Regional Inequalities in Turkey

between 1900-1965 and Impact of Minority Population

Movements

Very Preliminary

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I. Introduction

Regional inequalities have been an important dimension of the development experience of many of today's developed and developing countries. Economists and economic historians have been studying the causes and consequences of regional inequalities within national borders at least since the seminal study by Jeffrey Williamson more than half a century ago.[4] Regional inequalities have also been a central part of the development experience of Turkey during the last century and going back to the late Ottoman era. In fact, Turkey presents one of the more severe cases of regional inequalities anywhere in the world, certainly comparable to the well-known case of the North-South differences in Italy.

Studies suggest that per capita income differences between the more commercialized and more industrialized western regions and the less developed southeastern and eastern regions of Turkey have been in excess of 2 to 1 and closer to 3 to 1 in recent decades. (Karaca 2004; Filiztekin and Çelik 2010) Equally importantly, it has been shown that large differences between the western and

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[4] Williamson, Jeffrey G., "Regional Inequality and the Process of Economic Development: A Description of the Patterns", *Economic Development and Cultural Change*, Vol. 13, No. 4, Part 2, pp. 1-84.

eastern regions of the country in terms human development, health and education have also persisted. For example, until recently life expectancy in the northwestern regions of the country was as much as ten years higher than life expectancy in the southeastern and eastern regions. It is thus not surprising that addressing regional disparities have been a central part of development policy and more generally of politics at both the local and national levels in Turkey during the last century.

Regional inequalities in Turkey have carried a strong ethnic dimension since the late Ottoman era. Until the outbreak of the World War I, more than half of the Armenian population in the Ottoman Empire lived in what is today eastern Turkey. Growing commercialization and export orientation of Ottoman agriculture during the nineteenth century and the proximity of the western regions to the major ports of exports as well as domestic urban markets suggest that regional disparities already existed before World War I. It has been argued that the forceful removal of the Armenians from the region and the death of large numbers of them exacerbated the west-east disparities inside Turkey and had long lasting impact on the subsequent course of development in the region and across the country. The exchange of the Greek orthodox population in Anatolia with the Muslim population in Greece arranged by the two governments during the early 1920s added another ethnic dimension to the evolution of the regional disparities. Kurds have been the largest ethnic group living in Turkey's eastern region and Kurdish attempts at greater autonomy, and at times independence, have always emphasized the large and persistent regional differences between the east and the west of the country.

Even though large regional disparities have remained central issues of economic and social development and policy in Turkey during most of the past century, long-term studies on their origins, causes and historical evolution have been rare. Most of the existing studies on the pattern of regional inequalities focus on the most recent period since 1980 for which data is more readily available. This paper is a part of a larger study that aims to examine the evolution of regional inequalities in Turkey by studying the changing patterns and causes in different historical context since the late nineteenth century. Based on the conventional thinking and existing qualitative and scattered evidence, we the east-west gap, in all likelihood, existed before World War I, as the economic growth at the time depended on export orientation in agriculture, thus the proximity to export markets must have favored the western provinces. On the other hand, it is hard to guess how the construction of railroads, the import substitution and public industrial enterprises and

massive rural-urban migration have shaped east-west differentials in the following period up to 1980s. As for the post-1980s, two single most important developments have the trade liberalization, privatization, and in the case of east, Kurdish armed conflict. All of these might have affected the spatial distribution of income, as well as the regional sectoral composition, in different directions and ways.

Therefore, our study aims to document the long-run regional disparities via a comprehensive data reconstruction and to empirically explore the ways each of such factors shaped, overall regional inequalities, and in particular, east-west gap. For this purpose, we make use of Ottoman statistics and other sources of data in the Ottoman period after 1880 as well as the official statistics and other data from modern Turkey since the 1920s. We make use of the growing volume of geographical databases that have become available in recent decades. We construct, amongst others, indices of per capita income as well as indices of per capita income in agriculture, industry and services in order to establish the patterns of regional inequalities and their evolution. These indices will allow us to study the impact of many long term processes such as the commercialization of agriculture, structural change, rural to urban migration, patterns of industrialization as well as government policy on the pattern of regional inequalities. Our indices and the conceptual framework will also provide us the opportunity to test some of the new theories of economic geography and long-term patterns of regional development.

This paper, more specifically, presents the preliminary estimates of the agricultural and industrial value added in 55 provinces, during the first half of the twentieth century. Secondly, we discuss our empirical findings of how the forceful removal or the extermination of Christian minorities during 1915-1923 affected the agricultural sector by measuring the crop diversity and the cultivation of cash crops and estimating the effect of legacy of presence of Greeks and Armenians in the subsequent commercialization in provinces. It is widely documented that the Muslim immigrants incoming from mainland Greece after the Population Exchange of 1923 were specialized in cash crops and hence it is expected that the agricultural income gaps between the East and West of Turkey might have increased in favor of the West in the early Republican years. Indeed, our preliminary estimations confirm the hypothesis that the share of cash crops increased in regions vacated by Greek minorities after 1923 (and most likely filled with Muslim immigrants from Greece) but we do not find evidence for increase in cash crop shares after 1915 in the regions where Armenians had previously significant population shares.

II. Why do the regional gaps persist?

Whilst questions related to the spatial distribution of economic activities, and more precisely urbanization and concentration of industries have been a part of economic research throughout the last century, this wave of literature has gained more prominence after 2008, when Paul Krugman received a Nobel prize for his work on New Economic Geography (NEG) models. The earlier neoclassical models focused on the "first-nature geography", such as physical geography and resource endowments (locational fundamentals), whereas the NEG models explored the role of "second-nature geography", i.e. locational choices of economic actors and their interactions.[5]

NEG models are built around increasing returns to scale and transport costs, that create external economies. Importantly, combined with factor mobility, these lead to cumulative causation and agglomeration. On the other hand, dispersion forces such as the immobile factors of production or non-traded goods in inelastic supply are also at work, thus the interaction between these agglomeration and dispersion forces determines the spatial distribution of economic activity. For a range of parameters of such forces, the spatial distribution is not uniquely determined, instead exhibits multiple equilibria. The implication of that is that multiple small shocks can have large and permanent effects, as the economy may shift from one equilibrium to another.

