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ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

THE ROLE OF BANKING SYSTEM IN PROVINCIAL ECONOMIC DEVELOPMENT: A STUDY OF TURKIYE, FROM THE 70S TO THE 2000S

BANKACILIK SİSTEMİNİN İL BAZINDA İKTİSADİ KALKINMADAKİ ROLÜ: 70'LERDEN 2000'LERE TÜRKİYE ÖRNEĞİ

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Abstract

This research examines the relationship between banking activities and provincial economic development. In particular, the study offers insight on the nature of the regional economic development discrepancies in Turkiye. The study finds that, despite the trend towards decentralisation that takes place in regional economic policies, the banking system adopts centralisation policies. Using dynamic generalised method of moment (GMM) estimates, a unique data set including 39 years of provincial demographic, socioeconomic, and financial factors in Türkiye is evaluated. The study demonstrates that the banking intermediation is detrimental to provincial development. The Turkish banking system's hierarchical structure prevents financial intermediaries from fulfilling their role in fostering development. Consolidation and concentration strategies must be reassessed, since they tend to favour centralisation, which has been shown to be inefficient for regional convergence. The results also suggest that branch managers should be granted greater decision-making authority to make better use of locally produced information when approving or rejecting projects, which would eventually lead to a reduction in provincial disparities.

Keywords: Financial intermediation, branch banking, provincial economic growth, dynamic GMM, soft & hard information

JEL classification: G21, L2, O16, R11

Öz

Bu araştırma, bankacılık faaliyetleri ile illerin ekonomik kalkınması arasındaki ilişkiyi incelemektedir. Çalışma özellikle Türkiye'deki bölgesel ekonomik kalkınma farklılıklarının doğasına ışık tutmaktadır.

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Araştırma, bölgesel ekonomi politikalarında gerçekleşen adem-i merkeziyetçi eğilime rağmen, bankacılık sisteminin merkezileşme politikalarını benimsediğini belirlemiştir. Çalışmada "Dynamic Generalised Method of Moments (DGMM)" tahminleri kullanarak Türkiye'deki 39 yıllık demografik, sosyoekonomik ve finansal faktörleri içeren benzersiz bir veri setini değerlendirilmiştir. Çalışma, bankacılık aracılığının il kalkınması için negatif etkisi olduğunu göstermektedir. Türk bankacılık sisteminin hiyerarşik yapısı, finansal aracıların gelişmeyi teşvik etme rolünü yerine getirmesini engellediği ortaya konmuştur. Bankaların birleşme ve konsantrasyon stratejileri tekrar değerlendirilmelidir, çünkü bunların genellikle bölgesel yakınsama için etkisiz olduğu gösterilmiştir. Sonuçlar ayrıca şube müdürlerine, projeleri onaylama veya reddetme konusunda daha fazla karar alma yetkisi verilmesi gerektiğini, bunun da nihayetinde iller arasındaki farklılıklarının azaltılmasına yol açacağı ön görülmüştür.
Keywords: Finansal Aracılık, Şube Bankacılığı, Kentsel Ekonomik Kalkınma, Dinamik GMM,
JEL classification: G21, L2, O16, R11

1. Introduction

There is substantial empirical evidence to support a positive causal link running from finance to economic growth at the national level (see, e.g., Levine, 2005, for a survey). However, such an outcome at the national level might be consistent with a range of financial development and growth experiences across a country's regions, depending in part on banks' organizational structures. This paper investigates whether hierarchical branch banking, while facilitating financial deepening and accelerating national economic growth, can also contribute to uneven development across different regions. This might occur, for example, because informational asymmetries lead hierarchical banks to ignore or reject profitable local investment opportunities or to use scarce resources in unproductive local investments (Alessandrini and Zazzaro, 1999; Klagge and Martin, 2005), or because agency problems worsen as the distance between local branches and head offices lengthens (Berger and DeYoung, 2001). In contrast, locally-based financial intermediaries (such as unit banks) may have superior knowledge about investment opportunities in their region and may be more willing to invest locally, and thus be more consistent with balanced growth across a country's regions. Previous empirical studies of the regional finance-growth nexus have focused mainly on the importance for growth of bank efficiency (Hasan et al. 2009; Lucchetti et al. 2001), levels of local financial development (Guiso et al, 2002; Hao 2006; Carbo-Valverde et al. 2007), the health of local financial institutions (Samolyk 1994), and bank size (Hakenes et al. 2015). An exception is Degryse et al. (2015), who report that the credit supply to SMEs decreases as the functional distance between UK bank branches and headquarters increase. For two centuries, a local, decentralised banking system enabled Germany's SMEs to upgrade technology and maintain high output. (Mear and Werner, 2021).

