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IFPRI Discussion Paper 02329

March 2025

Tajikistan's Agrifood System
The Past Performance and Future Opportunities and Challenges

Xinshen Diao

Parviz Khakimov

Timur Ashurov

Jovidon Aliev

Peixun Fang

Josee Randriamamonjy

Karl Pauw

James Thurlow

Development Strategies and Governance Unit
Foresight and Policy Modeling Unit

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

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AUTHORS

Xinshen Diao (x.diao@cgiar.org) is a Senior Research Fellow in the Foresight and Policy Modeling (FPM) Unit of the International Food Policy Research Institute (IFPRI), Washington, DC.

Parviz Khakimov (p.khakimov@cgiar.org) is a Senior Research Fellow with IFPRI's Development Strategies and Governance (DSG) Unit, Dushanbe, Tajikistan.

Timur Ashurov (t.ashurov@cgiar.org) is a Research Assistant with IFPRI's DSG Unit, Dushanbe, Tajikistan.

Jovidon Aliev (j.aliev@cgiar.org) is a Senior Research Analyst with IFPRI's DSG Unit, Dushanbe, Tajikistan.

Peixun Fang (p.fang@cgiar.org) is a Senior Research Analyst with IFPRI's FPM Unit, Washington, DC.

Josee Randriamamonjy (j.randriamamonjy@cgiar.org) is Senior Scientist with IFPRI's FPM Unit, Washington, DC.

Karl Pauw (k.pauw@cgiar.org) is a Senior Research Fellow with IFPRI's FPM Unit, Washington, DC.

James Thurlow (j.thurlow@cgiar.org) is the Director of IFPRI's FPM Unit, Washington, DC.

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ABSTRACT

This study analyzes the past performance and future opportunities and challenges of Tajikistan's agrifood system (AFS). The study measures the current size and structure of AFS and its historical contribution to economic growth and transformation through a data-driven exercise. A forward-looking economywide model is used to assess the effectiveness of future AFS growth (led by agricultural productivity gains in different value chains) in promoting multiple development outcomes. The findings of the study indicate that AFS transformation is an important part of Tajikistan's economic transformation and structural change. Because of lower growth contributions from AFS's off-farm components as well as fewer farm workers moving from primary agriculture to off-farm activities within AFS, Tajikistan's AFS did not grow as quickly as the broader economy. Expanding off-farm activities to boost on-farm productivity growth remains a challenge for sustainable transformation of Tajikistan's AFS. Using an economywide model, we find that there is no single value chain group that would most effectively achieve all desired development outcomes including broad economic growth, job creation, declining poverty, and improved diets. Livestock value chains, however, have the most potential to contribute to multiple development outcomes, particularly to dietary improvement, and these value chains also performed impressively during the study period. Moreover, most cattle and ruminants are owned by household farms, and their growth could contribute to broader agricultural transformation. The maize value chain also ranks high in the model-based comparison, but it seems to only modestly contribute to job creation and diet quality and had performed disappointingly during the study period. While growth in livestock and maize value chains face a series of challenges and constraints, promoting them together seems to offer an effective way to broadly achieve important development outcomes.

Keywords: Agrifood system transformation, economic growth, poverty, job, diet, Tajikistan

ACKNOWLEDGMENTS

Funding for this work was provided by the United States Agency for International Development (USAID) through the Tajikistan Evaluation and Analysis Activity. The researchers of the IFPRI's Foresight and Policy Modeling Unit received financial support through CGIAR Research Initiatives on Foresight and National Policies and Strategies. The authors gratefully acknowledge the support of and contributions from the USAID Mission to Tajikistan and various USAID-supported projects. We thank all funders who supported this research through their contributions to the CGIAR Trust Fund or through their contribution to IFPRI directly. Any opinions expressed here belong to the author(s) and are not necessarily representative of or endorsed by IFPRI, CGIAR, or USAID.

ACRONYMS

AFS	Agrifood system
AgEMP+	Agrifood system employment
AgGDP+	Agrifood system gross domestic product
ASSADP	Agrifood System and Sustainable Agriculture Development Program
GDP	Gross domestic product
HIC	High-income countries
IFPRI	International Food Policy Research Institute
ILO	International Labor Organization
LIC	Low-income countries
LMIC	Lower-middle-income countries
REDD	Reference Diet Deprivation Index
RIAPA	Rural Investment and Policy Analysis Model
SAM	Social Accounting Matrix
TAJSTAT	Agency of Statistics under President of Tajikistan
UMIC	Upper-middle-income countries
US\$	US dollars
WDI	World development indicators

1. INTRODUCTION

Tajikistan has experienced prominent annual economic growth since the early 21st century, some of which resulted from a recovery from post-Soviet civil unrest in the 1990s that severely affected the country's economic development (Khakimov et al. 2024). Economic recovery and growth have also translated into improved living standards. Between 2007 and 2023, national GDP grew 7.2 percent annually, the national poverty rate fell by more than half (from 54 percent in 2007 to 23 percent in 2022), and the rural and urban poverty gap was narrowed from 55 percent and 49 percent in 2007, respectively, to 23 percent and 21 percent in 2022, respectively (TAJSTAT 2024a). The 2007-2008 global financial crisis and the 2020 COVID-19 pandemic caused significant slowdowns in economic growth in 2009 (3.9 percent) and 2020 (4.5 percent) as the country relied heavily on wheat and fuel imports and remittance incomes. The economy rebounded in 2021, reaching an above-average growth of 9.4 percent in 2022. Tajikistan has also felt some effects caused by the Russia-Ukraine war that started in 2022, and more recently, by the global recession in 2023 (Arndt et al. 2023; Diao and Thurlow 2023).

Agriculture is an important economic sector in the country, accounting for one-fourth of the national GDP and about 50 percent of jobs in Tajikistan (World Bank 2023). The agriculture sector played a vital role during the pandemic (growing 8.8 percent in 2020) and in weathering the global commodity market shocks in 2022 and 2023 (Khakimov et al. 2024; TAJSTAT 2024b; Diao and Thurlow 2023). In this paper, we focus on a broader agrifood system to assess the role of agriculture. We unpack the historical patterns of AFS transformation against broader economic growth and structural change while considering more disaggregated agricultural value chain groups. We also provide a model-based assessment for the future trajectory of AFS transformation and the potential roles of different value chain groups for development outcomes. The analysis follows a similar approach applied in the authors' previous work (Diao et al. 2023) and uses an updated social accounting matrix for Tajikistan that is constructed from newly available statistics and survey data. The paper also draws on some early analysis of Khakimov et al. (2024) to integrate the model-based analysis with the country's agricultural historical performance.

AFS are complex network of actors, connected by their roles in supplying, consuming, and governing agrifood products and jobs. Just as an economy undergoes transformations as a country develops, agrifood systems also evolve (Diao, Hazell, and Thurlow 2010; Timmer 1988). Subsistence farming typically dominates agriculture during the earliest stages of development. As agricultural productivity rises, however, farmers begin to supply surplus production to markets, thus creating job opportunities for workers in the nonfarm economy both within and outside the agrifood sectors (Haggblade, Hazell, and Dorosh 2007). Rising rural incomes generate demand for more diverse products, leading to more nonfarm activities such as processing, packaging, transporting, and trading. In the early stages of transformation, the agriculture sector serves as an engine of rural—and even national—economic growth. Eventually, urbanization, the nonfarm economy, and non-agricultural incomes play increasingly dominant roles in propelling agrifood system development, with urban and rural nonfarm consumers creating most of the demand for agricultural outputs via value chains that connect rural areas to towns and cities (Dorosh and Thurlow 2013). The exact nature of this transformation process varies across countries because of the diverse structure of their economies and the unique growth trajectories of their various agrifood and non-food subsectors.

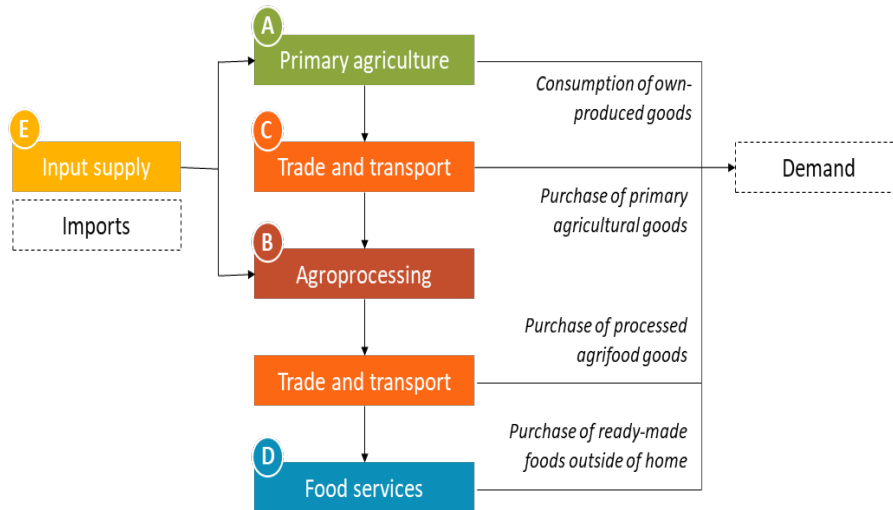
The objectives of this paper are three-fold: first, we review the current structure of Tajikistan’s agrifood system by disaggregating it into various value chain groups; second, we analyze the performance and structural transformation of Tajikistan’s AFS at the system level and across value chain groups in recent years; and third, we assess the effectiveness of agricultural productivity-led growth across agrifood value chain groups for achieving multiple development outcomes and inclusive agrifood system transformation. We start by offering a simple conceptual framework of the AFS (see Fanzo et al. 2020 for a detailed conceptual description of the AFS) in Section 2. Description of the AFS data construction for the study consistent with the conceptual framework of Section 2 and presentation of the current structure of Tajikistan’s AFS using this framework are provided in Section 3 alongside a comparison of Tajikistan’s AFS to other countries at different stages of development. We then disaggregate Tajikistan’s AFS across agrifood value chain groups, and by taking into consideration of their different market structures, we measure their size and contribution in the AFS. In Section 4, we assess historical contributions of the AFS

to Tajikistan's broader economic structural change and growth as well as measure its contribution to different agrifood value chain groups compared to past performance and transformation of the AFS. Finally, to evaluate the potential contribution of different value chains to accelerate agricultural transformation and inclusiveness, we rely on IFPRI's Rural Investment and Policy Analysis (RIAPA) model (IFPRI 2023). The model is used to assess and compare diverse contributions of different agrifood value chains to multiple broad development outcomes. In Section 6, we conclude by summarizing our main findings and challenges in Tajikistan's agrifood system transformation and laying out a direction for further research.