There have been numerous empirical studies to test the hypotheses of the NEG models, partly thanks to the development of the geographical information systems (GIS) that made it lot easier to carry out credible research with strong identification strategies, as the mapping technologies transformed geographical information and infrastructure stock into measurable data at the micro level.[6] One of the prominent examples of studies that test NEG theories is Davis and Weinstein (2002) who look at Japanese cities that were bombed during World War II. The study finds that

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[5] See Redding (2010) and Kim (2009) for a brief evaluation of the empirical applications of NEG models.

[6] Distance between major markets, geographical conditions, population density, road length and highway coverage, existence of dams and other infrastructure investments are easily transformed with the help of GIS into usable data for economic research. One of the best uses of GIS in economic history research is the study by Campbell and Bartley (2006), who digitised ten thousands of archives on land ownership and tax registry and documented the historical patterns in regional land prices, rents and income distribution. Another example is Atack et.al. (2010) which investigates the impact of railroad investments on urbanization and population growth in the American mid-west during 1850-1860. In this study, railroad maps were digitalized and were merged with censuses through the use of GIS. Similarly, Gregory et al. (2010) developed a population density database at NUTS-2 and NUTS-3 levels for European countries by using GIS.

these cities were able to restore their pre-war growth rates within 20 years. Since war and bombing can be considered as external shocks, the evidence presented by this study supports the traditional models that argue for the importance of initial and geographical conditions for spatial distribution and growth of cities. Davis and Weinstein (2008) show that the spatial distribution of major Japanese industries also remained mostly intact after the War. Redding (2010, 305) suggests several explanations of why these findings are not line with NEG predictions. First, the allied bombing was short-lived, while locational decisions were forward-looking. Second was the continued existence of road networks may serve as focal points around which reconstruction occurs. And also, the continued property rights and land-use regulation might be another explanation.

Redding, Sturm and Wolf (2011) looks into the spatial distribution of industries in West and East Germany which were divided after World War II but united again in 1990. The split and reunification of Germany after 40 years can be considered as "natural experiments" since they are two exogenous shocks from the point view of industry. Using airlines and flight data in a difference in differences framework, the study presents evidence that the relocation of Germany's air hub from Berlin to Frankfurt in response to division was a permanent shift in the location of economic activity from one steady state to another. Hence in contrast to Davis and Weinstein's findings, Redding et al. suggests that shocks as opposed to geographical characteristics can have permanent effects for long run multiple equilibria.

Kim (2009) points out that most of the economic geography models are static and do not contain elements of structural shift in the economy, primarily from agriculture to industry and services. The cross-country evidence is robust and consistent in developed countries, and main source of inequality is the geographic differences in industrial concentration. The industries like textiles tend to be more concentrated than food or electrical machinery. Similarly agriculture and mining contribute to inequality as the natural sources are distributed unequally. In contrast, services, those serving local markets, reduce the inequality. Kim (1995) documents the historical inequality for the US regions and finds that at every point in time, traditional low tech industries were more localized than medium-to high tech industries. Consequently, the gradual shift in

manufacturing from low to high tech industries contributed to the dispersal of manufacturing over time.

Caselli and Coleman (2001) investigate the degree of structural transformation and regional income convergence in US between 1880 and 1980. The study finds that differences in disproportionate shares of skilled and unskilled labour across regions brought about comparative advantages in agricultural and non-agricultural sectors initially, however declining education/training costs induced an increasing proportion of the labor force to move out of the (unskilled) agricultural sector and into the (skilled) nonagricultural sector and the decline in the agricultural labor force leads to an increase in relative agricultural wages. Hence the study suggests that empirically most of the regional convergence was attributable to nationwide convergence of agricultural wages to nonagricultural wages and the faster rate of transition of the southern labor force from agricultural to nonagricultural jobs.

How can NEG models inform the study of Turkey's large regional imbalances? The conventional thinking has so suggested several lines of thinking. For one thing, the first-nature geography, or the locational fundamentals, is the leading explanation: the distance of the eastern provinces to the ports and western markets, rugged territory and small cultivable terrains all increase the transport costs within and beyond the region, making the local markets small and isolated. Also, physical geography thwarts backward and forward linkages via less access to intermediate goods (energy, raw material). However, a systematic analysis of the increasing transport networks (railroads and highways) and thus decline in transport costs is still lacking. Moreover, the sectoral dimensions are ignored in this framework, since manufacturing and agriculture probably respond differently to changes in transport costs, so while this argument may explain why manufacturing is not concentrated in the east, the underdevelopment of commercial agriculture and related processing industries need a better explanation.

Second, in the heyday of the development economics of the 1960s and 1970s, most economists and historians were engaged in discussions on production systems being influenced by the intellectual currents of the time such as Third-World Developmentalism and Marxism. The main culprit of the underdevelopment of the east was then seen as the prevailing feudal land tenure and large landownership in the east, as they reduced labor mobility. Related to that, the prevailing tribal

structure of the local communities in the east has also been understood as an obstacle to the development of the modern market relationships and political and social structures. Third, another strand focused on the human capital differences and low school attendance in the east, which could however be seen as endogenous element of the spatial development. All in all, as suggested above, such views have primarily been based on scattered and usually very selective evidence, thus they should be discussed in a consistent conceptual and empirical framework that is based on systematic and reliable evidence, which is what this study primarily aims to carry out.

III. Preliminary value-added estimates of manufacturing and agriculture

In order to trace the long-run dimensions of the regional income gaps, we attempt to estimate the income per capita at historically consistent provincial units for benchmark years between 1880-1980 and combine them with the official estimates of the recent period, i.e. the post-1980s. We choose the year 1880 as the starting year due to the fact that reliable data at the regional level in Ottoman statistical accounts were first published around this time. Methodologically, we rely on the "Geary-Stark" and the "proxy" methods, and the traditional national income accounting framework. The Geary-Stark method allocates national income across regions based on relative wages and sectoral employment data. If the relative wages or employment data are missing, the proxy method produces the regional incomes via the statistical identification of the socio-economic correlates of income.

