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Regional inequalities and the West–East divide in Turkey since 1913

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Abstract

This paper examines the evolution of regional disparities within the present-day borders of Turkey since 1913. Based on our estimates for 58 provinces, we find β-convergence, an inverse U, and more recently, the beginnings of an N-shaped pattern for value added per capita. We also find that regional disparities in Turkey exhibit a number of special features that do not easily fit the well-studied pattern of the early industrializers. First, while per capita value added in other regions moved towards country averages, the differences between the East and the rest of the country persisted and even increased until recently. Second, spatial distribution of economic activity became more concentrated over time due to continued migration to the megacity of Istanbul. Third, we find that regional disparities in per capita value added in Turkey and other developing countries have been higher than those experienced by the early industrializers. These findings raise questions about the extent to which the regional disparities experiences of Turkey and other developing countries have been different than those of the early industrializers.

KEYWORDS

regional inequalities, regional disparities, Turkey, Ottoman Empire

Regional disparities have been an important part of the experience of both the early and late industrializers during the last two centuries. In many of the early industrializing countries, the decline of transportation costs during and after the industrial revolution was accompanied by the creation of national markets, the shift from agriculture to the urban economy, rising economies of scale, and the concentration of manufacturing activities in a small number of regions. The literature

suggests different explanations for the rise of regional economic inequalities. Neoclassical models with perfect competition and constant returns have explained regional disparities in terms of differences in endowments, most importantly; natural resources; factors of production; and technology. They expect that diminishing returns and factor mobility will eventually lead to per capita GDP convergence across regions.[1] The new economic geography models, on the other hand, have explored the role of 'second-nature geography', that is, locational choices of economic actors and their interactions in the context of urbanization and concentration of industries. Many of these models emphasize market access as a crucial determinant of industrial location and are built around the idea that declining transport costs and increasing returns to scale may generate pecuniary externalities for firms and workers' location choices. They suggest deeper economic integration among regions of different sizes may actually lead to greater regional imbalance in the location of economic activity. As a result, these models are less optimistic about long-term trends in regional inequalities.[2]

In one of the earliest studies on economic development and regional inequality, Williamson posed the hypothesis that regional disparities followed an 'inverse-U' pattern, with inequalities growing in the early stages and convergence later.[3] Later studies have confirmed the importance of structural change, industrial location, and economic agglomeration in explaining the rise and decline of regional inequalities in the United States and in other developed countries including Italy, France, and Spain.[4] However, more recent studies show that regional disparities across Europe have been rising once again in the recent era of continental integration and globalization. As a result, an N-shaped pattern has emerged in the long-term evolution of regional disparities in many developed countries.[5]

The evolution of regional disparities in today's developing countries remains understudied, but the emerging literature points to some contrasts with the pattern for today's developed countries. During the nineteenth century, most developing countries were integrated into the global economy as exporters of primary products, and national market integration remained weak. Regional disparities were based mostly on geography and resource endowments, and they could be quite large.[6] By the time industrialization began to gain momentum after the Second World War, transportation costs were significantly lower, and rates of tariff protection, rates of population growth, rural to urban migration, and GDP growth rates were significantly higher in comparison to those of the early industrializers in the nineteenth century. As a result, the potential for market access and agglomeration economies in only a small number of urban centres remained high.[7] Along with better health conditions and higher life expectancy, a small number of urban centres of unprecedented size, or what are often called megacities, thus came to dominate the process of urbanization and industrialization in many of the larger, high-growth developing countries.[8] In

[1] Barro and Sala-i Martin, 'Convergence'.

[2] Krugman, *Geography and trade*; Michaels, Rauch, and Redding, 'Urbanization'; Redding, 'Economic geography'.

[3] Williamson, 'Regional inequality'.

[4] Prager and Thisse, *Economic geography*; Kim, 'Economic integration'; Caselli and Coleman, 'US structural transformation'; Puga, 'Rise and fall'; Felice, 'Regional value added in Italy'; A'Hearn and Venables, 'Regional disparities'; Combes et al., 'Rise and fall'; Martínez-Galarraga et al., 'Long-term patterns'.

[5] Rosés and Wolf, *Economic development*; Iammarino et al., 'Regional inequality'; Diez-Minguela et al., *Regional inequality in Spain*; Martinez-Galarraga et al., 'New economic geography'.

[6] Tirado-Fabregat et al., *Time and space*.

[7] Puga, 'Urbanization'; Prager and Thisse, *Economic geography*, pp. 25–40.

[8] Puga and Venables, 'Agglomeration'; Henderson, 'Cities'; Deichmann et al., 'Industrial location'.

developing countries, too, costs of congestion, higher wages, and land prices sooner or later began to reduce the concentration of economic activity. Nonetheless, forces of dispersion could remain weak in developing countries for reasons yet to be fully explored.[9]

In part due to the scarcity of long-term data, the evolution of regional disparities has been studied for only a small number of developing countries, mostly for those in Latin America.[10] The emerging evidence suggests that, during the nineteenth century, regional disparities depended on relative resource endowments and were often quite high.[11] Many of these countries have also experienced the inverse U-shape pattern in the evolution of regional disparities. However, globalization and the rise of exports of manufactures have brought about a rise in regional disparities in recent decades, suggesting an N-shaped pattern for developing countries, as well. Moreover, recent evidence suggests that the regional disparities experienced by the developing countries may have been higher than those experienced by today's developed countries at comparable levels of GDP per capita.

This study aims to contribute to this emerging literature on developing countries by examining the regional income inequalities within the present-day borders of Turkey since 1913. The timing and intensity of urbanization, industrialization, and economic growth in Turkey during the last two centuries have been broadly similar to those in other developing countries. Moreover, since the late Ottoman era, the West–East economic differences within Turkey have been accompanied by ethnic polarization and conflict and large demographic shocks involving Armenians, Greeks, and Kurds as well as Turks. Notably, the West–East income disparities in Turkey are still amongst the highest in the world and one of the leading issues in national politics.[12]

Most of the existing studies on regional disparities in Turkey focus on the period since the 1980s for which data is more readily available. Our study aims to document, for the first time, the evolution of the regional inequalities since the late Ottoman era, when regional statistics became available. Making use of Ottoman statistics for the decade before the First World War and the official statistics and other data from modern Turkey since the 1920s, we construct indices for value added per capita for agriculture, industry, and services as well as total value added for 58 provinces for eight benchmark years. For the recent period since 1987, we make use of the official series for GDP per capita for the same 58 units which can easily be aggregated into present-day Turkey's 26 nomenclature of territorial units for statistics (NUTS) 2 regions.

Relying on these novel estimates of value added per capita at the province level, we first test for β-convergence and find that poorer provinces in the initial period grew faster than the richer ones during most of the period 1913–2015. We then calculate Theil decomposition indices and show that disparities between provinces in per capita terms exhibited an inverse U, with regional inequalities rising until middle decades of the twentieth century, declining until the end of the century, and rising again more recently possibly towards an N-shaped pattern. While these results are consistent with what we know about the pattern of regional disparities in early industrializers, we also find that the case of Turkey has a number of special features that do not easily fit the well-studied pattern for the early industrializers. First, while per capita value added in other regions moved towards country averages, the differences between the East

[9] Kanbur and Venables, 'Spatial inequality'; World Bank, *Reshaping economic geography*, pp. 48–122; Prager and Thisse, *Economic geography*.

[10] Kanbur and Venables, 'Spatial inequality'; Gennaioli et al., 'Growth in regions'; Tirado-Fabregat et al., *Time and space*.

[11] Kanbur and Zhang, 'Fifty years of regional inequality'; Caruana-Galizia, 'Indian regional income inequalty'; Tirado-Fabregat et al., *Time and space*.

[12] Gezici and Hewings, 'Spatial analysis'.

TABLE 1 A periodization and basic indicators for Turkey's economy, 1880–2015.

	1880–1914	1914–50	1950–80	1980–2015
Population at the end of the period (mill.)	16.5	21	45	79
Annual rate of growth of population (%)	0.7	0.7	2.6	1.7
Urbanization rate at the end of the period (%)	23	18	44	78
Share of agriculture in total employment at the end of the period (%)	75–80	75–80	50	22
Annual rate of growth of industrial value added (%)	1.3	2.6	8.5	5.2
Exports:GDP ratio at the end of the period (%)	11	8	4	15
Length of railways at the end of the period (km)	3240	7670	10 150	12 530
GDP per capita at the end of the period (PPP adjusted and in 2011 US dollars)	1500	2100	6100	16 500
Annual rate of growth of GDP (%)	1.3	1.6	5.9	4.1
Ratio of PPP adjusted GDP per capita Turkey/Western Europe at the end of the period (%)	34	35	36	56

Note: Urbanization rate is defined as the share of settlements with population above 5000.
Sources: Pamuk, *Uneven Centuries*, Karakoç et al., 'Industrialization', and Bolt and Van Zanden, 'Maddison style estimates'.

and the rest of the country persisted and even increased until recently. Our convergence clubs analysis shows that the eastern provinces form a different convergence club. Second, we find that spatial distribution of aggregate economic activity in Turkey became more concentrated over time, which was in large part due to continued migration to and the rise of the share of the megacity of Istanbul and its periphery. Third, our comparison with other countries of similar population and surface area shows that, while many countries experienced the inverse U and more recently the N shape, regional disparities in per capita value added in Turkey and other developing countries have been higher than those experienced by the early industrializers. These findings raise questions about the extent to which the regional disparities experienced by Turkey and other developing countries have been different than those of the early industrializers.

The next section provides an overview of Turkey's economic history since 1880. Section III summarizes our methodology and the dataset we have constructed as well as the empirical literature on regional disparities in Turkey since the 1960s. Sections IV and V present our findings regarding the pattern of regional inequalities based on our province-level estimates followed by a discussion of these findings in Section VI. Section VII compares the evolution of regional disparities in Turkey with those of other developed and developing countries. Section VIII provides a brief conclusion and suggestions for future research. The online appendix presents further details of our estimation procedure and data sources.