2. A SIMPLE CONCEPTUAL FRAMEWORK OF THE AGRIFOOD SYSTEM

The simple conceptual framework for a country’s AFS in this section employs a narrower focus to present the AFS from its supply-side perspective, allowing us to apply economywide data to measure and track the country’s AFS performance and transformation.

FIGURE 2.1. A SIMPLE CONCEPTUAL FRAMEWORK OF THE AGRIFOOD SYSTEM



Source: Thurlow et al. (2023).

In Figure 2.1, a country’s AFS is made up of five components, A to E (see Thurlow et al. 2023). *Primary agriculture* (A) comprises the supply and demand of all agricultural products including crops, livestock, fisheries, and forestry products. *Agroprocessing* (B) is part of the manufacturing sector and includes those subsectors that process agriculture-related food or non-food products. *Trade and transport services* (C) includes those services associated with the transporting, wholesaling, and retailing of agrifood products between farms, firms, and final points of sale. *Food services* (D) include services such as meals prepared at restaurants, food stalls, or hotels. Finally, *input supply* (E) is the portion of domestically produced intermediate inputs used directly in agricultural and agroprocessing production, such as fertilizers and financial services.

Using this conceptual framework, it is possible to measure the size and structure of a country’s AFS economywide. Following the definitions of Thurlow et al. (2023), AFS GDP (or AgGDP+) is the sum of the GDP contributions of these five components (A to E), while AFS employment (or AgEMP+) is the total

number of jobs across those components. As a country's economy grows and transforms over time, there will be changes in the relative contributions of the various on-farm and off-farm components of the AFS to total AgGDP+ or AgEMP+. A transforming economy, for example, will typically be characterized by more rapid growth in the off-farm activities of the AFS; hence, there will be an increased contribution by off-farm components to AgGDP+ and AgEMP+ as well as a relative decline in the contribution of primary agriculture. By disaggregating AgGDP+ and AgEMP+ into specific agricultural value chain groups, we can further assess the contribution of each individual value chain to AFS growth and transformation.

3. TAJIKISTAN'S AGRIFOOD SYSTEM

3.1. The Agrifood System Data Construction

To present the structure of Tajikistan's agrifood system following the AFS conceptual framework in the previous section, we rely on a newly constructed 2022 Social Accounting Matrix (SAM) for Tajikistan (IFPRI 2024).¹ The Tajikistan SAM is an economywide dataset organized into a 155-row account \times 155-column account square matrix that captures Tajikistan's economic structure in detail.² Specifically, in the 2022 Tajikistan SAM, there are 69 economic production sectors that produce both for domestic and international markets and 72 commodities that are supplied by domestic producers or by imports. Among the 69 economic sectors, there are 22 primary agricultural sectors: 14 crop sectors, 6 livestock sectors, one fishery sector, and one forestry sector, which collectively represent component A of the AFS (see Figure 2.1).

Using the SAM that represents the structure of Tajikistan's national economy at a detailed sectoral level, we estimate the non-agricultural components B to E in the AFS by breaking down the non-agricultural economic sectors of the SAM. Among the 36 industrial sectors, there are 29 manufacturing sectors which include 14 food processing sectors (component B of the AFS), and the remaining 15 manufacturing sectors and 7 other industrial sectors are part of the rest of the economy. Transport, trade, and hotels and restaurants are three out of 11 services sectors³ that represent components C and D of the AFS. However, not all activities in these three sectors are part of the AFS. Trade and transport provide services to the entire economy and hotels provide lodging as part of accommodation services. Thus, we use the supply and use table data (TAJSTAT 2024b) to identify which activities qualify as AFS components C and D and which activities are relevant to the rest of the economy. The shares of market margins in the primary agriculture and agroprocessing sectors are used to break down trade and transport GDP and employment into

¹ Tajikistan 2022 SAM is compiled from eight categories of official datasets: (a) national accounts, (b) macroeconomic statistics including balance of payments, government fiscal statistics, exchange rates, (c) 2016 supply and use tables, (d) agricultural sectoral and product statistics, (e) a recent industrial survey, (f) international commodity and service trade statistics, (g) a national representative household survey for household consumption and expenditures, and (h) sectoral employment statistics (TAJSTAT 2024b; ILO 2024).

² For a lengthier discussion on SAMs in general, see Pyatt and Round (1985) and Reinert and Roland-Holst (1997).

³ The remaining 8 services sectors are less directly relevant to Tajikistan's AFS.

component C of the AFS. To split the hotel and restaurant sector's GDP and employment (AFS component D) and the hotel and restaurants serving the rest of the economy, we consider shares of primary agricultural and agroprocessing products relevant intermediates to AFS component E. We used input-output tables and sectoral GDP and employment data to define the portions of domestically produced intermediate inputs of non-AFS sectors, for example, fertilizers or part of financial services, employed directly in agricultural and agroprocessing production as component E of the AFS. Thus, combined with the agricultural sector (AFS component A) that is already in the national SAM, we compile all five components of the AFS disaggregated at detailed sectoral level. AgGDP+ and AgEMP+ respectively represent detailed AFS sectoral GDP and AFS sectoral employment.

In addition, the SAM includes three production factors (labor, land, and capital) and three domestic institutions (enterprises, households, and government). Households receive incomes from returns to these three factors and the government's transfer programs. Households may also receive income from migrant remittances which are captured by the flows from the rest of the world account. Households spend their incomes to consume 72 commodities, and the SAM captures households demand and expenditure structure across these commodities.

3.2. Current Structure of Tajikistan's Agrifood System

Table 3.1 presents the structure of Tajikistan's AFS in 2022 based on the 2022 SAM and other official data. The national economy (first row of Table 3.1) is first broken down into estimates for the AFS (that is, AgGDP+ and AgEMP+, row 2) and the rest of the economy (row 9). The AFS in the table is consistent with the five components of the analytical framework, and the table also displays the aggregation of the four off-farm components of the AFS. Economywide manufacturing, total services, and trade and transport services at the bottom of the table include activities in both the AFS and non-AFS sectors, thus providing a perspective on the relative size of off-farm AFS components (B to D) within the overall manufacturing, total services, and trade and transport services.

TABLE 3.1. CURRENT STRUCTURE OF TAJIKISTAN'S AGRIFOOD SYSTEM AND ECONOMY (2022)

	GDP		Employment	
	Value (US\$ billion)	Share (%)	Workers (million)	Share (%)
Total economy	9.8	100.0	2.8	100.0
Agrifood system	3.4	34.7	1.6	58.1
Primary agriculture (A)	2.4	25.0	1.5	54.9
Off-farm AFS	1.0	9.7	0.1	3.2
Processing (B)	0.6	6.5	0.0	1.1
Trade and transport (C)	0.2	1.8	0.0	1.4
Food services (D)	0.1	0.6	0.0	0.2
Input supply (E)	0.1	0.9	0.0	0.5
Rest of economy	6.4	65.3	1.2	41.9
Total manufacturing	1.6	16.5	0.1	3.3
Total services	3.6	37.1	1.0	34.7
Total trade and transport	1.8	18.8	0.3	11.6

Source: Authors' calculation based on the 2022 Social Accounting Matrix for Tajikistan (IFPRI 2024).

Note: A to E corresponds to the five agrifood system components from Figure 2.1.

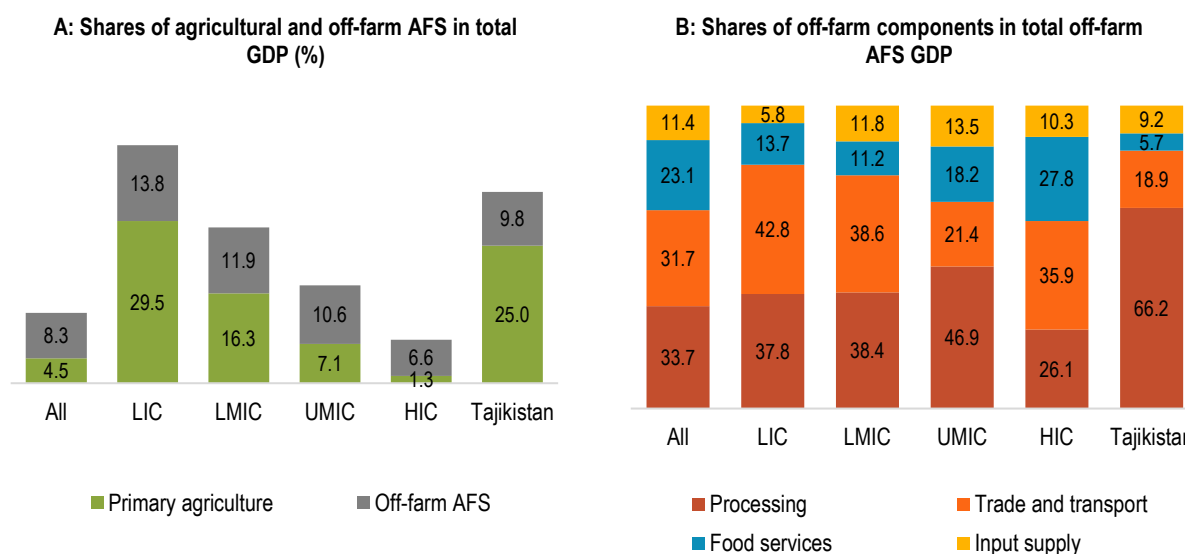
As shown in Table 3.1, the AFS accounted for 34.7 percent of Tajikistan's national GDP and 58.1 percent of employment in 2022. Primary agriculture alone contributed one-quarter of total GDP and nearly 55 percent of employment, while the four off-farm components of the AFS contributed about 10 percent of GDP and 3.2 percent of employment. The off-farm components of the AFS therefore accounted for close to 30 percent of AgGDP+ and only 5 percent of AgEMP+. The comparison of on- and off-farm GDP and employment shares shows that labor productivity in the off-farm components of the AFS is significantly higher than on-farm productivity. The movement of farm workers into these off-farm components—a natural process of agricultural transformation—may thus be beneficial to household incomes.

