Main Determinants of the Unequal Distribution of Physicians in Turkey: An Empirical Analysis

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Abstract
The shortage and unequal distribution of physicians is an important policy concern in any country. Since the measures to reduce the shortage of physicians and minimize the imbalance in their geographic distribution may affect the population's health status, it is important to measure the extent of maldistribution and in connection with this problem to find out the determinants of physicians' location choices. Therefore the aim of this paper is twofold; firstly to assess the distribution of physicians and determine the main factors behind their locationdecision in Turkey. Our calculations showed that both the overall and regional disparities have decreased dramatically between 1965- 2007. According to the econometric estimation, the findings unsurprisingly indicate that the population density is one of the main determinants of location choices both in the static and dynamic models. Other explanatory variable, such as hospital bedswere found to have a significant effect on the distribution of physicians supply.

Keywords: Inequality, physicians, Gini coefficient, location choice

1. Introduction and Conceptual Framework

In recent years a mucheffort has been devoted to explore the different aspects of inequality in health status. To explain this inequality, the literature focuses mainly on the relationship between income, health care expenditure, education, insurance coverage, age and health status. Previous studies especially emphasized the importance of socio-economics differences and have shown that especially income growth and its equal distribution contributed to improvements in infant mortality, under-five mortality rate, adult mortality rate, life expectation as well as actual health care utilization (Subramanian et. al., 2002; Mayer &Sarin, 2005; Doorslaer et. al., 2008)

Nevertheless, health status disparities could not be solely explained by socio-economic differences. It has been widely documented that need based, accessible and good quality health care services (and especially health care workers) are critically important to minimize health disparities and to improve health status within and across populations groups (Elola& Navarro, 1995; Nixon &Ulmann, 2006; Bloom, 2001). Many studies revealed that a high ratio of physicians to population has a negative effect on mortality resulting from heart disease, cancer, stroke, infant mortality and maternal mortality(Chen et. al., 2004; Grubaugh&Santerre, 1994; Barbera&Gertlerb, 2009; Anand&Baernighausen, 2004). Consequently increased investment on human resources in health care would inevitably make a great contribution to health status. As indicated in the Kampala Declaration (2008), global initiatives and programmesfor external

support to health systems and disease-specific interventions in countries could be analyzed and monitored in terms of their impact on the health workforce and on people's access to skilled health workers. Similarly, World Health Organization (WHO, 2006) has emphasized the need to have sufficient numbers of health workers to achieve the basic objectives of the Millennium Development Goals (MDGs).

On the other hand, health care services are changing because of financing policies, technological innovation, demographic transition, epidemiological transformation, rising expectations and globalization as well as health needs. These developments are dramatically increasing the demands on the workforce in health systems. Moreover a shortage of health care workers is becoming a serious problem in the context of changing and rising health care needs. It is well known that at the heart of each and every health system, the workforce is central to advancing health. A typical country devotes just over 42% of total general government health expenditure to paying its health workforce, though there are regional and country variations around this average. For example, governments in Africa and South-East Asia typically devote lower proportions than do those in other regions (WHO, 2006). Health care workers deal with various tasks including control and synchronization of all health resources and outcome; considering the shortage of human resources in the field this massive workload is a serious challenge for all countries. Therefore, in recent years there is a growing attention on the unequal distribution of physicians as well as their limited number in many countries. Although the WHO has suggested a minimum target for all countries: 2,3 health professionals per 1 000 people, there is no consensus on what constitutes appropriate distribution of physicians. Therefore, the "appropriate distribution" of physician human resource is a societal judgment -as such, it can vary across regions, provinces, and countries (Kralj, 2001). As the effects of inequalities in the distributions of physicians are known, public policies can promote a more balanced geographical distribution of physicians. Moreover, from the regional economic perspective, the distribution of physicians provides important information about the ability of regions to attract qualified human capital (Isabel& Paula, 2010).

In thehealth economics literature, three different techniques have been used to measure the distribution of physicians and the factors associated with it. The most common approach uses the physiciantopopulation ratio across geographical areas. The main advantages of this approach are the simplicity with which it can be applied and the limited data required. The second most common approach uses various indexes as an aggregate measure for the degree of equality of distribution of physicians (Wilkinson &Symon, 2000; Theodorakis et. al, 2006; Munga&Mæstad, 2009). In recent years econometric methods started to be used to determine pyhsicians' locational choices –which are assumed to be influenced by population,- health care services, payment incentives, educational, health status, economic and social lifestyle (Newhouse et. al., 1982; Foster &Gorr, 1992; Horev et. al., 2004; Nocera&Wanzenried, 2008). Krishnan (1997) has called these studies as structural approach.

Despite the growing concern with the uneven distribution of physicians, there are limitedthe number of studies to assess the distribution of physicians in Turkey at any geographical scale and the existing studies often focus on the calculation of simple physician/population ratios. The purpose of the present study is to measure the degree of regional disparities in the availability of physicians in Turkey, and to investigate the determinants of physician location choices.

