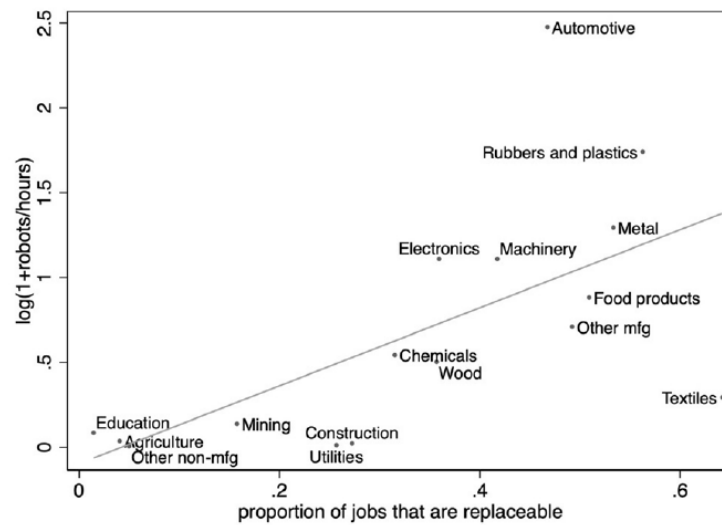
Figure 1. The Effects of AGVC Participation on Structural Transformation by Income

	Dependent variable: Structural transformation (share by sector)					
	GDP share (%)			Employment share (%)		
	Agr	Ind	Srv	Agr	Ind	Srv
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Low-income countries						
AGVC Participation (%)	15.428	-28.038***	28.357***	-20.004***	10.133***	9.861***
	(11.43)	(6.707)	(10.065)	(6.147)	(3.454)	(3.359)
N	558	558	558	558	558	558
R ²	.829	.873	.753	.976	.958	.986
Panel B: Low-middle income countries						
AGVC Participation (%)	4.499	-46.479***	16.537***	-7.38**	1.62	5.744**
	(3.558)	(4.106)	(4.302)	(3.112)	(1.732)	(2.523)
N	855	855	855	855	855	855
R ²	.9	.933	.903	.983	.962	.986
Panel C: Middle-high income countries						
AGVC Participation (%)	15.446***	-31.863***	-20.097***	17.949***	-28.387***	10.457**
	(3.693)	(5.522)	(6.231)	(4.805)	(3.722)	(4.319)
N	895	895	895	895	895	895
R ²	.926	.974	.944	.992	.946	.994
Panel D: High income countries						
AGVC Participation (%)	5.351***	-37.379***	24.74***	8.286***	-33.785***	25.47***
	(.996)	(3.871)	(4.066)	(1.66)	(3.824)	(3.896)
N	892	892	892	892	892	892
R ²	.949	.964	.969	.974	.968	.978
Country & Year FE	yes	yes	yes	yes	yes	yes
Covariates	yes	yes	yes	yes	yes	yes

Notes: The World Bank defines four income categories based on GNI per capita in US\$ in year 2010: low income ($\leq 1,005$); lower middle income (1,006 – 3,975); upper middle income (3,976 – 12,275); high income ($> 12,275$). GDP and employment shares data are sourced from the World Development Indicator database. All regression specifications include country fixed effects and year fixed effects. Country-level characteristics include population bins (by age, by gender, rural and urban population ratio), agricultural production conditions (arable land, agricultural land, total land area, food production index, livestock production index, land under cereal production, total cereal production, total fisheries production), and economic characteristics (GDP, GDP growth, inflation GDP deflator, trade proportion (%), exports of goods and services, self-employment total). Trade policy controls include the number of 5 types of trade agreements and a binary variable for each trade agreement (RTA, CU, FTA, PSA, EIA). A full list of variables included in the regression can be found in the Appendix Table A.2. Standard errors clustered at the country level are in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

(Lim, 2021)

Figure 2. Robot Adoption and Feasibility of Automation across Sectors



Source: Artuc, Baston, and Rijkers (2023). Updated using data from EU KLEMS and IFR through 2020.

