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Local Financial Development and Capital Accumulations: Evidence from Turkey

Summary: Despite the unquestionable importance of financial markets in the economy, the factors promoting financial development have just recently begun to be researched intensively. In this context, the aim of the study is to explain the reasons for the financial development gaps among provinces in Turkey on the basis of capital accumulations. According to the results of the spatial panel data model estimates based on indices of 81 provinces in Turkey for the period 2005-2009, it was found that the level of social capital best explained the level of financial development, followed by physical capital and human capital. Additionally, it was found that capital accumulations contributed above average not only to the financial development of that province, but also to that of the surrounding provinces.

Key words: Financial development, Physical capital, Human capital, Social capital, Spatial panel data analysis.

JEL: C21, C23, C43, G20, O16, R12.

In the literature, it is generally accepted that financial markets play an active role in the economy by means of the functions they undertake, and they are one of the fundamental factors in explaining economic growth differences among countries. Indeed, the relationship between financial development and economic growth has received wide attention in the literature and has been the case since the late 1960s (Jean-Pierre Allegret and Sana Azzabi 2012). In addition, financial development becomes gradually more important due to increasing international financial integration. Despite this unquestionable importance of financial markets in the economy, the factors promoting financial development have begun to be researched intensively just in the last two decades. Therefore, it is important to analyze in detail the financial supply and demand dynamics of a country, and to make predictions and formulate policies accordingly. Analyzing all parts of the whole rather than looking at the whole, in other words, conducting analyses at sub-regions level may provide a better

vision of their current structure and needs. Consequently, the level of regional financial development determines the national financial system.

In this context, the main purpose of this study is to explain the reasons for the financial development gaps among provinces in Turkey on the basis of capital accumulations. In classical economics, the concept of capital consisted of merely physical capital, and an approach placing emphasis on the quantitative aspect of growth was being followed. However, the failure to explain the ever-changing dynamics merely relying on physical capital as well as the increasing significance of technology and knowledge in production process have shown that the human aspect in production is not negligible. Assessment of the influence of the human aspect on production processes, in other words, the concept of human capital both brought a qualitative approach to growth and enabled the incorporation of intangible elements into the concept of capital. The fact that human capital efficiency considerably influences the productivity of other production factors entailed the analysis of the social structure in which individuals are formed, and the studies conducted drew attention to the concept of social capital. This new definition of capital, which placed more emphasis on social aspects, allowed the scholars to give more weight to the qualitative approach of economics. In this context, the study intends to research in which direction and to what extent the concepts of capital steering the growth literature affect financial development and to deal with the subject, to the best of our knowledge, for the first time in the literature using this approach under a single umbrella within the framework of the concepts of capital.

In this regard, a spatial panel data analysis, based on the data of 81 provinces for the period 2005-2009, is conducted to seek answer to this question: "What is the influence and level of significance of physical, human, and social capital on financial development gaps among provinces?" To that end, physical, human, and social capital and financial development indicators on the basis of provinces are indexed for use in the analysis. Accordingly, the remaining part of the study may be summarized as follows: theoretical framework, data set and analysis, econometric method and model, empirical findings, and conclusions.

1. Theoretical Framework and Related Literature

Although financial development gaps among countries are intensively researched in the relevant literature, the number of studies analyzing financial development gaps at regional level is relatively far lower. As far as is known, the only studies examining financial development and economic development relationships at regional level in Turkey are those that belong to Süheyla Ozyildirim and Zeynep Önder (2008), Jülide Yildirim, Nadir Öcal, and Mahmut Erdoğan (2008) and Önder and Ozyildirim (2010). To our knowledge, there is no study conducted yet on the determinants of regional financial development differences for Turkey.

One of the reasons why there is limited number of studies on regional financial development in the literature is the anticipation that the factors which are heterogeneous among countries would be homogenous within the country. Nevertheless, the presence of discrepancies between regions, such as production pattern, demographic and socio-cultural characteristics, liquidity preferences, tendency to resort to

formal markets and their accessibility to financial facilities may cause the regional financial development levels to differentiate significantly. According to Ozyildirim and Önder (2008), another reason why analyses for financial development at regional level are relatively low in number is the assumption that interregional mobility of financial capital is high. The conception that underlies this assumption is that regional financial development plays a passive role in regional development. The argument against this conception is that capital is not mobile between regions, financial activities focus on certain regions, and financial services are disproportionately distributed among regions.

Numerous studies in the literature underline that the distance between financial agencies and those that want to receive services, in other words, the distance between the financial supply and demand is important. Indeed, many studies show that the increase in the distance between financial agencies and those that wish to receive services increases the costs of information and transaction, thereby hindering involvement in the financial system. In this sense, while large-scale enterprises do not have any difficulty in accessing foreign funds, the access of local small-scale enterprises and potential investors to financial markets is a more significant indicator for financial development.

In this context, analyses on the basis of provinces are particularly important in terms of interpreting the current situation in the provinces that have relatively smaller-scale enterprises and small investors. In the analysis conducted by Ozyildirim and Önder (2008) for Turkey, they found that the distance between a province and Istanbul, the finance centre of Turkey, affects the participation of that province in financial markets. However, technological developments and the increasing use of computers facilitate data storage and sharing, and reduce information and transaction costs, and the widespread use of internet banking diminishes the importance of the distance to the finance centre. Therefore, to access financial markets, it has become sufficient to access a branch rendering financial services instead of a finance centre. Proximity to agencies providing financial services reduces the information asymmetry between parties and allows both financial development and regional development by means of the functions undertaken by financial markets in the economy. The presence of large financial development gaps between regions prevents effective realization of functions attributed to the financial system in the growth process. This may cause economic development gaps between regions.

In this regard, the determination of the factors affecting the level of regional financial development becomes important not only for financial markets, but also for growth policies. Besides, the emphasis placed on the role to be undertaken by the financial system in reducing poverty and attaining millennium development goals is increasing, and it is thought that the findings obtained will provide an important source for policy reforms. Furthermore, as the same political, legal, and regulatory framework applies within the country, conducting an analysis among the regions of a country will eliminate the problems caused by such factors that are not included in the analyses conducted among countries. Considering the importance of financial development analyses at regional level, the potential impacts of capital accumulations on financial development are described in the sections below.