The paper is organized as follows: in the following section, we present a brief account of the health care system in Turkey, the health care reform process as well as the health care workforce indicators. This is followed by an empirical framework for inequalities in the distribution of physicians as well as the determinants of these inequalities. In the third part of study, empirical model, data set and the estimation results for the determinants of the distribution of physicians in Turkey are presented. Last section concludes and offers some policy recommendations for Turkey.

1. Background

In 2007, Turkey spent approximately 6% of its gross domestic product (GDP) on health care. Health expenditure growth has been more than twice of the OECD average over the past ten years (OECD, 2009). As in many OECD countries a large proportion of health care financing in Turkey comes from public sources, primarily taxes (45%) and social insurance premiums (35%).

Moreover, Turkish health system is also going through a phase of transition or transformation. The government has initiated a reform program in 2003; i.e., the Health Transformation Programme (HTP). Prior to 2003, Turkish health system was characterized by the presence of several different public agencies funding and providing health care, some vertically integrated and others relying on contractual relationships. As a part of the government's HTP, institutional and organizational reforms that aim at eliminating fragmentation and duplication in the health financing and delivery systems and assuring universal access to health insurance and health serviceshave been underway. Thus the distinction between purchasing and provision of health care functions was introduced. The most important step of the program was taken in May 2006, with Law No: 5502, all security institutions are gathered under the umbrella of the Social Security Institution (SSI). With the Law No: 5510 that was enacted on 1 October 2008, aimed to eradicate inequalities in access to and financing of health care services through defining the rights and responsibilities, besides covering all the population by the social security. The purchasing function was placed into the hand of the newly established SSI, which is an autonomous public organization that collects premiums and contributions from the government budget. In the meanwhile all community hospitals were re-organized under the MoH. Now, SSI is the major health care institution, providing free health insurance to people while the MoH is responsible for managing the provision and monitoring of health care.

Although the implementation of the HTP has resulted in some significant changes in the health care system, the current and looming shortage of physicians as well as other health professionals in Turkey has recently become a serious problem, which has been increasingly pointed out by health economists. As indicated by El-Jardali(2007) successful health system reform in any country depends on the provision of effective, efficient, assessable, sustainable and high quality services by a health workforce that is sufficient in number, appropriately- trained and equitably-distributed. Although the number of physicians increases over years, the overall ratio of physicians to population in Turkey is still low compared to the other OECD countries. The development in the relative numbers of physicians during these years is shown in Table 1.

Table 1: Changes in the number of physicians and population size in Turkey, 1965-2007

Year	Number of Physicians	Change (%)	Population	Change (%)	Physicians per 100 000 Inhabitants	Change (%)
1965	10 466		31 391 421		33,34	
1970	13 850	32	35 595 176	13	38,91	17
1975	21 766	57	40 347 649	13	53,95	39
1980	24 969	15	44 466 957	10	56,15	04
1985	36 427	46	49 176 801	11	74,07	32
1990	49 124	35	56 462 850	15	87,00	17
2000	82 924	69	67 80 3873	20	122,30	41
2007	112 045	35	70 586 256	07	158,73	28

Source: Calculated by the author using TurkStat and the MoH data.

In addition to the shortage of physicians, unequal geographic distribution has been a persistent problem and therefore it has been an important policy concern in Turkey. According to the Report on monitoring and evaluating the HTP performance(The MoH, 2007), the most important factors influencing access to quality health care services are the size, composition, distribution and productivity of the health care workforce. While progress has been made in decreasing geographic imbalances, compared to the OECD countries Turkey still fares poorly. The regional and provincial variation in physician density in Turkey ranks the first among the highestcompared to the other OECD countries. In 2007, the number of physicians per capita varied significantly between districts, from 0,8 per 1000 in Şırnak which is the most disadvantaged province in terms of socio-economic indicators in Turkey, to 3,54 per 1000 in Ankara province. While the imbalance is greater with the number of specialized physicians, it is relatively smaller in the number of general practitioners and total physicians. Another outstanding point is that the provinces with the best or worst socio-economic development level are not necessarily always from the same region. For various professions, the provinces with the best socio-economic development level include one province each from Central Anatolia (CA), Marmara, Black Sea (BS) and the Eastern Anatolia (EA). And, while the provinces with the poorer socio-economic level are mostly from EA and South-eastern Anatolia (SEA), the one province where the population per general practitioner is highest (i.e., the worst case) is İstanbul. Existing data suggest that the unbalanced distribution of the health care workforce in Turkey has complex socio-cultural and socio-economic reasons.

3. Empirical Framework; Measuring Inequality and Structural Models

3.1.1 Measuring Inequality

Similar to previous studies, in the present study we calculated the level of inequality in the regional distribution of both general practitioners (GPs) and specialists. Previous studies (Newhouse et al., 1982; El-Jerdali, 2007) evaluating the spatial distribution of physicians find that the Gini and Atkinson indices are the most useful for fairly aggregated forms of economic analysis, involving relatively few and large geographical divisions. For the purposes of the present study, relative inequality indicators are used: the Gini coefficient and Atkinson index. Inequality indices were calculated using the software DAD.