(Goldberg & Ruta, 2025)

Section 4: Policy Conclusions

Every LIC will need policies to address the specific issues keeping them from attracting investments into food manufacturing. To address a few policy options, we will continue to look at Uganda, coffee roasting and extraction as an example. Uganda employs 70% of its labor force in agriculture, predominantly on small farms. Uganda is the largest coffee exporter in Africa, bringing in income for over 1.7 million households (Luwemba, 2026). It grows about 4% of the world's coffee (USDA FAS, 2024). The industry is heavily export-driven, with 94% of total coffee production being exported. It only has 12 registered domestic coffee roasters. Uganda's coffee farmers are receiving prices 17.9% below world prices due to poor roads, high transport costs, and inefficient processing (World Bank, 2018). Uganda is losing value on its raw beans before it can consider roasting. Uganda is an example of a country that has great opportunities if they can invest in infrastructure. If they can achieve this, they can utilize their low labor costs and compete on a world stage and attract firms such as Kerry. The barriers for countries like Uganda to enter higher level food manufacturing are structural and can be mitigated through policy.

The evidence shows two main structural barriers for Uganda to increase their coffee roasting. They are competing with very large roasting corporations, and their infrastructure does not allow for a reliable manufacturing environment. First, Uganda's policy priorities must be in improving roads to reduce the cost of transporting goods. Uganda has already identified this as a major hurdle to overcome to reduce the cost of production (World Bank, 2018). A roasting plant will not have a competitive advantage from lower labor costs if the transportation costs eat away at these savings. This will allow Uganda to avoid the mistake that Mozambique made when trade policy shifted, reducing taxes on exported cashews. Because poor infrastructure increased the price of transporting goods, domestic processing plants could not take advantage of their low labor costs. Many of them closed and exports greatly increased. This improved the welfare of the farmers but has kept Mozambique from climbing the GVC ladder (McMillan et al., 2003).

Uganda's local government operates in a political patronage structure. Much of the infrastructure development funding is allocated to politically aligned areas. Patronage politics can be mitigated through an oversight board that uses objective measures to fund needed projects. Reporting can also undermine patronage politics (Kiwanuka, 2026). Transparent reporting can make the voters more aware of the disparities. With voters being informed, public servants will be required to make decisions that benefit the entire public to get reelected.

Improving infrastructure will create a large opportunity for domestic roasters to take advantage of Uganda's lower wages. However, given the consolidated nature of the coffee industry, Uganda should start smaller and focus on regional distribution of roasted coffee. Coffee consumption is rising in Uganda and the surrounding region (World Bank, 2018). This new market has fewer regulatory requirements making it easier for Uganda to enter the market with inexperienced roasters. Rodrik (2008) outlines a policy framework of direct credit and public-private partnerships as a successful policy for LIC to drive new manufacturing led growth. Many firms in LIC are credit constrained even when there is real opportunity for them to industrialize. Banerjee and Duflo have found that credit constrained firms in India were given access to lending, their revenues grew (Banerjee & Duflo, 2014). Capital access and certification costs are specific barriers that access to capital can help roasters overcome. Public-private partnership of the German Government development agency (GIZ) and SAP, a German software company, to launch a traceability software for Ugandan coffee farms has already shown the success of public-private partnerships in coffee growing by increasing price transparency (GIZ, 2014). Uganda should engage with firms such as Kerry Group to create a possible Public-private partnership to eventually be able to build a coffee extraction plant.

Upgrading processing ability does come with upfront losses before long-term gains. Evidence from Thailand shows that when a country upgrades their production processes to meet international standards, they temporarily become less competitive as they learn how to achieve those standards. Over time, knowledge transfers increase the exporting countries' abilities to comply with international standards allowing them to increase

exports (Tanrattanaphong et al., 2020). This initial dip should be small if Uganda focuses on the regional market with less strict standards. Over time Ugandans will learn more about coffee roasting, make investments back into the plants and be able to sell into the world market, even if it is directly to the top three coffee manufacturers.

Evidence points to policies investing in the foundational issue of infrastructure and in upgrading food manufacturing abilities can lead to slow but steady growth for LICs. Food may be one of the last sectors that can support the original industrial growth structure used by many Asian countries to become world leading economies. Food processing remains labor intensive while other sectors have become highly automated. LICs that have followed the AGVC have shown continued growth.

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