Dynamic GMM panel analysis of finance-growth link stands out as a superior method comparing traditional time series and cross-sectional analyses. By incorporating lagged variables and instrumental variables, dynamic GMM allows for a more robust examination of the finance-growth nexus. Unlike static analyses, dynamic GMM accounts for potential endogeneity and omitted variable biases, thereby enhancing the accuracy and reliability of the findings. This approach not only provides deeper insights into the relationship between financial development and economic growth but also ensures the validity and credibility of the study's conclusions.

Using dynamic GMM methods, several studies (Greenwald et al., 1993; Guiso et al., 2004; Hao, 2006; Hasan et al., 2009) demonstrate a positive correlation between municipal financial development and real development in both developed and developing nations. Particularly, branch banking has been viewed as a solution to the issue of restricting the free flow of capital between regions. In a seminal study, Levine et al. (2000) examined the finance-growth link across 74 countries by constructing three financial indicators, which were refinements of previous parameters to enhance accuracy. Employing dynamic panel GMM and cross-country IV methods, their analysis contributed significantly to understanding the finance-growth relationship, offering superior insights compared to traditional time series and cross-sectional analyses.

Moreover, studies like Önder and Özyıldırım (2010) have delved deeper into the impact of bank ownership on regional growth dynamics. Utilizing the dynamic GMM method, they revealed that state-owned bank credit significantly fosters growth in more developed provinces but has limited effect on less developed ones. Conversely, credit extended by private banks positively influences per capita real GDP across all provinces. These findings shed light on the nuanced effects of bank ownership on regional economic disparities within countries.

The model is tested employing Dynamic GMM regressions, controlling for various province and bank level characteristics. The reliability of the results is then checked by applying several robustness tests, incorporating a number of macroeconomic and regional variables. Tests are carried out using bank – and provincial-level data from Türkiye; the country provides an appropriate setting to analyze the role of hierarchically structured banks in regional growth as there are no regional banks and private banks are operated through branches located in different provinces with lending decisions made at the head offices located mainly in the city of Istanbul. How provincial GDP growth is impacted by measures of bank intermediation focusing on the transformation of deposits to loans at the bank, provincial, and national levels is examined while controlling for a variety of province-level economic and social indicators and bank-level characteristics.

2. Model and data

Methodology Framework for Dynamic Panel Data Analysis

Panel data econometrics involves the analysis of a pooling of observations on N cross-sectional units (individuals, firms, countries) over T time periods. Panel data comprise information across both space and time. Hence, a panel data analysis may be capable of producing richer conclusions than either a 'pure' cross-sectional or a 'pure' time series analysis. Moreover, the use of panel data allows an increase in the size of the data set.

Econometrically, the specification of a panel data set can be presented as follows:

$$y_{it} = \alpha + \beta x_{it} + u_{it} \qquad (2.1)$$

For $i = 1, \dots, N$ and $t = 1, \dots, T$

In the equation (2.1), y_{it} is the dependent variable, is the intercept term, x_{it} is a 1 X k vector of observations on the explanatory variable, β and is k X 1 vector of parameters to be estimated for the explanatory variables. $\bar{y} = \sum_{i=1}^{N}\sum_{t=1}^{T} y_{it}/NT$ denotes the sample mean of the dependent variable across all observations, and $\tilde{y} = \sum_{t=1}^{T} y_{it}/T$ denotes the sample mean of entity across time.

The method used in the analysis is the dynamic panel data and generalised method of moments, which captures autocorrelations by the presence of a first order autoregressive process AR(1). This means that the specification includes a lagged dependent variable among the explanatory variables:

$$y_{it} = \delta y_{it-1} + \beta x_{it} + u_{it} \tag{2.2}$$

For $i = 1, \dots, N;\ t = 1, \dots, T$

Equation (2.1) assumes that follows a one-way error component model:

$$u_{it} = \mu_i + v_{it} \tag{2.3}$$

Where $E(\mu_i) = 0$ and $var(\mu_i) = \sigma_\mu^2$, $E(v_{it}) = 0$ and $var(v_{it}) = \sigma_v^2$, and $E(\mu_i, v_{it}) = 0$.

The dynamic panel data model is characterised by the first autocorrelation described by the first order autoregressive process and heterogeneity among entities characterised by individual effects, μ_i.