Here we report preliminary set of estimations on regional crop output and industrial regional output between 1909-1965. Very briefly, the agricultural output is calculated as the regional production of all major crops (including cereals, vegetables, fodder crops and fruits) multiplied by the national average prices. Data is obtained from official Ottoman agricultural statistical collections for 1909 and the Turkish Statistical Institute's (Turkstat) annual agricultural statistics published between 1928-1965, which are all digitized and processed.[7] The provincial units reported in the original data changes from one year to another, which is why we created a 55-year provincial classification to able to accommodate such changes and harmonize the data. As for the price data, we obtain

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[7] Ottoman data is also available for 1913 and 1914, yet since the data is not complete for the eastern provinces, we rely on 1909 data. Yet we use the subsequent publications to crosscheck consistency of the data, which are available for all three years.

national averages from official sources, combined with data in Bulutay et.al.(1974). Consequently, we calculate the total crop output for 55 regions at current prices and divided by the rural population and then the ratio of output in each province to the national mean.

In estimating industrial value added between 1927-1965, we rely on two distinct sources; industrial censuses and electricity consumption.[8] We have the summary results of the industrial censuses in 1927 and 1964.[9] For 1932-39, the Turkstat published the detailed reports on the enterprises that benefited from Law of Promotion of Industry (*Teşvik-i Sanayi Kanunu*). 1927 industrial count provides information on the number of establishments and number of workers per province and per industry, it does not include any data on the capital stock or wages paid to the employees. Fortunately, statistics collected under the Industrial Law between 1932-1939 as well as industrial counts of 1964 are more detailed and includes data on the number of machines, type of machinery, horsepower, total wages paid, total costs and value added.

An important shortcoming of the 1932-1939 industrial statistics is that they are likely to include large firms which benefited from the incentive law and smaller firms are not adequately represented in the surveys. While the 1964 industrial count includes firms that have employment less than 10, the statistics are provided at the industry level and there are no province information smaller establishments. This means that relying on the large firms would lead us to overestimate the share of large provinces where the industrial production is more likely to be mechanized. To overcome this problem, we use the following strategy: We start from 1964 census results, which provide regional breakdown of total value added of the medium and large enterprises (about 78 percent of total value added) and some total value added estimate for small ones. We allocate the gross national figure for small establishments to the provinces on the basis of the share of each province in the total wage share.[10] Thus, we add up these two figures for each region. For 1939, in a similar fashion, we assume Turkstat's official data is comparable to 1964's data on large enterprises and rely on Eldem (1955)'s estimates of the relative value added shares of large and small sector. We distribute 60 percent of the total value added to each province based on its "large-firm value-added share", and 40 percent of the total by each province's share in total population for 1939.[11]

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[8] The source of electricity data is Turkstat's annual statistic yearbooks and State Institute of Public Electricity Works (*Elektrik Amme İşleri İdaresi*) archives.

[9] Note that the published report of 1950 industrial census does not provide data on regional level. In addition, there exist several wage surveys conducted between 1957-1980 which also offer data on employment and wages in the industrial sector.

[10] Wage data is obtained from Turkstat's official yearbook. The data covers estimates of wages in all sectors.

[11] In addition, there exist several wage surveys conducted between 1957-1980 which also offer data on employment and wages in the industrial sector. However, total value added for Turkey that is implied in the 1964 industrial count falls short of the total industrial value added reported in Turkstat's 1923-1998 national