1.1 Physical Capital and Financial Development

In the neoclassical economics theory, the concept of capital is addressed with a narrow definition as physical capital that includes elements used for long years in the production process, such as building, machinery, and equipment. Physical capital accumulation, one of the primary indicators of the capacity to produce goods and services in a given period, is generally accepted to be one of the fundamental determinants of employment and productivity growth, and thus, the increase in national welfare. Physical capital accumulation promotes cooperation, specialization and technological innovation, and thus, economic growth by taking advantages of economies of scale.

Development of financial markets is closely related to the demand for the services rendered by financial markets. In his demand-following hypothesis, Hugh T. Patrick (1966) assigns an active role to the real sector and states that the increasing demand for financial instruments contributes to the development of financial markets, and in other words, economic growth promotes financial development. In this context, it may be stated that physical capital accumulation affects financial development indirectly. As mentioned previously, it is commonly accepted in the literature that physical capital accumulation is one of the primary sources of economic growth (see James B. DeLong and Lawrence H. Summers 1991; Ross Levine and David Renelt 1992; Robert J. Barro and Xavier Sala-i-Martin 1995; Tuncer Bulutay 1995). Increasing physical capital accumulation is an indicator of both industrialization and increasing economies of scale. When examined in this context, the firms' need for external financing will increase to be able to adapt to competitive conditions, make new investments, and follow technological developments. Therefore, the increasing need for external financing will increase firms' demands for financial services. Potential mechanisms of action from physical capital to financial development are given in Figure 1.

1.2 Human Capital and Financial Development

Neoclassical economics theory, which dominated the economics literature until the 1980s, gave weight to the qualitative aspect of growth and emphasized physical capital as the primary determinant of economic growth and the concept of capital (Aykut Kibritçioğlu 1998). One of the fundamental assumptions of the neoclassical growth theory is that capital has diminishing returns. This statement means that the gaps between developing and developed countries will be closed in time, and the levels of development will converge. However, unlike the convergence theory, many studies in the literature have found that income gaps between developing and developed countries are increasing. The failure of the neoclassical growth theory to explain the development gaps gave rise to the formulation of new theories.

In the mid-20th century, rapid developments in technology enhanced the importance of knowledge and showed that human capital became non-negligible in the development process. The concept of human capital has been a research subject of the modern economics theory since its beginning and was studied intensively for the first time by Schultz in 1960 (Theodore W. Schultz 1960). Above this foundation, it

steered the growth literature as one of the fundamental concepts of the endogenous growth models led by Paul Romer and Robert E. Lucas, and was incorporated into the new definition of the concept of capital.

The concept of capital, which denotes the knowledge, skills, and experiences possessed by individuals, affects both directly and indirectly the demand for financial services, and thus, financial development. The level and quality of human capital is the direct determinant of the demand for financial services. Studies demonstrate that a low level of human capital is a significant hindrance to having information about financial instruments, evaluating those instruments, and particularly to participating in capital markets. Therefore, high level of human capital promotes financial services demand and financial development by increasing financial literacy (see Shawn Cole, Thomas Sampson, and Bilal Zia 2009; Maarten van Rooij, Annamaria Lusardi, and Rob Alessie 2011).

Indirect impact of human capital on financial development takes place by means of the impacts of human capital on income and savings. As the level of human capital rises, the level of income and thus, the savings rate increase, and the transformation of increasing savings to financial investments can escalate the level of financial development indirectly. J. François Outreville (1999) indicated that individuals with a high level of human capital tend to save more and take more risk. Additionally, he found that human capital is an important factor explaining the level of financial development, based on a cross-section analysis of 57 developing countries. Similarly, Rashmi Umesh Arora and Shyama Ratnasiri (2011) showed positively significant relationship between financial development and human capital, both at the national and sub-national level for India.

One of the major indicators of human capital is related to the maintenance of a healthy life by individuals. In this context, one may expect that increasing average life expectancy at birth will boost the demand for financial services, in other words, the duration of the demand for services. In fact, the increasing average life expectancy results in individuals investing in financial markets for their prolonged periods of retirement, which increases the participation in private retirement schemes. In sum, it is possible to consider that the increasing average life expectancy will promote financial development by a demand-following approach. Potential mechanisms of action from human capital to financial development are given in Figure 1.

1.3 Social Capital and Financial Development

The failure of physical and human capital gaps to properly explain the development gaps between countries entailed that the concept of social capital, which emphasizes relations between people, social networks and social trust, be incorporated into the concept of capital. Social factors, the importance of which has been mentioned since Adam Smith and particularly emphasized by Max Weber, have been neglected in economic analyses. However, it is not possible to consider individual decisions apart and separate from the social structure in which they are formed. In economic decision-making processes, dealing with individuals by isolating them from the society they belong to is to withhold the individuals from social life. According to Francis Fukuyama (1995), economics is one of the most fundamental and dynamic fields of

the socialization of people, and there is no field of business that does not require social cooperation of mankind.

In this context, another type of capital that affects financial development is the social capital. The concept of social capital is not a new concept and has drawn the attention of economists in the last two decades. The importance of the concept of social capital was comprehended, thanks to the studies of Pierre Bourdieu (1986), James S. Coleman (1988) and Robert D. Putnam (1993), upon which intensive research was initiated in the literature (Jamel Boukhatem 2012). However, the discrepancies in the authors' manner of addressing the concept of social capital prevented the formation of a generally accepted single definition in the literature. In Bourdieu's study, social capital denotes the resources that individuals may access through their relationships. In other words, social networks of individuals are social capitals. Matching social capital with power, Bourdieu states that a high level of social capital is accompanied by inequality between individuals and groups. Coleman addresses the concept of social capital as a collective commodity. Coleman builds social capital, which is a means of competition and the source of inequalities according to Bourdieu, on the concept of cooperation. Accordingly, Coleman explains social capital as the social structure that enables individuals to act collectively and choose to cooperate. Although Bourdieu and Coleman deal with the subject by diverse approaches, social capital in both of their studies is a concept relating to the interests of individuals. Putnam deals with the concept of social capital on a wider scale, in other words, at societal level as compared with Bourdieu and Coleman. According to Putnam, social capital does not belong to individuals, but to the society. Therefore, while the social capital increases the resources of individuals according to Bourdieu and Coleman, Putnam places more emphasis on the enhancement of the resources of the society. The social capital approach addressed in this study belongs to Putnam. Putnam addresses the concept of social capital as social involvement and cooperation to achieve common goals, and the whole trust, social networks, and norms that support this structure.