3.3. Comparing Tajikistan's Agrifood System to Other Countries

The structure and economic contribution of a country's AFS varies at different stages of its development. Evidence of this is provided in Figure 3.1, which compares Tajikistan with the AFS structures of low-income (LIC), lower-middle-income (LMIC), upper-middle-income (UMIC), and high-income countries

(HIC). Tajikistan is a LMIC, but its AFS’s on-farm composition and its total contribution to national GDP are larger than those of its peer countries (Panel A). However, within the four off-farm AFS components, Tajikistan’s agroprocessing component is much larger than the LMIC average, making trade and transport, food service, and input supply components are relatively smaller (Panel B), meaning that Tajikistan’s agroprocessing may be more productive than many of its peers. A comparison between the shares of agroprocessing and shares of other off-farm components in national GDP and total employment in Table 3.1 clearly shows that the productivity of agroprocessing is higher than the productivity of other off-farm components, although all off-farm components are more productive than Tajikistan’s primary agriculture.

FIGURE 3.1. COMPARING TAJIKISTAN'S AGRIFOOD SYSTEM TO OTHER COUNTRIES (TAJIKISTAN 2022, OTHER COUNTRIES 2021)



Sources: IFPRI’s Agrifood System Database (Thurlow et al. 2023) and the 2022 Social Accounting Matrix for Tajikistan (IFPRI 2024).

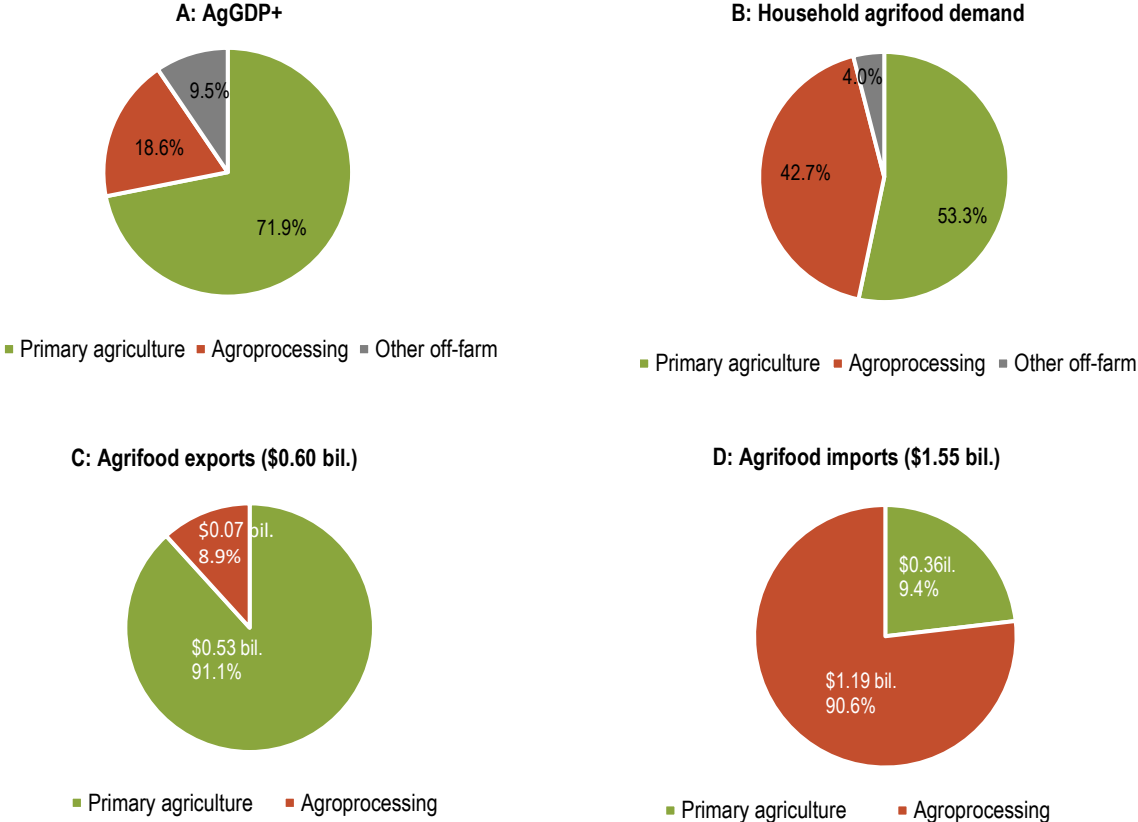
Notes: LIC = low-income country; LMIC = lower-middle-income country; UMIC = upper-middle-income country; and HIC = high-income country; AFS = agrifood system.

3.4. Unpacking the Demand Side of Tajikistan’s Agrifood System

The supply and demand sides of Tajikistan’s AFS structure are presented in Figure 3.2 (see Panels A and B). Household consumption and expenditure represent the demand-side structure of the AFS in Panel B, covering demand for primary agricultural products, agroprocessing products, and services associated with other off-farm components of the AFS. Compiling Tajikistan’s demand-side AFS relies on household

demand data for the 72 commodities/services in the SAM. To do so, we used a similar approach to our breakdown of the 69 national production sectors on the supply side of AFS described in Section 3.1.

FIGURE 3.2. COMPOSITION OF AGRIFOOD SYSTEM GDP, HOUSEHOLD DEMAND, AND TRADE (2022)



Source: Authors’ calculation based on the 2022 Social Accounting Matrix for Tajikistan (IFPRI 2024).

While 71.9 percent of AgGDP+ comes from domestic primary agricultural production, primary agricultural commodities that can either be produced domestically or imported account for 53.3 percent of household demand. By contrast, household demand for processed agrifood products—most of which are imported—accounts for 42.7 percent of total agrifood demand, despite the associated domestic production sectors accounting for only 18.6 percent of AgGDP+. The bias toward processed agrifood products in the demand-side structure of the AFS is mirrored in an extremely high share of agrifood imports accounted for by processed products; that is, 90.6 percent of imports are processed goods (Panel D), while 91.1 percent of agrifood commodity exports are primary agricultural commodities (Panel C). Thus, there is a substantial deficit in Tajikistan’s agrifood commodity trade balance—the value of Tajikistan’s agrifood commodity

imports is more than twice the value of its agrifood exports. This is because the amount of processed food imports (US\$1.19 billion, Panel D) is greater than the amount of processed food exports (\$0.07 billion, Panel C), although there is a modest surplus in primary agricultural commodity trade (\$0.53 billion in exports compared to \$0.36 billion in imports; see Figure 3.2).

3.5. Disaggregating the Agrifood System Across Value Chains

For a more detailed assessment of structural patterns and historical growth within the AFS, we disaggregate Tajikistan's agrifood system into 14 value chain groups (see Table A1 in the Appendix for more details on how individual agricultural subsectors are mapped to value chain groups). The 14 value chain groups are further categorized into three subgroups based on their trade orientation. Exportable and importable value chains are defined, respectively, as those value chains with export–output and import–consumption ratios above the national average. We consider trade in both primary and processed agrifood products in the calculation of these trade ratios. The remaining value chains are classified as less-traded value chains.

Table 3.2 shows the 14 value chain groups, categorized into exportable, importable, and less-traded value chains. The table also reports the contribution of each value chain group to AgGDP+, primary agricultural GDP, and GDP in the off-farm components of the AFS. Figure 3.2 shows a deficit in Tajikistan's agrifood trade, and Table 3.2 is consistent with this, with an import–consumption ratio more than double (24.7 percent) the export–output ratio (11.3 percent). Though Tajikistan is an agrarian economy, it imports a lot of foods, and the shares of imports in the country's total merchandise imports are consistently high, around 22 percent between 2016 and 2022. For the same period, food exports as a percentage of total merchandise exports were just 3 percent (World Bank 2023). Agrifood imports also grew more rapidly, increasing by a multiple of 16 between 2000 and 2023, while exports only doubled over the same period (Customs Service under the Government of the Republic of Tajikistan Statistics 2024).

TABLE 3.2. TAJIKISTAN'S AGRIFOOD SYSTEM COMPOSITION BY TRADE ORIENTATION OF VALUE CHAINS (2022)

	Share of GDP (%)			Exports / output (%)	Imports / demand (%)
	AFS (AgGDP+)	Primary agriculture	Off-farm AFS		
Total	100.0	100.0	100.0	11.3	24.7
Exportable	22.6	28.8	6.5	42.5	3.4
Cotton	9.4	12.0	2.4	62.2	
Fruits and nuts	13.3	16.8	4.1	26.7	4.8
Importable	27.5	16.1	57.3	0.6	34.4
Wheat	14.5	7.0	34.2	0.6	34.3
Maize and rice	4.1	2.6	8.3	0.0	37.3
Oilseeds	5.5	5.5	5.3	0.6	43.9
Other crops	0.8	0.4	1.8	5.0	71.9
Fish	0.3	0.3	0.2	0.0	24.4
Forestry	2.3	0.3	7.6	0.5	66.9
Less traded	49.9	55.1	36.2	3.4	7.0
Pulses	1.9	2.5	0.3	0.0	13.6
Roots (potatoes)	6.1	8.1	0.7		0.5
Vegetables	19.9	23.4	10.5	8.0	6.7
Cattle and dairy	9.2	8.3	11.6	0.3	11.4
Poultry	6.1	6.5	5.0		3.6
Other livestock	6.8	6.2	8.1	0.3	7.4

Source: Authors' calculation based on the 2022 Social Accounting Matrix for Tajikistan (IFPRI 2024).