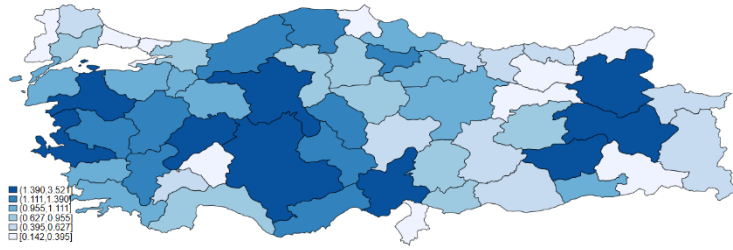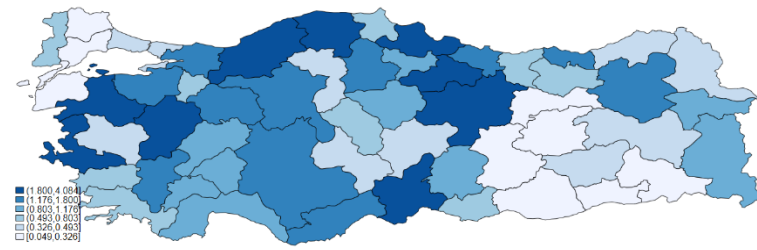*Figure 1 East-west crop output ratio*
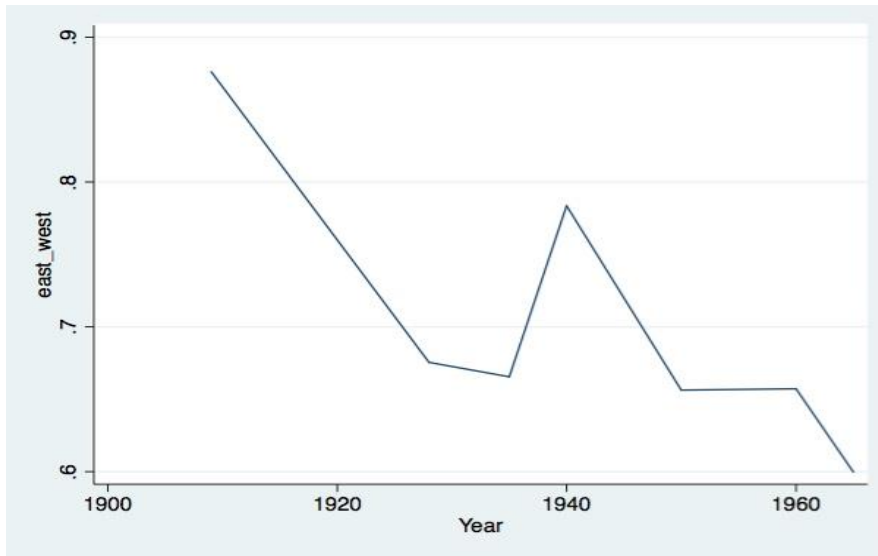
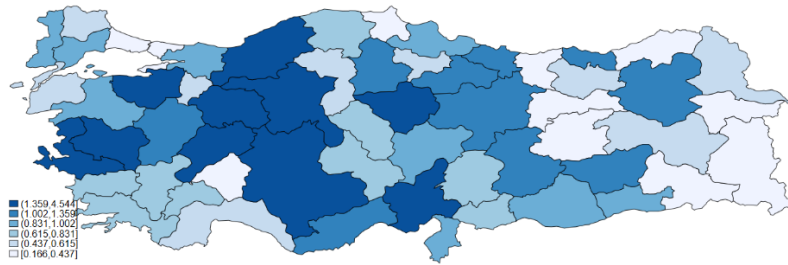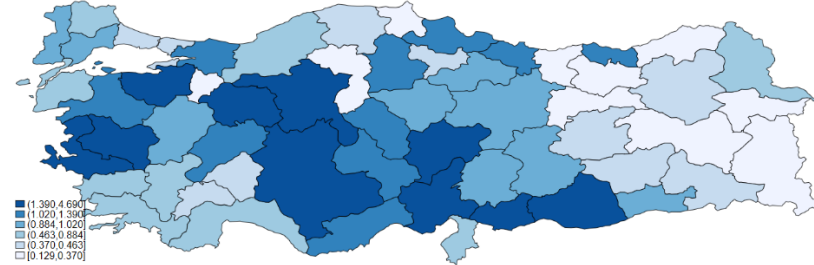*Figure 2 Crop output per capita relative to mean*
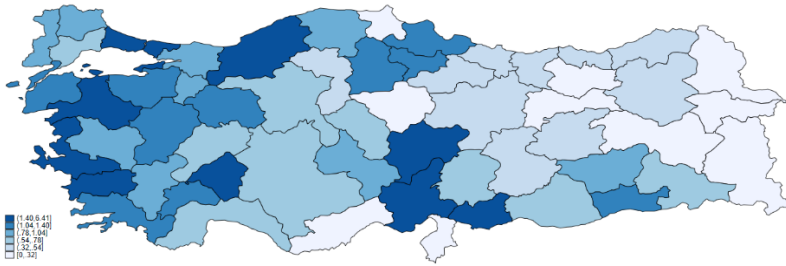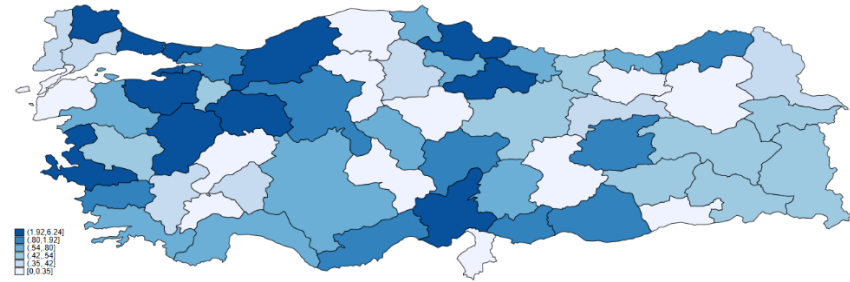
1909

1928

1950

1965

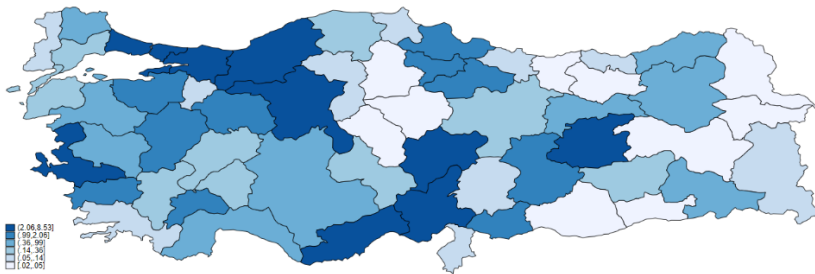*Figure 3 Industrial value added per capita relative to mean,*

1927

1939

1965

Our preliminary estimations suggest that the agricultural output differences between the East and West of Turkey increased overtime until 1960s. More specifically, East-West crop output ratio declined from about 0.9 in 1909 to about 0.6 in 1964. Figures 1 and 2 show the overall decline and differences in agricultural output across regions over time. On the other hand, differences in industrial output per capita seem to be less straightforward. From 1927 to 1939, East-West differences seem to decline, most likely thanks to state enterprises established under the command economy but then seem to have deteriorated between 1939 to 1965.

As next steps, we would like to refine our industrial output per capita estimations by using the industrial electricity consumption data as well as estimating services output per capita using the archives and historical censuses provided by Turkstat. Since our agricultural estimations are more complete, we start by exploring the impact of minorities on agricultural output first. The impact on industrial and services output are works in progress and will be provided in the incoming versions.

IV. Impact of the change in ethnic composition of population on regional income gaps

Migration has important consequences for resource allocation and long-term economic performance of both the sender and receiving countries as the most skilled are usually the first ones to leave. Economists have recently turned their attention to the consequences of migration shocks partly thanks to the humanitarian crisis in Syria and the migration restrictions debate between Mexico and United States. Existing studies show that the immigrants tend to invest in human capital in their host countries whereas regions or countries which lose sizable populations due to migration or expulsions are economically hurt in the long run.

A recent working paper by Becker et. al (2018) find that forced migration of Poles from Kresy in East to western territories when the Polish borders were redrawn after the WWII led to a shift in preferences, away from physical possessions towards investment in human capital up to three generations. Acemoglu et al. (2011) show that before the German occupation of Western Russia in 1941, over 67% of Jews living in Russia held white-collar jobs, in comparison to about 15% of non-Jews having white-collar occupations. They find that cities where Holocaust was more intense are less densely populated today and regions that were affected relatively more have lower levels

of per capita income and lower average wages today. Chaney and Hornbeck (2016) find that almost two centuries after the expulsion of about 120,000 Moriscos from the Kingdom of Valencia in 1609, areas with higher former shares of Moriscos were relatively more agrarian.