I | TURKEY'S ECONOMIC HISTORY SINCE 1880

The economic strategies and trade regimes followed by governments within the present-day borders of Turkey as well as the timing and intensity of urbanization, industrialization, and economic growth have been broadly similar to those in other developing countries. Table 1 and the rest of this section summarize Turkey's economic history since 1880 in four periods.[13]

[13] Pamuk, *Uneven centuries*; Karakoç et al., 'Industrialization'.

The area within the present-day borders of Turkey was part of the Ottoman Empire until after the First World War. Early in the nineteenth century, the Ottoman government signed free trade treaties with the European states to obtain their support for the empire and the ongoing reforms. While specialization in agriculture advanced, crafts-based manufacturing activities, especially in textiles, declined under the competition of imports. The Ottoman Empire disintegrated after the First World War and modern Turkey was established in 1923 over part of its territories. The new nation-state gained the right to establish its own tariffs beginning in 1929. In response to the Great Depression and the collapse of agricultural prices, protectionism and state-led industrialization were embraced as the new strategy for economic growth. With the building of the highway and road network, costs of transportation inside the country continued to decline after the Second World War. Along with higher rates of population growth, urbanization and migration from rural to urban areas and from poorer to richer regions accelerated. The large domestic market remained strongly protected from international competition. In 1980, the economic policies and institutions of the inward-looking industrialization era began to be dismantled in favour of trade and financial liberalization and a customs union agreement with the European Union. These changes opened Turkey's economy to globalization once again, and exports of manufactures emerged as an important engine of growth.

II | DATA AND METHODS

The earliest studies estimating regional incomes and their disparities in Turkey began with province-level data for the 1960s.[14] The publication of annual official series for sectoral value added at the province level beginning with the year 1987 provided support for new research focusing on this recent period. Most of these studies did not find convergence; some found divergence.[15] Other studies have examined various aspects of the regional disparities in per capita income mostly for the period after 1987.[16]

As part of this study, we constructed value added estimates for agriculture, industry, and services and value added per capita for 58 provinces for the benchmark years of 1913, 1927, 1939, 1950, 1964, 1970, 1980, and 1991. We began with 1913 because detailed regional production data are not available for the earlier period. The subsequent benchmark years were chosen because they were the years of industrial censuses. As we explain briefly below and in greater detail in the Online Appendix, we followed different procedures for the three sectors and in different years, as the quantity and quality of the available data vary considerably. We ended our estimates in 1991 to be able to compare our series with the official estimates that became available on an annual basis in 1987.[17]

The administrative divisions within the present-day borders of Turkey changed often since the late Ottoman era. Nonetheless, there was a large degree of continuity from the Ottoman *sancak*s

[14] Jurkat, *Employment and value added*; Bulutay and Ersel, 'Türkiye milli gelirinin'; Özmucur, 'Bölgelerarası gelir', Özötün, *İller itibariyle*; Özötün, Hazinedar, and Kaya, *Türkiye gayri safi*.

[15] Filiztekin, *Convergence*; Doğruel and Doğruel, 'Türkiye'de bölgesel gelir'; Yıldırım and Öcal, 'Income inequality'; Gezici and Hewings, 'Spatial analysis'; Karaca, 'Türkiye'de bölgesel yakınsamanın'.

[16] Mutlu, *Dogu sorununun kökenleri*; Kırdar and Saracoglu, 'Migration and regional convergence'; Celebioglu and Dall'erba, 'Spatial disparities'; Yılmaz and Kaplan, 'Regional polarization'.

[17] For the conventional national income accounting methods, see Devlet İstatistik Enstitüsü, Turkey, *Türkiye milli geliri*. For an application to the early republican period, see Bulutay, Tezel, and Yıldırım, *Türkiye'nin milli geliri*.

of the nineteenth century, whose numbers varied between 50 and 60 to Turkey's *vilayet*s or provinces, whose numbers increased from 67 to 81 since the 1980s. We made some adjustments in the available data and defined 58 spatial units for the entire period. These 58 provinces form the basis of our empirical work and can easily be collapsed into the 26 present-day NUTS 2 regions, with relatively minor adjustments.[18]

For agriculture, Ottoman statistics at the level of provinces became available for the first time in the years before the First World War. Annual regional agricultural statistics are available from 1928 onwards, allowing us to calculate 3-year averages for agricultural value added for each of the provinces and the benchmark years.[19] At the last stage, we distributed the national agricultural value added amongst the 58 provinces in proportion to our province-level estimates for each benchmark year.

We consider total industrial value added as the sum of the value added of five sub-sectors: big manufacturing, small manufacturing, mining, utilities, and construction. Big manufacturing value added data comes from the summary reports of industrial censuses. Value added in small manufacturing, mining, and utilities are estimated by making use of the related employment data. Value added in construction is estimated from the value of new building permits for each benchmark year. We distributed the national industrial value added amongst the 58 provinces in proportion to our province-level estimates for each benchmark year.

While we are able to make direct value added estimates for agriculture and industry using the available censuses, we cannot follow the same method for services, as there are no services output or value added data at the province level for the period before 1975.[20] Facing similar data limitations, Geary and Stark used a weighted average of regional wages in agriculture and industry as a proxy for services wages, which are in turn used as a proxy for average services productivity. The wage-based method with wage data for different branches of services have also been used for Italy and Spain.[21] Due to the absence of wage data in services, we use a regression-based method to predict provincial shares in services value added and check robustness of our estimates by comparing them, first, with alternative Geary–Stark type employment-based estimates for 1938–80, and second, with another training sample and comparing with the official services value added series.

To produce out-of-sample predictions of services value added for pre-1987 years, we begin with Özötün's detailed annual estimates for services value added at the province level for 1975–85, which is chronologically closest to the earlier period we are interested in.[22] Using these series, we estimate an ordinary least squares (OLS) model that predicts the share of services value added using as predictors the provincial industrial and agricultural value added shares in Turkey's total value added, provincial urban population in total urban population, and year fixed effects.[23] We chose these variables because the empirical evidence suggests that industrialization, urbanization, and services value added are strongly correlated, especially in the early stages of structural

[18] For further details on the definition of the 58 provinces, see table A1.

[19] For agricultural value added for the second benchmark year of 1927, we used the average of the years 1928–30.

[20] Comparable labor force surveys become available after 2004 and only for the 26 NUTS 2 regions. Censuses after 1935 include some information on wages and occupations which we use in our Geary–Stark estimations as discussed below.

[21] Geary and Stark, 'Examining'; Felice, 'Estimating regional GDP'; Martínez-Galarraga et al., 'Long-term patterns'; Rosés et al., 'Upswing of regional income'.

[22] Özötün, *İller itibariyle*; Özötün, Hazinedar, and Kaya, *Türkiye gayri safi*.

[23] We chose not to include region fixed effects in our regressions because two-way fixed effects take away most of the variation in the data and reduce the accuracy of out-of-sample predictions. The estimated coefficients of province shares in total industrial and agricultural value added and urban population are highly significant and are presented in table A3.

transformation.[24] We then make out-of-sample predictions for the provincial services shares for each of our earlier benchmark years based on our estimated coefficients. The regression model and the results are explained in greater detail in the online appendix.

Our regression model has strong predictive power over the regional distribution of regional value added services in the earlier periods, as figures A1 and A2 of the online appendix show. One reason for the high predictive power of our model is the strong correlation between urbanization, industrialization, and services value added. Turkey's national income accounts indicate that, whereas the share of services sector in GDP averaged close to 65 per cent in recent decades and above 50 per cent during the 1980s, it averaged close to 40 per cent in the 1950s and the 1930s and below 40 per cent before the First World War.[25] This trend means that we use our regression-based model to predict the share of services for periods when services sector was relatively small, which limits our margin of error.

To check the robustness of our services estimates to alternative methods, we first make partial use of the Geary–Stark method. Although occupation and wage data at the province level are not available for our benchmark years of 1913 and 1927, we were able to use regional occupation and workforce data, provided in the population censuses, to predict services value added at the province level for 1939, 1950, 1964, 1970, and 1980 and compare them with our regression-based estimates. We show in figure A1 in the online appendix that there is strong correlation between the partial Geary–Stark and our regression-based results.

For our second robustness check, we use the same regression model as before, but this time, instead of the 1975–85 series, we rely, as our training sample, on Turkstat's official services value added shares at the province level for the years 1991 and 2000. Using the coefficients from these new regression estimates, we predict services value added shares for each province and then compare our predictions with the official estimates for 1991 and 2000. Again, the regression-based estimates and the official series turn out to be highly correlated, as we show in figure A2. The fact that both the Geary–Stark estimate of services share for pre-1980 years, and official figures for 1991 and 2000 are highly correlated with our estimates gives us further confidence that our regression-based method produces reliable predictions for services value added share at the province level.

Three caveats are in order for our overall estimations. First, we are well aware that the national income and regional income are in some ways dissimilar conceptually. For example, the EU's regional accounts manual describes the methodological challenges of estimating regional GDP, including the difficulty of classifying the activities of the enterprises and individuals that have operations in different locations.[26] We also recognize that output–income equivalence at the national level may not hold at the regional level. Following the approach in most of the recent studies, our regional estimates are based on the production side and reflect how much value added was produced by sector and by province.[27]

[24] Prager and Thisse, *Economic geography*; Herrendorf, Rogerson, and Valentinyi, 'Growth and structural transformation'.

[25] Pamuk, *Uneven centuries*.

[26] Eurostat, *Manual*.

