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Liberalizing Trade in Agriculture between Türkiye and the European Union: A Multi-Regional Computerized General Equilibrium Analysis

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ABSTRACT

This study examines the regional impacts of agricultural trade liberalization between Türkiye and the European Union (EU), which has been excluded from their Customs Union since 1996. Motivated by recent diplomatic progress toward expanding the Customs Union to include agriculture, we employ a Multi-Regional Turkish Computable General Equilibrium (CGE) model to simulate the effects of reducing tariffs and non-tariff barriers (NTBs) by 50% (moderate scenario) and 90% (ambitious scenario). Our findings reveal significant regional disparities: while regions like the Mediterranean and Aegean stand to gain from enhanced market access, others such as Central and East Anatolia may face intensified competition from EU imports. Urban centers, notably Istanbul and Izmir, are projected to benefit from lower consumer prices, improving the affordability of agricultural products. Importantly, no region is expected to experience welfare losses; in fact, areas like Southeast Anatolia may see considerable welfare gains. These results underscore the necessity for strategic policies that align with EU standards and bolster regional competitiveness to fully harness the benefits of trade liberalization and promote equitable development across Türkiye's diverse regions.

ملخص

تبحث هذه الدراسة في الآثار الإقليمية لتحرير التجارة الزراعية بين تركيا والاتحاد الأوروبي، والتي ظلت مستثناة من الاتحاد الجمركي منذ عام 1996. واستنادا إلى التقدم الدبلوماسي الأخير نحو توسيع نطاق الاتحاد الجمركي ليشمل القطاع الزراعي، استخدمنا نموذج التوازن العام (CGE)

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التركي متعدد المناطق لمحاكاة آثار تخفيض الحواجز الجمركية وغير الجمركية بنسبة 50% (سيناريو معتدل) و90% (سيناريو طموح). وكشفت النتائج عن تفاوتات إقليمية كبيرة: فبينما قد تستفيد مناطق مثل منطقة البحر المتوسط ومنطقة بحر إيجه من تحسين فرص الوصول إلى الأسواق، قد تواجه مناطق أخرى مثل وسط وشرق الأناضول منافسة أشد من واردات الاتحاد الأوروبي. ومن المتوقع أن تستفيد المراكز الحضرية، لا سيما إسطنبول وإزمير، من انخفاض أسعار المستهلك، مما يحسن القدرة على تحمل تكاليف المنتجات الزراعية. وتجدر الإشارة أنه من غير المتوقع أن تعاني أي منطقة من خسائر في الرفاهية، بل قد تشهد مناطق مثل جنوب شرق الأناضول مكاسب كبيرة في هذا الجانب. وتؤكد هذه النتائج على ضرورة تبني سياسات استراتيجية تتماشى مع معايير الاتحاد الأوروبي وتعزز التنافسية الإقليمية لضمان الاستفادة الكاملة من تحرير التجارة وتعزيز التنمية المتوازنة عبر مختلف المناطق في تركيا.

RÉSUMÉ

Cette étude examine les impacts régionaux de la libéralisation du commerce agricole entre la Türkiye et l'Union européenne (UE), qui a été exclue de leur union douanière depuis 1996. Motivés par les récents progrès diplomatiques visant à étendre l'union douanière à l'agriculture, nous utilisons un modèle d'équilibre général calculable (EGC) multirégional turc pour simuler les effets d'une réduction des droits de douane et des barrières non tarifaires (BNT) de 50 % (scénario modéré) et de 90 % (scénario ambitieux). Nos résultats révèlent d'importantes disparités régionales : alors que des régions comme la Méditerranée et la mer Égée devraient bénéficier d'un meilleur accès au marché, d'autres, comme l'Anatolie centrale et orientale, pourraient être confrontées à une concurrence accrue de la part des importations de l'UE. Les centres urbains, notamment Istanbul et Izmir, devraient bénéficier d'une baisse des prix à la consommation, ce qui rendra les produits agricoles plus abordables. Il est important de noter qu'aucune région ne devrait subir de pertes de bien-être ; en fait, des zones telles que l'Anatolie du Sud-Est pourraient connaître des gains de bien-être considérables. Ces résultats soulignent la nécessité de politiques stratégiques qui s'alignent sur les normes de l'UE et renforcent la compétitivité régionale afin d'exploiter pleinement les avantages de la libéralisation du commerce et de promouvoir un développement équitable dans les diverses régions de la Türkiye.

Keywords: Türkiye, Agriculture, Regional Trade Agreements, Customs Union, Türkiye-EU relations, Computerized General Equilibrium (CGE) model

JEL Classification: O4, O19, F21, C23

1. Introduction

Since its establishment in 1996, the Customs Union (CU) between Türkiye and the European Union has significantly liberalized bilateral trade in manufactured goods, excluding agriculture and services. Despite additional efforts in 1998 to provide preferential access for agricultural trade, enhanced in 2007 with reciprocal concessions for certain processed agricultural products under Most Favored Nation (MFN) duty exemptions within tariff quotas, challenges remain in bilateral trade in agri-food goods. Bilateral trade in this sector remains hindered by high tariffs and non-tariff barriers (NTBs), affecting products such as meat, dairy, and cereals, often due to divergence in food standards (World Bank, 2014; Larson et al., 2016). These limitations highlight the CU's unfulfilled economic potential and market access barriers for both Türkiye and the EU. The European Commission (EC) and the Turkish government agreed in May 2015 to expand the CU, aiming to strengthen trade relations, address outstanding barriers in excluded sectors, and enhance economic cooperation between the two entities (EC, 2016; Altay, 2021: 271).

The EC and Türkiye have mutually agreed to broaden their trade liberalization efforts to include services and agriculture, aiming to enhance the existing commercial framework with new regulations on government procurement, dispute resolution, and sanitary and phytosanitary measures. Yet, the initiation of negotiations for this comprehensive upgrade awaits a formal mandate from EU member states to the European Commission. Since 2016, the momentum for upgrade talks has been hindered by political tensions between the parties (Altay, 2021: 281). Following Türkiye's general elections in May 2023, however, signs of thawing relations have emerged. A joint report on November 29, 2023, by the EU's High Representative for Foreign Affairs and Security Policy and the European Commission has highlighted the urgency of commencing negotiations to modernize the Customs Union (CU) (DEUT, 2023). EU leaders are anticipated to consider these recommendations in upcoming summits, potentially marking a critical juncture in improving trade ties between Türkiye and the EU (European Council, 2023).

Previous studies indicate that dismantling the remaining trade barriers in agriculture between Türkiye and the EU could result in significant welfare gains and commercial advantages, benefiting Turkish consumers through access to less expensive EU imports (e.g., Cakmak and Dudu, 2013; World Bank, 2014; Larson et al., 2016). The effect on Turkish farmers

and exporters is expected to be mixed, heavily dependent on the product coverage and the extent to which tariffs and NTBs are addressed in any potential agreement (Ibid.; Bektasoglu et al., 2017). However, these analyses largely overlook the differential impacts of welfare and trade across Türkiye's various regions, focusing instead on the aggregate effects at the national level. This study seeks to bridge the literature gap by examining the regional effects of EU-Türkiye agricultural trade liberalization across Türkiye's 11 regions. The article investigates whether major Turkish cities and regions experience price increases or decreases from trade liberalization, assesses whether the regional impact correlates with income levels in a progressive or regressive manner, and queries if all regions benefit from overall positive welfare impacts despite the potential uneven distribution of trade liberalization gains.

