THE IMPACT OF THE SOUTHEASTERN ANATOLIA PROJECT ON THE INTER-REGIONAL INEQUALITIES IN TURKEY

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ABSTRACT

THE IMPACT OF THE SOUTHEASTERN ANATOLIA PROJECT ON THE INTER-REGIONAL INEQUALITIES IN TURKEY

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The aim of this study is to examine the impact of the South Eastern Anatolia Project (GAP) on the inter-regional inequality between the GAP region and the rest of Turkey. Cross-sectional analyses are carried out for the years of 1990 and 2000, that is, before the project is put into effect and 10 years after of its implementation. Although this thesis is ultimately concerned with the inter-regional inequality, the within and the total-region inequality are also discussed. Moreover, since not only the economic, infrastructure and service related variables, but also the socio-demographic variables are included in the analyses, it is a comprehensive evaluation, and the results provide current information about the success of the GAP.

In this study, Theil's inequality index is used as it provides the property of additive decomposability, which allows us to analyze the magnitudes and trends in inequality among regions and within regions as well as total inequality. The indicators include

17 socio-demographic, 12 economic, and 10 infrastructure and service related variables, i.e., total of 39 independent variables.

Although the GAP region performed an improvement in absolute terms for most of the variables, the findings show that the inequality between the GAP region and the rest of Turkey increased for more than half of the variables during the last decade. These variables are mostly related to demography (i.e., infant mortality rate, fertility rate, etc.), health services, and GDP p.c.. On the other hand, the between-region inequality decreased for the variables related to infrastructure, urbanization, educational level (i.e., literacy and schooling ratios in primary education), and non-agricultural labor force.

Keywords: Regional Inequality, Theil's Index, Southeastern Anatolia Project

ÖZ

GÜNEYDOĞU ANADOLU PROJESİ'NİN TÜRKİYE'DEKİ BÖLGESEL EŞİTSİZLİĞE OLAN ETKİSİ

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Bu tez çalışmasının amacı, Güneydoğu Anadolu Projesi (GAP)'nin, sosyo-ekonomik açıdan Türkiye'deki bölgelerarası eşitsizliğe olan etkisinin belirlenmesidir. Her ne kadar bu tezin asıl amacı bölgelerarası eşitsizlik olsa da, ülkedeki ve GAP bölgesi içindeki eşitsizlikteki değişimlere de yer verilmiştir. GAP öncesi ve sonrasındaki eşitsizlikteki değişimin incelenebilmesi için 1990 yılı ve 2000 yıllarına ait veriler kullanılmıştır. Bu veriler sadece ekonomik ve altyapı ile ilgili veriler değil, aynı zamanda sosyal ve demografik yapıyı yansıtan verilerdir. Bu nedenle, çalışmanın analiz sonuçları GAP'ın başarısı hakkında oldukça kapsamlı ve güncel bir bilgi sağlayacaktır.

Çalışmada, toplam eşitsizliğin yanı sıra, bölgelerarası ve bölge içi eşitsizliği ölçmeyi mümkün kılan Theil Metodu kullanılmıştır. Analizler, 17 tanesi sosyo-demografik, 12 tanesi ekonomik ve 10 tanesi altyapı ve servis ile ilgili olmak üzere toplam 39 değişken kullanılarak yapılmıştır.

1990-2000 yılları arasında, her ne kadar gerçek değerler açısından GAP bölgesinde bir gelişme olduğu gözlense de, analiz sonuçları değişkenlerin yarısından fazlası için GAP bölgesi ve Türkiye'nin geri kalanı arasındaki eşitsizlikte bir artış olduğunu göstermektedir. Bu değişkenler genellikle, demografi (bebek ölüm hızı, doğurganlık oranı gibi), sağlık servisleri ve gelir ile ilgili değişkenlerdir. Diğer taraftan, altyapı, kentleşme, eğitim seviyesi (okuryazarlık ve ilköğretim okullarında okullaşma oranları gibi) ve tarım dışı faaliyetlerde çalışan nüfus oranı ile ilgili değişkenler açısından bölgesel eşitsizlikte bir azalma olduğu gözlenmektedir.

Anahtar Kelimeler: Bölgesel Eşitsizlik, Theil Metodu, Güney Doğu Anadolu Projesi

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TABLE OF CONTENTS

LIST OF TABLES

TABLE

LIST OF FIGURES

FIGURE

CHAPTER 1

INTRODUCTION

Regional economic and social disparities appear as a problem in Turkey as in other developing and developed countries. Therefore, “regional inequality” is an important issue in economic and political agenda of the countries and "regional development plans" are made in order to reduce these regional inequalities. The most important of those regional plans in Turkey is the “Southeastern Anatolia Project (GAP)”, prepared for one of the least developed regions of Turkey.

The legal foundation of the GAP was established in 1989 and the GAP Master Plan was prepared. It was a multi-sector social and economic development program for the Southeastern Anatolia region. Its basic objectives are to eliminate regional development inequalities by improving living standards and income levels of people; and contributing to such national goals as social stability and economic growth by enhancing productivity and employment opportunities of the rural sector. The GAP Master Plan was prepared for the period 1989-2005 (GAP, url: http://www.gap.gov.tr).