The models described in (2.1) and (2.2) imply that is correlated with, hence the correlation between $\mathrm{y_{it-1}}$ and μ_i. Therefore, the lagged dependent variable $\mathrm{y_{it-1}}$ is correlated with the error term. This violates one of the assumptions of the OLS, and the OLS estimators are no longer the best linear unbiased estimators.

As mentioned above, estimating dynamic panel data model is inconsistent due to existing correlation between the lagged variables and the disturbance term. A solution suggested by Anderson and Hsiao (1982) consists of eliminating by differentiating the model, as follows:

$$y_{it} = \delta y_{it-1} + \beta x_{it} + \mu_i + v_{it} \tag{2.4}$$

becomes

$$\Delta y_{it} = \delta \Delta y_{it-1} + \beta \Delta x_{it} + \Delta v_{it} \tag{2.5}$$

where $\mathrm{\Delta y_{it} = y_{it} - y_{it-1}}$. Similarly $\mathrm{\Delta y_{it-1} = y_{it-1} - y_{it-2}}$ and $\mathrm{\Delta v_{it} = v_{it} - v_{it-1}}$. Since $\mathrm{y_{it}}$ is a function of , is a function of $\mathrm{v_{it-1}}$. It follows then that $\mathrm{\Delta y_{it-1}}$ is correlated with $\mathrm{\Delta v_{it}}$. The method suggests using instrumental variables (IV) to correct this correlation. The two conditions for the validity of IV are: firstly, they must be correlated with the explanatory variable as mentioned; and, secondly, they must be uncorrelated with the disturbance term.

Anderson and Hsiao (1982) recommend the second lag (y_{it-2}) (as an IV, assuming that the v_{it} are not serially correlated. $E(y_{it-2}\Delta v_{it}) = 0$, since y_{it-2} is realised two periods before v_{it}, and there is a zero correlation between v_{it} and its lagged values. The first difference iv method is only efficient if homoscedasticity is verified. In such a case, Anderson and Hsiao (1982) present the most efficient estimation procedure.

Arellano and Bond (1991) suggest a different GMM procedure that is more efficient than Anderson and Hsiao's (1982). Blundell and Bond (1998) suggest a system GMM procedure in order to correct the weak instrument problem encountered in difference GMM.

Consider the following dynamic panel data model:

$$y_{it} = \delta y_{it-1} + \beta x_{it} + \mu_i + v_{it} \tag{2.6}$$

The specific effects are eliminated using the first difference of (2.6):

$$y_{it} - y_{it-1} = \delta(y_{it-1} - y_{it-2}) + \beta(x_{it} - x_{it-1}) + (v_{it} - v_{it-1}) \tag{2.7}$$

where $(v_{it} - v_{it-1})$ is a first order moving average process with unit roots.[1] The first period difference for $t = 3$ is:

$$y_{i3} - y_{i2} = \delta(y_{i2} - y_{i1}) + \beta(x_{i3} - x_{i2}) + (v_{i3} - v_{i2}) \tag{2.8}$$

Here, y_{i1} is a valid instrumental variable because it is highly correlated with $(y_{i2} - y_{i1})$ and independent from $(v_{i3} - v_{i2})$, assuming no serial correlation of the disturbance. Similarly, in time $t = 4$, y_{i2}, along with y_{i1} are valid instrumental variables for $(y_{i4} - y_{i2})$. Hence, for time $t = T$, the set of valid instrumental variables is $(y_{i1}, y_{i2}, \dots, y_{iT-2})$.

Unlike Anderson and Hsiao (1982), Arellano and Bond (1991) argue that more instrumental variables can be identified if the orthogonality conditions between lagged values of y_{it} and the error terms v_{it} are utilised. They argue that the IV procedure does not take into account the differenced error term in (2.6). In fact, there is a matrix of instrumental variables $M = [W_1', \dots, W_N']$, such as for an entity i:

$$M_i = \begin{bmatrix} [y_{i1}, x_{i1}', x_{i2}'] & 0 & \dots & 0 \\ 0 & [y_{i1}, y_{i2}, x_{i1}', x_{i2}', x_{i3}'] & \dots & 0 \\ \vdots & \dots & \ddots & \vdots \\ 0 & 0 & \dots & [y_{i1}, \dots, y_{iT-2}, x_{i1}', \dots, x_{iT-1}'] \end{bmatrix} \tag{2.9}$$

The idea here is that the set of instrumental variables described above are given by the moment conditions of exogeneity.