In an innovative effort, the study employs a Multi-Regional Turkish Computerized General Equilibrium (MR-T CGE) model, building on the Turkish multi-regional social accounting matrix (SAM) by Pişkin and Hannum (2017). The model simulates economic behavior based on SAM, aiming for market equilibrium. It considers Turkish demand for EU agricultural products, factoring in tariffs that affect utility and cost choices. The model encompasses 13 regions, incorporating 11 in Türkiye (including three major cities), the EU-27, and the rest of the world. The study explores two scenarios of market opening in agricultural trade between the EU and Türkiye: a moderate scenario eliminating 50% of tariffs and NTBs, and an ambitious scenario removing 90% of all barriers. The outcomes of these policy changes are interpreted in terms of trade, welfare, and price shifts across the EU and Türkiye's 11 regions.

Our investigation across ambitious and moderate scenarios, unveils marked, nuanced impacts on Türkiye's agricultural sector, contrasting with minimal welfare effects on the EU. The moderate scenario brings slight boosts to household consumption in Türkiye, driven by export growth and mild deflation, especially benefiting urban and Southeast Anatolia regions, along with welfare improvements in the Mediterranean. The ambitious scenario further amplifies these advantages, underscoring the influence of existing trade barriers. Central and Southeast Anatolia could witness price and output declines for local products, pressured by EU imports that intensify competition. Notably, EU agricultural exports to Türkiye surge more than Turkish exports to the EU, particularly in areas facing high tariffs. While the Mediterranean and Aegean regions

enjoy greater access to the EU market, Central and Southeast Anatolia face increased competition but also potential gains in specific sectors like oilseeds and maize. Importantly, no region suffers welfare losses, with Southeast Anatolia and cities such as Istanbul and Izmir benefiting from reduced consumer prices, thus improving the affordability of agricultural goods in the post-COVID-19 era.

The paper is divided into two parts: the first reviews Türkiye's agri-food sector, policies, and EU trade relations, as well as an assessment of previous research on the economic impacts of agricultural trade liberalization. The second part presents the study's methodology, data, and findings, offering insights into Turkish policy-making implications.

2. Agriculture in the Turkish Economy and Trade

In 2023, Türkiye ranks as the 17th largest global economy and 7th in Europe by nominal GDP, reflecting a diverse economic structure. Although agriculture’s contribution to GDP declined to 6.5% in 2022, the sector remains vital, employing 16% of the workforce and playing a critical role in sustaining rural livelihoods, ensuring food security, and promoting socio-economic stability, particularly in underdeveloped regions (see Table 1; FAO, 2021; OECD, 2023; Altay, 2024: 3868).

Türkiye's agricultural sector covers 38.1 million hectares, primarily used for cereal crops like wheat, maize, and barley, which account for 43.7% of production between 2016-2021. This focus on cereals aligns with national food security priorities. Concurrently, Türkiye has diversified into high-value crops such as fruits, vegetables, and nuts, which comprise 36.9% of production, driven by its diverse climate and export potential (MoAF, 2022a; WTO, 2023). As a leading livestock producer, Türkiye excels in sheep, goat farming, and dairy, producing 24 million tons of milk annually. Despite the decline in cattle farming, sheep farming is growing due to strategic advantages. However, Türkiye occasionally relies on grain and red meat imports to stabilize markets (Cakmak, 2018; OECD, 2023).

Table 1. Selected economic and sectoral indicators (%)

Macroeconomic Indicators (%)	**2009**	**2019**	**2022**
GDP (Current, billion USD)	649	760	907
GDP growth rate	-4,8	0,8	5,5
GDP growth rate per capita	-6,1	-0,6	4,4
Agricultural value added growth	4,1	3	1,3
Agricultural value added /GDP	8,1	6,4	6,5
Inflation rate (CPI)	6,3	15,2	72,3
Unemployment rate	12,6	13,7	10
Agricultural employment/total	23,1	18	16
Import/GDP	23,4	30,1	42,6
Export/GDP	23,4	33,1	38,6
Export/Import ratio	72,5	86	70
Agri-food export/import ratio	1,68	1,41	1,83
Agri-food imports/total	5	7	6
Agri-food exports/total	10	11	12
Agricultural land out of total land	50,6	49	49.5*

Source: World Bank, TurkStat

*Data for 2021

Agri-food exports rose from USD 18.3 billion in 2013 to USD 30.5 billion in 2022, maintaining a positive trade balance (Table 2). With an export-to-import ratio of 1.83, Türkiye exports fruits, nuts, and processed foods, primarily to the EU, Iraq, and the U.S. Import surges, especially in wheat, cotton, and soybeans, address shortages and support domestic processing (IO, 2022; WTO, 2023). Figure 1 lays out Türkiye's agri-food exports and imports with the EU in product categories. While Türkiye maintains a trade surplus with the EU in fruits, it faces a deficit in cereals. From 2010 to 2022, meat exports surged from USD 208 million to USD 1.14 billion, and fruit exports grew significantly. However, cereal and dairy imports rose to USD 3.39 billion in 2022 (MoAF, 2022a, 2022b).

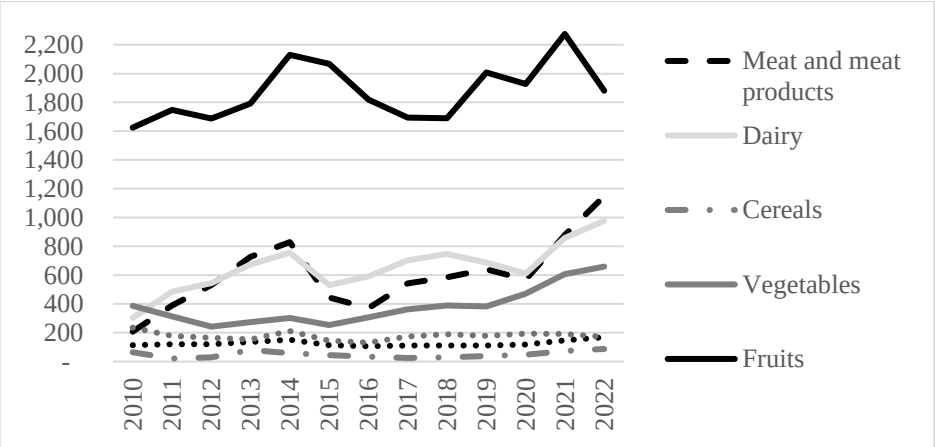
Table 2: Turkey's Exports and Imports in 2022, thousand USD