Gini index

The Gini coefficient (G) or index is perhaps the most widely used single indicator of a distribution of income, or consumption, or health, or a distribution of any other kind. The Gini index is constructed by ordering the geographically defined per capita provision (i.e., physician to population ratio) in ascending order and calculating the cumulative proportion of the total number of physicians and the corresponding cumulative proportion of the total population (Kralj, 2001).

Atkinson Index

The Atkinson index (1970) is used to measure the degree of inequality in different distributions that are compatible with a standard utilitarian Social Welfare Function. The Atkinson index measures the relative loss in terms of social welfare, associated with a certain level of inequality, as compared to a situation where the same amount of income had been distributed equally (Waters, 2000). The main feature of the Atkinson index is the so-called epsilon (ε) parameter that decides both the degree of inequality aversion and the degree to which the index will give priority to income differentials at the lower end of the income distribution. Atkinson index was calculated assuming that ε values equal to 2.

3.1.2 Structural Models

In the health economics literature, a fairly standard approach for investigating the maindeterminants of geographic distribution of physicians can be used to analyze the location choices of physicians. According to Foster &Gorr(1992) health care personnel's location choices are determined by three different

factors: these are professional climate, social amenities, and market conditions, and these are also known as 'push' and 'pull' factors (Lehmann, 2008). However, it should be indicated that the complexity of these factors makes their categorization very difficult. For example, in the location choice of a married physician with children, addition to his/her expectations about income and career opportunities, expectations of his/her spouse and children may play an important role. Thus, various factors should be taken into consideration before defining a utility function reflecting location choices.

In the location choice, professional climate also plays a crucial role. Working conditions can range between private and public hospitals to medical centers with advanced technology, or laboratories; and social issues such as relations among peers can also be an important factor here. The choices of general practitionersand specialistsmay be different with respect to working conditions. According to Jiang & Begun (2002) specialists make such choices as research hospitals provide access to a whole range of capital equipment and facilities that are indispensable for specialists' practices. However, general practitioners prefer such hospitals as they can transfer some of their patients that need specialty services or 24-h care by clinical personnel in these places. Moreover, major cities with private hospitals and medical centers are also demanded by physicians as they create positive externalities for physicians such as part-time working opportunities in countries that allow physicians to have extra jobs. Consequently, the attractiveness of working conditions positively affects the supply of physicians. As current evidence points out the availability of education opportunities, recreational facilities and other social amenities can affect location choices of physicians. Such factors require not only the choices of physicians but also of their families to be taken into consideration. For these reasons, better the social amenities, more physicians are attracted to a region.

Once these are considered, it is safe to argue that major metropolitan areas have greater potential in attracting physicians due to working conditions and social amenities that they can offer to physicians. Metropolitan areas, due to their high levels of economic advancements, create a large demand potential for medical services just like they generate demand for various goods and services. In fact the literature indicates that socio-economic condition of a given location is an important determinant of physician location choice. Rundall& McClain (1982) show that neither specialists nor general practitioners prefer places with low levels of natural resources, which are measured by population size, availability of medical facilities and income; in such places physicians often treat patients with certain kinds of diseases and the complex cases. ButElesh&Schollaert(1972) indicated that high socio-economic conditions have more impact on the location choice of specialists than that of general practitioners. Other socio-economic conditions, such as the extra income opportunity for public sector physicians by working at private institutions as a second job, could also have an impact in the location choice of these physicians. Therefore it is also possible that these major metropolitan areas offer better living conditions and are preferred by physicians.

According to economic theory, in a competitive market structure, physicians' location choices should be determined by demand and supply conditions. Real wages will guide an equal distribution of physicians in the long run. Yet, the existence of legal regulations and other factors such as supply induced demand abolishes the traditional demand and supply mechanism. In sum, occupational working conditions, expectations of physicians and their families, and health policies are responsible for the geographical distributions of physicians. By and large, structural approach studies indicate that physicians prefer to practicein urban areas that offer professional development, education and attractive employment opportunities for themselves, social amenities for their families.

4. Empirical Model, Data and the Estimation Results

4.1 Model Specification

One of the main goals of this study is to test the following statement: regional differences in the distribution of physicians are associated with the differences in the population, health care services environment (hospital beds, medical faculty *etc*.), health status, and socio-economic developments in Turkey between the years 1965 and 2007. In this study, the effects of these variables will be taken into account with two different models similar to previous studies: *i*) static model to analyze the distribution of physicians in 1965 and 2007, and *ii)* dynamic model that examines changes in the distribution of physicians over the period 1965-2007.

Static Model

For the static model the equation (1) is used to analyze the main determinants of location choice of physicians;

$$\ln PHYS_{ji} = \alpha_1 + \alpha_2 \ln POP_i + \alpha_3 \ln BEDS_i + \alpha_4 \ln MORT_i + \alpha_5 \ln MEDUN_i + u_i \qquad (1)$$

where PHYS denotes the ratio of the number of GPs and specialists per 100 000 inhabitants for every provinces, for general practitioners and specialists, and j=G,S (general practitioner, specialist), i= province.