Two most catastrophic migration waves in human history took place in the beginning of 20th century in Anatolia under the Ottoman territory, which now forms modern Turkey. The first one is the massacre and expulsion of Armenians in 1915 which resulted in a loss of around 1.5 million native Armenians. The second one is the 1923 Convention of Population Exchange between Turkey and Greece under the Lausanne Peace Treaty that led to immediate compulsory denaturalization of around 1.2 million Greeks inhabiting Anatolia and about 500 thousand Muslims inhabiting Greece.

The geographic distribution of Christian minorities was uneven across Anatolia. Armenians were historically more intensely located in the East, while Greeks were mostly clustered in the West and Black Sea region. Figures 4-5 show the spatial distribution of Armenian and Greek minorities between 1893-1965. By 1893, some provinces had Armenian population shares as high as 42.3 percent (Mus) and Greek population shares as high as 42.8 percent (Kırklareli). The shares sharply declined -after 1915 and 1923 and by 1960s, there were literally no minorities left in many provinces. On the other hand, Turkey also received inflows of Muslim populations escaping from the Caucasia and Balkans throughout 1890-1923. Most of these Muslim newcomers were allocated minority properties by Turkish state.

Historical accounts as well as Church records suggest that Christians and Muslims had different schooling rates (Kevorkian 1992) and occupational specialization. Christian minorities had dominated commerce and artisanship (Ungor and Polatel, 2011) in the East and West and Muslims were more likely to be employed in agriculture. Given the evidence that Christian minorities were more skilled on average, it is likely that the loss of minorities had non-negligible impact on short-run economic activity and long-term effects on economic structure, human capital accumulation and technology adoption.

Figure 4: Armenian Population Over Time

1893
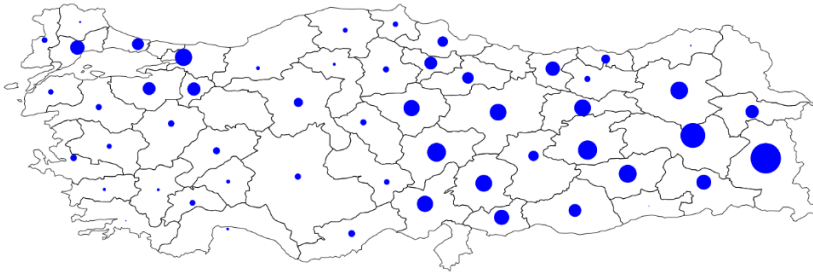
1909
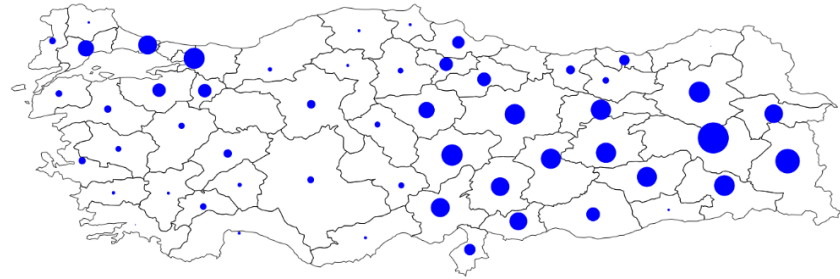
1935

1965

Figure 5: Greek Population Over Time

1893

1909

1935

1965

Despite the importance of the issue, there are only two studies which explore the impact of minority losses in modern Turkey. Arbatli and Gokmen (2016) suggest that districts with greater presence of Armenian and Greek minorities in the Ottoman census of 1893 were systematically more densely populated, more urbanized and more develop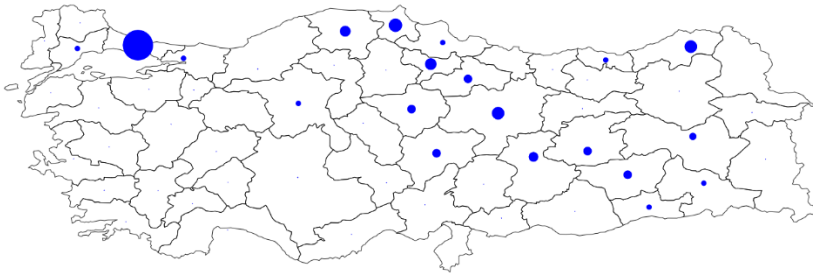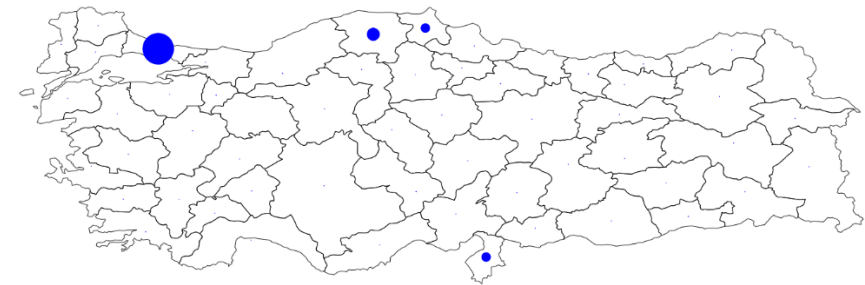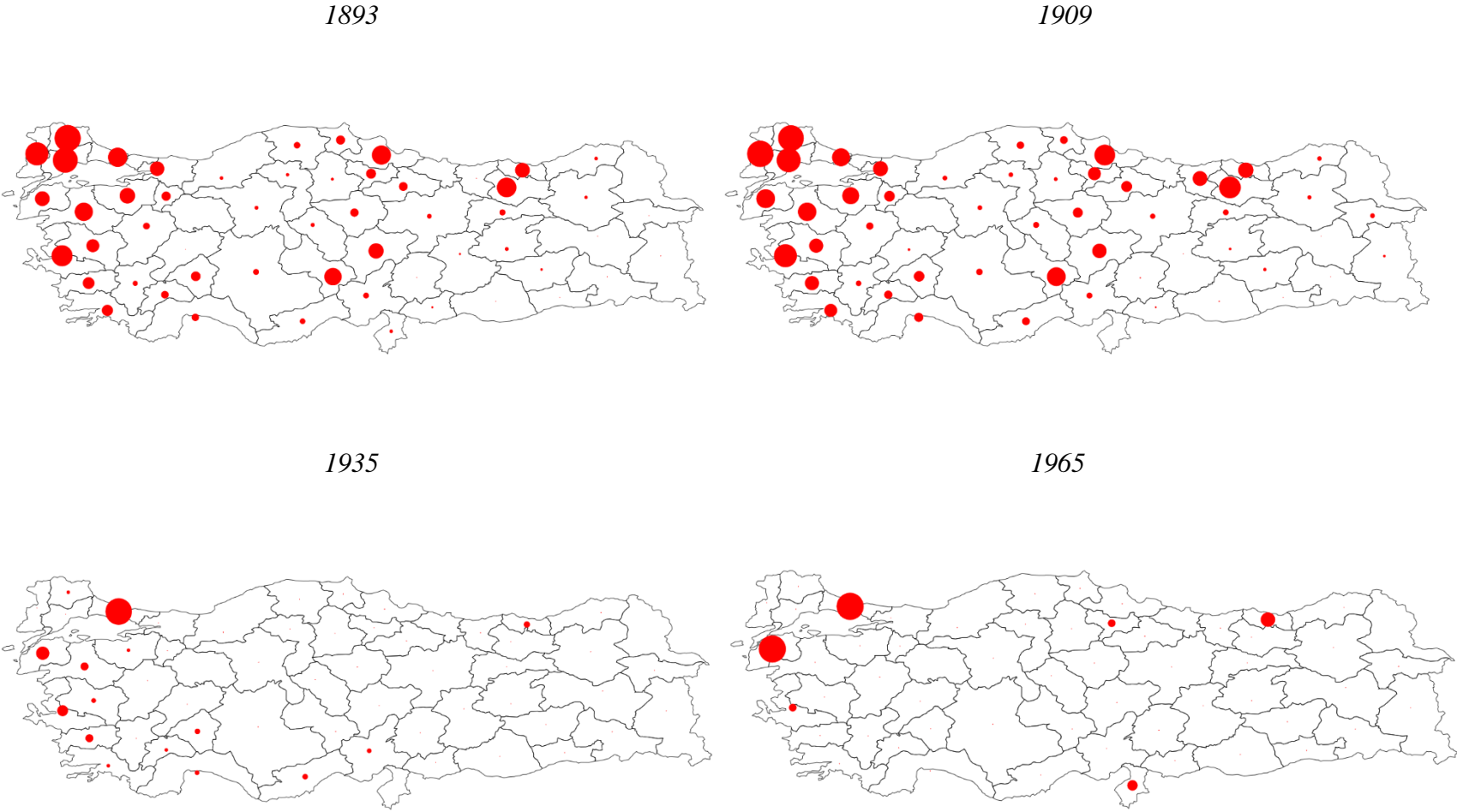ed in terms of the night light luminosity in year 2000. The study suggests that the minorities left a positive legacy and the regions with higher minority shares accumulated higher human capital accumulation over time. Although the study is robust to inclusion of several geographic and historical controls, the results could still be driven by the fact that the districts with larger minority shares were on average more urbanized in 1893.[12] Hence the cross-sectional estimations in the study might be capturing the long run effects of urbanization in 1893 on urbanization in 2000 rather than the effect of minorities.