[27] Some recent estimates rely on the method used by Geary and Stark, 'Examining', which reallocates national incomes across locations based on regional and sectoral level wages. Other recent studies such as Martínez-Galarraga et al., 'Long-term patterns', combine the wage-based methods with the traditional output-based approach, as in our study. These studies also assume the output and income equivalence. Rosés et al., 'Upswing of regional income', and Martinez-Galarraga et al., 'Long-term patterns', combine production-side estimates for some sectors of Spain with Geary–Stark type estimates

Second, one drawback of the present estimates is that we do not use regional deflators to derive constant price from nominal value added. The procedure in the literature is often to estimate the incomes in nominal terms, as we do here, and then deflate with the single price index for all provinces due to the difficulty of obtaining separate regional deflators over a long period and across a large spatial spectrum. In the absence of detailed price data at the level of provinces, we also use a single price index to deflate regional incomes. [28]

Third, we link our own estimates for the pre-1990 period with the official series for the period after 1987. The methodologies and data sources in our own work differs in some respects from those for the period 1975–85 and those of the official series.[29] However, we carefully compared our estimates for 1980 with those of Özötün et al. for the same year and our estimates for 1991 with the official series. We did not find significant differences between our estimates and the others.[30]

III | THE EVOLUTION OF COUNTRY-WIDE INEQUALITIES

This section presents an overview of our estimates of sectoral value added and value added per capita for our 58 provinces and the results of our analysis of the evolution of regional disparities using well-known statistical measures. We first test for β-convergence and show that provinces with lower value added per capita in the initial period experienced higher rates of growth for most of the time frame under investigation. We then employ Theil indices which allow us to decompose total variation between provinces into within and between components. We show that, while spatial concentration of economic activity for the country as a whole continued to increase, disparities in value added per capita between provinces exhibited an inverse U-shaped pattern, rising until the mid-decades of the twentieth century and declining afterwards.

We begin with figure 1 and table 2, which summarizes the changes in the distribution of population amongst the 12 NUTS 1 regions of the country for the period 1913–2015. In addition to population growth and urbanization, an important demographic trend has been the acceleration of interregional migration since the end of the Second World War. High rates of rural to urban and interregional migration from the north and east to north-west and south has led to growing concentration of population, especially in the north-west of the country. Most striking has been the rise in Istanbul's share in total population from about 6 per cent in 1913 and 1950 to more than 10 per cent in 1980 and more than 19 per cent in 2015. More generally, shares of regions in the west and the south have risen, while those in the north and east have declined since 1950.

Table 3 summarizes the evolution of value added per capita in each of the NUTS 1 regions in relation to the country average on the basis of our province-level estimates.[31] It shows that, on

for industry and services. Combes et al., 'Rise and fall' refer to "value added" estimates as the basis of their analysis of regional disparities in France.

[28] Leading studies on the evolution of regional disparities in other countries including Kim, 'Economic integration', Caselli and Coleman, 'US structural transformation', Combes et al., 'Rise and fall', and Roses and Wolf, *Economic development*, all use a single national price index to deflate regional incomes measured in nominal terms.

[29] Özötün, *İller itibariyle*; Özötün et al., *Türkiye gayri safi*; Devlet İstatistik Enstitüsü, Turkey, *Iller Itibariyle.*

[30] Our province-level estimates for the year 1980 are close to those by Özötün et al., *Türkiye gayri safi*, for the same year. The coefficient of variation for GDP per capita for 58 provinces in our study is 1.61, while it is 1.81 in Özötün et al. for 67 provinces. Our coefficient of variation for estimates for agriculture, industry, and services are 0.72, 2.08, and 2.27, respectively, while the corresponding coefficients in the Özötün et al. study are 0.66, 2.17, and 2.43.

[31] Our estimates of GDP per capita for each of the 58 provinces in relation to the country average for each of the benchmark years are given in table A4.

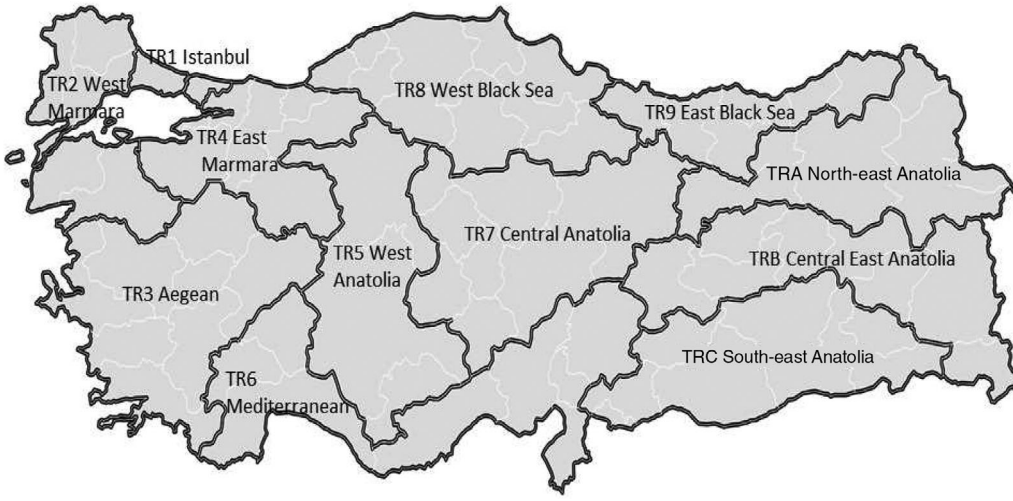

FIGURE 1 NUTS 1 regions of Turkey.

TABLE 2 Population shares of NUTS 1 regions, 1913–2015 (in per cent).

NUTS 1 REGIONS	1913	1927	1940	1950	1965	1970	1980	1990	2000	2010	2015
ISTANBUL	6.0	6.0	5.6	5.6	7.3	8.5	10.6	12.9	15.0	18.7	19.4
WEST MARMARA	7.8	7.1	8.4	7.1	6.1	5.6	5.0	4.6	4.3	4.3	4.3
AEGEAN	14.3	15.5	14.3	14.3	14.0	13.7	13.3	13.4	13.2	13.1	12.9
EAST MARMARA	7.3	8.7	8.0	8.3	7.8	7.6	7.7	8.1	8.2	8.5	8.8
WEST ANATOLIA	5.3	6.7	6.9	7.5	8.8	9.3	9.9	9.8	10.1	9.9	10.1
MEDITERRANEAN	8.1	7.9	9.1	9.8	10.5	10.8	11.8	12.4	12.8	12.8	12.8
CENTRAL ANATOLIA	8.6	8.9	8.5	8.5	7.8	7.4	6.8	6.1	5.6	4.8	4.6
WEST BLACK SEA	13.4	13.4	12.4	12.7	11.6	11.0	10.0	8.7	7.2	6.1	5.7
EAST BLACK SEA	8.0	8.5	8.3	7.9	7.4	7.1	6.2	5.2	4.8	3.5	3.4
NORTH-EAST ANATOLIA	7.4	5.3	5.7	5.8	5.5	5.4	4.8	4.0	3.6	2.9	2.7
CENTRAL EAST ANATOLIA	6.9	5.2	6.0	6.1	6.5	6.7	6.7	6.4	6.4	5.7	5.6
SOUTH-EAST ANATOLIA	6.9	6.6	6.8	6.4	6.7	7.0	7.2	8.2	8.8	9.5	9.9

the eve of the First World War, well before industrialization gained momentum, there already existed large disparities in the value added per capita of different regions. Table 3 also shows that the province of Istanbul has always had the highest value added per capita in the country. Its value added per capita in relation to the country average rose until the middle decades of the twentieth century and has been declining since. Western regions kept their relative positions over time and remained among the most prosperous regions in the country. The West Marmara and East Marmara regions, which include the provinces neighboring Istanbul and West Anatolia, saw increases in their relative value added per capita during the second half of the twentieth century. The Aegean, which includes Izmir, was the second wealthiest region after Istanbul during the first

TABLE 3 Value added per capita of NUTS 1 regions, 1913–2015; Country average = 100

NUTS 1 REGIONS	1913	1927	1939	1950	1964	1970	1980	1991	2000	2010	2015
ISTANBUL	249.1	288.9	326.5	305.5	249.4	220.9	183.0	157.7	124.8	159.7	161.2
WEST MARMARA	93.2	109.7	79.4	83.1	87.4	104.1	112.2	115.4	115.3	105.1	97.4
AEGEAN	130.2	110.6	112.0	119.8	102.7	106.2	108.6	120.3	124.8	96.9	96.5
EAST MARMARA	123.1	98.8	100.1	103.3	104.8	111.5	136.0	148.3	149.6	121.7	126.6
WEST ANATOLIA	108.8	70.6	110.7	127.9	135.1	131.0	117.7	115.9	119.0	124.1	116.9
MEDITERRANEAN	102.4	144.8	115.5	97.1	107.8	99.7	96.4	95.5	95.6	84.0	79.6
CENTRAL ANATOLIA	86.0	68.4	78.6	74.1	81.5	83.1	84.3	61.7	69.4	74.2	74.9
WEST BLACK SEA	67.8	82.2	68.2	82.7	74.1	75.6	77.1	67.7	82.4	69.1	69.4
EAST BLACK SEA	40.4	56.2	53.8	42.8	45.7	61.2	48.3	59.9	69.9	70.9	73.9
NORTH-EAST ANATOLIA	68.6	45.7	69.3	52.5	51.1	33.5	31.9	33.5	35.1	54.6	53.2
CENTRAL EAST ANATOLIA	67.5	50.2	63.5	59.9	57.5	47.7	47.3	50.2	43.0	49.0	49.1
SOUTH-EAST ANATOLIA	95.7	85.8	82.2	84.5	87.2	81.5	82.3	60.5	54.1	49.8	51.3

half of the twentieth century, but its relative value added per capita declined over time. The two Black Sea regions and Central Anatolia always remained below country averages. Value added per capita in the three eastern regions also remained below country averages, and it declined further during the second half of the twentieth century. The differences between the eastern provinces and the rest of the country have decreased somewhat since the beginning of the present century, but they are still very large today.

One of the most frequently used measures in the literature for examining the evolution of regional disparities is β-convergence, which tests whether the poorer provinces in the initial period grew faster than the richer ones. Since the seminal work of Barro and Sala-i-Martin, the neoclassical growth framework has been extensively used to investigate regional growth convergence.[32] The literature has suggested different ways of looking at β-convergence (absolute and conditional convergence), depending on the assumed structure of steady-state growth rates of different regions stemming from neoclassical framework. In their original work, Barro and Sala-i-Martin used the concept of conditional convergence based on the idea that adjusting for some initial characteristics of regions, such as initial share of agriculture, makes the uniform steady-state growth rate more realistic. However, more recent studies have highlighted the limitations of their method since the spatial dependence of regional growth dynamics and other possible confounders may lead to biased estimates of the steady-state growth levels. Following the recent literature, we use here a revised version of absolute β-convergence by adjusting the regression for spatial dependence between the regions, using two-stage least squares (2SLS) estimates for individual periods and the maximum likelihood (ML) estimates of the spatial random effects panel model.[33] Figure 2 links the initial value added per capita to the growth rate for the subsequent

[32] Barro and Sala-i Martin, 'Convergence'.