As Marden(1996) mentions, population is not only an important factor in determining the institutional structure, but it is also a direct measure of the market size. Additionally, the sensitivity of physicians' choices to changes in age, gender, and health status of the population is assumed to be high. Yet, following many other studies, our study will focus on the size of population as an indicator of health care demand.As it was also indicated in many other studies, there is a positive relationship between the population size and the location of physicians, particularly for specialists. However,in the health economics literature health care need has various meanings and differs from health care demand in several respects. Moreover, the important differences between health care need and demand should be taken into account and, thus, in order to proxy the health care need of the population, the measure such as health status should particularly be used. In a considerable number of cases the demand of health care is substantially correlated with socio-economic structure such as population, income, geographic variation, education level etc. Therefore, if the need should be seen as a necessary condition for the receipt of equitably distributed health care services (Culyer, 2001), it is important to investigate the relationship between the number of physicians and health status as an indicator of health care need. Although health status is a complex case, the mortality rate is frequently used as proxy indicators of population health status. Many international comparisons and within-country studies confirm the positive relationship betweenthe numbers of physicians and mortality rate(Or, et. al, 2005). However, there are no age, gender, and cause-specific mortality rates and morbidity data available for Turkey. The present study thus usesthemortality rate of populationas a leading indicator of health status as well as the need of health care services. In generally, the expectation is that the higher level of mortality rate implies the higher number of physicians employed at a health facility.

Existing studies also show that another factor responsible for the inequality in the distribution of physicians is the distribution of hospital beds. Many studies reveal that the distribution of physicians or physicians/population ratiois positively associated with the distribution of hospital bed capacity (Marden, 1996; Krishman, 1997; Jiang & Begun, 2002). Moreover, we found that the correlation coefficient between the number of physicians and the number of beds per 100 000 population is 0,94 for both years we analyze. Therefore, we expect the estimated coefficients of hospital bed capacity to be positive and a higher value of coefficient for specialist than GPs.

According to ''prior-contact theory'', physicians are more likely to practice in places where they receive medical education and residency training (Jiang & Begun, 2002). The location of a medical school has also been associated with specialization and choice of location of practice. Graduates from medical

schools located outside the major urban areas are more likely to practice in rural areas and to select a primary care specialty, such as family medicine. From viewpoint of continuous education for physicians to update their knowledge and techniques, a dummy variable, MEDUN, is constructed for region's medical attractiveness; and it takes the value of one if the province has a university hospital.

Dynamic Model

In light of the above conceptual framework, the following model is specified in order to take variations on parameters into account that are assumed to affect location choice process of physicians;

$$GPHYS_{ji} = \alpha_1 + \alpha_2 VARPOP_i + \alpha_3 VARPOP_i^2 + \alpha_4 VARBEDS_i + \alpha_5 DENS_{ji} + \alpha_6 DENS_{ji}^2 + \alpha_7 VARMORT_i + \alpha_8 MEDUN_i + u_i \quad (2)$$

where j=G, S (general practitioner, specialist), i=1,.…,67.

GPHYS denotes the percentage change in the number of physicians per 100 000 inhabitants in each province. Similar to other studies, five indicators for agglomeration, attractiveness and competition effects are considered. Differences in supply of physicians and growing demand are associated with the percentage growth in general population (VARPOP) in the province between 1965 and 2007. As the practice of a specialty requires a larger supporting population than general practice, it is expected that the extent of the effect of VARPOP on general practitioners and specialists is different. VARBEDS stands for the percentage of the variation in the number of beds per 100 000 inhabitants in the province between 1965 and 2007. As in Marden's(1996) paper stated that medical care is no longer a highly individualized profession but one that is very dependent upon a complex of supportive services, institutional facilities, and other health personnel. In order to test this hypothesis, the number of hospital beds per 100 000 inhabitants is also included intothe equation. The sign of the coefficient for this variable is expected to be positive for both physician groups.

On the other hand, following other studies, the physician density (DENS) at the start of the period is included in the model in order to test whether there is a competitive structure among physicians. Since DENS captures two opposing mechanisms, the sign of its coefficient is ambiguous. Reflecting agglomerative forces, the coefficient of DENS is expected to be positive. The coefficient of DENS can also be negative because of increasing competitive forces. VARMORT represents the variance the mortality rate of population between 1965 and 2007. The choice of this variable informed by earlier finding that there isa strong relationship the supply of physicians and mortality.In fact, some studies found that the supply of physicians has been observed to have a "persistent but puzzling positive correlation" with mortality rates that could not be "adjusted away" by covariates such as income (Young, 2001). Considering the pattern of mortality differences across all age-sex groups and among regions in Turkey, the coefficient of VARMORT is expected to be positive forboth GP and specialists.

MEDUN is a dummy variable taking the value of one if the province has a university hospital. The presence of university hospitals makes such cities desirable places for physicians since such hospitals supply high technological equipment for their patients and physicians. This reason indirectly leads to a high demand for specialists in such cities. Similarly, many studies reveal that many newly graduated physicians chose to live in the city that they went to medical school. Thus, a positive coefficient is expected for MEDUN which indicates the presence of a university hospital.

5. Data

As of 2011, Turkey consists of 81 cities across 7 regions. However the persistent socio-economic disparities between these regions have been the main concern of policymakers in Turkey. Even though the socio-economic conditions as well as the behavior and cultural attitudes of people vary across regions, there

are limited number of empirical studies to assess regional disparities, and its determinants in Turkey(Ferhan&Hewings, 2007).