Based on Putnam's views, Fukuyama (1995) underlines the trust aspect of social capital while assessing the impact of social capital on economic processes. He notes that a high level of social trust decreases transaction costs, thereby promoting economic efficiency and thus economic development (see also Stephen Knack and Philip Keefer 1997; César Calderón, Alberto Chong, and Arturo Galindo 2002; Mel Evans and Stephen Syrett 2007). According to Luigi Guiso, Paola Sapienza, and Luigi Zingales (2000), one of the mechanisms that may establish a link between social capital and economic development is financial markets. The importance of the aspect of trust is enhanced by the fact that financial markets intrinsically face problems such as moral hazard and adverse selection. Due to the low level of trust, it is necessary to include in the contracts some additional conditions such as assurance requirement to provide protection against opportunistic actions, and this situation causes to increase in transaction costs (Calderón, Chong, and Galindo 2002). High transaction costs prevent access of those with low income to formal markets due to economies of scale. Hence, as shown in Figure 1, the high level of general trust is expected to reduce negative externalities and transaction costs, thereby promoting financial development.

In the analysis conducted by Guiso, Sapienza, and Zingales (2000) for Italy, they found that in social capital, intensive areas, households are more likely to use checks, invest less in cash and more in stock, and make less use of informal credit as compared with regions with low social capital. They noted that relations and economic transactions took place in narrow groups (family and close relatives) in regions with low social capital. Calderón, Chong, and Galindo (2002) found that a high level of trust is associated with deeper financial markets, lower interest margins and fixed costs, and more dynamic capital markets.

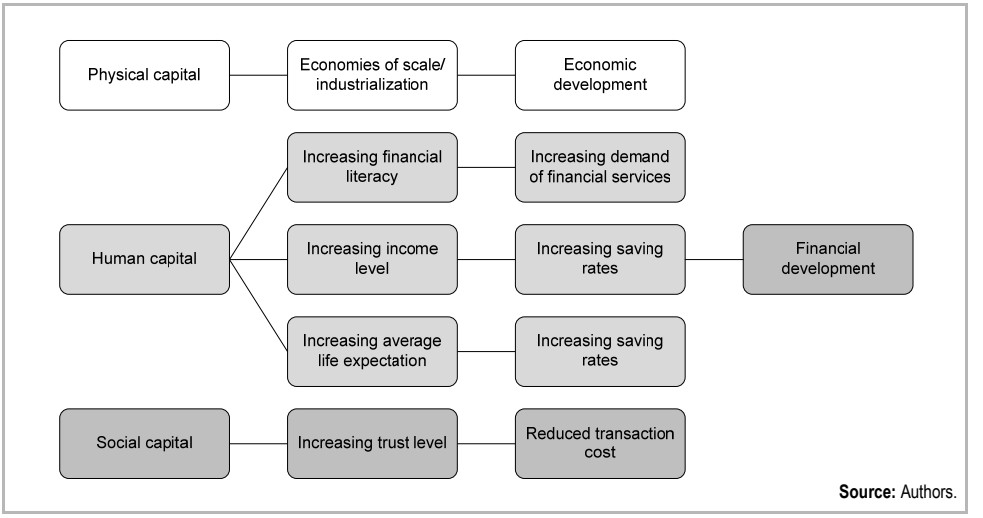


Figure 1 Mechanisms of Potential Impacts from Capital Accumulations to Financial Development

2. Data Set

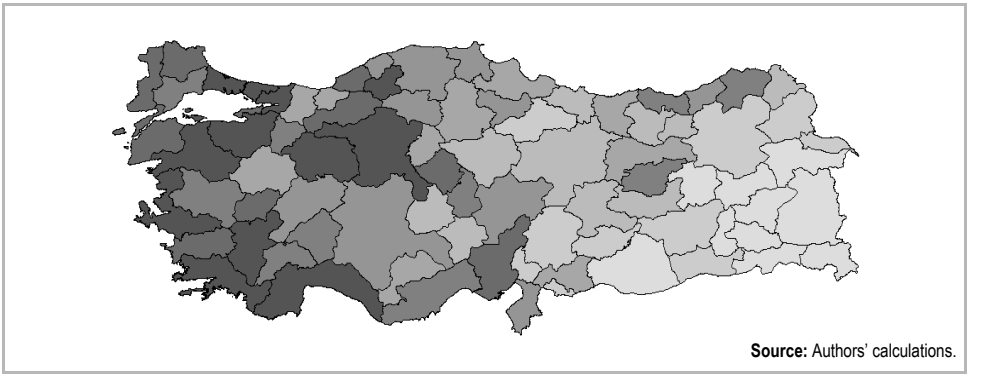
This section includes the calculation of financial development index (FD), physical capital index (PC), human capital index (HC), and social capital index (SC) values. It is thought that carrying out index calculations instead of representation by individual indicators would provide some advantages. One of these advantages is that indexation allows dealing with more than one variable, and the other one is that it reduces the impact of abrupt and transient fluctuations in some indicators. In fact, abrupt changes observed in series relating to credit and portfolio sizes, which are widely used in the literature to particularly represent financial development, indicate the correctness of the decision. To that end, principal component analysis (PCA) is used for index calculations. PCA is a multivariate statistical analysis used to decompose a multivariate data set into a set of sequential orthogonal components that can explain the variance as far as possible. PCA is also widely used to establish indices in various fields. PCA is one of the multivariate statistical analysis techniques and intends to obtain a smaller number of independent linear combinations among a group of variables. That is, it is used to obtain k uncorrelated dimensions among p original variables (George H. Dunteman 1989). In principal components analysis, there is always the hope that the variances of most of the new variables will be so low as to be

negligible. In this case, most of the variation in the full data set can be adequately described by the few *k* uncorrelated dimensions featuring variances that are not negligible.

First, the indicators used in indices established for financial development and capital accumulations are defined, and then the index values are analyzed and mapped in Figures 2, 3, 4, and 5 to reveal the spatial differences by provinces. Variation of color intensity in all maps from light to dark indicates financial development, physical capital, human capital, and social capital levels of the provinces from low to high.

One of the primary difficulties in analyzing the financial development is how to measure it, because there is not one single indicator that enables to measure the level of financial development. Additionally, the potential to obtain data plays a restrictive role in the selection of indicators. In fact, because there are less restrictions on indicators pertinent to banking activities, many studies address merely those indicators and rule out the equity market. However, according to Thorsten Beck, Asli Demirgüç-Kunt, and Levine (2001), both markets assume similar functions in the growth process and closely interact with each other. They note that studying both markets together will ensure more accurate and clear interpretations in the assessment of the financial system.