[33] Breinlich et al., 'Regional growth'; Dall'Erba and Le Gallo, 'Regional convergence'; and Gennaioli et al., 'Growth in regions'. More specifically, our analysis is based on an absolute convergence framework with spatial dependence. We

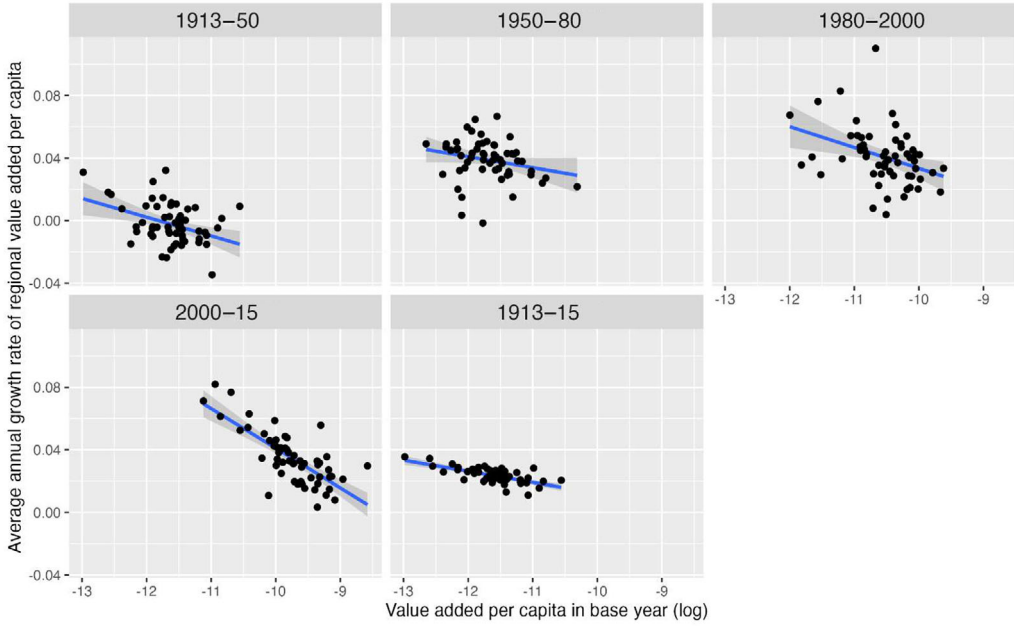

FIGURE 2 Beta convergence of regional value added per capita for different subperiods. [Colour figure can be viewed at wileyonlinelibrary.com]

period for all provinces and shows that the absolute β-convergence could be at work for each of the subperiods in Turkey. The negative slope indicates faster growth performance by the poorer provinces.

Figure 3 presents the estimated beta convergence coefficients for selected periods based on our 2SLS estimates and for the whole dataset using the spatial random effects model, together with their 95 per cent confidence intervals. Since each period in figure 3 has distinctive features, the coefficients for different periods are not necessarily comparable. We observe that all convergence coefficients are negative, showing some convergence is at work in each period. However, the confidence intervals include zero for 1913–50 and 1980–2000. The size of coefficient was highest for 1950–80. Crucially, the average coefficient for the entire period is negative, indicating

estimate the following convergence equation:

$$g_{it} = 1/T\ log\left(\frac{y_{i,t}}{y_{i,t-1}}\right) = \alpha + \beta\ 1/T\ \log\left(y_{i,t-1}\right) + W * g_{it} + \epsilon_{it}$$

where g_{it} is the log of the growth rate of per capita incomes in province i in each period, k is the length of observation interval, β is the convergence coefficient, y is the real income per capita, and W is the spatial weights matrix. The W matrix is constructed, as in the geostatistics literature, by first obtaining the pairwise geographical distance between the central coordinates of each region, taking its inverse and finally row-standardizing the matrix. Multiplied by the annual compound growth rate, vector $W * g_{it}$ produces spatially lag weighted compound growth rate for each region, which is used as an explanatory variable to address the spatial autocorrelation in the data. As often pointed out, OLS estimates are not consistent when using spatially lagged variables as when using explanatory variables, since individual errors are correlated with spatial lags. Instead, 2SLS is advised in the literature (Arbia, *A primer*; Dall'erba and Le Gallo, 'Regional convergence'). To do so, we use a spatially lagged exogenous variable (income per capita in the base year – W * $\log(y_{i,t-1})$) as an instrument for $W * g_{it}$ (using an *ivreg* package in R). For the panel model, however, either ML or generalized method of moments (GMM) estimates are suggested. We use ML estimates of the spatial random effects panel model, assuming spatial lags in the dependent variable and spatial autocorrelation in individual errors (using a *splm* package in R).

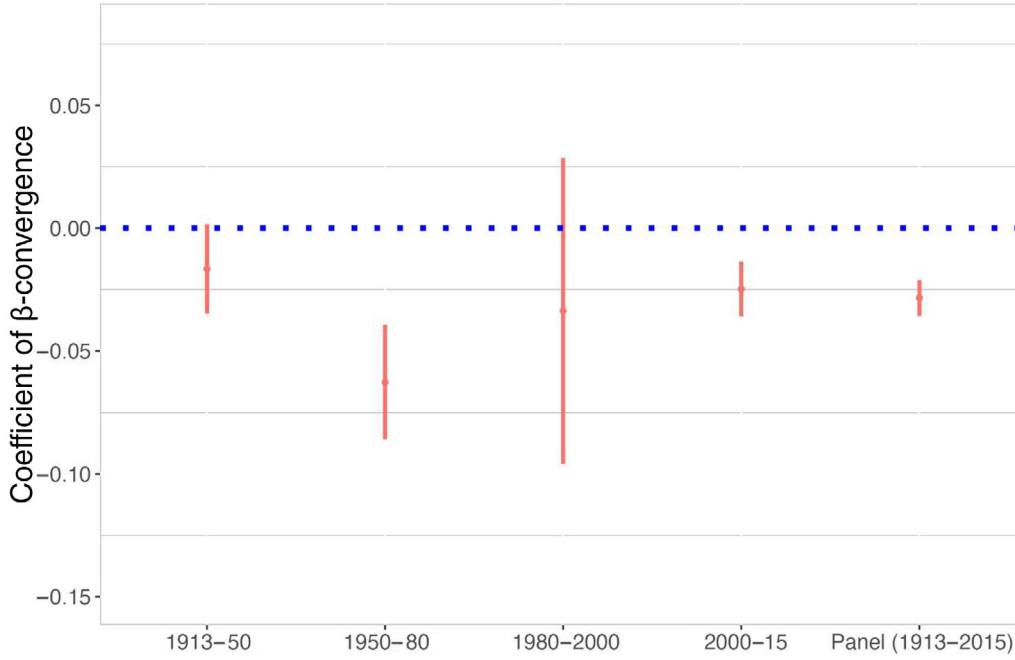

FIGURE 3 Absolute β-convergence coefficients. *Note*: Points represent the absolute β-convergence coefficient estimates, and the lines are 95% confidence intervals. [Colour figure can be viewed at wileyonlinelibrary.com]

β-convergence, after adjusting for spatial dependence. Furthermore, the convergence literature usually calculates the convergence rate.[34] Our calculations point to convergence rates of 0.05 per cent for 1913–50, 0.22 per cent for 1950–80, 0.17 per cent for 1980–2000 and 2000–15, and 0.03 per cent for the whole period 1913–2015. As shown in the formulas in footnotes 33 and 34, the speed of convergence depends on both the estimated coefficient and the period length as well as the model specification. We note that these are estimated rates for the spatially weighted absolute convergence. While Barro and Sala-i-Martin find higher absolute convergence rates for US regions (around 1–2 per cent), Mankiw et al.'s conditional convergence rates are much lower (around 0.1–0.3 per cent).[35] Our spatially weighted convergence rates are comparable to the latter estimates. Overall, the evidence thus supports absolute β-convergence for the entire period, while there were different dynamics for each of the subperiods. These results should be read with caution, however, in view of the criticisms against the neoclassical hypothesis of similar steady-state regional growth rates.

Another key focus of the literature on regional disparities has been the evolution over time of the dispersion of the variable of interest (income or value added) as summarized by the coefficient of variation, Theil index, and other similar indices. Among alternative indices, we prefer to use the Theil index (with $\theta = 1$) since it allows the decomposition of value added between and

[34] The relationship between the convergence speed and estimated coefficient of initial per capita incomes is as follows: $\lambda = -ln(1+\beta)/k$. Here, k is the number of years, β is the estimated coefficient, and λ is the convergence speed. λ values are directly calculated from the regression tables by Barro and Sala-i-Martin, 'Convergence', and are calculated as 'implied rates' from tables by Mankiw, Romer, and Weil, 'A Contribution'.

[35] Table 3 in Mankiw, Romer and Weil, 'A contribution'.