Only 2 of the 14 value chains are classified as exportable value chains because their export–output ratios exceed the national average of all AFS value chains. Tajikistan's major agricultural export products are cotton and fruits. All fruits are aggregated as a single value chain in Table 3.2, which includes both fresh and dried fruits, almonds, and other nuts such as walnuts and pistachios. Production of cotton, one of the key agricultural products in Tajikistan, has declined notably from its historical high but still accounted for 12 percent of Tajikistan's primary agriculture GDP in 2022. One-quarter of cotton is grown by large agricultural enterprises and three-quarters are grown by *dehkan* farms (FAO/WFP 2023)⁴. A small share of produced cotton is processed domestically by textile industry and the rest is exported without any further processing; thus, the cotton value chain has a large share in primary agriculture GDP (12 percent) and a small share (2.4 percent) in off-farm AFS. Fruits (mainly dried fruits) and nuts are also exported as primary agricultural products, making the agricultural GDP share of fruits and nuts value chain quite large (16.8

⁴ A *dehkan* farm is an independent business entity created by a family/household or an individual or jointly with others who produce agricultural products by using property, land, and other natural resources that are in their private ownership.

percent) and small in off-farm AgGDP+ (4.1 percent). These two exportable value chains together have a small off-farm AgGDP+ share (6.5 percent), compared to a much larger primary agricultural GDP share (28.8 percent).

Six of the 14 value chains fall into the less-traded group of value chains, together accounting for 49.9 percent of AgGDP+. Less traded crops are mainly grown by *dehkan* and/or household farms. In the livestock value chains, poultry (chicken meat and eggs) is produced mainly by large enterprise farms while households' farms are dominated in production of cattle and small ruminants (other livestock) meat and milk (FAO/WFP 2023). Four of the six less-traded value chains (pulses, roots, vegetables, and poultry) have small off-farm components,⁵ and their contribution to off-farm AgGDP+ (36.2 percent) is smaller despite dominating primary agricultural GDP (55.1 percent). The exceptions are cattle and dairy and other livestock value chains where their contribution to off-farm AgGDP+ is higher than primary agricultural GDP (Table 3.2). Small ruminants (sheep and goats) account for 90.6 percent of total other livestock in primary agricultural GDP (see Table A1 in Appendix). Small ruminant and poultry meats require processing and have associated trade, transport, and other services. The three livestock value chains (cattle and dairy, poultry, and other livestock) together account for 24.7 percent of total off-farm AgGDP+, more than the three less-traded crop value chains (pulses, roots, and vegetables) combined which account for 11.5 percent (Table 3.2). Moreover, the domestic demand of nearly 11 percent of cattle meat, 3.6 percent dairy products, 7.4 percent of poultry meat/eggs and other livestock meat are met by imports; thus, these value chains are also important for import substitution to increase off-farm AgEMP+ and value added (IFPRI 2024).

Tajikistan relies heavily on agrifood imports to meet growing domestic demand fueled by income and population growth. Of the 14 value chains, 6 are classified as importable value chains, many of which have import–consumption ratios greater than one-third of their domestic demand. Wheat is the most important staple for Tajikistanis. While production of wheat increased recently, the country still relies heavily on imports, mainly from Kazakhstan. Maize is predominantly a feed crop and is mainly grown by household

⁵ The off-farm components of the poultry value chain are 5 percent of total off-farm AgGDP+, comparable with the value chain's share of primary agricultural GDP (6.5 percent).

farms and *dehkan* farms. Table 3.2 groups maize and rice together as a single value chain, although rice is mainly imported. Imported wheat is milled domestically, and part of domestically grown and imported maize for food consumption as well as paddy rice also require milling, which makes the shares of off-farm components of these two value chains disproportionately large. All 6 importable value chains together dominate off-farm AgGDP+ (57.3 percent), far exceeding their primary agricultural share of GDP (16.1 percent). Thus, importable value chains compete not only with primary agricultural imports but also with processed agrifood imports. For example, while Tajikistan may not be able to produce enough wheat and some other agricultural products to meet growing domestic demand, increasing domestic processing of these products instead of importing milled maize, wheat flours, and other wheat products can add more value to AgGDP+. Therefore, expansion of agroprocessing and import substitution in livestock production, together with the promotion of diverse fruit and nuts exports, could effectively drive agricultural transformation by boosting value addition and off-farm employment in the value chains.

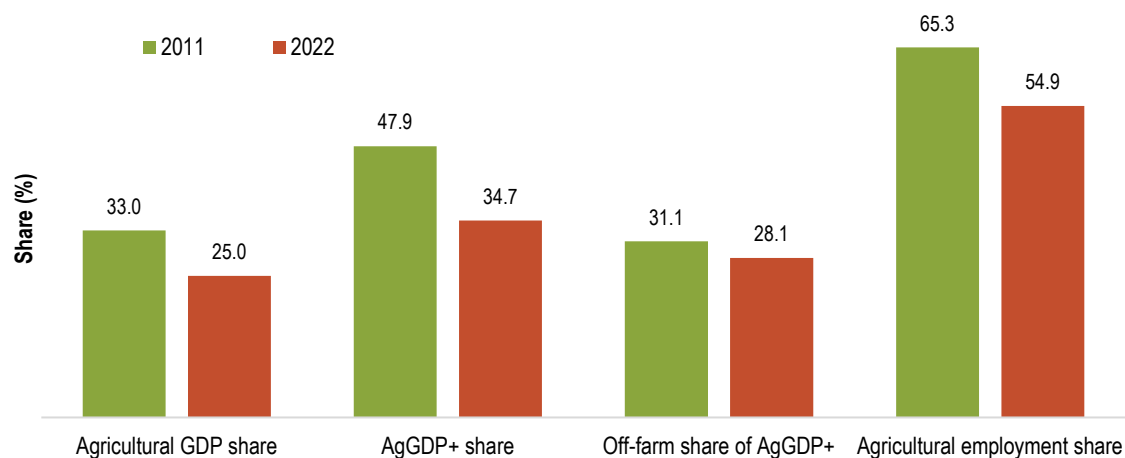
4. STRUCTURAL CHANGE AND DRIVERS OF AGRIFOOD SYSTEM GROWTH

The earlier section has provided a snapshot of the current structure of Tajikistan's AFS, the decomposition of the AFS across the 14 value chain groups, and the trade orientation of those value chains. The section shows that, to meet domestic demand, Tajikistan relies on imports of agrifood products, and the country's AgGDP+ is dominated by importable and less-traded value chains. Many of the importable value chains and less-traded livestock value chains are more oriented toward value addition in the off-farm components of the AFS, thus their contribution to off-farm AFS components is large relative to their contribution to primary agriculture. Prioritizing growth in particular importable value chains and livestock value chains (less-traded), together with fruit and nut value chains (an exportable value chain), could be an effective strategy for expanding off-farm value addition and jobs, contributing to AFS transformation.

In this section, we assess the performance and structural transformation of Tajikistan's AFS in recent years. Labor productivity is typically lowest in primary agriculture and higher in off-farm activities, such as in agrifood processing, food services, or in sectors outside the AFS. Economic growth and urbanization are associated with relatively faster growth in these non-agricultural sectors, which could help create higher-paying jobs for both rural and urban households. As such, even smallholder farm households with family members who obtain off-farm employment may benefit from structural transformation.

Figure 4.1 compares the shares of agricultural GDP and AgGDP+ in Tajikistan's national GDP, as well as agricultural employment as a share of total employment between 2011 and 2022. It also includes an estimate of the share of the off-farm components in AgGDP+. Agriculture GDP and AgGDP+ shares, as well as the share of agricultural employment, all fell between 2011 and 2022, while off-farm components of AgGDP+ did not increase. While the growth in Tajikistan's broader economy was accompanied by economic structural change, off-farm components of the AFS did not perform well. Primary agriculture remains a large sector, dominating total employment and the AFS.

FIGURE 4.1. AGRICULTURAL GDP, AGRIFOOD SYSTEM GDP, AND EMPLOYMENT SHARES (2011 AND 2022)

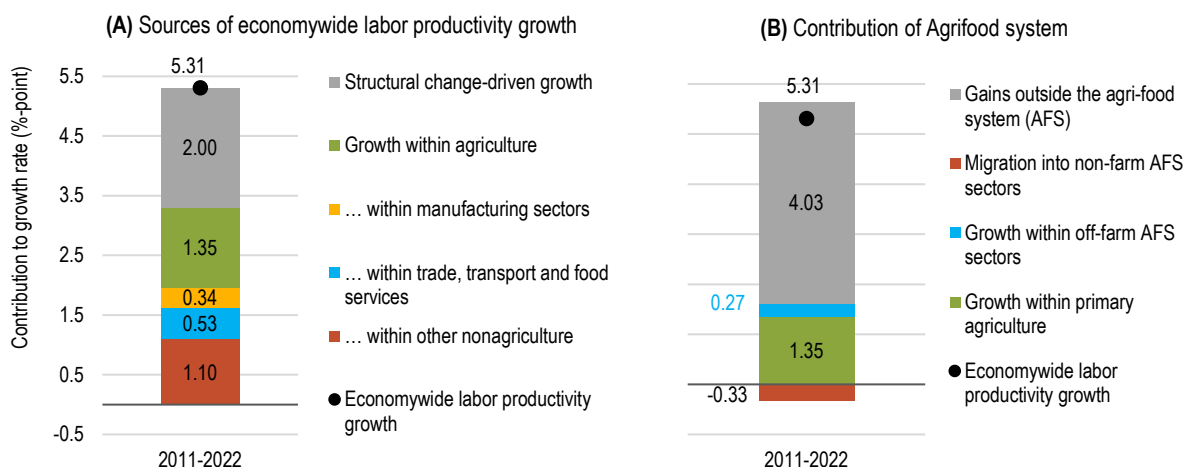


Source: Authors' estimates using the 2011 and 2022 Social Accounting Matrixes for Tajikistan (IFPRI 2024).