Based on this idea, the indicators used to calculate the financial development index by provinces for the period 2005-2009 are the number of bank branches per thousand people (The Banks Association of Turkey (TBB) 2012[1]), number of capital markets investors per thousand people (Turkish Capital Market Association (TCMA) 2012[2]), total real deposits *per capita* (TBB 2012), total real credits *per capita* (TBB 2012), and real investor portfolio value *per capita* (TCMA 2012). Financial development indices by provinces, obtained to show the spatial differences in financial development, are mapped for 2009 in Figure 2.



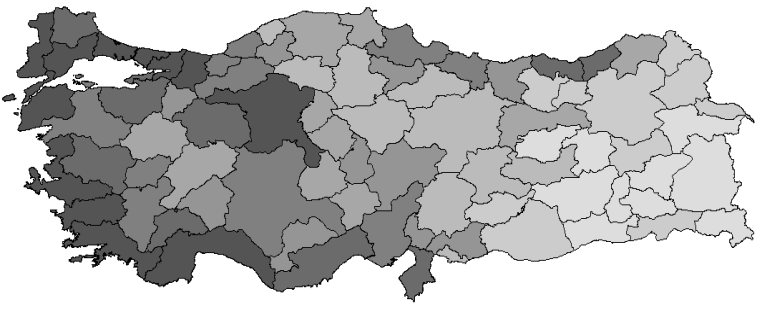
Source: Authors' calculations.

Figure 2 Spatial Distribution Map of Financial Development Index 2009

[1] **The Banks Association of Turkey (TBB).** 2012. https://www.tbb.org.tr/tr/banka-ve-sektor-bilgileri/veri-sorgulama-sistemi/illere-ve-bolgelere-gore-bilgiler/73 (accessed March 06, 2012).
[2] **Turkish Capital Market Association (TCMA).** 2012. Investor Profile in Turkey. http://www.tspb.org.tr/tr/Default.aspx?tabid=133 (accessed December 04, 2012).

Regarding the measurement of the level of physical capital, one sees that gross fixed capital investments are widely used in the literature. However, the lack of data by provinces makes it necessary to carry out alternative measurements. Şeref Saygili, Cengiz Cihan, and Hasan Yurtoğlu (2002) note that in addition to building, machinery and equipment indicators, infrastructural elements such as roads and dams, and housing investments are included in the physical capital measurement. Accordingly, the number of vehicles, agricultural machinery and equipment, the ratio of concrete asphalt road to the total length of road, household and industrial electricity consumption, total stock of buildings, drinking and waste water service intensity are used as the indicators representing physical capital (see Olaf Erenstein, Jon Hellin, and Parvesh Chandna 2007; Nicholas Cooper 2010; Karin Kataria, Jarmila Curtiss, and Alfons Balmann 2012, etc.).

Indicators by provinces, used in the calculation of physical capital index, are the number of motor vehicles per thousand people (Turkish Statistical Institute (TUIK) 2012[3]), number of agricultural machinery and equipment per thousand people (TUIK 2012), household electricity consumption *per capita* (TUIK 2012), industrial electricity consumption *per capita* (TUIK 2012), total area of buildings (TUIK 2012), ratio of municipality population receiving service from the drinking water mains (TUIK 2012), ratio of municipality population receiving sewage service (TUIK 2012), and ratio of the length of concrete asphalt road to total length of roads in the provinces (General Directorate of Highways, Republic of Turkey 2012[4]). Physical capital indices by provinces, obtained to show the spatial differences in the level of physical capital, are mapped for 2009 in Figure 3.



Source: Authors' calculations.

Figure 3 Spatial Distribution Map of Physical Capital Index 2009

Human development index of the United Nations is generally used to measure the level of human capital. Sub-indicators of this index were determined based on the

[3] **Turkish Statistical Institute (TUIK).** 2012. Regional Statistics.
http://tuikapp.tuik.gov.tr/Bolgesel/sorguSayfa.do?target=degisken
www.tspb.org.tr/tr/Default.aspx?tabid=133 (accessed October 15, 2012).

[4] **General Directorate of Highways**, **Republic of Turkey.** 2012. Lengths of Provincial Roads According to Surface Types by Provinces.
http://www.kgm.gov.tr/SiteCollectionDocuments/KGMdocuments/Istatistikler/DevletIlYolEnvanter/IllereGoreIlYollari.pdf (accessed December 03, 2012).

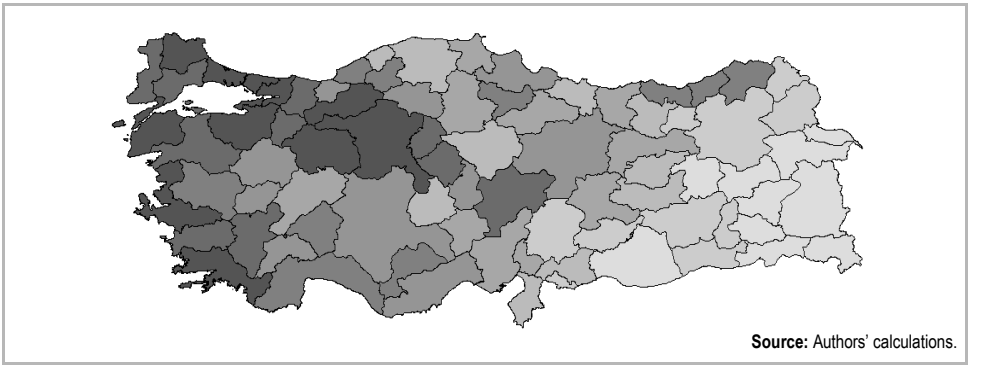
idea that the individuals that would provide the functions attributed to human capital need to have a good level of education, a healthy life, and high living standards. The calculation of indices in this study relies on this idea serving as basis for the human development index. However, unlike the human development index, the indices in this study include the secondary school and higher education enrolment rates, but not primary school enrolment rates. The reason behind this logic is that primary education does not reflect well the rate and tendency of schooling because it is compulsory. This may prevent the identification of education level differences between regions, because the regions have more or less the same rate of schooling at primary education level. Secondary school enrolment rate level is the human capital indicator that is used most widely in the literature and is accepted to be a more sufficient indicator for representing financial literacy and thus, financial demand (see Abdelkarim Yahyaoui and Atef Rahmani 2009; Mobolaji Hakeem and Oluwatoyin Olutan 2012; Anna Lo Prete 2013). Unlike the primary school enrolment levels, the secondary enrolment rates and higher-education level vary considerably between regions. Therefore, the secondary school enrolment rates provide a more accurate measurement in representing the educational level gaps between regions as compared with the primary school enrolment rates. Similarly, the reason behind the incorporation of the schooling rate at high education level into the index calculations is the expectation that people with a higher educational background have a higher level of financial literacy and that this would be more determinative on financial development.