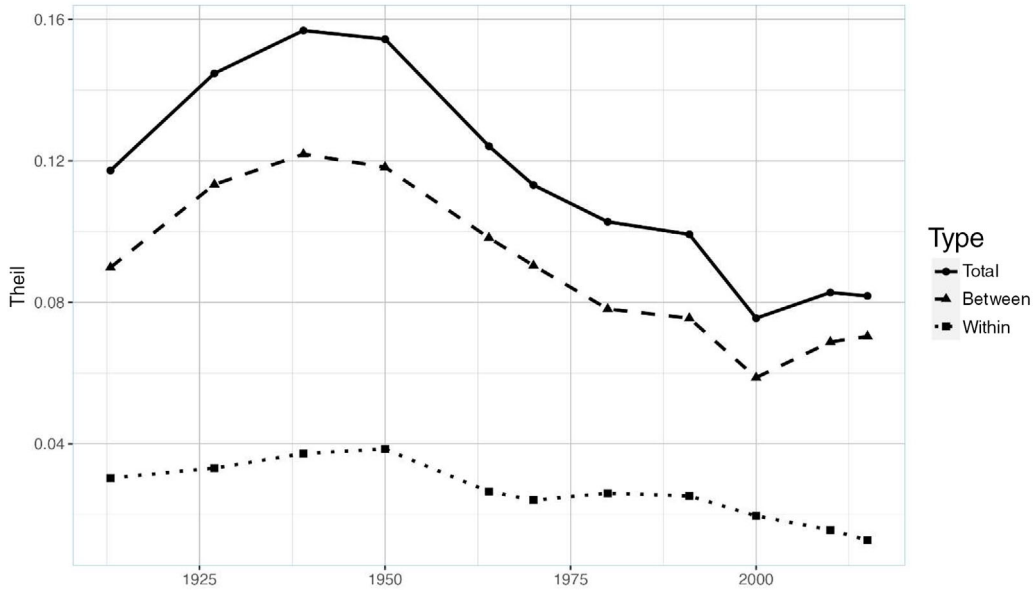

FIGURE 4 Theil decomposition of value added per capita, 1913–2015. [Colour figure can be viewed at wileyonlinelibrary.com]

within groups in a fully consistent manner, unlike, for instance, the coefficient variation.[36] In our Theil decomposition analysis presented below, the 58 provinces are regrouped into Turkey's officially defined 12 NUTS 1 regions with each of the latter containing, on average, six provinces. Several NUTS 1 units have less than six provinces, and Istanbul is by itself a NUTS 1 unit. The between-group component in the Theil analysis, therefore, measures dispersion between the NUTS 1 regions keeping the within-region inequality constant, while the within-group component measures dispersion within the NUTS 1 regions.

Figure 4 shows the Theil decomposition of value added per capita at the NUTS 1 level. This exercise yields a number of important findings. First, the evolution of dispersion of value added per capita of the 58 provinces clearly has exhibited an inverse U-shape until recently. The dispersion of value added per capita across provinces increased until the middle of the twentieth century, declined during the second half of the century, and has risen again since the turn of the present century. Secondly, figure 4 shows that between-group inequality or inequality between the NUTS

[36] The generalized entropy indices are the only family of indices satisfying certain key criteria such as income scale independence, decomposability, and strong principle of transfer as one would expect from an inequality measure (Cowell, *Measuring inequality*, p. 68). Theil index with $\theta = 1$ is special within this family since it allows the decomposition of parameter of interest between and within groups in a consistent manner. In the present case, we would like to detect if the spatial disparities arise from between or within larger regions. The within and between components of Theil index can be calculated as follows:

$$T = \sum_{g=1}^{w} s_g \log\left(\frac{n}{n_g} s_g\right) + \sum_{g=1}^{w} s_g \sum_{i \in g} s_{i,g} \log(n_g s_{i,g})$$

where n_g is the number of provinces in group g, $\sum n_g = n$, $s_g = \frac{\sum_{i \in g} y_{i,g}}{\sum_i^n y_i}$ is the share of total value added of the group g, and $s_{i,g} = \frac{y_{i,g}}{\sum_{i=1}^{n_g} y_{i,g}}$ is the share of province i's value added in the group to which it belongs (Rey, 'Spatial analysis'). Note that, only in the Theil index within the entropy family, the weights used in within-group variation are totally independent of the between-group averages (Combes et al., 'Rise and fall', p. 264).

1 regions has consistently been larger than the within-group inequality during the period 1913–2015. In other words, overall inequality of value added per capita between Turkey's 58 provinces has been driven mostly by inequalities between NUTS 1 regions rather than inequalities within the NUTS 1 regions during this period.

For a check on how the potential error in our regional value added estimates affects the analysis of the inverted U shape, we use a simulation method suggested by Combes et al.[37] We produce a series of artificial noises by randomly choosing 1000 values *(e)* from a normal distribution with mean 0 and standard deviation 0.1. We then calculated y * (1 + *e*) for each province separately, where y is the value added per capita at a certain year in a certain province and the mean and standard deviation of the Theil index of value added per capita for all hypothetical situations. The choice of standard deviation 0.1 of the normal distribution guarantees that the hypothetical value added estimates deviate from the actual values (our estimates) by 20 per cent (plus or minus) for at least 95 per cent of the cases. This exercise supports the inverse U shape overall (figure A3).

IV | THE EAST LAGGING BEHIND

The preceding analysis showed that, for Turkey as a whole, poorer provinces grew faster than the richer provinces during the last century. In addition, along with increasing spatial concentration of aggregate economic activity, disparities in value added per capita at the province level has traced an inverse U shape, rising until the middle decades of the twentieth century and declining since. At the same time, however, the development gaps between the West and the East have persisted, and they remained one of the leading issues in national politics and development policy since the late Ottoman era. What do our new regional estimates show about the trajectory of the East in relation to the rest of the country? To address this question, we begin with the existing administrative divisions that define the East and then move on to convergence club tests using our value added per capita estimates.

Of the 12 NUTS 1 regions, the current administrative divisions refer to the TRA (North-east), TRB (Central east), and TRC (South-east) regions as the East. These three NUTS 1 regions are divided into a total of seven NUTS 2 regions of which there are 26 for the country as a whole. It has been suggested in the literature that, if economies or regions start with different initial conditions, they might converge to different steady state income levels, forming separate convergence clubs.[38] Following Phillips and Sul, we use the log *t*-test to identify the convergence clubs on the basis of our value added per capita estimates for our benchmark years. The test decomposes the variable of interest into a common growth factor and an idiosyncratic part that varies over time across units. Hence, it is possible to measure whether a unit departs from the common growth path in a variety of macroeconomic and microeconomic settings.[39]

[37] Combes et al., 'Rise and fall', p. 251.

[38] Azariadis and Drazen, 'Threshold externalities'; Galor, 'Convergence'; Phillips and Sul, 'Transition modelling'.

[39] Phillips and Sul, 'Transition modelling'. Bartkowska and Riedl, 'Regional convergence clubs', apply this approach and identify six distinct convergence clubs in Europe. Following the same methodology, we first rank our regions on the basis of highest income per capita in 2015. In the second step, starting with the two highest income provinces, we run log *t*-tests by adding the provinces one at a time until the one-sided *t* statistics fell outside the 5 per cent significance level (≤1.65) and the null hypothesis of convergence was rejected. This procedure is then repeated for the remaining provinces. We use the *logtreg* algorithm in STATA 17 for our estimations.

TABLE 4 Long-run convergence clubs in Turkey, 1913–2015.

	Beta	t stat	NUTS 2 Regions
Club 1	−0.79	−1.49	TR10, TR21, TR22, TR31, TR32, TR33, TR41, TR42, TR51, TR52, TR61, TR62, TR71
Club 2	−0.47	−0.67	TR63, TR72, TR81, TR82, TR83, TR90, TRA1, TRB1
Club 3	−1.02	−1.59	TRA2, TRB2, TRC1, TRC2, TRC3

FIGURE 5 Convergence clubs in Turkey based on 58 regions and NUTS 2 classification, 1913–2015.

Based on our series and the existing NUTS 2 classification, we find three distinct long-run convergence clubs in Turkey, as shown in table 4 and figure 5. The first club with the highest value added per capita consists of all provinces to the west of an Ankara–Nigde–Adana line. The third convergence club consists of all the eastern regions as defined by the three NUTS 1 regions TRA, TRB, and TRC, except for the two NUTS 2 regions TRA1 (Erzurum and Erzincan) and TRB1 (Elazig and Malatya). The second convergence club includes the regions in between the two.

In figure 6 we plot the value added per capita of the three convergence clubs relative to Turkey's average during the last century. Figure 6 shows that, the eastern provinces, or Club 3, were not the poorest provinces in the country before the First World War. However, the First World War, ethnic conflicts, and the large demographic movements during 1913–27 might have taken its strongest toll on the East. Value added per capita in the East started to converge towards the country averages during the interwar period, but this trend did not last long. The divergence between the East and the rest that began in the 1960s became stronger after 1980 and continued until the end of the century. The value added per capita gaps between the West and the East and between the country average and the East were both larger at the end of the twentieth century and in 2015 than in 1950. Our convergence clubs test results thus provide a formal justification for our motivation to explore the evolution of long-run value added per capita differences between the East and the rest of the country. Although the test results differ slightly from the existing administrative definition

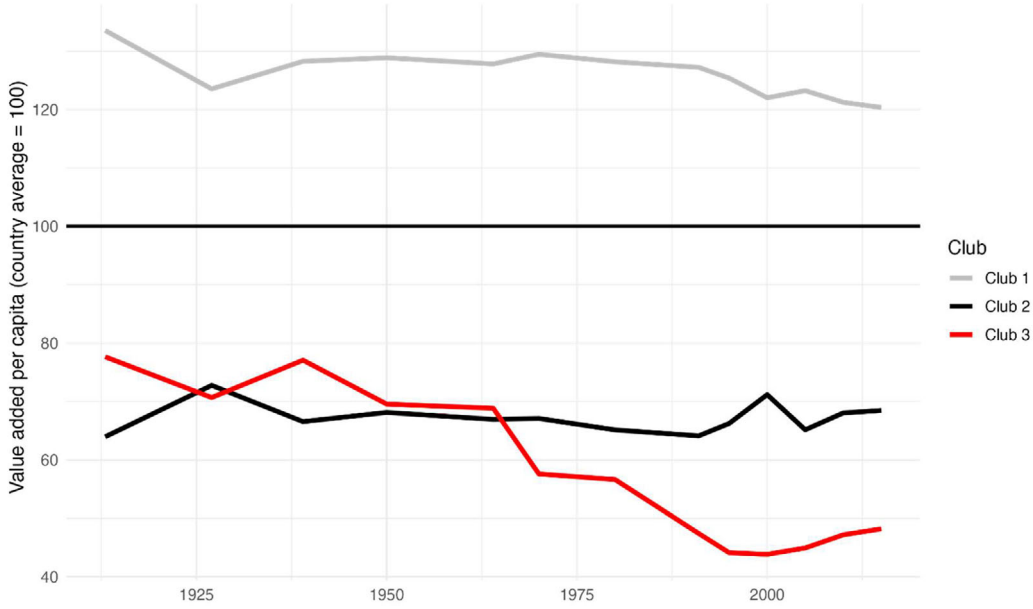

FIGURE 6 Value added per capita by convergence clubs, country average = 100. [Colour figure can be viewed at wileyonlinelibrary.com]

as reflected in the NUTS 1 classification, it confirms that the provinces in the East have lagged behind since the late Ottoman era and constitute a separate club.[40]

V | A DISCUSSION OF THE FINDINGS

In this section we briefly review some of the potential factors behind convergence of the value added per capita gaps, the inverse U-shaped pattern and the lagging of the East identified in the previous two sections. We do not make causal arguments but highlight instead the possible mechanisms that might have played a role in the convergence and divergence trends that our data reveals. We hope, however, that this discussion and future research will provide additional insights into the long-term evolution of regional disparities in a developing country and how that might compare with the experience of today's developed countries.