Agrifood system transformation is an important part of economic transformation and structural change. Increases in economywide labor productivity, closely tied to economic development, typically arise through two channels. First, productivity can increase among workers within their respective sectors of employment. Second, economywide productivity rises when workers transition to more productive sectors. These two channels are commonly referred to as the “within-sector” and “between-sector” (or “structural change”) drivers of labor productivity growth. As previously mentioned, GDP per worker in agriculture is lower than in other segments of AFS and the broader economy. Hence, a shift away from agriculture toward other sectors enhances economywide labor productivity.

The distinct contributions of these structural drivers of growth can be estimated utilizing a decomposition approach outlined by McMillan, Rodrik, and Verduzco-Gallo (2017). Panel A of Figure 4.2 illustrates that economywide labor productivity, as measured by GDP per worker, expanded at an average annual rate of 5.31 percent between 2011 and 2022. Roughly 38 percent was driven by structural change growth, that is, through labor moving out of agriculture into more productive non-agricultural sectors. The remaining 62 percent was driven by within-sector labor productivity growth from both agricultural and non-agricultural sectors.

FIGURE 4.2. DECOMPOSITION OF AVERAGE ANNUAL LABOR PRODUCTIVITY GROWTH RATE (2011-2022)



Source: Authors’ analysis using the 2011 and 2022 Social Accounting Matrixes for Tajikistan (IFPRI 2024).

Notably, within-sector labor productivity growth in agriculture accounts for 1.35 percentage points out of a total 5.31 percent for economywide labor productivity growth rate, contributing about 25.4 percent of the total labor productivity growth. This has likely happened due to mechanization and reducing rural underemployment that led labor movement away from traditional agriculture and toward more productive sectors of economy during this period, in addition to growth in high-value exportable crops and in the livestock sectors that often have higher value added per farm worker than staple crop production.

The agricultural sector accounted for one-third of total GDP in 2011 (see Figure 4.1). While agricultural productivity did not necessarily grow faster than economywide productivity, agricultural productivity made a significant contribution to economywide productivity growth due to its initially large size of the sector. There is also substantial contribution to economywide labor productivity growth stemming from within non-agricultural sectors between 2011 and 2022, including within the manufacturing sector (0.34 percentage points); within trade, transport, and food services (0.53 percentage points); and within other non-agricultural sectors as a group (1.1 percentage points). The within-sector productivity growth of these three groups of non-agricultural sectors together makes 1.97 percentage points of economywide labor productivity growth, contributing about 37 percent of the total labor productivity growth (Figure 4.2, Panel A).

Panel B of Figure 4.2 shows the estimated contribution of AFS to economywide labor productivity growth. The within-sector contribution from agriculture remains consistent across both panels (1.35 percentage points). The movement of workers into a set of non-agricultural sectors—defined as structural change driven growth in Panel A—is disaggregated into two sub-components in Panel B. The labor mobility from primary agriculture to AFS’s off-farm components, which are part of the non-agricultural sector, declined by 0.33 percentage points in Panel B. This indicates that migration from primary agriculture to non-agricultural sectors outside the AFS contributes more to structural change (2.00 percentage points) than is shown in Panel A, and all growth led by structural change during this period comes only from labor mobility to non-agricultural sectors outside the AFS. This is consistent with Figure 4.1 in which the GDP share of the off-farm part of the AFS is slightly lower in 2022 than in 2011. However, with less labor moving from primary agriculture to off-farm AFS, labor productivity growth within the off-farm sector of AFS rises (0.27 percentage points). This is consistent with Panel A of Figure 4.2, where labor productivity of manufacturing—parts of which are attributed to agrifood processing, trade, transport and food services, and which are important components of off-farm AFS—rises. Consequently, the contribution of the AFS to the economywide labor productivity growth comes only from labor productivity growth within primary agriculture (1.35 percentage points), while the contribution of off-farm AFS components yields a net negative (0.27 minus 0.33). The three components associated with the AFS, as shown in Figure 4.2 (B), contributed 24.3 percent of total labor productivity growth between 2011 and 2022. The remaining 75.7 percent of total labor productivity growth is labeled as gains outside AFS growth, Panel B of Figure 4.2 (4.03 percentage points), which originates from two sources outside AFS:

- Within-sector productivity growth in the rest of the economy. That is, $0.34 + 0.53 + 1.10$ in Panel A – 0.27 in Panel B, which equals 1.70. This is equivalent to roughly 32 percent of total labor productivity growth of 5.31 percentage points on the top of both panels (Figure 4.2).
- Migration of farm workers into sectors outside the AFS. That is, 2.00 in Panel A + 0.33 in Panel B, which equals 2.33. This is equivalent to roughly 43.7 percent of total labor productivity growth rate of 5.31 percentage points on the top of both panels (Figure 4.2).

Within the AFS, we further evaluate performance of different value chains over the 2011–2022 period, and Table 4.1 presents the assessment results. As before, value chains are grouped according to their trade status, that is, exportable, importable, and less traded. Overall, Tajikistan’s AFS grew slowly (4.1 percent per year) compared to its total economy (7.2. percent). The off-farm component of the AFS grew slower (3.1 percent) than primary agriculture (4.5 percent), and agrifood processing, a subcomponent of the off-farm component of the AFS, grew relatively fast (5.1 percent).

TABLE 4.1. AGRIFOOD SYSTEM GDP GROWTH RATE BY VALUE CHAIN (2011-2022)

	Average annual GDP growth rate (%)			
	Total AFS	Primary agriculture	Off-farm AFS	Agro-processing
Total AFS	4.1	4.5	3.1	5.1
Exportable	7.5	8.1	2.6	6.0
Fruits and nuts*	9.4	10.1	3.0	
Cotton*	6.4	6.9	2.4	6.0
Importable	2.5	1.5	3.2	4.4
Wheat	3.8	4.0	3.6	4.2
Maize and rice	1.8	1.4	2.2	4.4
Oilseeds	-1.2	-1.2	-1.0	5.0
Other crops	-1.7	4.0	-3.8	7.3
Fish*	10.6	9.9	13.9	11.1
Forestry*	11.7	6.5	12.5	6.5
Less traded	3.9	4.0	3.8	6.3
Pulses	-1.2	-1.0	-4.4	
Roots (potatoes)	0.4	0.6	-3.9	
Vegetables	3.0	2.9	3.3	6.5
Poultry*	5.7	6.8	4.1	6.3
Cattle and dairy*	5.7	5.5	6.5	9.1
Other livestock*	11.8	20.5	4.4	5.4

Source: Authors’ analysis using the 2011 and 2022 Social Accounting Matrixes for Tajikistan (IFPRI 2024).

Note: Value chains that experienced above-average AgGDP+ growth over the period 2011–2022 (that is, higher than 4.1 percent) are marked with an asterisk (*).

Among the 14 value chains, 7 achieved above-average growth during the 2011–2022 period, that is, more than 4.1 percent per year (these are marked with an asterisk in Table 4.1), while in the same period, 3 had negative growth (oilseeds, other crops, and pulses). Two exportable value chains (cotton and fruits and

nuts⁶), two importable value chains (fish and forestry), and three less-traded livestock value chains (cattle and dairy, poultry, and other livestock) grew faster than the AFS average. In the rapidly growing exportable and importable value chains, growth in their processing components were faster than their primary agricultural components. Similarly, processing grew faster than the AFS agroprocessing average for the three rapidly growing less-traded livestock value chains; only in the cattle and dairy value chain did processing grow faster than its primary agriculture. The processing component of these fast-growing value chains grew rapidly, which is consistent with the broader patterns of growth and structural change in Tajikistan's AFS.

Findings of a recent study (Khakimov, et al. 2024) indicate that population of cattle, dairy cows, and small ruminants (sheep and goats, which constitute 90 percent of the other livestock value chain) grew rapidly in 2011–2022 and contribute to AgGDP+ and agricultural GDP. While growth in meat processing is higher than the agrifood processing average, it is not as high as the cattle and dairy value chain in which rapid growth in dairy processing is a contributive factor (Khakimov, et al. 2024). Rapid growth in meat and dairy processing⁷ signals that increased household incomes and demand for meat and dairy products could grow rapidly, offering good market opportunities for expanding livestock production and developing the meat/dairy processing industry. In this period, poultry (chicken meat and eggs) production also contributed significantly to the growth of primary agricultural GDP (Table 4.1). From 2018 to 2022, the government's proposed incentives⁸ resulted in significant improvements in the poultry sector: the poultry population more than doubled (2.2 times), and poultry meat and egg production grew by 6.4 and 3.6 times, respectively. Domestic production of poultry feed, which satisfied only 10 percent of national demand in 2017, rose to cover 70 percent of domestic needs by 2022. This rapid growth also led to a fivefold increase in the value

⁶ Fruit production experienced tremendous growth, with land allocated to fruit trees increasing 3.5 times nationwide (Khakimov et al. 2024).