Category	Exports	Imports	Net exports
Edible fruit and nuts	4.943.278	1.073.578	3.869.700
Preparations of vegetables, fruit, nuts	3.079.618	248.142	2.831.476
Preparations of cereals, flour, starch or milk	2.627.286	282.049	2.345.237
Product of milling industry	1.900.663	287.292	1.613.371
Fish and crustaceans, mollucs and other aquatic invertebrates	1.549.461	304.636	1.244.825
Edible Vegetables	2.111.359	931.880	1.179.479
Meat and edible offal	1.148.991	140.580	1.008.411
Dairy produce	977.556	134.714	842.842
Sugars and sugar confectionery	1.070.145	625.467	444.678
Tobacco	841.090	752.761	88.329
Miscellaneous edible preparations	1.040.771	794.841	245.930
Preparations of meat	268.387	24.218	244.169
Live trees and other plants	138.252	47.535	90.717
Coca and cocoa preparations	942.579	648.038	294.541
Beverages, spirits and vinegar	547.908	770.379	-222.471
Products of animal origin	102.998	82.427	20.572
Vegetable plaiting materials	38.289	16.386	21.903
Lac	47.585	82.913	-35.327
Coffee, tea, mate and spices	285.673	530.759	-245.086
Animal or vegetable fats and oils and their cleavage products	3.538.977	4.104.938	-565.960
Live animals	129.006	180.905	-51.899
Residues and waste from food industries	1.151.664	2.468.538	-1.316.874
Oil seeds and oleaginous fruits	701.422	3.306.899	-2.605.477
Cereals	688.542	5.368.591	-4.680.049

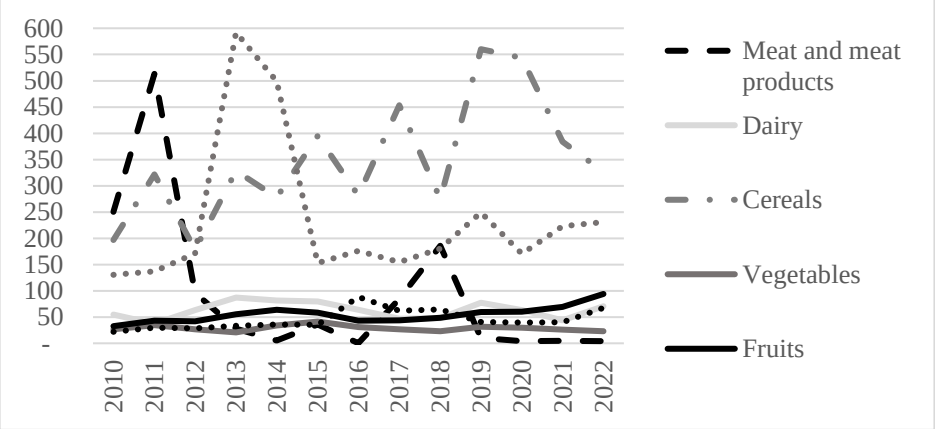
Source: UN Comtrade

Figure 1: Türkiye's agri-food trade with the EU in product categories

1a: Türkiye's Exports to the EU (thousand USD)



1b: Türkiye's Imports from the EU (thousand USD)



Source: UN Comtrade

2.1. Regional Dynamics of Agriculture

Agriculture's role across Türkiye's 11 regions varies significantly due to distinct climatic conditions, resource endowments, and economic structures (Figure 2). Table 3 outlines key regional indicators, while Table 4 details the regional distribution of agricultural production by value. Table 5 presents Türkiye's regional agri-food exports by product group, whereas import data are unavailable.

Istanbul, while contributing 30% to national GDP, derives only 0.6% from agriculture, highlighting its urban economic orientation and the potential for expanding agri-food trade through processed products leveraging logistical advantages (Cakmak, 2018). The Marmara region, surrounding Istanbul, balances consumer and producer welfare, with agriculture contributing 6.7% to regional GDP (MoAF, 2022a, 2022b).

The Aegean and Mediterranean regions are pivotal in agricultural output and exports. The Aegean region, with key cities like Izmir, specializes in high-value crops such as olives, tobacco, and fruits, contributing significantly to both domestic markets and exports (MoAF, 2022a). The Mediterranean region stands out by contributing 22.5% to national crop output in 2021, primarily from fruits and vegetables, underscoring its dual role in domestic consumption and exports (MoAF, 2022a; WTO, 2023).

Conversely, regions like Central and Southeast Anatolia focus on grains and livestock. Central Anatolia, encompassing Ankara, is significant for grain production and livestock, although it faces challenges in productivity and market access (Cakmak and Dudu, 2013). Southeast Anatolia, the most underdeveloped region, emphasizes grains and meats, indicating efforts towards import-competing production despite domestic demand challenges and infrastructural limitations (MoAF, 2022b).

The East Black Sea region dominates in hazelnut production, a key export commodity for Türkiye, highlighting regional specialization based on comparative advantages (MoAF, 2022a). These regional disparities in agricultural production and economic contribution necessitate tailored policy interventions to promote equitable development and harness each region's potential effectively.

Figure 2: The map for 11 regions of Türkiye

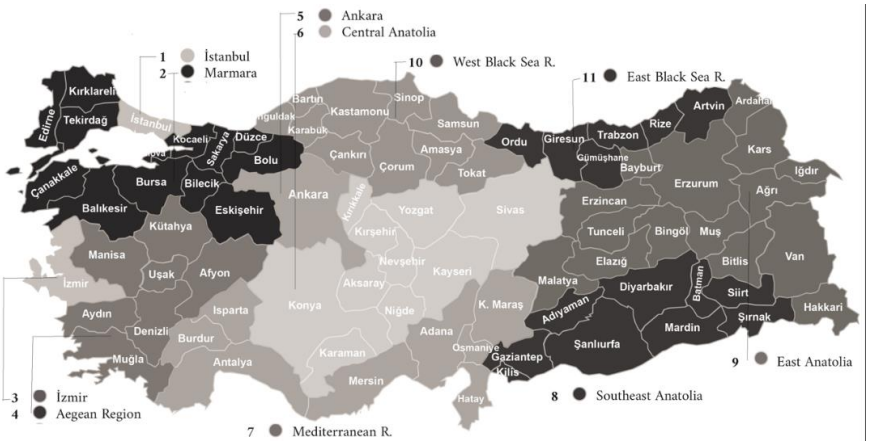


Table 3: Selected regional indicators

Regions	Population (2022*)	Share in GDP (2022, %)	Regional Income Relative to Turkish Avg. (2022)	Share in Sector Contribution to GDP (2020, %)	Share of Food within Household Expenditure (2017-19, %)
Istanbul	16.103.390	30,4	1,79	0,6	15,9
Marmara	12.429.162	16,3	0,93	14,3	20,2
Izmir	4.531.689	6,5	1,20	4,2	18,5
Aegean R.	6.426.616	6,4	0,75	13,6	21,5
Ankara	5.957.446	8,9	1,71	2,6	18,3
Central Anatolia	6.672.931	6,2	0,63	15,3	24,1
Mediterranean R.	10.919.260	9,6	0,69	15,2	22,3
Southeast Anatolia	8.540.173	6,3	0,45	10,2	27,1
East Anatolia	6.110.832	3,4	0,50	10,0	27,0
West Black Sea	4.665.375	3,8	0,67	8,5	23,8
East Black Sea	2.705.967	2,2	0,67	4,4	24,2