Indicators used in calculating the human capital index are real gross domestic product *per capita* (GDP) (Kiralama Danışmanlık Merkezi *(*KDM) 2012[5]), average life expectancy (Mehmet D. Karakaya 2009), literacy rate (TUIK 2012), secondary school enrolment rates (TUIK 2012), and higher education enrolment ratios (TUIK 2012). Regarding the level of human capital, indicators such as number of teachers, schools, hospitals beds per person, etc. are not included in the index. In the pre-analyses conducted with such variables, considered to be input variables, it was seen that output variables such as the rate of schooling and income *per capita* were not high, but on the contrary quite low in the regions where input variables were high. Additionally, various difficulties are encountered in the obtainment of the data of such variables for each year of analysis. Accordingly, the use of output variables was deemed to be appropriate in the calculations of human capital index. Human capital indices by provinces, obtained to show the spatial differences in the level of human capital, are mapped for 2009 in Figure 4.

Based on Putnam (2000), the variables used to represent social life, interest in public incidents, informal socialization, and general level of trust to calculate the social capital index are the ratio of active membership to associations during the year to the population of the province the rate of participation in non-governmental organizations (Department of Associations, Republic of Turkey Ministry of Interior

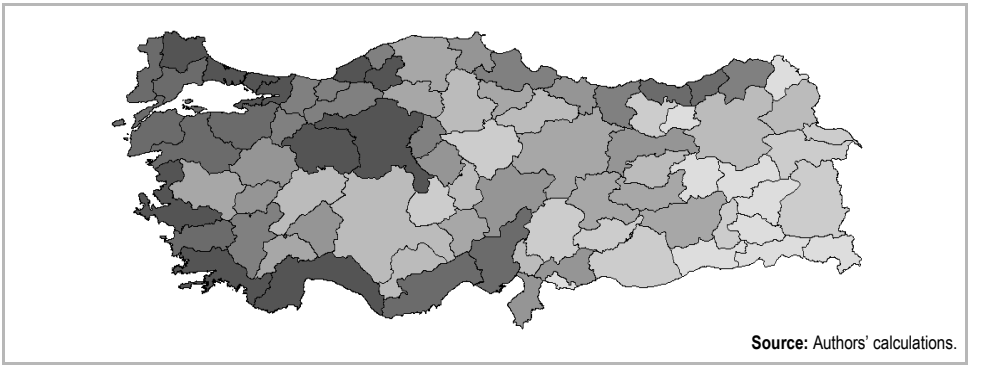
[5] **Kiralama Danışmanlık Merkezi *(*KDM).** 2012. http://www.kdmavm.com.tr/eng/corporate.aspx (accessed November 02, 2012).

2012[6]); average annual newspaper circulation *per capita* (Yaysat 2012[7]); rate of accidents per thousand vehicles (TUIK 2012); crime rates and rates of participation in the referendum 2007 (TUIK 2012). In the study, blood donation rates, which are commonly used as social capital measure, were not used in calculating the social capital index due to the inconsistency and unsoundness of the data derived artificially. Social capital indices by provinces, obtained to show the spatial differences in the level of social capital, are mapped for 2009 in Figure 5.



Source: Authors' calculations.

Figure 4 Spatial Distribution Map of Human Capital Index 2009



Source: Authors' calculations.

Figure 5 Spatial Distribution Map of Social Capital Index 2009

3. Econometric Method and Model

It is known that cross-section data analysis is often used in the literature regarding regional analyses. This study employs spatial panel data analysis instead of cross-section analysis to estimate the impacts of capital accumulations on provincial financial development levels. Accordingly, the panel data spatial lag and spatial error models proposed by J. Paul Elhorst (2003) are used. The following sub-sections include the theoretical discussion relating to spatial panel data analyses.

[6] **Department of Association, Republic of Turkey Ministry of Interior.** 2012. http://www.dernekler.gov.tr/tr/AnasayfaLinkler/uye-istatistikleri.asp (accessed October 25, 2012).
[7] **Yaysat.** 2012. http://www.yaysat.com.tr/anasayfa.html (accessed November 19, 2012).

3.1 Spatial Panel Data Analysis

Particularly, the use of cross-section and panel data models for international and interregional analyses is subject to several restrictions. The most important one is that such models do not take into account the spatial effects. However, cross-section models may be reformulated to take into account the spatial effects. Nevertheless, the presence of omitted variables and the handicaps of the cross-section model such as heterogeneity bias may still persist. At this point, Cheng Hsiao (1986) and Badi H. Baltagi (2001) argue that the use of panel data is an appropriate approach in terms of overcoming some problems particularly such as omitted variable, deviation of heterogeneity, and multi-collinearity. To eliminate such problems, the study uses panel data models that take into account the spatial effects.

Generally speaking, spatial lag models incorporate spatial dependence into the analysis through the spatial lag variable, and resemble time series models in this sense. However, unlike time series models, they associate the current value of the dependent variable with the current value of the adjacent dependent variable rather than explaining it with past values. Therefore, they are more effective particularly in capturing the spatial diffusion effects. Besides, spatial effects in spatial error model are included in the distribution of the error term. This model implies that spatial interactions between observations substantially result from the autocorrelated omitted variables (Chong Won Kim, Tim T. Phipps, and Luc Anselin 2003).

The indices calculated and the sub-indicators selected as variable cover all of 81 provinces of Turkey for the period between 2005 and 2009, which means that there is no random sample in terms of the estimation of the model. Thus, the spatial panel data models to be used in the study are restricted to fixed effect spatial lag and error models.

The traditional fixed effect model can be developed to include a spatial autocorrelated error term or in such manner that the explanatory variables will include a spatial lag dependent variable. The simplest form of the pooled linear regression model that includes spatial fixed effect is as follows:

$$Y_{it} = \alpha_i + X_{it}\beta + u_{it}, \tag{1}$$

where $i = 1,...,N$ denotes the units, $t = 1,...,T$ the time, α_i the unit specific effects, Y_{it} the dependent variable vector, X_{it} the explanatory variable matrix, β the parameter vector, and u_{it} the error term.