1 Moving average process is one where the current value of the independent variable is a linear combination of white noise process. First order moving average process MA (1) is $y_t = \mu + u_t$. A moving average is always stationary.

When implementing the GMM procedures described above, it may be necessary to find the appropriate number of instrumental variables to include in the estimation. Since instruments tend to improve the efficiency of the estimation, it can be argued the more the better. However, increasing the number might cause the loss of degrees of freedom.

In this current study, the main methodology consists of GMM techniques. However, in addition to GMM estimations, to carry out robustness checks, other methods are also employed, including: random effects (RE), fixed effects (FE), autoregressive random effects (ARRE) and autoregressive fixed effects (ARFE).

For the empirical analysis, the following model is specified:

$$\Delta \mathrm{GDP}_{j,t} = \alpha_j + \beta_0 \Delta \mathrm{GDP}_{j,t-1} + \beta_1 \mathrm{INTPR}_{ij,t} + \beta_2 \mathrm{INTBR}_{i,t} + \beta_3 \mathrm{INTNATR}_t + \gamma BCV_{i,t} + \delta PCV_{j,t} + \varepsilon_{j,t} \quad (2.10)$$

The dependent variable is the growth rate of provincial GDP, $\Delta GDP_{j,t}$, the subscripts i, j and t denote bank, province and time, respectively, α_j is the intercept term for each province, and $\varepsilon_{j,t}$ is the error term. The first financial intermediation variable, $INTPR_{ij,t}$, captures each bank's contribution to intermediation and is defined by the ratio to provincial GDP of bank loans less bank deposits.[2] The second intermediation variable, $INTBR_{i,t}$, measures each bank's intermediation efficiency and is defined by the ratio to total assets of each bank's deposits less its loans. The final intermediation variable, $INTNATR_t$, captures intermediation at the national level and is defined by the ratio to total GDP of the sum of all bank loans less all banks. The objective underlying these measures is to capture the local effect of the ratio of the transformation of deposits into loans where β_1, β_2 and β_3 are the coefficients of provincial, bank and national level financial intermediation, respectively. The remaining independent variables are the lagged dependent variable, $\Delta GDP_{j,t-1}$, to allow for persistence in the behaviour of the dependent variable, and vectors of control variables at the provincial level, $PCV_{j,t}$, and the bank level, $PCV_{j,t}$. At the provincial level, the controls capture aspects of provincial economic development and fiscal policy and include the log of initial GDP per capita, and for each province the ratio to provincial GDP of central government development expenditure. The coefficients on provincial GDP per capita and the human development index are expected to be negative, reflecting convergence across provinces, and for government development spending to impact positively on provincial GDP growth. The bank-level controls include the natural log of each bank's total assets to measure bank size, the capital-asset ratio, and measures of bank efficiency, profitability, liquidity, and credit quality. The empirical literature suggests that provincial growth will be negatively associated to: bank size, because, the allocation of funds to smaller provinces falls as bank size increases (King and Levine 1993; Demirgüc-Kunt and Maksimovic, 1998); the liquidity ratio, because more liquid banks lend less (Demetriades and Liuntel, 1996); and credit quality, because banks are forced to reign in their lending portfolio as non-performing loans increase (Borio

2 Deposits and Loans per bank per branch are not released by Turkish Banking Association and the local amount of deposits and loans are calculated on the basis of the number bank branches of any bank in each province over the total number of bank branches (see Hakenes et al. 2009).

et al. 2002). In contrast, provincial growth is likely to be positively associated with bank profitability (Hasan et al. 2009) and efficiency (Belke et al., 2016). The evidence on bank capital and growth is more mixed, with considerable debate as to whether banks increase or reduce lending in response to the need to raise capital (Martynova 2015).

The model (2.10) is estimated with the one-step system dynamic panel data (DGMM) estimator that has been used widely in finance-growth literature (e.g., Casselli et al. 1996, Levine et al. 2000, for cross-country studies, and Beck et al. 2000, and Hasan et al. 2009, for regional studies). In this method, lagged levels are used as instruments for differenced equations and lagged differences are used as instruments for level equations to control for the presence of unobserved province-specific effects and for the potential joint endogeneity among explanatory variables (Blundell and Bond, 1998).