Source: TurkStat

Table 4: Regional distribution of agricultural production in value (%)

	Crops *			Animal Products			Livestock	
Regions	**2020**	**2021**	**Regions**	**2020**	**2021**	**Regions**	**2020**	**2021**
Mediterranean	21,92	22,45	**Central Anatolia**	17,52	18,45	**East Anatolia**	19,81	18,912
Marmara	14,05	15,97	**East Anatolia**	18,31	18,41	**Central Anatolia**	18,19	18,11
Central Anatolia	15,88	15,76	**Marmara**	11,69	11,61	**Marmara**	11,9	12,75
South East Anatolia	14,01	13,44	**Aegan**	11,79	11,14	**Aegan**	11,78	11,81
Aegan	11,52	10,85	**South East Anatolia**	11,19	10,79	**South East Anatolia**	11,65	11,04
West Black Sea	7,54	6,85	**Mediterranean**	9,66	9,35	**Mediterranean**	8,96	9,57
East Black Sea	5,02	4,64	**West Black Sea**	7,77	8,14	**West Black Sea**	7,07	7,05
East Anatolia	4,22	4,38	**Izmir**	4,64	4,63	**Ankara**	3,72	3,94
Izmir	3,00	3,12	**East Black Sea**	4,38	4,13	**Izmir**	3,98	3,89
Ankara	2,59	2,22	**Ankara**	2,17	2,54	**East Black Sea**	2,33	2,32
Istanbul	0,26	0,32	**Istanbul**	0,89	0,80	**Istanbul**	0,61	0,62
Total	100	100		100	100		100	100

Source: Authors' calculation based on annual production values of cities given in Turkish lira by TurkStat

*Includes cereals, vegetables, fruits and other products

Table 5: Türkiye's agri-food exports in product groups divided for 11 regions, thousand USD (2022)

	% of Total	Total	Cereals, Oil Seeds & Preparations	Fruits, Vegetables & Preparations	Animal Products & Sea Food	Hazelnut & Preparations	Tobacco	Olive & Olive Oil
Regions	100,0	35.210.470	15.589.167	9.316.048	5.304.894	2.385.021	1.519.821	748.993
Istanbul	16,2	5.700.344	3.323.212	931.800	626.484	583.562	168.820	66.466
Marmara	20,2	7.110.540	3.787.701	1.283.235	1.150.232	601.027	173.408	114.937
Aegean	15,5	5.455.736	959.408	1.950.424	1.607.501	61.865	600.497	276.041
Southeast Anatolia	13,4	4.723.868	3.946.098	609.639	140.581	9.375	2.913	15.262
Mediterranean	12,1	4.253.287	1.452.166	2.241.251	417.958	33.588	42.860	65.465
Izmir	8,9	3.136.055	688.888	1.181.887	521.375	49.931	521.420	172.554
East Black Sea	5,4	1.885.153	274.097	279.039	307.981	1.016.961	6.785	290
Central Anatolia	4,4	1.535.230	873.449	335.573	301.614	1.525	407	22.662
Ankara	1,5	526.378	226.659	187.050	97.383	666	407	14.213
West Black Sea	1,3	457.958	6.506	7.756	83.049	13.784	-	337
East Anatolia	1,2	425.921	50.982	308.394	50.736	12.737	2.304	768

Source: Turkish Exporters Assembly

2.2. Policy Environment and Instruments: Türkiye vs. EU

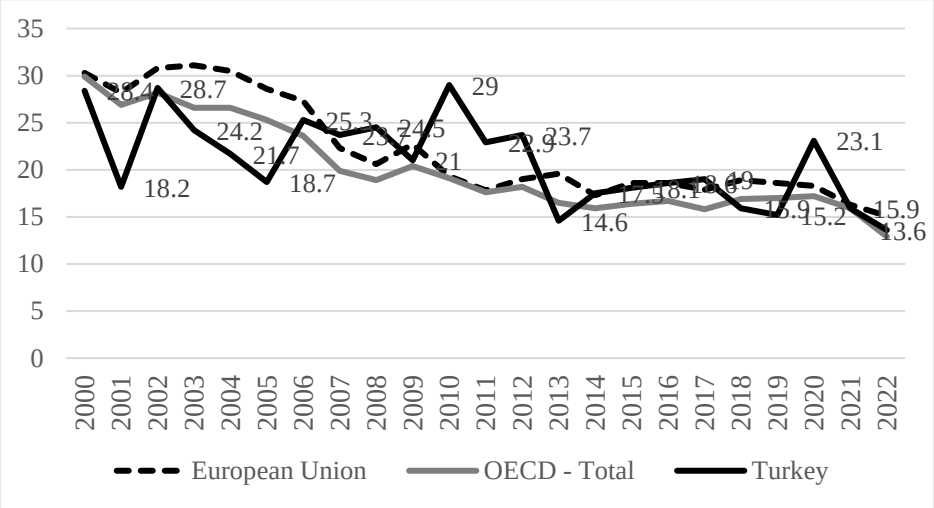
Türkiye's agricultural policy framework, guided by the Eleventh Development Plan (2019-2023) and the Ministry of Agriculture and Forestry's Strategic Plan (2019-2023), aims to transform the sector into a competitive, market-driven force providing diversified, high-quality, and affordable food (EC, 2022; WTO, 2023). Key priorities include food security, self-sufficiency, and enhanced productivity and resilience to climate and market fluctuations (FAO, 2021; OECD, 2023).

Since the mid-1990s, reforms—aligned with WTO commitments and supported by the IMF and World Bank—have shifted focus from subsidies to consumer-oriented policies. Türkiye reduced export subsidies and now implements over 120 support tools, including income support,

subsidies for diesel and fertilizers, and agricultural insurance schemes (Cakmak and Dudu, 2011; OECD, 2023; Altay, 2024: 3879-3880). Despite efforts to reduce it, producer support remained above the OECD average until recently (Figure 3). Investments in mechanization, irrigation, and soil improvement continue to boost productivity, but Türkiye faces challenges in fully integrating into global value chains due to infrastructural and regulatory hurdles (FAO, 2021).

Türkiye has made strides in aligning with WTO agreements by phasing out export subsidies; however, significant trade barriers with the EU and other partners persist. These barriers are marked by tariff peaks and stringent non-tariff measures. Figure 4 illustrates the tariff structures of Türkiye and the EU, with Figure 4a comparing MFN applied tariff lines, and Figures 4b and 4c showing average tariffs and tariff peaks by product groups. Türkiye, ranking among OECD countries with the highest MFN tariffs on agricultural imports, diverges from EU trade policies, which also impose substantial tariff barriers.