In order to measure the extent of unequal distribution of physicians and determine the main factors underlying their location choices in Turkey, our data include eight time periods spanning four decades: 1965, 1970, 1975, 1980, 1985, 1990, 2000 and 2007. The data set is provided by the MoH; and it includes physicians working in a practice as general or as specialists, as well as the number of hospital beds. Medical residents are not included in the data set. According to the data set there were 108 402 physicians by 2007 and of these, 54 439 were specialized physicians, 34 559 were general practitioners and 19 404 were medical residents. The number of specialized physicians per 1 000 persons was -0,78 and for general practitioners the ratio was 0,40 2007. In this study, we also used another data source; i.e., the National Population Census, which was conducted in every 5 years between 1965 and 1990, and then in 2000 and 2007 by the Statistical Institute of Turkey (TurkStat). So, while the population and mortality data were obtained from the TurkStat, the physicians and hospital beds data were drawn from the MoH for the same period. As some of the districts became provinces between 1965 and 2007, the number of provinces increased from 67 to 81. However, we treated these new provinces as if they are still districts of their original provinces and kept the number of provinces as 67 for the sake of consistency.

6. The Findings of Inequality Analysis

The Gini and Atkinson index values are presented for both the country and each region in Table 2. Overall,intertemporal comparisons of the indices indicate that the unequal distribution of physicians in Turkey has substantially decreased during the period under concern. The value of the indices reveals that the relative change for all physicians is approximately 50% for the Gini index, and 70% for the Atkinson index. Nevertheless, these findings state that there was greater variation across regions both in terms of GPs and specialists in Turkey during 1965 and 2007.

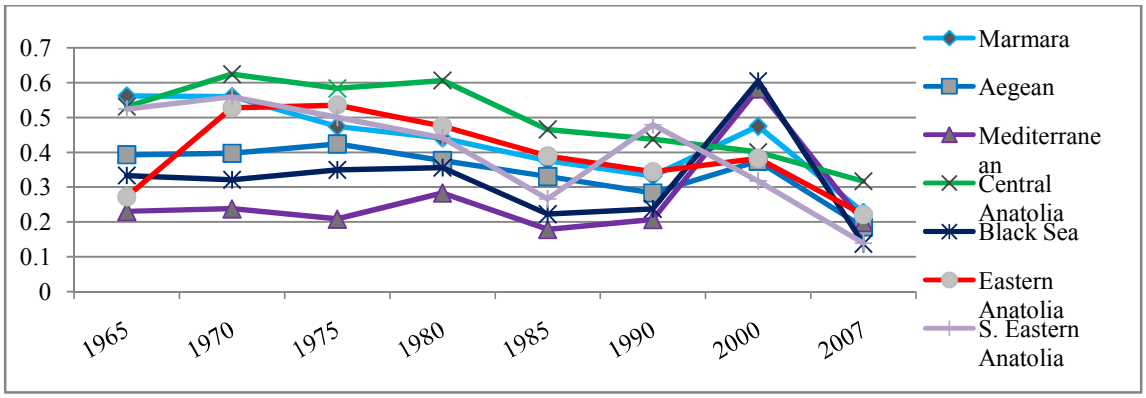
Table 2: Gini and Atkinson Indexes values by geographic region and specialty group

Region/Specialty Group	1965 Gini Index	2007 Gini Index	% Change	1965 Atkinson Index	2007 Atkinson Index	% Change
Turkey						
All physicians	*0,4117*	*0,2036*	*-50,548*	*0,3769*	*0,1124*	-70,1655
GPs	0,3922	0,1802	-54,06	0,3543	0,0904	-74,4735
Specialists	0,5208	0,2468	-52,594	0,6045	0,1610	-73,3675
Marmara						
All physicians	0,5036	0,1987	*-60,526*	0,4824	0,1209	-74,9310
GPs	0,4623	0,1864	-59,677	0,4628	0,1038	-77,5613
Specialists	0,5618	0,2271	-59,574	0,5872	0,1429	-75,6654
Aegean						
All physicians	0,3900	0,1672	*-57,107*	0,3320	0,0754	-77,2820
GPs	0,4063	0,1564	-61,488	0,3552	0,0659	-81,4477
Specialists	0,3930	0,1853	-52,849	0,3432	0,0926	-73,0154
Mediterranean						
All physicians	0,1750	0,1846	*5,498*	0,1782	0,1000	-43,8833
GPs	0,1239	0,1780	43,607	0,0725	0,0941	29,7931
Specialists	0,2298	0,1985	-13,639	0,2986	0,1116	-62,6256