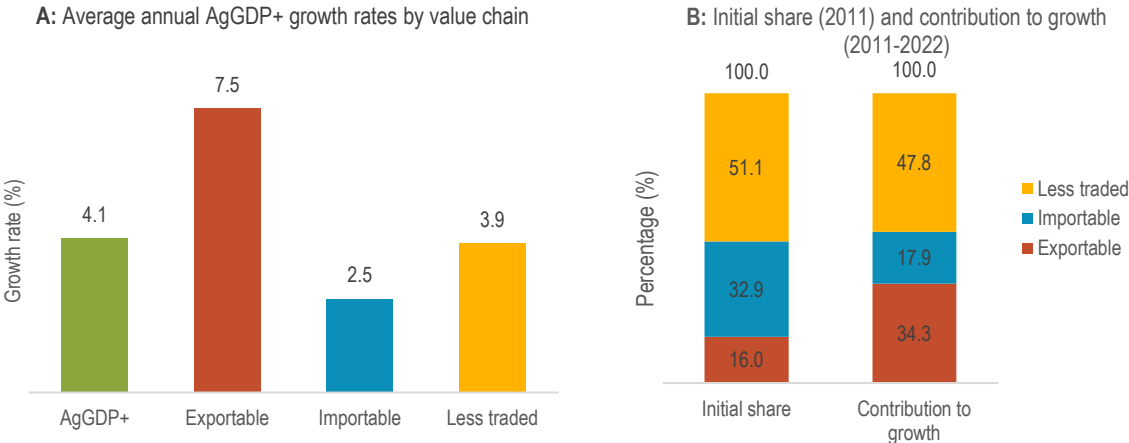
⁷ An increase in milk production was driven primarily by the increase in the number of cows rather than productivity (Khakimov et al. 2024).

⁸ Tax and customs exemptions were introduced in 2017 for the poultry sector, which covers hatching eggs, day-old chicks, equipment, and construction materials (Khakimov et al. 2024).

of production within the poultry sector, accounting for 5 percent of the total agricultural output in 2022, up from 1.8 percent in 2017 (Khakimov et al. 2024).

Figure 4.3 summarizes the growth trends of the three groups of value chains in aggregation. On average, exportable value chains grew faster (at 7.5 percent) than the national average growth in AgGDP+ (4.1 percent), and growth in less-traded value chains was close to the AFS average, while importable value chains grew at a slower pace, 2.5 percent (Panel A). Although the initial share of exportable value chains is 16 percent, their contribution to growth is plausible (34.3 percent). While initial shares of less traded (51.1 percent) and importable (32.9 percent) value chains are higher, their contribution to growth are lower than their initial values, 47.8 percent and 17.9 percent, respectively (Figure 4.3, Panel B).

FIGURE 4.3. DRIVERS OF TAJIKISTAN’S AGRIFOOD SYSTEM GDP GROWTH (2011-2022)



Source: Authors’ analysis using the 2011 and 2022 Social Accounting Matrixes for Tajikistan (IFPRI 2024).

In summary, growth in labor productivity was the primary driver of Tajikistan’s rapid economic growth between 2011 and 2022. Both structural change and within-sector labor productivity growth have made important contributions to labor productivity growth. However, the AFS did not grow as fast as the broader economy, due to a lower growth contribution from the off-farm components of AFS. While within-sector labor productivity growth in off-farm AFS contributed positively to the economywide productivity growth, labor did not migrate from primary agriculture to other off-farm components of the AFS. Creating more off-farm employment opportunities within the AFS is a challenge for a sustainable transformation of Tajikistan’s AFS in the future.

5. ASSESSING GROWTH OUTCOMES USING IFPRI'S RIAPA MODEL

IFPRI's Rural Investment and Policy Analysis (RIAPA) model is a tool for conducting forward-looking general equilibrium analysis at the country level (IFPRI 2023). At the core of RIAPA is an economywide dynamic computable general equilibrium (CGE) model that simulates the functioning of a market economy, including markets for products and factors which include land, labor, and capital. The RIAPA model includes a set of microsimulation modules that are used to assess potential impacts of policy and public investment scenarios on multiple development outcomes using household data and has been used in a wide variety of contexts to simulate the impact of policies, investments, or economic shocks. Here, we employ the RIAPA model to assess the effectiveness of productivity-led growth in different agricultural value chain groups in Tajikistan to promote multiple development outcomes. We used the Tajikistan 2022 SAM for the RIAPA-Tajikistan model that is used also for the agrifood system analysis in sections 3 and 4 above. The Tajikistan 2022 SAM introduced in Section 3.1 is further disaggregated by types of households and labor structures to properly link the CGE model with the microsimulation modules for assessing agricultural productivity growth impact on selected development outcomes (poverty, diet, and undernourishment outcomes using the inter-linkages to the RIAPA CGE model and RIAPA microsimulation modules). Specifically, the single national household account in the national SAM is disaggregated into 15 household groups with 10 rural households by farm and nonfarm income sources and five urban households by income quintiles (from low to high). The single labor factor in the national SAM is disaggregated into eight different rural and urban labor categories with different skills based on four education levels workers received. Information for rural and urban household income groups and education levels of workers is drawn from a national representative household survey data.

In the RIAPA-Tajikistan model, the 15 household groups receive incomes from eight different categories of labor as well as returns to land and capital. Some households also receive income from the government through income transfer programs or pay taxes to the government, and from the rest of the world as foreign remittance income. While wages and returns to land and capital are endogenously determined by the factor

market equilibrium in the RIAPA CGE model, transferred incomes to the households by government and foreign remittances are exogenously determined based on their total amounts in the SAM and initial distribution across the household groups.

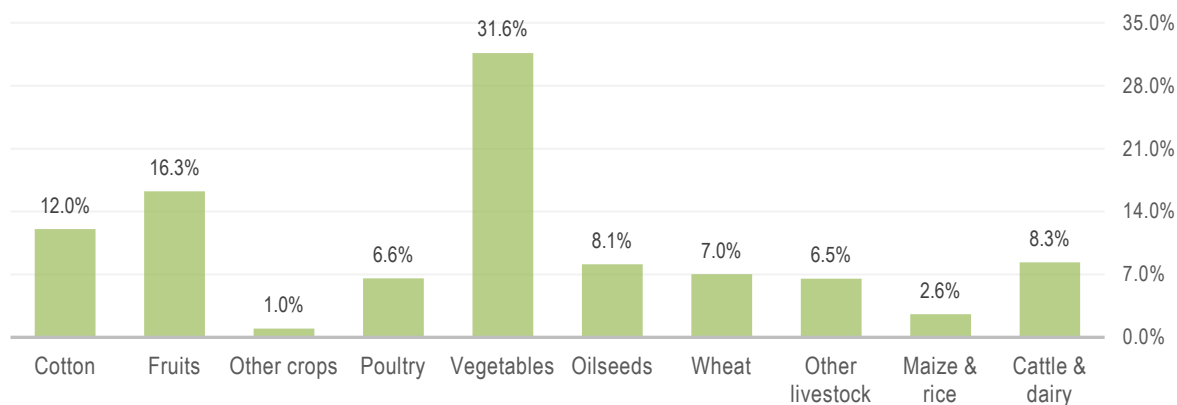
This analysis covers 10 value chain groups, which were selected from the original list of 14 in the agrifood system analysis in the previous sections. In the simulations, pulses were grouped together with oilseeds as a single value chain (oilseeds). Fish (accounting for only 0.3 percent of AgGDP+) was grouped into the other livestock value chain, while forestry was excluded. We considered the potential impacts of agricultural productivity growth for the five following development outcomes:

- A poverty–growth elasticity that measures the percentage-point change in the poverty headcount rate associated with a 1-percent agricultural GDP growth from the targeted value chain.
- An undernourishment–growth elasticity that measures the percentage-point change in prevalence of undernourishment rate associated with a 1-percent agricultural GDP growth from the targeted value chain.
- A growth multiplier that measures the change in GDP per unit of increase in agricultural GDP in the targeted value chain.
- An employment multiplier that measures the change in the number of jobs created per unit of increase in agricultural GDP in the targeted value chain; and
- A diet-quality indicator that measures the percentage change in a diet quality index per unit of agricultural GDP growth from the targeted value chain.

The simulations entail increasing on-farm productivity separately in each targeted value chain and comparing the economywide impacts on development outcomes across value chains. The size of the 10 simulated value chain groups varies by their shares of agricultural GDP. The vegetable group including potatoes is the largest in terms of share of agricultural GDP (31.6 percent, Figure 5.1), followed by the fruit and nuts (16.3 percent) and cotton (12.0 percent) value chains, while the other crop group is the smallest (1.0 percent). We considered achieving a similar 1-percent annual growth rate in total agricultural GDP

between 2023 and 2028 led by exogenous productivity growth in one of the 10 groups of crop or livestock production for each simulation. Because the value-added sizes of the crop and livestock production are different, the required exogenous productivity growth rate varies across these 10 groups. The required productivity growth is also affected directly by production of the targeted crop/livestock products which release or attract labor and land to other agricultural sectors due to change in their relative prices. If a targeted crop or livestock production does not rely on export or import, its price usually falls with rising productivity because demand for food is usually inelastic. For a product highly relying on exports (like cotton) or imports for meeting domestic demand (like wheat), its domestic price is influenced by the international prices and usually does not change much with a change in productivity.

FIGURE 5.1. SHARES OF PRIMARY AGRICULTURE GDP AMONG THE SIMULATED VALUE CHAINS (2022)



Source: Authors' analysis using the 2022 Social Accounting Matrix for Tajikistan (IFPRI 2024).

Note: The order of the 10 simulated groups of agricultural products is consistent with that in Figure 5.2.

At higher productivity, an internationally tradable crop and livestock sector can increase production by competing over labor and land with other agricultural sectors. For example, fruits are more export oriented than vegetables in Tajikistan, hence, prices for exportable fruits do not need to fall with rising productivity. Most vegetables are produced for domestic markets, and their prices will fall with rising productivity. While vegetables account for 31.6 percent of agricultural GDP, almost doubling the size of fruits in agricultural GDP (16.3 percent), to achieve a 1-percent agricultural GDP growth, the required productivity growth rate for vegetables has to be higher (0.59 percent) than the productivity growth of fruit production (0.44 percent). The required growth rates in productivity for the 10 value chains are presented in Table 5.1 below.