Figure 3. Producer support (PSE), Share of gross farm receipts (%) 2000 – 2022



Source: OECD

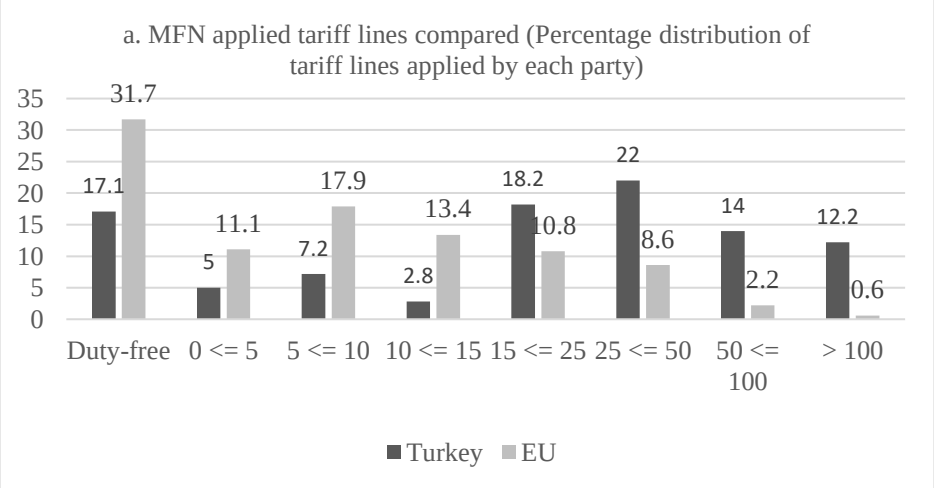
Türkiye's agricultural tariffs average 18.8%, significantly higher than the EU's 8.1% (WTO, 2020, 2023). For example, meat and dairy products are subject to tariffs of 134.9% and 106.4%, respectively. Türkiye's inward processing customs regime (IPR) mitigates some of these barriers by

exempting intermediate imports used in domestic production from tariffs. Temporary tariff adjustments are also used to stabilize prices for key commodities like beef and wheat (Cakmak, 2018). The exclusion of key agricultural commodities from the existing Türkiye-EU Customs Union, along with a reliance on preferential trade agreements, highlights the concern for sensitive sectors like meat, cereals, dairy, and sugar, which face high tariffs to protect domestic producers.

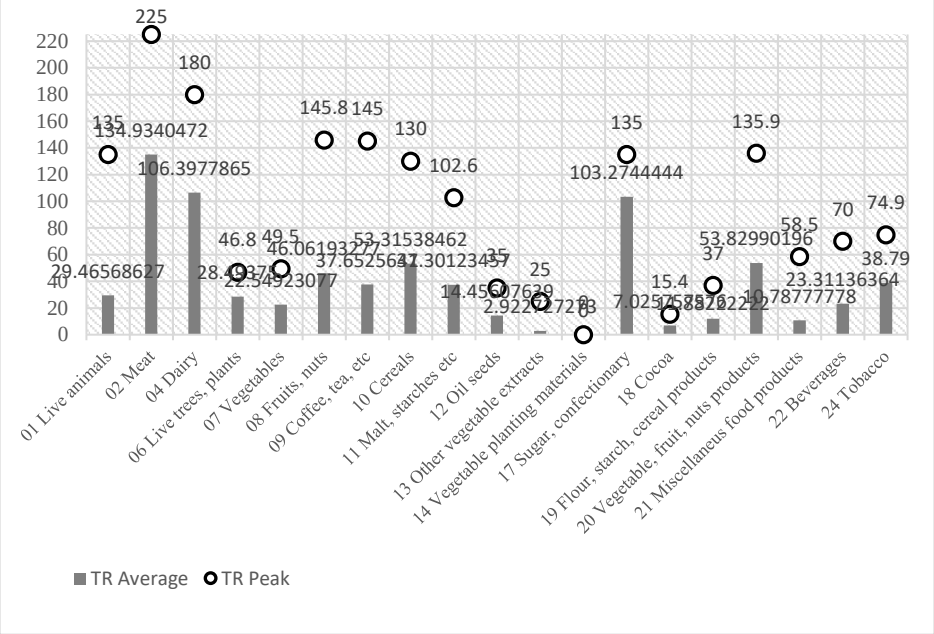
Figure 5 gives the ad valorem tariff equivalents of non-tariff barriers NTBs calculated by Bektasoglu et al, 2017. NTBs pose significant challenges to Türkiye-EU trade, particularly in sectors like cereals, dairy, horticulture, and livestock, often exacerbating the effects of tariffs. These barriers arise from regulatory, administrative, and technical discrepancies, leading to elevated trade costs for both Turkish and EU exporters. Varying food safety standards, arbitrary application of NTBs, and sanitary and phytosanitary (SPS) discrepancies further hinder trade. Despite Türkiye's alignment efforts through initiatives like IPARD, compliance gaps persist due to the 1995 Customs Union's exclusion of primary agriculture and SPS measures (World Bank, 2014; Dawar et al., 2018; Altay, 2024: 3880-3881). Harmonizing standards is essential for reducing these barriers.

Figure 4. The tariff structure of Türkiye and the EU compared

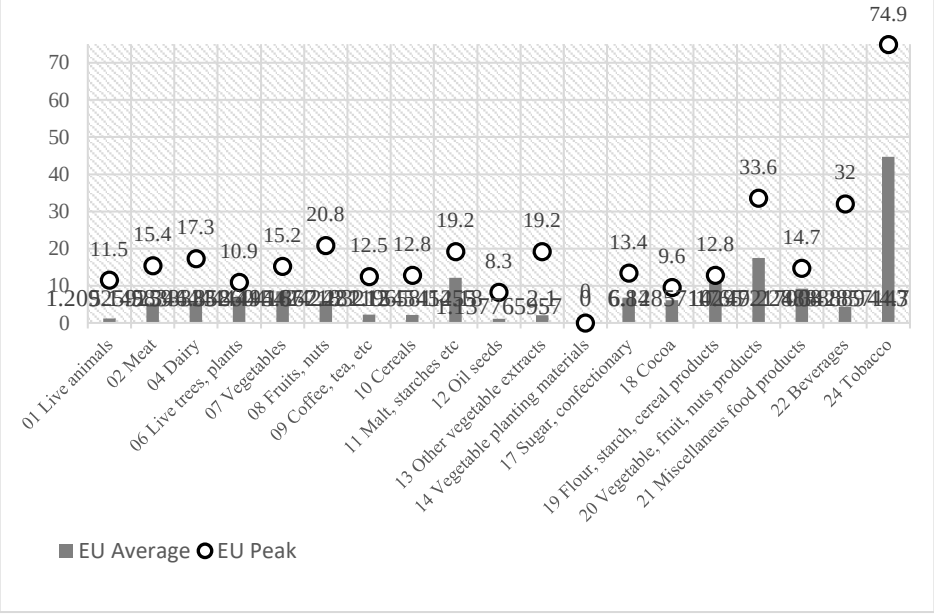
4 a: MFN applied tariff lines compared (Percentage distribution of tariff lines applied by each party)



4 b: Türkiye's average tariffs and tariff peaks in product groups.