Central Anatolia						
All physicians	0,4878	0,2615	*-46,382*	0,4649	0,1753	-62,2909
GPs	0,4628	0,2142	-53,699	0,4416	0,1293	-70,7127
Specialists	0,5311	0,3167	-40,366	0,5682	0,2410	-57,5818
Black Sea						
All physicians	0,2355	0,1295	*-44,987*	0,1649	0,0506	-69,3147
GPs	0,1978	0,1361	-31,152	0,1253	0,0540	-56,9034
Specialists	0,3333	0,1370	-58,877	0,3786	0,0523	-86,1859
Eastern Anatolia						
All physicians	0,1610	0,1797	*11,658*	0,0914	0,0902	-1,3129
GPs	0,1712	0,1622	-5,270	0,1106	0,0735	-33,5443
Specialists	0,2715	0,2207	-18,679	0,4142	0,1346	-67,5036
S. Eastern Anatolia						
All physicians	0,2460	0,1080	*-73,762*	0,2211	0,0335	-84,8485
GPs	0,1604	0,0949	-40,839	0,1263	0,0252	-80,0471
Specialists	0,5238	0,1389	-73,316	0,5884	0,0642	-89,0891

As it is expected, there is a greater inequality in the distribution of specialists than in GPs for all regions in this period. In terms of the regional distribution of specialists, Table 2 show that the Mediterranean, the BS and Aegean regions have the most even or equal distribution while the Marmara, CA, SEA and EA regions have the highest degree of inequality over the time period 1965-1980. As suggested by Isabel et al. (2010) this result may be due to the provinces with higher economic development being more attractive to specialist, as they offer a larger potential market for private health care practice. Other important factors could be the relative proximity of university hospitals, as well as the opportunities for career advancement available to specialists in different provinces or regions. As it will be mentioned in the next section, empirical results seem to support these arguments. It should also be noted that the latter three regions -CA, SEA and EA- in this group contain the poorest provinces in Turkey.

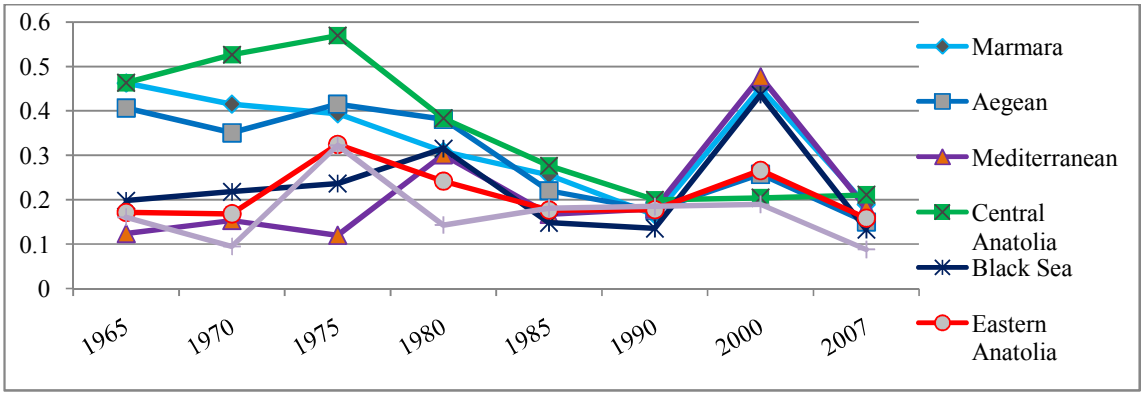
Figure 1: Gini index values for specialists across regions



In contrast to the case of specialists, GPs are relatively evenly distributed across the SEA and EA regions between 1965 and 1975, and Gini index values as well as Atkinson index values for GPS are similar to those for the Mediterranean and BS regions (see in figure 2 and table 2). This result is likely to be the result of the Law on Socialization of Health Services (Law No: 224), which was adopted in 1963 and first applied to the SEA and EA regions. The Law was then applied nationwide after 1983. The main justification for the Law was that health services should be delivered in an equitable manner, continuously and in accordance with the

needs of the population. In 1963, health was also included in the five-year development plans. One of the objectives of the development plan was to distribute health personnel evenly throughout the country. But after a few years the Law 224 collapsed, due to insufficient financial support and health care personnel.

Figure 2: Gini index values for general practitioners across regions



Comparing the 1965-1980 period with that for 1980-1990, there were large fluctuations during the former period for both GPs and specialist; however maldistribution declined substantially for GPs and partly decreased for specialists in the latter period. But, it increased again from 1995 onwards for all regions. As it can be seen in Figures 1 and 2, maldistribution is higher in 2000 than in 1990 on all measures of physician supply. The main reason is that an obligatory service requirement was in place between 1981 and 1995. But it was lifted in 1995. Another possible reason is that the majority of terrorist incidents in Turkey occur in the Eastern and South Eastern regions between 1980 and 2000 (Öcal&Yıldırım, 2010), it negatively affected not only the regional economy, but also triggered an internal migration from the eastern to the western provinces. This, along with the rapidly increasing population, accelerated the urbanization rate between 1985 and 1990 (0,43%), and then all of these triggering factors distorted the requirement of physicians as well as other health professionals.