This model may be expanded for the fixed effect spatial lag model (FSLM) as follows:

$$Y_{it} = \alpha_i + X_{it}\beta + \rho W Y_{it} + u_{it}, \tag{2}$$

where ρ denotes spatial autoregressive coefficient, W the standardized deterministic weight matrix established on the basis of geographical proximity between provinces and defined as $W = 1$ if province i is adjacent to province j, and $W = 0$ if they are not adjacent to each other. The standardization process relating to the

weights is carried out by dividing the number of adjacency by the weight value. Thus, weights are standardized so that the sum of rows is "1". Hence, this process is called "row standardization". Note also that $\mu_{it} \sim N(0, \sigma^2)$. The estimation procedure for FSLM is based on the principle of maximum likelihood (ML) and exhibits similarity to the cross-section estimation procedure (see Anselin 1988; Andrew Henley 2005). The fixed effect spatial error model (FSEM) can be expressed as:

$$\begin{aligned} Y_{it} &= \alpha_i + X_{it}\beta + u_{it}\ , \\ u_{it} &= \delta W u_{it} + \varepsilon_{it}\ , \end{aligned} \tag{3}$$

where δ denotes spatial autocorrelation coefficient and $\varepsilon_{it} \sim i.i.d.(0, \sigma^2)$ is the error term. Likewise, the estimation procedure for FSEM is based on ML as well and is similar to the estimation procedure for the cross-section spatial error model (see Anselin 1988; Henley 2005).

3.2 Empirical Model

The summative form of the general model in the study is as follows:

$$\ln Y_{it}^{FD} = \alpha_i + \beta_1 \ln X_{it}^{PC} + \beta_2 \ln X_{it}^{HC} + \beta_3 \ln X_{it}^{SC} + \gamma \ln Z_{it} + u_{it}\ , \tag{4}$$

where Y_{it}^{FD}, $X_{1,it}^{PC}$, $X_{2,it}^{HC}$, and $X_{3,it}^{SC}$ are the financial development, physical capital accumulation, human capital accumulation, and social capital accumulation for province i at time t, respectively, and β_1, β_2, and β_3 are the elasticities of the capital indices. Z_{it} is the matrix of control variables such as dependency rate and urbanization rate for province i, and γ is the parameter vector of control variables. In addition, α_i denotes the unobservable unit specific effects and it is expected that $0 < \beta_1, \beta_2, \beta_3, \gamma < 1$. Additionally, $\mu_{it} \sim i.i.d.(0, \sigma^2)$ is the error term.

Accordingly, the general model can be expanded for FSLM as follows:

$$\begin{aligned} \ln Y_{it}^{FD} = \alpha_i &+ \beta_1 \ln X_{it}^{PC} + \beta_2 \ln X_{it}^{HC} + \beta_3 \ln X_{it}^{SC} \\ &+ \gamma \ln Z_{it} + \rho W \ln Y_{it}^{FD} + u_{it}, \end{aligned} \tag{5}$$

and for FSEM as follows:

$$\begin{aligned} \ln Y_{it}^{FD} &= \alpha_i + \beta_1 \ln X_{it}^{PC} + \beta_2 \ln X_{it}^{HC} + \beta_3 \ln X_{it}^{SC} + \gamma \ln Z_{it} + u_{it}\ , \\ u_{it} &= \delta W u_{it} + \varepsilon_{it}\ , \end{aligned} \tag{6}$$

where ρ and δ are spatial lag and spatial error coefficients, respectively. As mentioned above, W denotes the standardized deterministic spatial weights matrix and is incorporated into both models. This study prefers the standardized deterministic weight matrix, defined as $W = 1$ if province i is adjacent to province j, and $W = 0$ if they are not.

4. Empirical Findings

This section of the study attempts to estimate the financial development gaps between provinces in Turkey and the relations between capital accumulations, taking into account the spatial effects. Thus, the empirical model elaborated above is estimated on the basis of indices established for 81 provinces for the period between 2005 and 2009. Empirical analysis begins with the estimation of cross-sectional spatial lag and cross-sectional spatial error models based on index averages to incorporate the presence of spatial effects in terms of financial development between provinces into the model and to see the advantages of using panel data. Prior to that, however, the scatter diagrams based on index score averages are given in Figure 6. The scatters formed based on index score averages indicate that there is a positive and increasing effect generally from capital accumulations to financial development.

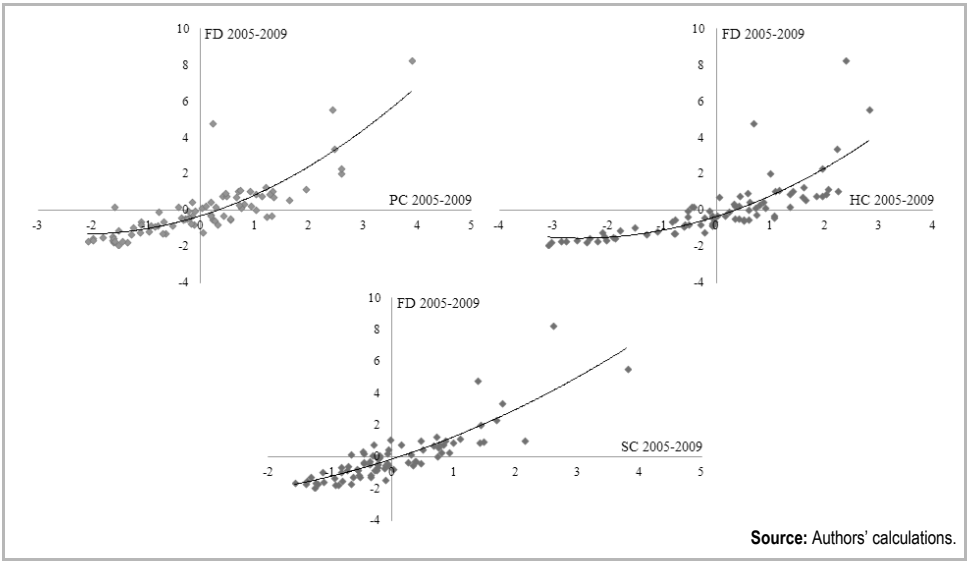


Figure 6 Scatter Diagrams of Capital Accumulations and Financial Development Indices

To find out whether any problem of endogeneity exists between explanatory variables regarding the estimation of the models defined in Equations (5) and (6), the causality of the relations between financial development and capital accumulations is assessed. Granger causality test based on panel data was employed to reveal the causality relationships between the variables. The results of the causality test show that there is causality from all capital accumulations to financial development, but no causality from financial development to capital accumulations. This indicates that there is no problem of endogeneity between explanatory variables regarding the estimation of the models defined in Equations (5) and (6).