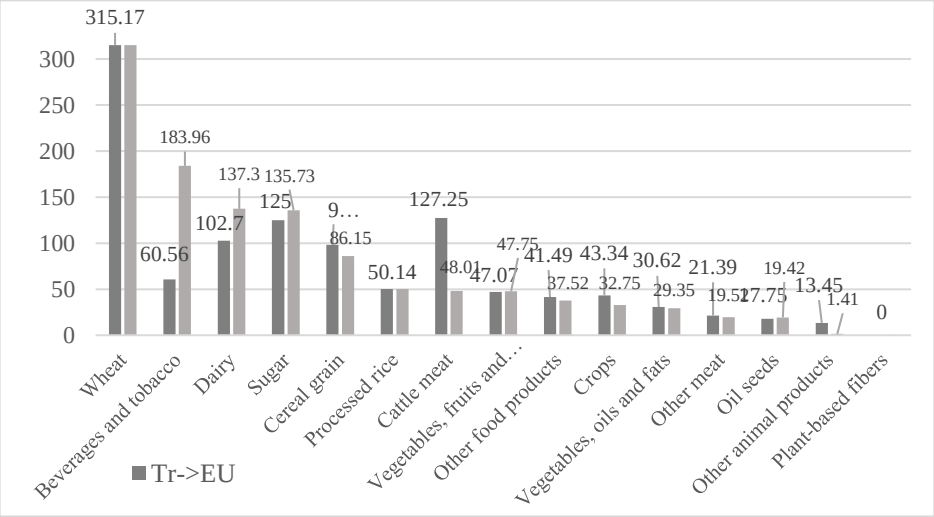


4 c: EU's average tariffs and tariff peaks in product groups.



Source: WTO (2020)

Figure 5: Ad valorem tariff equivalents of NTBs



Source: Bektasoglu et al, 2017.

3. Literature on Türkiye's Agri-food Trade Liberalization

The economic implications of agricultural trade liberalization between Türkiye and the EU have been extensively analyzed, with a consensus that liberalization would have a minimal impact on the EU's welfare but significant effects on Türkiye's economy.[1] Empirical studies using various modeling approaches, including CGE models, have projected that Türkiye could experience real GDP increases ranging from 0.5% to 2.13% annually, depending on the depth and scope of liberalization (Cakmak and Dudu, 2013; Yalcin et al., 2016; EC, 2016).

Cakmak and Dudu (2013), using a dynamic CGE model, found that eliminating tariffs and NTBs in agricultural trade between Türkiye and the EU could result in significant overall welfare gains for Turkish households, particularly under EU accession or full adoption of the Common Agricultural Policy (CAP). These gains are driven by increased access to lower-cost EU imports and enhanced export opportunities for Turkish producers. Similarly, Yalcin et al. (2016) noted that extending the CU to include agriculture and services could raise Türkiye's GDP by up

[1] Surveys of the literature on Turkish agriculture in the context of trade policies and liberalization can be found at Burrell and Oskam (2005), Leuwen et al (2011); Cakmak and Dudu (2013); and Larson et al (2016).

to 2.13%. Welfare gains depend on the depth of integration and trade barrier elimination. An ambitious scenario in the European Commission's 2016 impact assessment predicted a 1.44% GDP increase for Türkiye through comprehensive FTAs covering agriculture, services, and public procurement. Conversely, a modest scenario involving a full FTA, reintroducing rules of origin in industrial trade, could slightly reduce welfare by offsetting agricultural liberalization benefits (EC, 2016).

Studies consistently show that trade liberalization would expand Türkiye-EU bilateral trade, though with asymmetric benefits favoring the EU. The EC (2016) estimated EU exports to Türkiye could increase by €27.1 billion under ambitious liberalization, surpassing Türkiye's expected gains, due to the EU's competitive advantage and Türkiye's higher initial protection levels (EC, 2016). De Santis (2000) and Bekmez (2002) highlighted potential trade diversion, where Türkiye's exports to other markets could decline as a result of preferential access to the EU. Yalcin et al. (2016) warned that reverting the CU to a free trade agreement (FTA) could decrease Türkiye's GDP by 0.81%, emphasizing the need for deep integration. The Turkish Ministry of Economy (2014) projected that eliminating tariffs would boost Türkiye's exports by 3.3% and the EU's by 21%, reflecting Türkiye's higher tariffs in 2013 and underscoring the need for careful negotiation for an equitable distribution of gains from trade.

Agricultural trade liberalization is expected to have mixed effects across sectors. Türkiye's fruits and vegetables sectors are projected to expand due to rising EU demand and the removal of NTBs, which currently limit market access (Nowak-Lehmann et al., 2007; Cakmak and Kasnakoğlu, 2003). However, sectors like meat, dairy, cereals, and sugar could face increased competition from EU imports (Grethe, 2004; Cakmak and Dudu, 2013). Cakmak and Dudu (2013) found that wheat, rice, and other cereal production might decline under liberalization, while oilseeds and maize could grow due to comparative advantages. The EC (2016) projected a 10.27% decline in Türkiye's cereal sector value added under an ambitious FTA, signaling vulnerabilities. Larson et al. (2016) noted that extending the CU to agriculture and adopting the CAP could raise imports in sectors like fruits, nuts, and meat, but also boost exports, particularly in vegetable oils, sugar, and dairy. This highlights the complex balance between heightened import competition and new export opportunities depending on product groups.

The literature emphasizes the critical role of NTBs, and sanitary and phytosanitary (SPS) alignment in achieving significant trade liberalization gains. The World Bank (2014) and Larson et al. (2016) argue that Türkiye must substantially upgrade its regulatory frameworks, inspection capabilities, and SPS compliance to meet EU standards. Dawar et al. (2018) further note that harmonizing regulations requires infrastructural investments. The World Bank (2010) estimated that Türkiye would need approximately €2 billion to modernize agri-food enterprises, particularly in fish, dairy, meat, and livestock by-products, to align with EU food safety standards.

The literature indicates that while liberalization may yield welfare gains for Türkiye, it could impose adjustment costs on sensitive sectors and regions. Cakmak and Dudu (2013) recommend policy measures such as income support, training programs, and investments in productivity-enhancing technologies to support affected producers. Eruygur (2012) suggests that adopting aspects of the EU's CAP, including direct payments and market support mechanisms, could mitigate negative impacts. However, integrating CAP elements may divert resources from more productive sectors, requiring a balanced approach to policy design.

Most studies emphasize national-level impacts, with limited focus on Türkiye's regional disparities. Given the diverse economic structures across regions, trade liberalization effects could be uneven, requiring region-specific analysis and policies. Cakmak and Dudu (2013) hinted at potential regional variations but did not explore the spatial dimensions in depth. This gap highlights the importance of studies like the present one, which assesses the regional distribution of welfare and trade effects, offering a more granular understanding to inform targeted policy interventions.

In summary, research suggests that agricultural trade liberalization between Türkiye and the EU holds potential for significant welfare and economic gains for Türkiye, depending on the depth of integration and treatment of NTBs. However, benefits may not be uniformly distributed across sectors or regions, with challenges including regulatory alignment, infrastructural needs, and adverse effects on sensitive industries. Policymakers should adopt comprehensive strategies to enhance competitiveness, support affected sectors, and ensure compliance with EU standards, with careful negotiation and policy planning essential to maximize gains while mitigating risks.