Despite the prevalence of overall geographic inequality, there appears to be a trend towards a better distribution of all physician groups per 100 000 inhabitants and convergence across regions between the years 2000- 2007. For example, according to MoH progress report in HTP (The MoH, 2009) the population per specialist ratio between the best province and the worst province was decreased from 1/13 to 1/2 during the period. This reflected not only an increase of physicians, but it was also because of the regulatory and funding approaches that are the key elements of HTP. For instance, in order to encourage physicians to work in less developed regions, law No: 4924 was adopted in 2003. Under this law, health care personnel in such regions had their wage rates enhanced and they were also granted additional employee rights.As a result of this policy, more than 7 000 new health personnel were assigned in the East and Southeast Regions (The MoH, 2007). Moreover, a performance based payment system was introduced in the MoH hospitals in 2004. The World Bank report reveals that, between 2002 and 2005, the implementation of the performance based payment system resulted in a significant reduction in dual practice (The World Bank, 2009). This was due solely to the fact that the performance based payment system and bonus payments for physicians dramatically increased the share of full-time practitioners as well as their remuneration levels. Nevertheless it is emphasized that, although these incentives aim to encourage personnel into less developed regions and rural areas, they have done little to reduce the shortage and maldistribution of physicians. Therefore, it can be argued that compulsory service program is the most effective at mitigating physicians' discordance with other financial measures.

7. Findings of Structural Model

Static model

The empirical results for static models are in reported in Table 3. All models were estimated using by OLS. Regressions were carried out separately for the years 1965 and 2007. All analysis was carried out using STATA version 10. Table 3 shows that, the most important variable for the distribution of physicians is population, while BEDS and MEDUN are relatively more important than remaining variables in the both regressions. The population density is statistically significant and positively related to physicians' location decision except for GPs in 1965.Moreover, the population density tends to affect the location choice of GPs more than that of specialists in 2007 while the specialists are more sensitive in 1965. As the insufficiency of health services infrastructure and the difficulties with reaching to physicians in 1960s are considered, these findings seem to support the hypothesis that specialists' services are a substitute of general practitioners' services. However, the health policies in the last decade can be held responsible for these differences as well. As mentioned above, a new health service system, health transformation project-HTP, is in underway in Turkey since 2003. This new system places the family practitioners at the center of the primary health care system. The population already registered with the primary health care center is allocated according to their geographic location to a family health care. Thus the primary health care centers have started to play an important role in this system. Besides, with raising remuneration and performance payment system stimulated a rise in physician numbers and productivity in primary health care centers. Concomitantly, in 2010, a new law was adopted and specialists were prevented from working in the private sector. The most recent Ministry of Health information suggests that the number of full-time physicians in MoH facilities has increased from 11% in 2003 to 73% in 2008. Thus, the sensitivity of GPs to population density increased as a result of these developments.

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Table 3: Location decisions regression estimates-static model for 1965 and 2007

	Year 1965		Year 2007	
Variable	LN (GPs)	LN (specialists)	LN (GPs)	LN (specialists)
LNPOP	-0.2659 (0.165)	0.2808 (0.106)*	0.7105 (0.066)*	0.6066 (0.073)*
LNBEDS	0.2561 (0.138) **	0.5005 (0.147)*	0.3162 (0.095)*	0.5003 (0.091)*
LNMORT	0.0902 (0.150)	0.7438 (0.157)*	-0.0116(0.043)	0.0958 (0.051)* *
MEDUN	1.4251 (0.579) *	0.4228 (0.188)*	0.3159 (0.078)*	0.2087 (0.089)*
Constant	3.6442 (2.071)* **	- 8.0617 (1.34)*	- 5.8455 (0.535)*	-6.5904 (0.650)*
N	67	67	67	67
R-squared	0.3982	0.7481	0.965	0.962

*,**,*** denote significance at the 1%, 5%, 10% levels, respectively. Robust standard errors (SEs) are in parentheses

The number of beds per 100 000 population at hospitals is chosen as a proxy that reflects physicians' choices about the distributions of healthcare resources across cities. The result indicates a positive relationship between the physician distribution and hospital beds. The hospital beds are more relevant for the distribution of specialists than that of GPs. This probably is a reflection of the close ties between hospitals and specialists. As indicated that by Jiang & Begun (2002), specialist physicians seemed to consider an abundant supply of hospital facilities as beneficial to their practices.

The coefficient for the mortality variable that represents the need of population is marked positive in all models except for GPs in 2007, which is an important outcome as it shows that a high mortality level

affects physician's settlement. However, this coefficient is only statistically significant for specialists. Although there are large geographic differences in the mortality rates of the Turkish population as in other countries, consideringavoidable deaths such as cancers, specialists may have an important role to prevent and to treat such a disease than the GPs in a country. For example, earlier detection of cancer which greatly increases the survival rates for types of cancer that is amenable to treatment. Thus, Sundmacher&Busse(2011) recognized that the geographicproximity of specialized care reduced the economic costsfor access to high quality care which might have impactedupon survival time in some patients. Therefore, as expected specialist have traditionally favoredlocationsin highly risky and densely populated communities for accessibility to patients which are able to get economic gain for their services. The last variable MEDUN, the existence of a university hospital can be view as a major factor in the distribution of physicians. The presence of complex medico-technological equipment and the need of increasing medical training of physicians draw physicians into these regions.