Our series show that a high level of regional disparities existed within the present-day borders of Turkey on the eve of the First World War, well before industrialization gained momentum. While data for value added series are not available for the nineteenth century, evidence from tax collections suggests that West–East differences were large and rising during the decades before

[40] Our estimates suggest that the gap between the value added per capita of the West and the East in Turkey has been greater than the GDP per capita gap in Italy between the North and the South. Recent estimates by Felice indicate that the GDP per capita ratio for North:South in Italy fluctuated mostly between 1.5 and 2 and GDP per capita for the South has fluctuated mostly between and 60 per cent and 80 per cent of country average since 1891 (Felice, 'Regional value added', p. 933). Our estimates indicate that the value added per capita ratio for West:East in Turkey has fluctuated mostly between 2 and 2.5 and the value added per capita for the East has fluctuated between 45 per cent and 78 per cent of the country average since 1913 (figure 4 and tables 2 and 3). Moreover, whereas the North/South differences in Italy declined during the second half of the twentieth century, the West/East differences in Turkey have increased since 1950.

the First World War.[41] Geography including climate, soil, and crop patterns as well as proximity to western Europe must have played important roles in shaping the diverging regional patterns as the Ottoman economy opened to international trade and investment. Turkey is not particularly rich in mineral resources or oil. It is surrounded by seas on three sides and has the Mediterranean climate in the West and the South, a rain-fed plateau at the centre, and higher elevations and more mountains in the East. Because of the variations in soil and climate conditions, the distribution of agricultural crops varied significantly from one region to the other.[42] As trade with Western Europe increased rapidly, proximity to Western Europe emerged as an important source of regional differentiation. Growing commercialization and export orientation of agriculture in the West was also facilitated by the construction of railroads and other investments in trade, banking, and infrastructure by European companies. Istanbul, the capital city of two empires for more than a millennium, remained at the centre of trade and migration flows between the European and Asian provinces. Because of their distance from the leading ports of export and the absence of railroads, the eastern half of the country remained more connected to Syria, Iraq, and the rest of the Middle East, and per capita exports remained distinctly lower.[43]

It is likely that the division of the Ottoman Empire into nation-states and the drawing of new borders after the First World War also had uneven consequences for Turkey's regions. Patterns of trade and social networks that had developed across the empire over centuries were disrupted by the new borders. Agricultural producers and small- and medium-sized manufacturing establishments in the East lost their access to markets in Syria, Iraq, and elsewhere in the Middle East.

Our sectoral and value added per capita estimates suggest that ethnic conflicts and large demographic movements impacted the East more strongly and may have contributed to the growing disparities between this region and the rest of the country since the late Ottoman era.[44] Armenians made up about 16 per cent of the population of the East, and their levels of education and per capita commercial agriculture and trade were higher than the regional averages.[45] Large numbers of Armenians were killed during the First World War and many others perished after the Ottoman government forced them to march to the Syrian desert. The Muslim population of the region also declined as many died and others fled to other regions during the war and Russian occupation

[41] Eldem, *Osmanlı Imparatorluğu'nun İktisadi,* pp. 270–309.

[42] Tümertekin, *Ekonomik Coğrafya*.

[43] Pamuk, *Uneven centuries*, pp. 112–33. The large differences in urbanization rates are also consistent with the differences that we have identified in per capita value added between the West and the East. On the eve of the First World War I, about 39 per cent of the population in the West and 20 per cent of the population in the East lived in urban areas with populations above 5000 (our calculations based on Karpat, *Ottoman population*, pp. 122–98, and Behar, *Osmanlı Imparatorluğu'nun Nüfusu,* pp. 33–7). Moreover, our estimates for the West–East differences in value added in per capita before the First World War are similar to those by Eldem made on the basis of tax revenue data (Eldem, *Osmanlı Imparatorluğu'nun İktisadi,* pp. 69–87, 270–309).

[44] There is a large body of literature that points to ethnic polarization and conflict as an important source of regional inequalities. As different regions are often homelands to different ethnic groups, ethnic polarization and conflict may emerge as a leading source of regional inequalities. It may also interact with existing disparities or with unfolding processes such as industrialization that give rise to regional disparities (Horowitz, *Ethnic groups*; Esteban and Ray, 'On the salience'; Alesina et al., 'Ethnic inequality'). Studies show that, in the absence of the resolution of the ethnic issues, some regions may lag behind the rest of the country for long periods of time (Montalvo and Reynal-Querol, 'Ethnic polarization'; Esteban et al., 'Ethnicity and conflict'; Lessman, 'Regional inequality').

[45] Based on Karpat, *Ottoman population*, pp. 122–98. Our estimates take into account some undercount of the Armenian population in the Ottoman censuses.

of the region until 1917. We estimate that the population of the East declined by 34 per cent from 1913 to 1927, and close to half of that decline was due to the loss of Armenians. In contrast, the population of all other regions is estimated to have declined by 11 per cent, and total population within the present-day borders of Turkey declined by 16 per cent during the same period.[46]

Another large demographic shock was the exchange of the more than 1 million Greeks in the country with about 400 000 Muslims in Greece after an agreement between the governments of the two countries in the early 1920s. Our estimates show that the provinces where the Greeks lived until 1924 had more commercialized agriculture and higher urbanization rates and were more industrialized than those in the East. They also had access to better transportation networks, ports, and major urban markets. As economic growth accelerated after the Second World War, these provinces benefited more from commercialization of agriculture and industrialization in comparison to those in the East.[47]

Kurds have been the largest ethnic group living in Turkey's East since before the Ottoman era. There were frequent uprisings by the Kurds in the region during the 1920s and 1930s. Since the 1980s, Kurds have been seeking greater autonomy, and at times independence, by military and political means.[48] Our estimates summarized in table 3 and figure 6 suggest that the armed conflict between the Kurds and the central government both during the interwar period and after 1984 may have also played an important role in the relative decline of the East. Our estimates as well as the official series at the province level since 1987 show sharp declines in all three sectors relative to the country averages and then some recovery after cease fire was declared in 1999.

The evolution of regional disparities and the persistence of West–East differences since the nineteenth century were also correlated with the process of industrialization in Turkey. Table 5 summarizes the industrial value added series that we have constructed for the 58 provinces. It shows that large disparities existed in the spatial distribution of the low level of industrial activity already before the First World War. The first wave of factories was launched by the Ottoman state around the capital city in the 1830s and 1840s mostly to meet the requirements of the army and the state.[49] While traditional crafts declined under conditions of free trade, the decades before the First World War saw the establishment by the private sector of a small number of factories using the steam engine around Istanbul and Izmir in the West.[50] Market access was a leading motivation for the location of these early factories. After the new nation-state gained the right to establish its own tariffs beginning in 1929, the concentration of industrial value added in a small number of urban centres in the West persisted despite government policies to locate public sector factories in other regions. In 1950, Istanbul with a population share below 6 per cent accounted for 28 per cent of total industrial value added, and Izmir with a population share below 4 per cent accounted for 12 per cent of total industrial value added (table 5).

The decades after the Second World War II were a period of declining transportation costs, high rates of interregional migration from lower income provinces in the East and the north towards higher income provinces in the north-west and to a lesser extent in the south, as well as

[46] Pamuk, *Uneven centuries*, pp. 47–51, 126–7, 154–5. The population of the area within the present-day NUTS 1 regions TRA, TRB, and TRC in the East declined from 3.5 million in 1913 to 2.3 million in 1927, or by 34 per cent. Population in the rest of the area within the present-day borders of Turkey declined from 13 to 11.6 million, or by 11 per cent, during the same period (table 2).

[47] Based on Karpat, *Ottoman population*, pp. 122–98.

[48] Kirişçi and Winrow, *Kurdish Question*; Aydin and Emrence, *Zones of rebellion*.

[49] Clark, 'Ottoman industrial revolution'.

[50] Pamuk and Williamson, 'Ottoman de-industrialization'; Panza, 'De-industrialization and re-industrialization'.

TABLE 5 Industrial value added shares of NUTS 1 regions, 1913–2015 (in percent).