4. The Multi-Regional CGE Model for Türkiye

To analyze the regional impacts of agricultural trade liberalization in Türkiye, we employ a multi-regional Computable General Equilibrium (CGE) model based on a Social Accounting Matrix (SAM). This model incorporates detailed data from the revised Multi-Regional SAM (MRSAM) by Pişkin and Hannum (2017), which includes comprehensive regional employment and trade flow information from the Turkish Statistical Institute. Building on Yeldan et al. (2012) and utilizing data from the World Input-Output Database (Timmer et al., 2015), the model covers Türkiye's 11 regions, its three largest cities, the EU, and the rest of the world to quantify the nuanced effects of trade policy changes on regional economies.

4.1. Description of the Model

The Multi-Regional Trade Equilibrium Computable General Equilibrium (MRTE CGE) model, grounded in Arrow and Debreu's (1954) classical economic theory, operates in a static framework assuming perfect competition. It features firms optimizing costs and households maximizing utility within fixed budgets, employing Cobb-Douglas functions for production and utility. Parameters are calibrated to 2015 data, assuming market equilibrium, zero economic profits, and full income expenditure, with a focus on short-term outcomes due to fixed factor supplies.

The model includes a SAM spanning 13 regions and 8 sectors, encompassing the EU's 27 member states and classifying the UK within the Rest of the World (ROW). Türkiye is modeled with consolidated sectors like banking, government, and investment, reflecting the distribution of local economic activity. The model uses Armington aggregation to combine regional outputs, incorporating taxes and tariffs to simulate trade interactions between Türkiye, the EU, and ROW (Armington, 1969).

Economic actors—households, firms, and governments—engage in transactions aimed at utility maximization and cost minimization. Households, endowed with labor, interact with banks and government entities through taxes and pensions. Enterprises, with regional capital, and domestic banks focusing on investment, form part of the financial system, maintaining trade balances among Türkiye, the EU, and ROW. The model

assumes a single currency, simplifying exchange rate complexities and enhancing analysis of trade liberalization impacts.

4.2. Description of Data

The MRSAM compiles data from various sources, starting with an international SAM and disaggregating the Turkish component regionally, following the methodology by Piskin and Hannum (2017). This study enhances the matrix by incorporating agricultural tariffs and NTBs for Türkiye and the EU. Türkiye's agricultural tariffs average 18.8%, higher than the EU's 8.1% (WTO, 2020). NTBs are significantly higher, with Türkiye at 86.15% and the EU at 47.07% (Bektaşoğlu et al., 2017). These NTBs are incorporated as efficiency parameters, reflecting regulatory impacts on issues like chemical use and food safety (e.g. Fugazza & Maur, 2008; Andriamananjara et al 2003).

4.3. Description of the Scenarios

Recent analyses have examined agricultural trade liberalization scenarios between the EU and Türkiye, particularly in the context of enhancing the CU. With Türkiye's EU membership or adoption of the EU's CAP unlikely in the near term (World Bank, 2014; EC, 2016), this study excludes these possibilities. Instead, it focuses on two realistic scenarios from the European Commission (2016), aimed at reducing bilateral tariffs and NTBs through sector-specific free trade agreements, categorized as *moderate* or *ambitious*. The May 2015 Türkiye-EC protocol suggests aligning SPS measures to reduce NTBs by harmonizing food safety standards (Altay, 2021: 271). Using the MRTE CGE model, our study simulates the impact of tariff and NTB reductions under two scenarios: a 50% reduction for the moderate scenario and a 90% reduction for the ambitious one. The simulations, using the General Algebraic Modeling System - Mathematical Programming System for General Equilibrium (GAMS-MPSGE) framework, adjust baseline agricultural values to reflect these policy changes.

5. Simulation Results and Discussion

The analysis of tariff revenue under both liberalization scenarios reveals a modest fiscal impact on Türkiye's government income due to reduced tariff revenues. These reductions, outlined in Table 6, predict a decrease of approximately 46 million USD for a 50% reduction in tariffs and 89 million USD for a 90% reduction. This accounts for only 0.03% to 0.05%

of Türkiye's total government revenue and expenditure. Negative impacts of this minor fiscal downsizing would be offset by economic growth driven by increased trade. Relative to the size of the EU economy, revenue losses in the EU due to liberalization are smaller still.

Table 6: Tariff revenue losses (Million USD)

Region	Scenario 1: 50% Barrier Reduction	Scenario 2: 90% Barrier Reduction
EU	65	120
Turkey	46	89

Table 7: Simulation results for price, trade, and welfare changes (%)

Scenario 1	Price	Trade	Welfare	Scenario 2	Price	Trade	Welfare
50% barrier reduction	CPI	Exports	Household Real Consumption	90% barrier reduction	CPI	Exports	Household Real Consumption
EU	0,00	8,70	0,00	**EU**	0,00	16,80	0,00
Istanbul	-0,10	4,30	0,10	**Istanbul**	-0,20	7,60	0,20
Marmara	0,00	3,50	0,00	**Marmara**	-0,10	6,40	0,10
Izmir	-0,10	4,10	0,20	**Izmir**	-0,10	7,30	0,20
Aegean	0,00	3,30	0,10	**Aegean**	0,00	6,10	0,10
Ankara	-0,10	4,00	0,10	**Ankara**	-0,10	7,10	0,20
Central Anatolia	0,00	3,50	0,10	**Central Anatolia**	0,00	6,30	0,10
Mediterranean	0,00	3,90	0,20	**Mediterranean**	-0,10	7,00	0,30
South East Anatolia	-0,10	3,90	0,10	**South East Anatolia**	-0,10	7,00	0,20
East Anatolia	0,00	3,30	0,00	**East Anatolia**	0,00	6,10	0,00
West Black Sea	-0,10	3,70	0,10	**West Black Sea**	-0,10	6,70	0,20
East Black Sea	0,10	3,30	0,10	**East Black Sea**	0,10	6,10	0,20

Table 7 summarizes the regional impacts of trade liberalization on the EU and Türkiye's 11 regions. The moderate scenario, with a 50% reduction in tariffs and non-tariff barriers, stimulates export growth and reduces prices, boosting household consumption, particularly in urban and Southeast Anatolia regions. The Mediterranean region experiences the largest welfare increase of 0.2. In contrast, the ambitious scenario, with a 90% reduction, significantly amplifies these effects. The impact on exports nearly doubles, especially in the EU, and Turkish regions such as Istanbul, Marmara, and Izmir see substantial welfare gains, lower

consumer prices, and increased household consumption. These results highlight the potential of deeper liberalization to stimulate economic activity and improve living standards, though regional benefits vary.

The analysis underscores the importance of assessing bilateral trade dynamics, tariff frameworks, and the regional distribution of economic activity to enhance output, trade, and consumer welfare.