Dynamic model

The estimation results for the dynamic modelare presented in Table 4. Among independent variables measuring market size, although the magnitude of the estimated coefficient is small, the growth in the population was found to have a significant curvilinear relationship with change in the number of GPs and specialists. The introduction of family physicians into the model can be the most important reason behind the relationship between population size and GPs. As primary medical services are re-structured, the most noteworthy change was the re-organization of GPs per population. Moreover, in order to promote the use primary services, a co-payment system is initiated for secondary health services, and the introduction of the co-payment system seems to reduce the demand for specialists.

Table 4: Location decisions regression estimates-dynamic model for 1965-2007

Variable	General Practitioners	Specialists
VARPOP	0.0003 (0.00005)*	0.0002 (0.0001) *
VARPOP SQUARED	-1.71e-12 (1.49e-13)	-5.97e-13 (1.11e12)*
VARBEDS	0.2260 (0.02839)*	0.1276 (0.0565)*
DENS	179.63 (72.602)*	676.60 (223.96)*
DENS SQUARED	0.7682 (0.0938)*	-0.0653 (0.1260)
VARMORT	0.0903 (0.02327) *	0.00003 (0.7279)
MEDUN	-2061.2 (3684.6) *	43609 (90350)
Constant	-321.045 (2309.4)	-7442.50 (4344.3) ***
N	67	67
R-squared	0.975	0.960

*, **,*** denote significance at the 1%, 10% levels, respectively

As in line with previous studies the results confirm that physicians' location decision was positively associated with hospital beds for all physician types.Table 4 shows that agglomerative forces dominate the effect of increasing competitive forces for all physician type, since the coefficient of DENS is positive and strongly statistically significantly at the level of 1%. Therefore, an obvious explanation should be emphasized here, i.e., the competition factor does not effect on the distribution of physicians. Obligatory service serves an important purpose in this setting. The location decision of a specialist or general practitioner upon graduation has been determined by the government with obligatory law between 1981 and 1995, yet the law was repealed in 1995 and re-enacted in 2010. All practitioners who complete a basic medical education of 6 years either choose to take an exam for the specialty education or ask for their

appointment for the obligatory service of two years as a practitioner in a public facility. Although public sector physicians are allowed to work in private practice part time, almost half of the all physicians and one third of specialists were employed by MoH. The MoH is able to locate them as needed. According to the results the responsiveness of specialists to market size has not been affected by the changing context of Turkish health care reforms during this period.

Therefore, it may be logically postulated that due to the substitution elements between GPs and specialists, GPs seem discouraged from settling in provinces with university hospitals.When the association between physicians and mortality is examined as proxy of health status and health care needs, coefficients are found to be markedly different from static model. As seen in Table 4 mortality coefficient (VARMORT) is only statistically significant at the level of 1% for GPs.There are several reasons why GPs supply might beassociated with better population health. First, when taking into consideration that the vast majority of GPs are practicing as primary care physicians in Turkey, sensitive GPs to population density increased as a result of undergoing HTP. Furthermore considerable evidence suggests that may have better influence on primary prevention. As regard to Starfield et al.(2005) there are considerable evidence that primary care physicians achieve better generic (that is, not disease-specific) outcomes than do specialists at much lower costs, even though specialists may achieve better "quality" of care in their particular area of competence. Also geographic areas with more family and generalpractitioners per population have lower hospitalization rates for conditions thatshould be preventable or detected early with good primary care including diabetesmellitus or pneumonia in children and congestive heart failure, hypertension,pneumonia, and diabetes mellitus in adults (Parchman& Culler, 1994).As to MEDUN, the estimated coefficient has an inverse relationship with the distribution the distribution of GPs although it is no longer statistically significant for specialists.

8. Conclusion

The equal geographic distribution of physicians is one of the proclaimed objectives ofanyhealth policy in all countries. There is also growing recognition that inequality in the distribution of physicians is one of the main causes of ill-health. Therefore, to reduce the maldistribution of physicians and to eliminate its effect on health, several policy interventions have been used in Turkey.

In order to measure differences in the distribution of physicians as well as to explain the reasons for disparities, inequality indices and regression analysis are applied the spatial distribution of physicians in Turkey from 1965 to 2007. The study firstly reveals that the distribution of physicians become more egalitarian across regions in recent decades. This decrease does partially seem to have been a result of health workforce policy changes. Besides, one of the major components is the introduction of family medicine as an organizational model for the provision of outpatient or primary health care services. Efforts to retrain medical practitioners to family medicine have widely become successful. Analysis of whether agglomeration forces dominate competition effects strongly confirm that the unequal distribution of physicians is mostly explained by living standards and socio-economic conditions, the existence of and accessibility to health facilities, medical technologies and laboratories, as well as spillovereffect of hospitals. One of the main findings of the present study, provinces characterized by higher population density is more favorable for physicians. On the other hand, hospitals beds appear tobeamore importantdeterminant of the location choice of specialist that than of the GPs. The current evidence reinforces the competition factor has no effect on the distribution of physicians in Turkey.

Due to the variations on the epidemiological and demographic patterns across regions, a limitation of this study is that it solely depends on the standard measure of distributions of physicians. Ideally the

distribution of physicians should be evaluated by using alternatives such as age-sex specific mortality and/or morbidity, income indicators.

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