While Arbatli and Gokmen (2016) explore the impact on remaining populations and local economies, Murard and Sakalli (2018) explore the impact on a receiving country, i.e. impact of Greek immigrants on the long run prosperity of Greek municipalities. They find that localities that received a higher share of refugees in 1923 were more prosperous in terms of population density, economic activity, schooling and income per capita in 1971 and 1991. The study identifies three main channels for positive impact; *i.)* agglomeration economies, *ii.)* occupational specialization, and *iii.)* introduction of new industrial know-how brought by refugees. However, the study focuses only on the long-run impact on Greek districts. Economic fate of Turkish districts which sent disproportionately more native Greeks of Asia Minor than what they received from mainland Greece is out of the scope of the paper.

While these studies focus on the long-run effects of Christian minorities, to our knowledge ours is the first systematic study that investigates the short-run and medium-term effects of minority losses on economic activity and income gaps across the regions of Turkey.

We are primarily interested in establishing the causal effect of demographic shocks on regional disparities. The dominant sector at the beginning of the 20th century was agriculture. However, soon after the establishment of the new Republic in 1923, state-led industrial enterprises also kicked off. This paper tests several hypotheses. The first one is the impact of minority losses on agricultural product diversity which we measure in terms of i) number of agricultural products, ii)

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[12] See Karpat (2002) and Behar (1996)

share of cereals in total and share of cash crops in total. The second hypothesis is whether minority losses had any impact on regional agricultural value added. Third hypothesis is whether minority losses had any impact on industrial production and location choice. Once we establish the relationship between minority losses and value added, we would like to explore the mechanisms through which population losses might have affected regional inequality. In line with the new geography literature, potential mechanisms are the population growth of regions after the demographic shocks and government infrastructure investments such as the transportation networks. We would like to uncover how these might have interplayed with minority losses and what were the underlying reasons that led to recovery of some regions but not others.

In measuring minority population losses, our main data sources are the Ottoman and Turkish population censuses of 1893, 1906[13], 1927, 1935, 1940, 1950, 1960 and 1965. We also use these censuses to measure the urbanization rate and total population per region. For agricultural production we use SSI's official crop, price and livestock statistics.

Our baseline econometric specifications are as follows;

$$(1) \qquad Y_{i,,t} = \beta_0 + \beta_1 X_{i,t} + \beta_2 A_{i,t}^{1923} * D_i^{Greek} + \beta_3 A_{i,t}^{1915} * D_i^{Armen} + \beta_4 X_{i,t} * D_i^{Greek} +$$
$$\beta_5 X_{i,t} * D_i^{Greek} + \eta_i + T_t + \varepsilon_{i,j,t}$$

$$(2) \qquad Y_{i,,t} = \beta_0 + \beta_1 X_{i,t} + + \beta_2 Z_{i,t}^{Greek} + \beta_3 Z_{i,t}^{Armen} + \beta_4 X_{i,t} Z_{i,t}^{Greek} + \beta_5 X_{i,t} Z_{i,t}^{Armen} +$$
$$\eta_i + T_t + \varepsilon_{i,j,t}$$

where i denotes region, t denotes time, $X_{i,t}$ denotes the vector of control variables which include population growth, rainfall, livestock, railroad and transportation networks and regional policy incentive indicators whenever possible. In equation (1), $A_{i,t}^{1923}$ and $A_{i,t}^{1915}$ are dummy variables that take on the value equal to 1 if year is greater than 1923 or 1915 respectively and zero otherwise. D_i^{Greek} and D_i^{Armen} are dummy variables that take on the value equal to 1 if the population shares

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of each minority were higher than a certain percent of total regional population in 1893 population census.[14] η_i is region fixed affects and T_t is year effects. Our main variables of interest are the interaction terms, $A_{i,t}^{1923} * D_i^{Greek}$ and $A_{i,t}^{1915} * D_i^{Armen}$. In the second equation, $Z_{i,t}^{Greek}$ and $Z_{i,t}^{Armen}$ are the decline in population shares of Greeks and Armenians between each census covering 1906-1965.