5.1. Price Changes

Trade liberalization between Türkiye and the EU is expected to boost demand for agricultural goods while lowering Turkish domestic agricultural prices, though those in the EU are barely affected. Our analysis reveals minor deflationary impacts in key Turkish cities such as Istanbul, Izmir, and Ankara, potentially lowering local prices to benefit consumers amidst post-Covid-19 economic recovery. Only the Eastern Black Sea region might see slight price rises driven by increased export demand, especially for hazelnuts. Other areas such as the Mediterranean and Aegean, with their fruits and vegetable exports, and Eastern Anatolia, crucial for meat and grain production, experience minimal price alterations, indicating diverse regional effects from the liberalization process.

5.2. Trade Changes and Implications

The agricultural trade liberalization process between Türkiye and the EU is expected to substantially reshape Türkiye's agricultural sector under both moderate and ambitious liberalization scenarios. This transformation will affect its regions differently, with some benefiting from increased market access, while others face challenges due to heightened import competition and shifting production dynamics. Türkiye’s agricultural imports from the EU are projected to rise more significantly than its exports, due to higher historical barriers for EU imports into Türkiye. Despite this, Turkish agri-food exports are expected to grow, though unevenly across regions. The cuts of tariffs and NTBs should facilitate smoother trade flows, allowing Türkiye to leverage its competitive advantages in specific agricultural sectors.

In the 90% liberalization scenario, wealthier regions like Istanbul, Aegean, and Mediterranean, known for high-value export crops such as olives and citrus fruits, are projected to benefit substantially from EU market access. The Mediterranean region, in particular, could experience a 0.30% increase in

household real consumption and a 7% rise in exports, reflecting its strength in fruit and vegetable production. The Aegean region could also see gains in olive and olive oil product exports, demonstrating the importance of region-specific competencies under trade liberalization. Conversely, regions such as Central and East Anatolia, with modest export growth and stable consumer price indices (CPIs), may struggle to expand their market presence in the EU. These regions, producers of currently protected commodities targeting the domestic market like grains and cereals, may not benefit as much due to competition from the EU.
Agricultural imports from the EU are expected to increase by 8.7% under the modest scenario and 16.8% under the ambitious scenario, with regional variations depending on local economic structures. Regions like Southeast Anatolia, which depend heavily on imports of goods like meat, may experience greater import pressures, while stronger agricultural regions may see smaller increases, primarily in commodities outside their competitive advantage.

5.3. Welfare Changes

Our analysis of welfare changes reveals varied outcomes across Türkiye, reflecting regional disparities, which aligns with expectations from the broader literature. Welfare impacts, measured by household real consumption changes, range from 0 to 0.3%, with no significant welfare shifts in the EU, suggesting its agricultural sector may be largely resilient to liberalization with Türkiye.

Significantly, no Turkish region experiences a welfare decline, indicating generally positive outcomes, though benefits are uneven. Istanbul and Izmir, benefiting from reductions in the cost of living, show increases in real consumption. Istanbul registers gains of 0.10% to 0.20%, driven by enhanced purchasing power. Ankara's welfare boost may result from its strategic economic role and potential increases in government spending driven by liberalization.

The Mediterranean region also sees significant welfare gains, with household real consumption rising 0.3% in the ambitious scenario, driven by both productivity gains and increased output in key export sectors like fruits, vegetables, olives, and tobacco. Izmir and the Mediterranean reflect how enhanced trade conditions benefit regions with strong, globally competitive agricultural sectors. In contrast, Central and East Anatolia

show minimal welfare changes, likely due to the reliance of their agricultural sector on domestic demand for meat and grains. Southeast Anatolia, despite developmental challenges, records welfare improvements comparable to Istanbul, reflecting gains in consumer surplus from grains and livestock, capitalizing on improved EU trade terms.

5.4. Policy Implications

These findings emphasize the need for region-specific strategies to ensure the equitable distribution of the benefits of trade liberalization across Türkiye's 11 regions, to ensure broad-based political support. Targeted interventions should focus on regions facing adjustment challenges while enhancing gains in those that already benefit. Our analysis underscores the varied impacts of EU-Türkiye agricultural liberalization, calling for policies that integrate agriculture with broader rural development efforts. Aligning these strategies with Türkiye's national goals and regional economic profiles will help translate trade liberalization into sustainable development and equitable economic gains, fostering both regional resilience and national growth.

Regions like Istanbul, Izmir, and the Mediterranean stand to benefit from export growth and welfare improvements in sectors such as fruits, vegetables, and livestock. However, regions like Central and East Anatolia may face challenges due to increased EU import competition, particularly in cereals. To mitigate these effects, policymakers should implement targeted support mechanisms, including productivity enhancements, diversification strategies, and government aid. Regions negatively impacted by liberalization will need customized support, while sectors with export potential should receive enhanced technological investments, improved market access, and infrastructure development. Strategic branding and value-added production are also essential to strengthen Türkiye's presence in EU markets (FAO 2021; OECD 2023).

Addressing NTBs is crucial for maximizing trade liberalization benefits. Efforts should focus on regulatory alignment and implementation, customs facilitation, and meeting EU food safety and phytosanitary standards to boost Turkish agricultural exports (Larson et al., 2016; World Bank, 2014; Altay 2018). In updating the CU, Türkiye should prioritize reducing barriers for strategic export sectors while protecting vulnerable

ones. Negotiating lower tariffs for high-tariff EU products, such as tobacco and fruits, alongside safeguards for sensitive goods, would support smoother adjustments and enhance economic resilience amid liberalization challenges.

6. Conclusion

This study provides a nuanced analysis of the regional impacts of agricultural trade liberalization between Türkiye and the EU using a Multi-Regional CGE model. The study contributes to the literature by highlighting the critical role of regional dynamics in trade policy outcomes, offering valuable insights for future negotiations and policy formulation. The findings indicate that liberalization, especially under an ambitious 90% reduction in tariffs and NTBs, yields overall positive welfare effects for Türkiye without causing regional welfare losses.

Urban centers like Istanbul and Izmir are poised to benefit from decreased consumer prices, enhancing the affordability of agricultural products and stimulating household consumption. Regions such as the Mediterranean and Aegean stand to gain from increased exports in fruits, vegetables, and specialized crops, leveraging their competitive advantages to strengthen their presence in EU markets. Conversely, regions like Central and East Anatolia may face challenges due to heightened competition from EU imports, particularly in cereals and livestock sectors. These regions exhibit minimal welfare gains, underscoring the need for targeted policies to enhance competitiveness, diversify agricultural production, and improve infrastructure.

The results underscore the importance of strategic policy interventions to ensure equitable benefits across Türkiye's diverse regions. Policymakers should focus on:

- Enhancing Competitiveness: Invest in technology, innovation, and quality improvements to boost productivity in vulnerable sectors.
- Aligning Standards: Accelerate efforts to meet EU sanitary and phytosanitary standards, reducing NTBs and facilitating smoother market access.

- Regional Development Programs: Implement tailored support mechanisms for regions facing adverse impacts to mitigate transitional challenges and promote inclusive growth.

- Negotiation Strategies: Prioritize reducing EU tariffs on key Turkish exports while securing safeguards for sensitive domestic industries.

By adopting these strategies, Türkiye can maximize the benefits of agricultural trade liberalization, fostering sustainable economic growth and promoting regional development.

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