A panel data set is constructed for analysis, comprising banking and growth indicators alongside various control variables for Türkiye's 67 provinces spanning from 1975 to 2014. Notably, Türkiye expanded to 81 provinces in 2001, necessitating the consolidation of newly established provinces back into their original boundaries. This approach addresses both data gaps for the new provinces and mitigates the effects of boundary changes on surface area fluctuations. Monetary variables are adjusted for inflation and converted to USD, with all values scaled by a factor of 1,000,000. Ratios such as investment incentives, government expenditure, and net budget income are computed relative to GDP. Province size is gauged by the logarithm of GDP per capita, with GDP per capita scaled down by a factor of 100. The primary dependent variable is the GDP growth rate per province, supplemented by two newly created variables and a macroeconomic indicator (National GDP growth rate) derived from the model in the third chapter. Data on deposit banks operating in Türkiye from 1975 to 2014, sourced from balance sheets and income statements, facilitate the calculation of deposits and loans per bank per province based on branch distribution. Key data sources include TURKSTATS and the Banking Association of Türkiye (BAT), supplemented by data on closed and start-up enterprises, urban and rural populations, obtained from TURKSTATS to measure prosperity and urbanization ratios across provinces over the specified timeframe.

Table 1: Summary statistics

Variable	Observations	Mean	Standard Deviation	Median	Minimum	Maximum
Provincial GDP growth rate	111,019	9.55	27.74	6.72	-62.68	238.13
Provincial level intermediation	111,019	14.38	12.07	11.55	-12.52	99.58
Bank level intermediation	111,019	17.62	27.54	18.50	-75.03	97.17
National level intermediation	111,019	10.29	6.89	8.62	-1.12	31.42
Provincial GDP per Capita (log)	111,019	2898.39	3026.90	1578.71	152.62	19112.06

Government expenditure/ GDP	111,019	0.04	0.09	0.02	0.00	2.58
Bank assets (log)	111,019	5.85	2.39	5.92	-1.77	11.50
Bank capital-asset ratio	111,019	13.77	16.41	8.55	0.00	98.89
Efficiency Structure	111,019	85.98	208.23	100.00	-5175.81	1094.19
Bank profitability	111,019	12.74	20.44	8.55	-300.89	98.89
Bank liquidity	111,019	26.67	18.27	22.23	0.14	98.55
Bank credit quality	111,019	79.86	1313.09	1.94	-1.86	43803.98

Summary statistics of the variables are presented in Table 1[3]. Data set does not cover after 2014 firstly because, the highly centralized nature of institutions in Türkiye experienced further centralization after the 2010s. This heightened centralization may have influenced the dynamics of the data collection process, potentially impacting the reliability and impartiality of data produced post-2014. Additionally, the autonomy of statistical institutions was compromised, raising concerns about the political influence on data integrity. Secondly, the data span from 1970 to 2014 is deemed sufficient to illustrate the centralization effects on regional disparities, thus adding more years would not significantly contribute to the novelty or depth of the analysis.

3. Empirical results

A baseline set of results is reported in the first column of Table 2. The coefficients on the intermediation variables at the levels of the banks and the provinces are statistically significant and negative[4]. Branch banking in Türkiye is associated in a negative net flow of savings at the bank and provincial level, which adversely impacts on provincial GDP growth. That is, branch bank seems to promote unbalanced growth among provinces because local savings mobilized are only partially used for local investments, the rest being transferred to bank headquarters. This reflects bank branches having limited decision-making authority, with head office investment decisions leading to a flow of funds from the province to the capital in the first instance. However, and consistent with most cross-country studies on the finance-growth nexus, financial development at the national level promotes regional growth overall. Of the province-level controls, the coefficients on initial provincial GDP per capita is statistically significant and negative, suggesting that growth and development of provinces converges over time. The coefficient on development expenditure is positive and significant, suggesting that this type of public spending promotes regional growth. The coefficients on the bank-level controls indicate that bank size, liquidity and credit quality are negatively associated with provincial growth, and that profitability and efficiency are associated positively with growth. More bank capital is associated negatively with provincial growth, suggesting that these banks are more likely to reduce lending and/or intermediate funds out of the province. The validity of the instruments is tested with Sargan's test of overidentifying restrictions asymptotically distributed as in the number of restrictions. The

3 Variable definitions and sources are presented in the Table A.1. in Appendix.

4 Multicollinearity is not a concern when employing instrumental analysis, which separates the individual impact of independent variables from group and other variable effects. The correlation matrix provided in Table A.2. also rules out any potential significant multicollinearity bias.

analysis reveals the expected first-order serial correlation in the error terms, but no second-order serial correlation, suggesting that the instruments are not correlated with the remaining error terms.