Table 5.1. Size of simulated value chain groups in agriculture GDP and their required agricultural productivity growth rates in RIAPA model

Value chain groups	Initial size of agriculture GDP (2022)	Required productivity annual growth rate (2023-2028, %)
Wheat	7.0	1.14
Maize & rice	2.6	3.22
Oilseeds	8.1	0.83
Vegetables	31.6	0.55
Fruits	16.3	0.49
Cotton	12.0	0.63
Cattle & dairy	8.3	1.13
Poultry	6.6	1.65
Other livestock	6.5	1.55
Other crops	1.0	6.65

Source: Authors' analysis using the 2022 Social Accounting Matrix for Tajikistan (IFPRI 2024) and RIAPA model results.

While the exogenous productivity shock is imposed only in the primary agriculture component of each value chain, there are spillover effects into that value chain's off-farm components as well as into other agricultural value chains or sectors outside the AFS. These spillovers are captured by the economywide model and indicate the transformational effect that agricultural productivity growth in the value chain has both within the AFS and for the broader economy. There are also structural differences across value chains; for example, value chains use labor, land, or capital in different intensities. They have unique links to other sectors as suppliers or users of intermediate inputs, or they have unique links to rural or urban households in different income groups because of the types of workers they employ or the consumption preferences of households for the agrifood products produced by those value chains.

As such, each value chain growth scenario is expected to have a unique impact on development outcomes; moreover, not all value chains will be equally effective at improving development outcomes. In some cases, there may even be trade-offs because of competition for resources across value chains or because of their different impacts on prices, wage rates, and returns to land or capital. With the aid of the RIAPA model, these complex effects can be unpacked and thus provide information to the governments or development partners about how they can be best prioritized across different value chains depending on which development outcomes they most highly value.

Figure 5.2 shows the scores each value chain achieves across the five development outcome indicators. Panel A shows the percentage point changes in the national poverty headcount rate associated with a 1-percent increase in agricultural GDP led by agricultural productivity growth of the targeted value chain.

Changes in poverty rate are captured using a nationally representative household survey dataset from the database of RIAPA microsimulation modules, in which all surveyed households are included and mapped into a corresponding RIAPA CGE model's household group by their level of income, source of income, and residency (rural or urban). Under the RIAPA microsimulation module, households' real income change proportionally to the changes in incomes of corresponding household groups in the RIAPA CGE model. Household groups' incomes are endogenously determined by changes in labor income and returns to land and capital, which endogenously change at the new equilibrium in the CGE model's value chain growth simulations. The national poverty rate is then recalculated. Panel B shows the changes in total GDP (in US\$ million) that are associated with a \$1.0 million increase in agricultural GDP from the targeted value chain. Panel C is the change in total economywide employment (in thousand persons) that is associated with a \$1.0 million increase in agricultural GDP from the targeted value chain. These two outcome indicators are obtained directly from the simulation results of the RIAPA CGE model. Panel D is the percentage improvement in diet quality that is associated with a 1-percent increase in agricultural GDP. And finally, Panel E is the percentage point changes in prevalence of undernourishment rate that are associated with a 1-percent increase in agricultural GDP led by the productivity growth of the targeted value chain. The last two outcomes also rely on the inter-linkages between the RIAPA microsimulation modules and the RIAPA CGE model in a similar way as described for Panel A, the poverty-to-growth elasticity.

Figure 5.2 is ordered arbitrarily by the value chains' poverty rate outcome score.⁹ Taking the maize and rice value chain as an example. Panel A displays a poverty outcome score of -1.53 for this value chain, meaning that the national poverty rate falls by 1.53 percentage points by 2028 when agricultural GDP increases by 1 percent from its initial level in the base run and such increase results from agricultural productivity growth in maize and rice production. In Panel B of Figure 5.2, the change in total GDP is 4.5 for the maize and rice value chain, which means that total GDP increases by \$4.5 million when agricultural

⁹ The simulation results of the RIAPA model in this report differ from that in Diao et al. (2023) mainly due to the differences in the data used in construction of the SAM. Using a more recent supply and use table and a set of updated statistic datasets, the 2022 SAM differs from the early 2020 SAM, but it captures better the recent structures of Tajikistan's broader economy, the AFS and value chains within the AFS. The AFS analysis and the RIAPA model simulations of this report are hence not directly comparable with Diao et al. (2023) that is based on the early 2020 SAM.

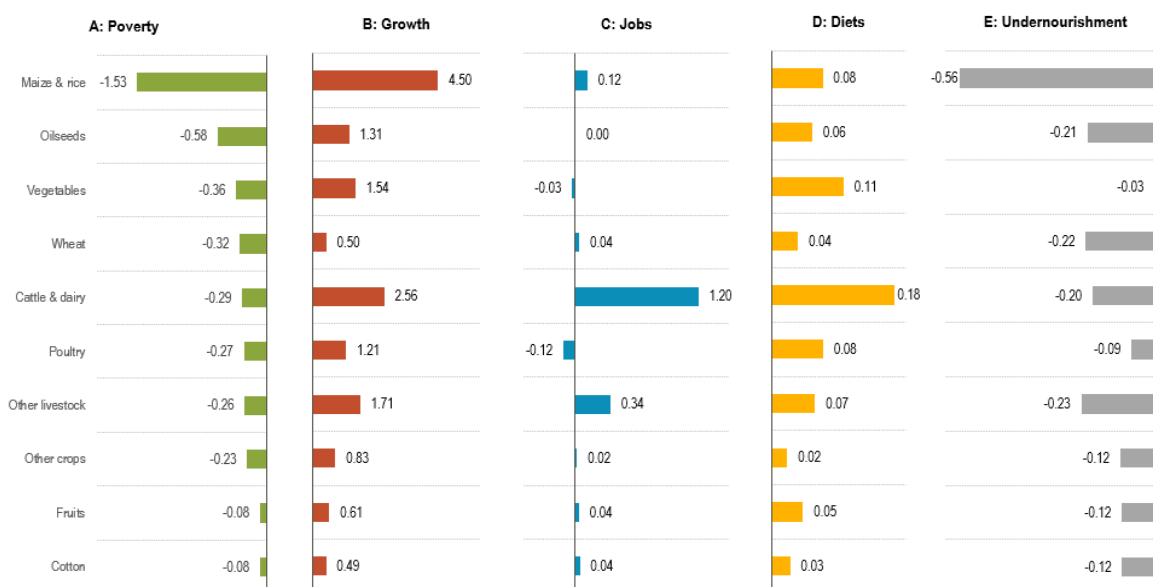
GDP increases by \$1.0 million from the targeted maize and rice value chain, that is, the growth multiplier is 4.5 in case of maize- and rice-led growth, and in total, there are 3.5 million additional increases in GDP from other agricultural sectors, off-farm components within the maize and rice value chain or in other AFS value chains, and the rest of the economy beyond the AFS. Maize is less dependent on export, and rice relies on import but is a much smaller sector than maize. Thus, productivity growth in maize and rice together releases labor and land to other agricultural sectors, leading to increased production of other agricultural sectors. The extremely high growth multiplier for the maize- and rice-led agricultural growth also comes from the linkage effects within its value chain through milling industries and through feed industries in which maize is an important intermediate. More productive maize and rice production will increase the domestic supply of milling products when prices of raw maize and paddy rice fall, and household demand for milled maize and rice will rise with an increase of household incomes. Additional increases to the non-agricultural GDP come from the feed industry. With a surge in households' incomes from agricultural growth, an increase in demand for livestock products will be more than increases in demand for cereals. Beyond direct linkages from maize and rice value chain to milling and feed industries, there are indirect linkages to trade, transport, and other service components as well as from other agricultural sectors to agroprocessing and services within the AFS or in the rest of the economy.

Panel C of Figure 5.2 shows a value of 0.12 for the maize and rice value chain, implying that economywide employment increases by 0.12 thousand persons when agricultural GDP increases by \$1.0 million due to growth in maize and rice production. The modest job creation effect of the maize and rice value chain is mainly due to their productivity growth that releases the labor from this value chain. Panel D shows the value of 0.08 for maize and rice value chain, which means that diet quality indicator¹⁰ improves by 0.08 percent with a 1-percent increase in agricultural GDP from productivity growth of this value chain. Finally, Panel E shows that the undernourishment rate decreases by 0.56 percentage points when agricultural GDP increases by 1 percent due to growth in the maize and rice value chain.

¹⁰ The diet quality is measured by the Reference Diet Deprivation (ReDD) index (see Pauw et al. 2023).

Figure 5.2 clearly shows that value chains differ significantly in terms of their effectiveness in improving different development outcomes. For example, the oilseeds value chain has a strong poverty effect ranking second (in Panel A), but it does not create jobs (see Panel C). In contrast, the poultry value chain has a strong dietary improvement effect but ranks low in the poverty and hunger outcomes. These results highlight the possible trade-offs that may appear when prioritizing individual value chains, as there is no single value chain that is the most effective at achieving every development objective. Promoting a few value chains at once will not only diversify agricultural growth but also help to simultaneously achieve multiple development objectives.

FIGURE 5.2. IMPACT OF VALUE CHAIN GROWTH ON DEVELOPMENT OUTCOMES



Source: RIAPA model results.

Note: Panel A shows the percentage point changes in poverty rate that are associated with a 1 percent increase in agricultural GDP from growth of the targeted value chain; Panel B shows the changes in total GDP (in US\$ millions) that are associated with a \$1.0 million increase in agricultural GDP from the targeted value chain; Panel C is the change in total economywide employment (in thousand persons) that is associated with a \$1.0 million increase in agricultural GDP from the targeted value chain; Panel D is the percentage improvement in diet quality that is associated with a 1-percent increase in agricultural GDP; and Panel E is the percentage point changes in the prevalence of undernourishment rate associated with a 1-percent increase in agricultural GDP from the targeted value chain. The figure is ordered by the poverty rate outcome.