We start our analysis with the association between agricultural outcomes and minority population losses.[15] Tables 1-3 show the baseline OLS estimations. In Table 1, we follow equation 1 and rely on two different sets of definitions as to whether a province had significant minority shares. In columns (1)- (4), our variables of interest are the two dummies which take on the values 1 if a province had Armenian and Greek minority shares higher than 3 percent in 1893 Census and in columns (5)- (8), the two dummies take on values equal to 1 if the corresponding minority shares were higher than 9 percent in 1893 Census. Our outcome variable is agricultural diversity as measured by the number of different crops. From columns (1)-(8) we include additional controls to check the robustness of our coefficients of interest, such as urbanization rate, population growth and (log of) livestock.[16]

Our estimations show that in the provinces (mostly Western) where Greeks had significant minority shares before 1923, agricultural product diversity increased after 1923 whereas in the regions (mostly Eastern) where Armenians had significant population shares, agricultural product diversity declined. More specifically, difference in differences estimations suggests that crop variety increased by about 2 crops on average in previously Greek dominated regions and it declined on average by 2 in the regions which lost their Armenian populations. It is important to note that all our specifications except for columns (1) and (5), we include province and year effects which capture the effects of important several geographical factors such as altitude, latitude, conduciveness to agricultural production, being land-locked and distance to main markets. Hence our estimations show variation within provinces before and after 1915 and 1923.

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[14] We also try alternative cut-off levels such as three percent, 6 percent, and 9 percent.

[15] So far we have been able to complete digitalizing the agricultural series and the impact on industrial and services production is work in progress.

[16] An important variable that is missing in our analysis is the railroad and transportation networks over time. We are still in the process of digitalizing old railroad maps and in the incoming versions, we will include those as additional controls.

Table 1: Baseline OLS, Agricultural Product Diversity as Measured by Number of Crops, 1909-1965

	(1) Threshold: 3% Population Share	(2) Threshold: 3% Population Share	(3) Threshold: 3% Population Share	(4) Threshold: 3% Population Share	(5) Threshold: 9% Population Share	(6) Threshold: 9% Population Share	(7) Threshold: 9% Population Share	(8) Threshold: 9% Population Share
Greek Dummy After 1923	3.137***	1.880***	2.321***	2.170***	2.276*	1.897***	2.806***	2.557***
	(1.122)	(0.194)	(0.690)	(0.324)	(1.299)	(0.204)	(0.645)	(0.318)
Armenian Dummy After 1915	-2.270**	-1.340***	-1.354*	-1.385***	-3.637***	-2.266***	-2.053***	-1.991***
	(1.117)	(0.284)	(0.699)	(0.301)	(1.104)	(0.255)	(0.634)	(0.193)
Population Growth			0.628	0.380			0.504	0.123
			(0.717)	(0.384)			(0.646)	(0.335)
Urbanization Rate			-11.403***	-6.204			-11.720***	-7.228
			(4.328)	(6.793)			(4.269)	(6.146)
Livestock (in logs)				0.194				0.136
				(0.629)				(0.602)
Observations	2,077	2,077	2,074	489	2,077	2,077	2,074	489
R-squared	0.131	0.007	0.026	0.037	0.148	0.010	0.031	0.050
Year Effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Province Effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Province Specific Trends	No	Yes	No	No	No	Yes	No	No

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2: Baseline OLS, Share of Cash Crops in Total Production, 1909-1965

	(1) Threshold: 3% Population Share	(2) Threshold: 3% Population Share	(3) Threshold: 3% Population Share	(4) Threshold: 3% Population Share	(5) Threshold: 9% Population Share	(6) Threshold: 9% Population Share	(7) Threshold: 9% Population Share	(8) Threshold: 9% Population Share
Greek Dummy After 1923	0.026	0.036***	0.044***	0.040***	-0.008	0.025***	0.038***	0.030***
	(0.020)	(0.005)	(0.016)	(0.007)	(0.022)	(0.005)	(0.015)	(0.007)
Armenian Dummy After 1915	-0.042**	-0.012***	-0.019	-0.024***	-0.070***	-0.033***	-0.034*	-0.039***
	(0.020)	(0.004)	(0.017)	(0.007)	(0.020)	(0.006)	(0.018)	(0.008)
Total Population (in logs)			0.018	0.028*			0.016	0.023*
			(0.021)	(0.014)			(0.020)	(0.013)
Urbanization Rate			0.050	0.076			0.043	0.054
			(0.077)	(0.069)			(0.077)	(0.057)
				0.022				0.023
				(0.015)				(0.015)
Observations	2,077	2,077	2,074	489	2,077	2,077	2,074	489
R-squared	0.063	0.004	0.007	0.041	0.112	0.005	0.007	0.041
Year Effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Province Effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Province Specific Trends	No	Yes	No	No	No	Yes	No	No

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Baseline OLS, Cash Crops and Population Losses, 1909-1965