The reason behind the failure to identify any causality from financial development to physical capital accumulation may be explained by the views of Patrick (1966) and Hernando de Soto (2000). According to the supply-leading approach for-

mulated by Patrick (1966), financial development promotes physical capital accumulation, and encourages industrialization and economic growth. However, as a significant progress is made in respect of physical capital accumulation in the later stages of industrialization and economic growth, the supply-leading approach loses its importance. Therefore, causality from financial development to physical capital accumulation may not be observed. De Soto (2000) takes a different approach to the matter and expresses that the problem of developing countries is their failure to transform financial development into physical capital accumulation. He attributes the reason behind this problem to poorly defined property rights and laws and to the length of bureaucratic processes.

One of the possible reasons behind the failure to identify causality from financial development to human capital accumulation may be that households or individuals do not sufficiently resort to financial markets to finance their education and health expenditures. Indeed, it can be said that the demands of households or individuals for credit are generally related to the financing of their consumption, real estate or vehicle requirements in Turkey. Another reason may be related to insufficient acquaintance with financial instruments and services, and to problems in accessing financial services.

The potential effect from financial development to social capital is the idea that financial development will provide financial facilities for individuals to attend social organizations and hold such organizations. It is related to the idea that financial development allows individuals to finance their investments or transfer their existing savings to profitable investments, thereby increasing their income level and resulting in high rates of participation in and membership to social organizations by individuals with high income (Calderón, Chong, and Galindo 2002). The reason behind emphasizing the participation in social organizations is based on the idea that the intensity of relationships between individuals will consolidate the level of social trust and increase the capacity of individuals to act together for common goals (see Putnam 1993). However, the failure to identify any causality from financial development to social capital means that the impact mechanisms mentioned above do not work in Turkey. The possible reasons for this may be that households or individuals do not sufficiently resort to financial markets in their participation in social organizations, and socio-cultural customs and practices in Turkey.

Examining Tables 1 and 2, it is seen that the spatial autocorrelation coefficient for the spatial error model is significant, whereas the spatial lag coefficient is insignificant. Moran's *I LM* test, another measurement that tests the presence of spatial effects, points out the presence of spatial dependency for the error model (for Moran's *I LM* test, see Anselin and Serge Rey 1991). In this sense, it may be said that spatial error model is more suitable as compared with spatial lag model. Moreover, the elasticity coefficients are generally consistent with economic expectations, but it is interesting that the elasticities for the physical capital variable are insignificant in both models. Furthermore, Breusch-Pagan's heteroscedasticity test results imply that both models have no problem of heteroscedasticity. Nevertheless, the insignificance of the elasticity coefficient of physical capital may stem from omitted variables or heterogeneity bias, which is possible in cross-sectional series.

Table 1 Cross-Sectional Spatial Lag Model Estimation Results

Dependent variable: financial development	Estimation	Standard error	*t*-value	*p*-value
ρ	-0.0148	0.0940	-0.1576	0.8748
Constant	-0.0093	0.2663	-0.0350	0.9721
Physical capital	0.0383	0.1147	0.3337	0.7386
Human capital	0.3474	0.0986	3.5217	0.0004
Social capital	0.6312	0.0672	9.3927	0.0000
$\overline{R}^2$	0.8719		AIC	-1.4992
Log-likelihood	308.6050		Observations	81
Breusch-Pagan heteroscedasticity test			6.755	*p*-value = 0.080
Moran's *I LM* test (lag)			0.025	*p*-value = 0.875

Source: Authors' estimations.

Table 2 Cross-Sectional Spatial Error Model Estimation Results

Dependent variable: financial development	Estimation	Standard error	*t*-value	*p*-value
δ	0.4163	0.1307	3.1854	0.0014
Constant	-0.3084	0.3073	-1.0035	0.3156
Physical capital	0.0959	0.1105	0.8674	0.3858
Human capital	0.3578	0.0934	3.8331	0.0001
Social capital	0.6133	0.0579	10.6012	0.0000
$\overline{R}^2$	0.8862		AIC	-1.5146
Log-likelihood	311.7077		Observations	81
Breusch-Pagan heteroscedasticity test			5.963	*p*-value = 0.113
Moran's *I LM* test (error)			6.231	*p*-value = 0.013

Source: Authors' estimations.

It is mentioned in the foregoing that in the case of spatial heterogeneity and omitted variables, panel data models may produce more reliable parameter estimates. Based on this, it becomes a significant necessity to estimate panel data models by expanding them to take into account the spatial effects. However, based on the information obtained from cross-sectional spatial lag and error model estimations, the empirical analysis is restricted to the panel data spatial error model in terms of the estimation of the model. Accordingly, Table 3 presents the estimation results of the panel data spatial error model on the basis of indices.

While the spatial error model based on indices is estimated, youth dependency rates and urbanizations rates are included in the model as control variables. The reason for including the youth dependency rates into the model is its ability to represent financial demand, which is the primary determinant of financial development. It is expected that high youth dependency rates will negatively affect financial demand. The considerable variation of youth dependency rates between regions enhances the importance of their incorporation into the model.

The reason why urbanization rates are included in the model is the idea that proximity to financial markets and being acquainted with financial instruments and services will provide ease of access to financial services. Additionally, it is also related to the expectation that a high urbanization rate will tend to result in more formal relationships, leading to the shift of financing requirements from individuals with close relationships to formal markets. In this context, urbanization rate is expected to have a positive effect in the models.

Examining Table 3, it is seen that all elasticities are statistically significant and consistent with economic expectations. Accordingly, a 1% increase in physical, human, and social capital leads to an increase of 0.43%, 0.23%, and 0.69% in financial development, respectively. It is remarkable that the elasticity of social capital is

higher than the elasticities of physical and human capital. This indicates that the social structure and the level of trust are important determinants in financial relations. This finding suggests that the differences in the socio-cultural structure are not negligible in formulating policies in Turkey, where economic development gaps between regions are significant. The second largest impact on the financial development gaps between provinces comes from physical capital. Physical capital is an indicator of the contributions of provinces to the economy of the country particularly in the production process, and also of their financial demand. The importance of the real sector for financial development is evident in that high differences between the levels of physical capital of provinces bring about differences in the financial development of provinces. It is observed that human capital has a relatively lower impact on the level of financial development. The reason behind this may be attributed to low savings rates, poor financial literacy, and challenges in accessing financial markets. Lastly, the coefficients of the youth dependency rates and urbanization rates, which are included in the model as control variables, are estimated and consistent with the expectations.