A composite score combining different outcome indicators is created for a comparison of combined impacts on multiple development outcomes across the value chains, which can help narrow down the number of value chains that might be prioritized. Since the different outcome indicators have different underlying units, the individual outcomes are normalized so that they are comparable while still retaining value chains’

ranking within the outcome category. Normalization entails assigning a score of 1 to the value chain that is most effective within an outcome category and a score of 0 to the least effective value. For any targeted value chain, if the poverty outcome is positive, if the outcomes of jobs and diet quality are negative, or if the growth multiplier is less than one, the scores for these outcomes are also assigned to zero as they are identified as having adverse effects. The remaining value chains receive a score between 0 and 1 that is proportionate to their original score and relative to the highest-ranked value chain. The individual normalized scores for the outcomes are then combined into a composite score for each value chain.

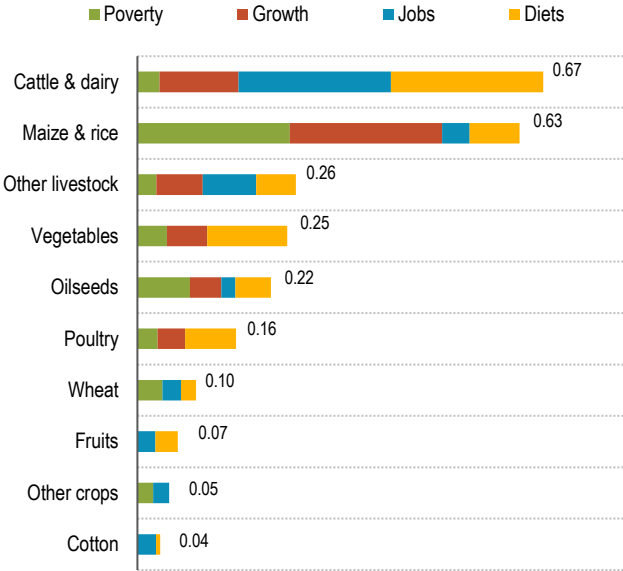
The default approach assumes that each of the analyzed outcomes is equally important, so an equal weight is assigned to each score. However, if policymakers consider a particular development outcome to be more or less important than the other outcomes, the weights assigned to each particular outcome score can be adjusted accordingly. Tajikistan has three distinct farm systems,¹¹ and they often affect the prioritization of policymakers. For example, cotton is the most important export crop, and the policymakers could prioritize it when foreign exchange earnings are the focus, and thus, the growth outcome might be the priority. However, while cotton is grown by both large enterprise farms and *dehkan* farms, policies that support cotton production may primarily benefit large farms because their cotton production is highly mechanized and more competitive internationally, leading to little improvement to poverty or diet quality. Among the three livestock value chains, poultry and eggs are mainly produced by large farms, while cattle and small ruminants are held by household farms. Prioritization of different livestock value chains could have different impacts on farm households' incomes, leading to different poverty outcomes. Farm systems are not considered in the RIAPA analysis due to a lack of disaggregated data, which constrains our ability to construct a SAM for Tajikistan that reflects its three distinct farm systems. This constraint, combined with country knowledge about the farm systems, means that different impacts to different development outcomes

¹¹ Three distinct farm systems are: (i) personal subsidiary plots including subsidiary farms of households, collective gardens and land plots under vegetables, and summer cottages; (ii) *dehkan* farms, an independent business entity created by a family/household or an individual or jointly with others who produce agricultural products by using property, land, and other natural resources that are in their private ownership; and (iii) the category of agricultural enterprises including associations and collective *dehkan* farms; inter-farms; state farms; lease enterprises; agricultural cooperatives; agrofirms; subsidiary farms of industrial, transportation, and other enterprises; and organizations.

across value chains could have certain implications about the roles different farm systems play in inclusive agricultural transformation.

Figure 5.3 presents the composite scores using equal weights across the four development outcome indicators. Because of a high correlation between poverty and hunger outcomes, we excluded the hunger indicator in the composite score to avoid a bias. Each component in the bars shows the relative contribution of a particular outcome indicator in the final score. From the discussion about the maize and rice value chains in Figure 5.2, we know that the value chain has the highest poverty and growth effects but modest effects on jobs and diet quality improvement. In the composite scores, the maize and rice value chain rank second in Figure 5.3, and the cattle and dairy value chain rank first. For cattle and dairy, it ranks first in terms of diet quality improvement and job creation and ranked second in terms of growth outcome, making it the highest-ranking value chain among all 10 value chains. While a ranking of combined impacts on multiple development outcomes based on composite scores enables us to effectively compare the growth outcomes across all value chains, helping identify and prioritize the value chains, trade-offs clearly exist within and across value chains.

FIGURE 5.3. COMPOSITE SCORE OF DEVELOPMENT OUTCOMES: EQUAL WEIGHTS



Source: RIAPA model results.
Note: The composite score is a simple average (equally weighted) of the scores for each of the four outcome categories; the figure is ordered according to the highest composite score.

6. SUMMARY AND DIRECTIONS FOR FURTHER RESEARCH

Tajikistan's economy has grown rapidly over the last 25 years. Some of this growth is a result of continuous recovery from the contraction of economic development caused by the post-Soviet civil unrest in the 1990s. Over the 2011–2022 study period, growth in Tajikistan's economy is led by both structural changes and within-sector productivity improvement in the broader economy and the agricultural sector. This growth played a key role in increasing household income and halving poverty (the national poverty rate fell to 23 percent in 2022 from 54 percent in 2007, [TAJSTAT 2024a](#)). However, compared to the broader economy, the AFS grew more slowly—4.1 percent per year compared to 7.2 percent per year, respectively—between 2011 and 2022. Despite recent progress, agricultural value added per worker remained low, the lowest one in the Central Asian region ([Khakimov et al. 2024](#)), and primary agriculture is still a relatively large sector. The domestic market played a vital role in the recent AFS growth, and a sizable portion of locally produced agrifood products in many value chains was able to meet internal demand. While Tajikistan relies heavily on agrifood imports in some value chains, both the cotton and the fruit/nut export value chains grew more rapidly than the average AgGDP+, making important contributions to AFS growth and the country's foreign exchange earnings. While agroprocessing, an important off-farm component of the AFS, grew more rapidly and thus contributed the most to off-farm AFS growth, the aggregate size of off-farm components of the AFS did not increase to match with the structural change in the broader economy. Developing off-farm components to create more nonfarm jobs within the AFS benefit households' incomes and are key to sustainable AFS transformation. Better paid jobs at higher productivity are also crucial to addressing food security, especially in a country where three-quarters of the population reside in the countryside.

Looking into the future, the RIAPA model-based assessment shows that there is no single value chain group that is the most effective in achieving all desired development outcomes, that is, broad economic growth, job creation, declining poverty, and improved diets. However, the three livestock value chains, particularly the cattle and dairy value chain, seem to have high potential for contributing to multiple development outcomes, particularly to dietary improvement, and these value chains also performed impressively in the

period between 2011 and 2022. Moreover, livestock is an important source of rural livelihood as more than 90 percent of cattle and ruminants are owned by household farms. Many such small farms are relatively poor and are expected to benefit from livestock-led growth both in terms of income and nutrition, making agricultural transformation more inclusive. However, small farm households do not own or manage any pastureland. As a result, livestock-owning household farms have to graze on marginal lands or on degraded or fragile rangeland areas with negative potential environmental outcomes (FAO/WFP 2023). This structural or institutional issue is also accompanied by a lack of improved feeding, breeding, and veterinary services for many livestock household farms (Khakimov et al. 2024). The maize and rice value chain ranks second place in the composite outcome scores in the RIAPA model-based comparison, but it seems to modestly contribute to job creation and diet quality in the comparison. Moreover, it performed disappointingly in the period between 2011 and 2022. Despite facing a series of challenges and constraints, promoting livestock and maize/rice value chains together seems to offer an effective and broad way to achieve important development outcomes. Prioritizing public investments and policies is important for addressing challenges and constraints. This paper is the first step towards prioritization. Future research for our continuous efforts to provide evidence for prioritization focuses on measuring the cost-effectiveness of different public investments and policies across value chains for achieving growth, poverty, and other development outcomes.

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APPENDIX

TABLE A1. VALUE CHAIN GROUPS AND THEIR CORRESPONDING AGRICULTURAL SUBSECTORS

Value chain groups and their share of AgGDP+	Individual value chains (or agricultural subsectors) in the group and their share of the group's agricultural GDP
Wheat (14.5%)	Wheat 100%
Maize and rice (4.1%)	Maize 74.5% Rice 24.5%
Pulses (1.9%)	Pulses 100%
Oilseeds (5.5%)	Groundnuts 7.3% Sesame 0.8% Other oilseeds (including cotton seeds, sunflower seeds, etc., dominated by cotton seeds) 91.9%
Roots (6.1%)	Irish potatoes 100%
Vegetables (19.9%)	Vegetables 100%
Fruits and nuts (13.6%)	Nuts 3.3% Fruits (including fresh and dried fruits) 96.7%
Cotton (9.4%)	Cotton 100%
Other crops (0.8%)	Tobacco 2.5% Other crops 97.5%
Cattle & dairy (9.2%)	Cattle meat 44.3% Raw milk 55.7%
Poultry (6.1%)	Poultry meat 28.0% Eggs 72.0%
Other livestock (6.8%)	Small ruminants 90.4% Other livestock 9.6%
Fish (0.3%)	Fish 100%
Forestry (2.3%)	Forestry 100%

Source: Authors' calculation based on the 2022 Social Accounting Matrix for Tajikistan (IFPRI 2024).

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IFPRI HEADQUARTERS

1201 Eye Street, NW
Washington, DC 20005 USA
Tel.: +1-202-862-5600
Fax: +1-202-862-5606
Email: ifpri@cgiar.org

IFPRI TAJIKISTAN

48 Ayni Street
Sozidanie Business Center, Block B, 4th floor
Dushanbe
Tajikistan
Phone: +992 43 3778910