Table 2: DGMM estimates of provincial GDP growth in Türkiye, 1975-2014

	(1)	(2)	(3)	(4)
Provincial level intermediation	-0.5089***	-0.5094***	-0.5580***	-0.5185***
	(0.015)	(0.015)	(0.146)	(0.016)
Bank level intermediation	-0.3195***	-0.3187***	-0.3304***	-0.3191***
	(0.007)	(0.007)	(0.011)	(0.007)
National level intermediation	1.5837***	1.5797***	1.5387***	1.6147***
	(0.026)	(0.026)	(0.198)	(0.026)
Lagged provincial GDP growth	0.2588***	0.2586***	0.2100***	0.2401***
	(0.005)	(0.005)	(0.026)	(0.005)
Initial GDP per capita	-0.2384	-0.2430*	-0.5723	-0.4420***
	(0.141)	(0.141)	(0.352)	(0.149)
Government expenditure	11.8487***	12.2045***	11.2018**	2.7572*
	(1.570)	(1.579)	(4.530)	(1.432)
Bank size	-0.9351***	-0.8775***	-1.0121***	-1.0473***
	(0.058)	(0.065)	(0.071)	(0.060)
Bank capital-asset ratio	-0.2548***	-0.2572***	-0.2774***	-0.2774***
	(0.022)	(0.022)	(0.019)	(0.022)
Bank profitability	0.2612***	0.2634***	0.2717***	0.2725***
	(0.019)	(0.019)	(0.019)	(0.020)
Bank efficiency	0.1082***	0.1086***	0.1075***	0.1145***
	(0.005)	(0.005)	(0.006)	(0.005)
Bank liquidity	-0.1320***	-0.1326***	-0.1328***	-0.1353***
	(0.006)	(0.006)	(0.007)	(0.007)
Bank credit quality	-0.0264***	-0.0254***	-0.0267***	-0.0288***
	(0.005)	(0.005)	(0.002)	(0.005)
Number of bank branches		-0.3188**		
		(0.150)		
Presidential elections			2.0299***	
			(0.268)	
Constant	-1.1239	-1.2599	-4.5510	-4.8988***
	(1.161)	(1.161)	(2.453)	(1.204)
Observations	88556	92029	88556	87874
AR(1)	0.000	0.000	0.000	0.000
AR(2))	0.740	0.824	0.347	0.384
Sargan-Hansen test	0.549	0.886	0.851	0.752

Notes: The dependent variable is growth rate of real provincial GDP. Robust standard errors are in parentheses. AR(2) and AR(1) are the Arellano-Bond tests for second-order and first-order autocorrelation, respectively, in the residuals of the differenced equation. The H_o for the Sargan-Hansen overidentification test is that the group of instruments is exogenous. *, **, and *** indicate statistical significance at the 10, 5, and 1% levels, respectively. The estimate in column (4) excludes the three largest provinces (Istanbul, Ankara, and Izmir).

In columns 2-4 of Table 2, some additional controls are introduced for robustness purposes. First, if branch banking promotes a flow of funds from branches to bank headquarters, a greater outflow might be expected from provinces with more branches and for this to be associated with a corresponding reduction in the GDP growth of those provinces. The number of bank branches per province are introduced in the estimate in column (2); as expected, the coefficient on the variable is negative and statistically significant while there is little change in the coefficients on the other variables compared to the results reported in column (1). Second, it is quite well documented that bank lending behavior changes during elections, especially in developing and emerging market economies, most usually in favor of lending to rural regions (Dinc 2005; Micco et al. 2007; Önder and Özyildirim 2013). The results reported in column (3) include a presidential election dummy to try to capture any impact on provincial growth. The coefficient on the dummy is positive and statistically significant, suggesting that elections promote regional growth, which may reflect a temporary change in bank lending and government development spending. Third, it might be that intermediation in the larger provinces dominates in a way that does not represent the behaviour of bank branches in the more numerous smaller provinces. The broad applicability of the results are captured by reporting in column (4) an estimate that excludes the three largest provinces (Istanbul, Ankara, and Izmir) from the sample. The result from this estimate is largely in line with those reported in columns (1)-(3) such that our finding that branch banking seems to promote unbalanced growth among provinces is broadly applicable. In each of these estimates, the Sargan test for the validity of the instruments remains satisfactory.