NAME	1913	1927	1939	1950	1964	1970	1980	1991	2000	2010	2015
ISTANBUL	26.4	22.8	28.8	28.0	27.9	34.7	23.9	27.2	30.0	29.7	29.8
WEST MARMARA	7.2	6.5	5.4	2.6	3.3	2.7	4.8	5.4	6.0	5.6	5.4
AEGEAN	20.8	18.5	17.3	19.5	16.1	15.1	16.2	15.3	16.3	13.4	13.4
EAST MARMARA	13.5	12.5	10.6	10.6	9.4	10.5	15.4	18.2	18.1	16.0	16.4
WEST ANATOLIA	1.8	4.5	6.1	7.6	11.7	9.2	8.7	8.0	7.3	11.7	10.9
MEDITERRANEAN	6.5	9.4	9.2	7.4	8.3	6.9	10.0	9.4	8.5	8.3	8.3
CENTRAL ANATOLIA	3.2	4.4	4.1	3.5	3.4	2.8	3.9	2.1	2.1	3.3	3.1
WEST BLACK SEA	9.1	11.3	8.8	13.6	10.2	8.7	9.5	5.1	4.8	3.2	3.1
EAST BLACK SEA	2.5	2.7	1.6	1.4	1.7	3.4	2.7	2.3	1.6	1.8	1.9
NORTH-EAST ANATOLIA	1.8	1.0	1.4	0.8	1.4	1.2	1.1	0.5	0.3	0.8	0.8
CENTRAL EAST ANATOLIA	2.7	1.8	3.2	3.2	3.4	2.6	2.1	3.1	1.9	1.8	2.1
SOUTH-EAST ANATOLIA	4.5	4.6	3.3	1.9	3.4	2.1	1.9	3.6	3.0	4.4	4.8

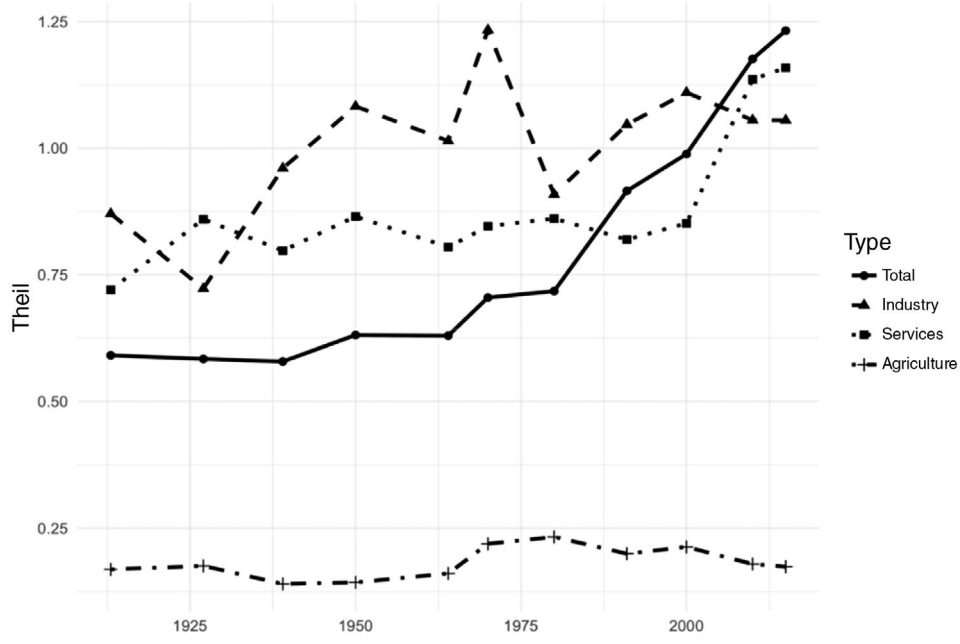

FIGURE 7 Aggregate Theil indices by sectors, 58 provinces, 1913–2015.

urbanization, industrialization, and economic growth. To gain further insights into the spatial and sectoral shifts that shaped the inverse U pattern of regional disparities in value added per capita, we present the Theil indices for total value added and sectoral value added for the 58 provinces in figure 7. Figure 7 shows that the spatial concentration of total economic activity in Turkey has increased steadily and strongly since the end of the Second World War. Moreover,

Theil indices also show that the growing concentration of population and economic activity in the megacity of Istanbul and to a lesser extent in other urban centres accounts for a large part of this pattern.[51] Not only did continued migration to Istanbul and the neighboring provinces increase their share in total value added, but it also led to the convergence of their value added per capita towards the national average, as reflected in the inverse U shape (tables 2 and 3). In other words, the decline of regional inequalities in per capita terms did not occur because of the dispersion of economic activity to other regions but rather due to continued migration to the north-west and the decline of per capita incomes in that region.[52]

Figure 7 also shows that there were large differences in the spatial distribution of the value added in the three sectors. Of the three sectors, agricultural value added is spatially the most dispersed due to the inherent characteristics of farm production. Moreover, with the shift of labor from rural to urban areas and steady decline in the share of agriculture in GDP from around 40 per cent in 1950 to less than 10 per cent in 2015, the role of disparities in agricultural value added in shaping disparities in total value added between the provinces has declined even further. In contrast, disparities in industrial value added between the 58 provinces was already high in 1913 and became even more so thereafter. Share of industry in GDP rose from around 15 per cent in 1950 to 26 per cent in the early 1990s, thus playing an increasing role in shaping spatial disparities in total and per capita economic activity. However, as an example of what Rodrik has called 'premature deindustrialization' in developing countries except those in East Asia,[53] the share of industry in Turkey's GDP did not rise any further and has fluctuated between 20 and 25 per cent since the early 1990s. In contrast, the share of services in GDP increased from 42 per cent in 1950 to 55 per cent in 1990 and 70 per cent in 2015. In addition, the disparities in value added in services between the 58 provinces began to exceed that of value added in industry in recent decades, as shown in figure 7. As a result, disparities in value added in services has been playing a more important role in recent decades in shaping the disparities in total economic activity between the 58 provinces.[54]

Figure 7 and the experience of the Istanbul region allow us to gain further insights into the variation behind the inverse U-shaped pattern in value added per capita at the province level that existed until recently. Even though Istanbul's share in total population continued to rise, its share in total industrial value added did not rise after 1970 (tables 2 and 5). Forces of dispersion were at work, and some industrial value added moved from Istanbul to neighboring provinces such as Kocaeli and Bursa.[55] However, the national trend of premature deindustrialization applied to this region, as well. With the stagnation if not decline of the share of industry in GDP and in total employment since the early 1990s, a rising share of the migrants arriving at Istanbul, at the neighboring provinces, and at many other urban centres across the country have been employed in services. Along with the growing diversification of the services sector, rising human capital levels across the country, and a growing concentration of skilled workers and professionals in Istanbul and other urban centres in the West, spatial variation of value added in services continued to

[51] As the population of Istanbul increased from less than 1 million in 1950 to more than 15 million in 2015, its share in total population increased from less than 6 per cent to more than 19 per cent, and its share in total value added increased from 17 per cent to 31 per cent (tables 2 and 3).

[52] Value added per capita in Istanbul declined from 305 in 1950 to 221 in 1970 and 161 in 2015, while the country average equalled 100 in each benchmark year (table 3).

[53] Rodrik, 'Premature industrialization'.

[54] Pamuk, *Uneven centuries*, pp. 267–74.

[55] Patterns of industrial agglomerations in Turkey are discussed at the level of provinces in Kaygalak and Reid, 'Geographical evolution'.

rise and exceeded that of value added in industry in recent decades, as shown in figure 7. Future research into the evolution of agglomeration economies in Istanbul and the neighboring provinces not only in industry but also in services should help us better understand these changes. This issue is relevant not only for Turkey but also for other developing countries experiencing premature deindustrialization in the current era of globalization.[56]

After the policy shift to trade liberalization and exports of manufactures in 1980, some limited amount of manufacturing activity expanded to new centres in Central Anatolia and to others across the country.[57] While these other regions slowly improved their industrial and total value added per capita in relation to the country average, another wave of armed conflict began in the East, and the region lagged further behind. Industrial value added per capita in the East declined to less than one-third of the national average and to less than one-sixth of that of the West by the end of the century. The official series indicate that industrial value added shares as well as GDP per capita in the East rebounded relative to country averages after the ceasefire around the turn of the century (tables 3 and 5). Value added per capita disparities between our 58 provinces began to rise once again in recent years possibly towards an N-shaped pattern, as is the case in many other countries. More evidence and more research is needed to understand this new pattern and its causes, which are often linked to the uneven impact of globalization and a growth strategy based on exports of manufactures in other countries. Whether regional disparities continue to rise will also depend on the future of the conflict and the tensions in the East.

Finally, a few words are in order on government policy. Government regional policies emerged in Turkey for the first time during the 1930s as state industrial enterprises and other economic activities began to be located in different parts of country including the Kurdish East. Regional policies became a visible item of the development agenda in the early 1960s after the establishment of the State Planning Organization. The first and second five-year plans defined regional cohesion policies and initiated several regional development projects. These initiatives became increasingly ineffective in the 1970s, however.[58] At the other end of the spectrum, the emphasis of government policy on infrastructure projects including highways, bridges, and airports in Istanbul and the north-west since the turn of the present century raise questions about favouritism of government policy towards this more developed region.[59] Those who study the regional policies in Turkey have often pointed out that state capacity remained limited and regional policies have not been very effective. Our estimates for value added per capita as well as the official series since 1987 that point to the persistence of the large gap between the East and the rest of the country support this assessment.[60]

VI | AN INTERNATIONAL COMPARISON

The introductory section emphasized both the similarities and differences in the experiences with regional disparities of early and late industrializers since the nineteenth century. This

[56] Puga and Venables, 'Agglomeration'; Deichmann et al., 'Industrial location'.

[57] Filiztekin and Tunalı, 'Anatolian tigers'.

[58] Göymen, 'Türkiye'de Bölge Politikaları'; Tekeli, 'Türkiye'de eşitsiz gelişme'.

[59] Luca and Rodríguez-Pose, 'Distributive politics'.

[60] Doğruel, 'Türkiye'de bölgesel politikalar'; Filiztekin, 'Convergence'.

section compares the evolution of regional disparities in Turkey with those for developed and developing countries with similar population and surface area for which long-term series dating back at least to the first half of the twentieth century are available. For this purpose, we were able to identify three countries in Western Europe (France, Italy, and Spain) and three in Latin America (Argentina, Mexico, and Peru).[61] The numbers of regions in these seven countries are similar, ranging from 17 to 32. In the absence of Theil indices for the other countries, we compare below the evolution of the coefficient of variation.[62]

Figures 8 and 9 both show that the population-weighted coefficient of variation for regional income or value added per capita in the three European countries had the inverse U shape until recently, and inequalities began to rise again in recent decades. Of the four developing countries in our sample, Mexico, Peru, and Turkey also show an inverse U-shaped pattern until recently. In the case of Argentina, regional disparities increased from the nineteenth to the twentieth century. In other words, in five of these seven countries, regional disparities began to rise once again in recent decades, suggesting the emergence of an N-shaped pattern overall. A related issue is the timing of the peak in regional disparities. In part because economic growth gained momentum later, the peak in regional disparities in Turkey, Mexico, and Peru occurred later in calendar time than those in France and Spain and at about the same time as in Italy, around middle of the twentieth century (figure 8). The peak in regional disparities occurred at a broadly similar level of GDP per capita in these six countries, approximately between 2000 and 5500 purchasing power parity (PPP) adjusted 2011 US dollars (figure 9).