	(1) All Sample 1909-1965	(2) All Sample 1909-1965	(3) All Sample 1909-1965	(4) All Sample 1909-1965	(5) Restricted Sample 1909-1935	(6) Restricted Sample 1909-1935	(7) Restricted Sample 1909-1935	(8) Restricted Sample 1909-1935
Decline in the share of Greeks	0.268*** (0.083)	0.327*** (0.078)	0.317*** (0.098)	0.233 (0.170)	0.321*** (0.091)	0.446*** (0.086)	0.441*** (0.091)	0.534*** (0.140)
Decline in the share of Armenians	0.034 (0.066)	0.067 (0.053)	0.141 (0.110)	0.377*** (0.115)	-0.026 (0.092)	0.012 (0.066)	0.083 (0.115)	0.340** (0.154)
Population Growth		0.023 (0.020)	0.016 (0.022)	0.020 (0.019)		0.048** (0.021)	0.041* (0.022)	0.045** (0.020)
Urbanization Rate		0.075 (0.077)	0.083 (0.087)	0.097 (0.085)		0.073 (0.187)	0.073 (0.194)	0.240 (0.239)
Decline in the share of Greeks*Population growth			-0.013 (0.149)				-0.000 (0.194)	
Decline in the share of Armenians*Population growth			0.202 (0.247)				0.189 (0.292)	
Decline in the share of Greeks*Urbanization rate				0.389 (0.510)				-0.265 (0.412)
Decline in the share of Armenians*Urbanization rate				-1.736*** (0.670)				-1.847* (0.953)
Observations	382	380	380	380	162	160	160	160
R-squared	0.038	0.054	0.057	0.066	0.115	0.211	0.218	0.240
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In Table 2, we are interested in the association between share of cash crops in total agricultural products and the minority losses. Cash crops are defined as crops produced for its commercial value rather than for subsistence, hence they marketable production. We again follow equation 1 as our baseline specification. Our estimations show that in the regions where Greeks had significant population shares in 1893, the share of cash crops in total increased by about 2.5-4.4 percent after the 1923 population exchange, whereas in Armenian regions, share of cash crops seems to have declined by about 1.2-7 percent on average after 1915.

In the first two sets of estimations, we measure the minority presence by population shares in 1893 Census and use annual agricultural production data. In an alternative specification, we use the population shares in each census starting from 1909 instead of using dummies. However, this reduces the number of observations about one fourth as the censuses are irregular with at most 5 years intervals. In other words, we match Armenian and Greek population shares reported in 1906, 1927, 1935, 1940, 1950, 1960 and 1965 Censuses with agricultural outcomes for the same years. Our results are provided in Table 3. We find some interesting results which confirms the earlier finding that the regions which had higher Greek population losses had seen higher cash crop shares after 1923. Moreover, the association seems to be stronger between 1909-1935 (restricted sample in columns 5-8) and seems be weaker once we focus period until 1965. However, in this new set of estimations, the coefficient on the Armenian population decline is no longer significant except in columns (4) and (8) where we interact the decline in Armenian population with urbanization rate as additional controls. The positive coefficient on the Armenian population loss indicated that the provinces which lost a significant proportion of their Armenian populations saw higher shares of cash crops on average after 1915, however the negative and significant coefficient on the urbanization interaction term suggests that more urbanized provinces with significant Armenian population shares were hit hard and the overall association is negative. On the other hand, the coefficient on the interaction term between Greek population losses and urbanization rates are significant, implying that there was no statistically meaningful difference in cash crop share growth between urbanized and unurbanized regions. Note that since the time periods in Table 3 are takes as each census year, the coefficients show the change over minimum 5 years intervals, and hence are consistent in magnitude with the coefficients in Tables 1 and 2.

Overall, our preliminary analysis between 1909-1965 suggest that the development gaps between the East and West of Turkey increased after 1920s. These results provide suggestive evidence that

the mass population movements might have magnified the gaps between East and West. One reason why the regions with Greek heritage do not seem to be adversely affected could be due to the fact that the minority losses were due to a population exchange which meant that there were incoming migrants and hence the implications could be quite different from those of an expulsion and massacres. Moreover, suggested by Murard and Sakalli (2018) suggest Muslim migrants incoming from mainland Greece tend to be more agrarian. Since the incoming migrants are more likely to settle down to regions vacated by Greek minorities, presence of incoming Muslim minorities could explain the increase in cash crops in those regions. Hence the lost skills by Greek migrants were compensated by incoming migrants from Balkans and Caucasia in the West but a critical population mass did not take place in Eastern regions and hence the growing gap.

On the other hand, our analysis so far only implies statistical correlations and do not imply causality for various reasons. First, omitted variables bias could be a serious threat for identification, lack of controls for incoming migrants being among the most important threat. Our results could also be driven by the fact that government had purposefully targeted Western regions for public investments as the new Republic had turned its face to Europe, adopting western style institutions and aimed to increase integration with Western markets. In that case, transportation investments and connectivity could also have grown faster in the West. It could also be true that extractive feudal institutions could have taken over in the East after the catastrophe in 1915 over which the state had limited control. All of these would mean that the income gaps between the East and West are driven by factors other than the minority losses per se. As further steps, we aim to address these concerns and improve identification by both including additional controls with respect to transport links, state investments, incoming migrants and land concentration as well employing methods such as regression discontinuity and matching designs.

V. Conclusion

This paper presents the preliminary empirical findings on the long run dynamics of the regional economic disparities in Turkey over the long twentieth century. The estimation of regional incomes is incomplete for the whole period is incomplete, yet our first round estimates of agricultural and industrial output between 1909-1965 shows that the current large imbalances go back as far as the early days of the Republican period. However, it is rather likely that the east-west gap was not as large in the last decades of the Ottoman Empire as it is now. When the incomes dataset is completed with complementary estimates of services and the non-agricultural incomes before the 1920s, we will be able to present more robust and reliable evidence and see whether this hypothesis still holds true.

Second part of the paper specifically explores the spatial dimensions of agricultural development with a special focus on distinguishing the provinces with previously major Christian population from others. We aim to look into how the loss of Christian population and their skill set after 1923 had any major effect on agricultural production. The preliminary estimates focus on two key indicators: crop diversity and the share of cash crops in total area under cultivation. We find that both indicators show a significant improvement in the decades after the 1920s in the provinces which previously had sizeable population, whereas the provinces where sizeable Armenian population previously (before 1915) resided did not witness improvement in those two variables, which collectively measure the degree of commercialisation in agriculture. At this stage of research, this finding is based on robust correlations, yet we also aim to test the causality between the Christian legacy and subsequent development with developing our identification strategy and analytical and conceptual framework.

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