Table 3: DGMM estimates of provincial GDP growth in Türkiye over three sub-periods

	1975-1989	**1990-2000**	**2001-2014**
Provincial level intermediation	-0.4616*	-0.2146**	-1.2436***
	(0.240)	(0.101)	(0.266)
Bank level intermediation	-0.1896***	-0.3112***	-0.3921***
	(0.020)	(0.012)	(0.014)
National level intermediation	6.0401***	0.5788***	1.3717***
	(0.566)	(0.203)	(0.262)
Lagged provincial GDP growth	0.3151***	0.0791**	0.1295***
	(0.057)	(0.033)	(0.030)
GDP per capita	-6.6677***	-0.6144	-12.3957***
	(1.090)	(0.842)	(1.794)
Government expenditure	7.6633	28.8882**	70.5255*
	(6.718)	(12.362)	(39.599)
Bank size	-0.8910***	-2.4709***	-2.8871***
	(0.292)	(0.131)	(0.135)
Bank capital-asset ratio	-0.1194***	-0.3749***	-0.7007***
	(0.024)	(0.012)	(0.022)
Bank profitability	0.1130	0.3341***	0.7444***
	(0.077)	(0.028)	(0.032)

Bank efficiency	-0.1215*** (0.033)	0.0018 (0.008)	0.0988*** (0.011)
Bank liquidity	-0.0562 (0.040)	-0.3011*** (0.026)	-0.6151*** (0.039)
Bank credit quality	-0.0748** (0.038)	-0.0136** (0.005)	-0.0625*** (0.007)
Constant	-51.0896*** (11.097)	32.5498*** (6.035)	133.3957*** (15.311)
No of observations	26557	35041	25125
AR(1)	0.000	0.000	0.000
AR(2)	0.120	0.142	0.144
Sargan-Hansen test	0.825	0.519	0.080

Notes: The dependent variable is growth rate of real provincial GDP. Robust standard errors are in parentheses. AR(2) and AR(1) are the Arellano-Bond tests for second-order and first-order autocorrelation, respectively, in the residuals of the differenced equation. The H_o for the Sargan/Hansen overidentification test is that the group of instruments is exogenous. *, **, and *** indicate statistical significance at the 10, 5, and 1% levels, respectively.

Finally, an examination is conducted to determine whether the provincial pattern of financial intermediation has changed over time by estimating model (1) for three sub-periods: 1975-89; 1990-2000; and 2001-2014. The key elements of banking sector liberalization in Türkiye (e.g., elimination of interest rate and credit controls, easing of barriers) were largely in place by the mid-1980s so there is no *a priori* reason to expect a change in bank intermediation behavior across the periods. However, provincial GDP growth would likely have been affected by changes in development policy that took place, including the creation of industrial zones, the implementation large-scale regional development project, changes in investment incentives, and a later focus on SME development. These empirical results are reported in Table 3. The same pattern of financial intermediation as reported in Table 2 is evident across all sub-periods: a net outflow of savings at the bank and provincial level that is associated negative real provincial GDP growth, but a positive impact on provincial growth of financial deepening at the national level. The sign and statistical significance of the coefficients on the control variables is broadly in line with the results reported in Table 2.

4. Conclusions

Inspecting the coefficients of intermediation variables at provincial, bank, and national level reveals the impact of banking activity on the provincial GDP growth rate. The model specified captures the effects of bank intermediation, controlling for regional fiscal tools such as government expenditure, macroeconomic factors, and changes in bank performance ratios in relation to provincial GDP growth rate. In contrast to previous studies, this analysis provides evidence that banks are one of the factors causing growth imbalances between regions within a country. The results quantify the significance of the influence of banking structure on growth in a developing country. This is an interesting result on its own, as several country-specific studies have found that branching has a stimulating effect on regional growth.

Hierarchical branch banking may cause unequal regional economic development while facilitating financial deepening and faster economic growth at the national level—for example, if decisions on the deployment of savings mobilized are taken at headquarters without regard or knowledge of local investment opportunities. Our examination of the patterns of financial intermediation at the bank – provincial – and national levels in Türkiye is consistent with branch bank contributing to unbalanced growth at the level of the provinces by promoting an outflow of funds to the center, even while facilitating greater financial deepening and faster GDP growth for the national level economy.

The empirical model in the current study differs from models proposed in earlier research, as it considers the difference between deposits and loans divided by GDP to measure the financing gap in provinces. Earlier research has been based on regional panel data, employing a smaller subset of provincial and banking data, while the data set used here covers more provincial data and a longer sample period.