Another important result in this comparison concerns the levels of regional disparities. Figures 8 and 9 show that the levels of regional disparities experienced by Turkey and three other developing countries have been consistently higher than those in the three developed countries, both with respect to calendar time and the level of GDP per capita. This result is consistent with the findings of a recent study that examines regional disparities for large numbers of countries around the world with data for the recent period since the 1970s. That study found not only that the average (and median) level of regional disparities has been higher for developing countries but also that the speed of convergence was lower and regional disparities are more likely to persist in the developing countries. The causes for this pattern are not yet well understood.[63]

[61] We are not aware of quantitative studies on the evolution of regional disparities beginning in the period before 1950 for other regions of the developing world. Estimates for the coefficient of variation since the nineteenth century are also available for Brazil, Chile, Uruguay, and Venezuela, but we did not include them because Brazil is too big and the others are too small (Chile and Venezuela in population, and Uruguay in both population and surface area) in comparison to Turkey (Tirado-Fabregat et al., *Time and space*, pp. 383–90).

[62] While our series are for value added per capita, we assume, for the sake of convenience, that they can be compared with the income per capita series available for some of the other countries. Population weighted coefficient of variation is defined as in Williamson, 'Regional inequality':

$$\sqrt{\sum_{i=1}^{n}\left(\frac{y_i}{y_m}-1\right)^2\frac{p_i}{p_m}}.$$

Here y and p are per capita value added and population of each province, I is the province index, and m is the national total. The coefficient of variation is broadly comparable to the Theil index discussed in footnote 34 above.

[63] Gennaioli et al., 'Growth in regions'.

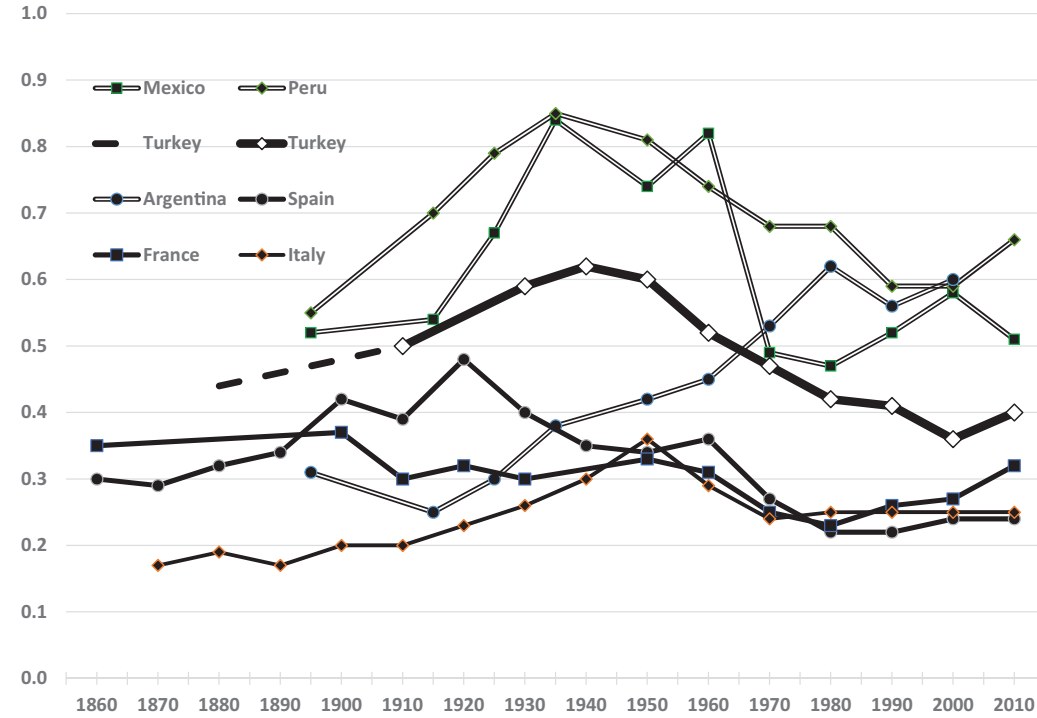

FIGURE 8 Coefficient of variation for regional GDP per cap for Turkey and other countries since the nineteenth century. *Note*: In the calculation of the coefficient of variation, NUTS 2 regions are used for the three European countries and Turkey. The numbers of regions used in the calculations are: Turkey (26), France (27), Italy (21), Spain (19), Argentina (24), Mexico (32) and Peru (25). *Sources*: Roses and Wolf (2018) for European countries; Tirado-Fabregat et al (2020) for Latin American countries and this study. [Colour figure can be viewed at wileyonlinelibrary.com]

VII | CONCLUSION

Existing studies on the evolution of regional disparities in Turkey have focused mostly on the period since the 1980s, for which data is more readily available. This study examined, for the first time, the evolution of the regional inequalities since the late Ottoman era and compared it with the experiences of today's developed and other developing countries. Based on estimates of value added per capita in 58 provinces of Turkey, we showed that a high level of regional disparities existed within the present-day borders of Turkey already before the First World War, well before industrialization gained momentum. Moreover, our β-convergence analysis indicated that poorer provinces grew faster than the richer ones during the period 1913–2015 and in most subperiods. Our Theil decomposition analysis showed that differences in value added per capita exhibited an inverse U-shaped pattern over time, with regional inequality rising until middle decades of the twentieth century and then declining until early in the present century. Evidence for the most recent period indicates that regional disparities have been rising once again.

We also found that Turkey's pattern, in per capita terms, of β-convergence, an inverse U, and the beginning of an N pattern more recently comes with a number of special features. First, while per capita value added in other regions moved towards country averages, the differences between the East and the rest of the country persisted and even increased since 1950. Our convergence

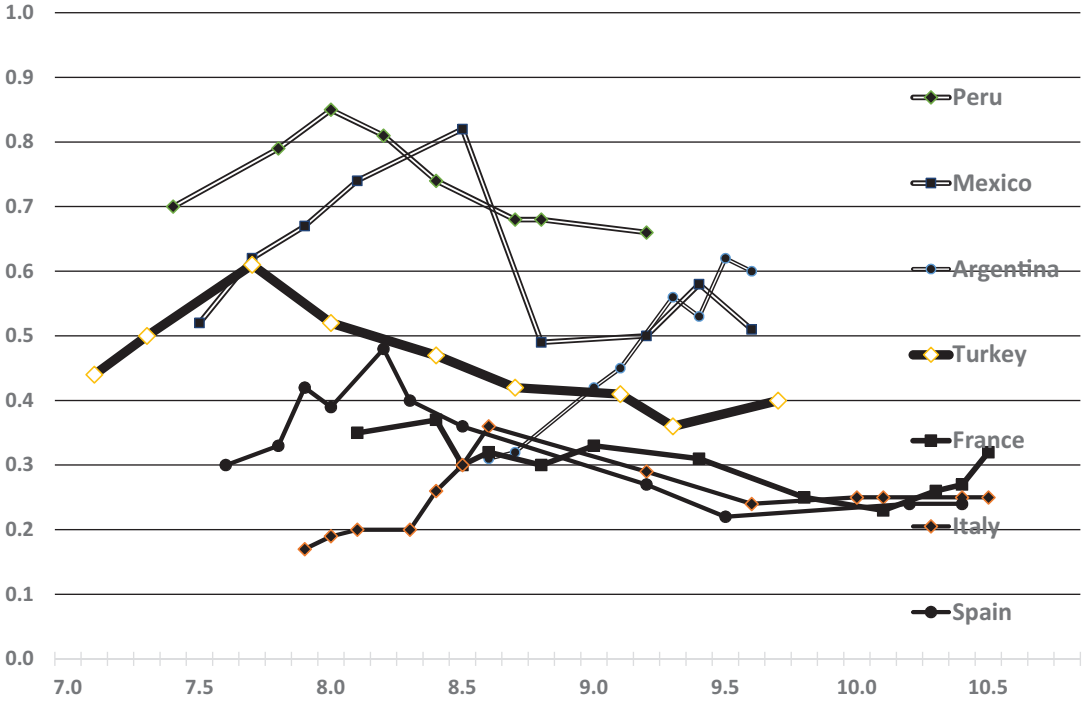

FIGURE 9 Coefficient of variation versus Ln GDP per cap PPP adjusted and in 2011 US dollars. *Note*: In the calculation of the coefficient of variation, NUTS 2 regions are used for the three European countries and Turkey. The numbers of regions used in the calculations are: Turkey (26), France (27), Italy (21), Spain (19), Argentina (24), Mexico (32) and Peru (25). *Sources*: Roses and Wolf (2018) for European countries; Tirado-Fabregat et al (2020) for Latin American countries and this study. [Colour figure can be viewed at wileyonlinelibrary.com]

club analysis showed that, at the NUTS 2 level, there is a clear geographical division: the eastern provinces form a different convergence club. Second, we found that spatial distribution of economic activity in Turkey became more concentrated over time as a result of continued migration to Istanbul and to the neighboring provinces in the north-west after 1950. This trend also led to the convergence of the value added per capita in these provinces towards the national average as reflected in the inverse U shape until recently. Growing concentration of aggregate activity and the rise of megacities has also been observed in other developing countries during the last half century. This presents an important contrast with the historical experience of today's developed economies. Third, we compared Turkey's experience with regional disparities with those of today's developed and developing countries of similar size for which long-term studies are available. Most countries in our sample experienced the inverse U shape and more recently an N shape in regional value added per capita. Finally, the same comparison also showed that the levels of regional disparities in per capita value added in Turkey and in other developing countries have been higher than those experienced by today's developed countries since the second half of the nineteenth century.

Our study pointed to differences, as well as similarities, in the experiences of Turkey and other developing countries with respect to regional inequalities in comparison to the better studied cases of the early industrializers. We hope future research can help us better understand to what extent

and why the evolution of regional inequalities in Turkey and other developing countries have exhibited features different from those of developed countries since the nineteenth century.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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