Table 3 Fixed Effects Spatial Error Model Estimation Results

Dependent variable: financial development	Estimation	Standard error	*t*-value	*p*-value
δ	0.2091	0.0692	3.0221	0.0025
Constant	0.4850	0.3585	1.3525	0.1762
Physical capital	0.4291	0.0743	5.7787	0.0000
Human capital	0.2250	0.1074	2.0945	0.0362
Social capital	0.6897	0.0585	11.7997	0.0000
Dependency ratios	-0.0087	0.0030	-2.9499	0.0032
Urbanization rates	0.0087	0.0024	3.6998	0.0002
$\overline{R}^2$	0.8862		AIC	-6.7540
Log-likelihood	1373.6881		Observations	405
Breusch-Pagan heteroscedasticity test			10.2321	*p*-value = 0.0689

Source: Authors' estimations.

Furthermore, the positivity and statistical significance of the spatial autocorrelation coefficient in all fixed effect spatial error models estimated imply that provinces that have a low financial development but surrounded by adjacent provinces that are above average in terms of financial development exhibit a faster financial development. In other words, physical, human, and social capital accumulations above average in a province contribute to the financial development of not only that province, but also of less developed adjacent provinces.

5. Conclusion

The present study intends to research in which direction and to what extent the concepts of capital steering the growth literature affect financial development and to deal with the subject, to the best of our knowledge, for the first time in the literature by this approach, under a single umbrella within the framework of the concepts of capital. Although financial development gaps among countries are intensively researched in the relevant literature, the number of studies analyzing financial development gaps at regional level is relatively far lower. For countries where economic, social, and cultural differences between regions are significant, such as Turkey, analyses at regional level are of great importance in terms of formulating policies. It is known that

there are a limited number of studies on the relations of financial development and economic development at regional level in Turkey, and to the best of our knowledge, there is no study yet conducted on the determinants of financial development. In this regard, a spatial panel data analysis, based on the data of 81 provinces for the period 2005-2009, is conducted to seek an answer to this question: "What is the influence and level of significance of physical, human, and social capital on financial development gaps among provinces?"

First, the sub-indicators of capital accumulation and financial development are indexed for use in analysis as this will allow more accurate and more reliable assessments. The calculated indices suggest that there are significant gaps of financial development and capital accumulation between provinces, consistent with the anticipations.

The model estimations present evidence that capital accumulations promote financial development. The finding that human capital positively affects the financial development is consistent with Outreville (1999), Arora and Ratnasiri (2011). However, it is found that human capital is the least effective in explaining the level of financial development gaps. One of the probable reasons for this may be the low savings rates. Indeed, while the average savings rates in upper middle-income countries including Turkey (according to the World Bank classification) were 35%, it was approximately 14% in Turkey in 2011. The other reasons may also be low level of financial literacy or difficulties experienced in financial access as suggested in Cole, Sampson, and Zia (2009) and van Rooji, Lusardi, and Alessie (2011) (due to reasons such as high transaction costs, insufficiency in the distribution of financial agencies to the population, etc.). It is also found that the level of physical capital is more effective than human capital in explaining the level of financial development. This may be evidence regarding the validity of Patrick's (1966) demand-following hypothesis. An increase in physical capital accumulation means growth in the real sector. In this regard, Patrick (1966) states that the demand for financial services increases in line with the requirements of the real sector, and the increasing demand of financial services promotes financial development in the demand-following hypothesis.

Additionally, it is found that social capital is more effective than physical and human capital in explaining the level of financial development gaps between provinces. Higher elasticity estimation of social capital in our study in comparison with those of other capital accumulations is consistent with the findings of Guiso, Sapienza, and Zingales (2000) and Calderón, Chong, and Galindo (2002). Guiso, Sapienza, and Zingales (2000) found that social capital was a more important factor for financial development in regions that had a low level of human capital and/or where the effectiveness of the legal system was. Social capital is a significant determinant of the level of trust. Yet, the effectiveness of the legal system may compensate for the low level of trust. Similarly, Calderón, Chong, and Galindo (2002) found that the effect of trust is stronger when legal enforcement is weaker in explaining financial development, because a high level of trust reduces the transaction costs as the effectiveness of the legal system and the legal enforcement do. In other words, the efficiency of the legal system may play a deterrent role on the tendency of individuals to violate contracts. Numerous studies in the literature note that the effectiveness of the

legal system promotes financial development (see Rafael La Porta et al. 1997; Beck, Demirgüç-Kunt, and Levine 2001; Paul G. Mahoney 2001, etc.). In this regard, the weakness of legal enforcement in Turkey, in other words, length of legal actions, presence of loopholes in laws, and poor power of sanction cast doubt on the validity of contracts. According to the Financial Development Report 2012, prepared by the World Bank (World Economic Forum 2012), Turkey ranks the 35th in the protection of property rights and 46th in the strength of legal rights among 62 countries. Ultimately, the extent of the influence of social capital on financial development might be stemming from the ineffectiveness of the legal system.

Another reason why social capital is the most effective in explaining financial development may also be associated with the level of human capital, as Guiso, Sapienza, and Zingales (2000) put forward. Individuals with a low level of educational background may have difficulty in assessing financial instruments and contracts. Therefore, regarding the participation of individuals with a low level of educational background in formal financial markets, the importance of the level of social trust is higher. However, the level of trust is less important for individuals with a high educational background as they have a higher rate of financial literacy, assess contract conditions better, and know their legal rights better.

In conclusion, it is of importance that policy-makers formulate policies that promote capital accumulation, in reliance on the fact that physical, human, and social capital accumulations positively affect financial development. A high level of financial development enhances the depth and stability of financial markets as well as product variability, thereby making the markets more attractive for national and international investors. According to the findings of the present study, formulation of policies that enhance the effectiveness of the legal system and improve the level of human capital and financial literacy to mitigate the restrictive impact of a low level of social capital on financial development may be recommended. The results of the spatial data analysis indicate that provinces with a capital accumulation above average contribute to the financial development of not only those provinces, but also to that of adjacent provinces. In this context, it is considered that the policies intended for improving capital accumulations of provinces will generate more favorable results on the levels of financial development than expected as the results of the policies will exhibit spillover effects.

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