Branch banking might be considered advantageous in developed countries, as there are few or no regional disparities. Developing countries, however, have significant regional imbalances in terms of growth; therefore, branch banking might widen these disparities by causing capital flows from rural and poor regions to highly urbanised rich ones. For this reason, establishing decentralised unit (regional) banks or granting more authorisation to branch managers might stimulate more effective investment decisions in regions that are performing below the national growth level. Moreover, unit banks might be more welcomed by local people in poor regions, and they might save more if they knew the deposits collected would be used to fund investments in their region. Increasing savings, with an emphasis on reinvesting locally, could eventually lead to higher capital accumulation and development in these poorer areas. It is also recommended that fiscal policies be actively and efficiently applied, to help address the imbalances within the country. Finally, other financial institutions might be encouraged to enter the financial sector to ameliorate the monopolising effect of branch banks.

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Appendix

Table A.1: Variable definitions and sources

Variable	Description	Source
Provincial GDP growth rate	Annual percentage change in GDP of each province	Özötün (1980,1988) for 1975-1986 TURKSTATS for 1987-2001 and 2004-2014 Authors' interpolation 2002-2003
Provincial level intermediation	The difference between the deposits and loans per bank for each province divided by provincial GDP	Authors' calculations using Turkish Banking Association data
Bank level intermediation	Difference between the deposits and loans per bank divided by the bank's total assets	Authors' calculations using Turkish Banking Association data
National level intermediation	Difference between the national level deposits and loans divided by national GDP	Authors' calculations using Turkish Banking Association data
Provincial GDP per Capita	Provincial GDP/total population of the province	TURKSTATS for 1987-2001 and 2004-2014 Authors' interpolation for 2002-2003
Government development expenditure	Central government provincial development expenditure/provincial GDP	Turkish Ministry of Development
Bank size	Total assets of each bank	Authors' calculations using Turkish Banking Association data
Bank capital-asset ratio	Ratio of bank equity to total assets	Authors' calculations using Turkish Banking Association data
Bank efficiency	Bank total expenditure /total Income	Authors' calculations using Turkish Banking Association data
Bank profitability	Bank net profit/total assets	Authors' calculations using Turkish Banking Association data
Bank liquidity	Bank liquid assets/ total assets	Authors' calculations using Turkish Banking Association data
Bank credit quality	Bank non-performing loans/total loans.	Authors' calculations using Turkish Banking Association data. Authors' interpolation for 1975-8.

Table A.2. Correlation of Model Variables

	Lagged provincial GDP growth	Provincial level intermediation	Bank level intermediation	National level intermediation	Bank size	Bank capital-asset ratio	Bank efficiency	Bank profitability	Bank liquidity	Bank credit quality	Number of bank branches	Initial GDP per capita	Government expenditure	Presidential elections
Lagged provincial GDP growth	1.000													
Provincial level intermediation	0.037***	1.000												
Bank level intermediation	0.017***	0.193***	1.000											
National level intermediation	0.201***	0.187***	0.233***	1.000										
Bank size	0.035***	0.127***	0.052***	0.172***	1.000									
Bank capital-asset ratio	0.019***	-0.074***	-0.352***	-0.054***	-0.270***	1.000								
Bank efficiency	0.020***	0.005	-0.266***	0.028***	-0.323***	0.846***	1.000							
Bank profitability	-0.024***	-0.069***	-0.112***	-0.073***	-0.029***	0.169***	0.033***	1.000						
Bank liquidity	-0.071***	-0.065***	0.107***	-0.118***	-0.446***	0.102***	0.066***	0.035***	1.000					
Bank credit quality	-0.048***	0.092***	0.087***	0.104***	-0.025***	0.006	0.064***	-0.094***	0.015***	1.000				
Number of bank branches	-0.009**	-0.025***	0.027***	-0.009**	0.189***	-0.024***	-0.038***	0.004	-0.099***	-0.011**	1.000			
Initial GDP per capita	0.077***	-0.081***	-0.116***	0.043***	0.403***	0.151***	0.179***	-0.012***	-0.143***	-0.007*	0.210***	1.000		
Government expenditure	-0.019***	-0.132***	-0.002	-0.126***	-0.091***	-0.005	-0.017***	0.012***	0.033***	-0.008*	0.257***	-0.035***	1.000	
Presidential elections	0.099***	0.004*	0.019***	0.008***	0.043***	-0.042***	-0.006*	-0.069***	0.019***	-0.036***	0.002	0.064***	-0.007***	1.000
* p<0.05, ** p<0.01, *** p<0.001														
+1 (perfect positive correlation), 0 (no correlation), -1 (perfect negative correlation)														