In 1994, the GAP Social Action Plan was developed to provide a general framework for social and human development related initiatives in the context of the GAP. The main target of the social policies of the Action Plan is the sustainable human development in the region. The basic function of social policies constitute improvements in the quality of services and life and maintaining a balanced development so as to ensure at least modern living standards for all sections of population by the participation of the poor to the process of development, improved

access to social services including health and education, employment generation and expansion of the coverage of social protection (GAP, url: http://www.gap.gov.tr).

The aim of this study is to examine the impact of the GAP on the inter-regional inequality between the GAP region and the rest of Turkey and on the intra-regional inequality in the GAP region in terms of socio-economic variables. Since the inequality analyses are made for 1990 and 2000, that is, before the project is put into effect and 10 years after of its implementation, the findings of 1990 and 2000 will be compared to understand the changes in the inequalities due the GAP. Not only the economic and infrastructure related variables, but also the socio-demographic variables are included in the analyses for a comprehensive evaluation of the success of the GAP. These indicators include 17 socio-demographic variables, 12 economic variables, and 10 infrastructure and service related variables, i.e., total of 39 independent variables.

There are many measures of inequality from which to select. Most economists agree that a suitable inequality index satisfies four properties: (1) mean independence, (2) population-size independence, (3) the Pigou-Dalton Condition, and (4) decomposability. Especially, the property of additive decomposability, which allows us to analyze the magnitudes and trends in inequality among regions and within regions as well as total inequality in a country, is most important requirement for this study. As a result of the comparison of the inequality measures in Chapter 4, the Theil's index T is selected as the inequality measure subject to it's meeting those properties above.

This thesis consists of seven chapters. The first chapter summarizes the general scope of the study. The second chapter discusses the concepts of region, regional development and regional development plans, including the two well-known regional development plan in the world, applied by Tennessee Valley Authority in the United States; and by the Cassa per il Mezzogiorno (Southern Development Fund) in Italy. In the third chapter of the study, the regional development inequalities in Turkey, the plans and policies to reduce these inequalities, and Southeastern Anatolia Project

along with its development policies, the socio-economic characteristics with its nine constituent provinces are discussed.

The fourth chapter provides the methodology of inequality index to employ. Various well-known inequality measures are introduced and a comparison of them with respect to the criteria for the selection of indices for our analyses is made. Then, the recent articles in the literature, which provides the application of the Theil's index T in various countries, are examined. The fifth chapter consists of certain choices with respect to the geographical regions to utilize and the data to analyze.

The sixth chapter discusses the empirical analyses of the between-region inequality analysis. Finally, the conclusion summarizes the major findings of the study and the policy implications.

CHAPTER 2

REGIONAL DEVELOPMENT AND REGIONAL INEQUALITY

If we think that regions in a country do not have the same characteristics, then there will be inequalities between those regions in terms of economic, social and cultural aspects[1]. Therefore, regional inequality[2] is observed in every country regardless of the level of their development.

One of the main objectives of regional development, as an interdisciplinary field, is to decrease inequalities directly or indirectly by economic, social, cultural and geographic agents. Generally, governments make "…use of a combination of policy instruments which can be summed under the rubric of 'regional development programs'…"(Cornelius and Trueblood, 1975, p.18) in order to reduce spatial inequalities.

Since the concern is the regional disparities in the levels of socio-economic development, it becomes inevitable to define the concepts of region, regional development and regional development plan.

[1] The most straightforward definition of socio-economic development inequality is probably differences among people in their standards of living. Here, the term 'inequality' is conceptualized as the dispersion of a distribution, whether that be income, education and health, or some other welfare indicators of a population

[2] Regional inequalities, regional disparities and regional imbalances are some terms used exchangeably in this study.

2.1. Region and Regional Development

2.1.1. The Concept of Region

The concept of a 'region' is necessarily a flexible one, and is defined in terms of size and location of an area which is appropriate to the analysis of the problems involved. Therefore, the word 'region' does not have a certain definition, and there are various definitions in the literature.

The Büyük Larousse Encyclopedia provides a general definition based on homogeneity. The concept of 'region' is defined as an area whose borders are determined according to the administrative and economic unity, similarity of climate and plant characteristics and people coming from the same origin (The Büyük Larousse Encyclopedia, 1986, p.1878)

"A region is a geographical area that meaningfully may be regarded as a coherent entity from the viewpoint of description, analysis, administration, planning or policy"(Sinemillioğlu, 1998, p.xi). It can be defined in terms of geographic, economic, social or administrative structure of a country. Therefore, various types of regions are described in the literature. For example, when macroeconomic criteria are taken into consideration, regions are distinguished as homogenous region, polarized (nodal) region and planned region (Elmas, 2001, pp.22-23; SPO, 2000, pp.8-9). If we consider the functionality of regions, then they also can be categorized as administrative regions, ecological regions, economic regions, etc.

Another frequently used classification distinguishes regions in terms of the level of development as more developed and less developed (or developing) regions. We will pay special attention to this later type of classification as it is directly related with the subject of 'regional inequality'.

2.1.2 Characteristics of Developed and Less Developed Regions

There are several common characteristics that can be applied both to developed and underdeveloped regions. Certain peculiarities of developed regions are: high per capita income and energy use; a low percentage of the labor force in primary activities (e.g., agriculture and mining) and a relative emphasis on secondary (e.g., manufacturing) and tertiary (e.g., service sector) pursuits; a long life span; and a better and more abundant food supply; a low rate of population growth, as a result of a continuing low birth rate and low death rate; and high literacy rate (Fisher, 1995, pp.85-90). For example, the regions Marmara and Aegean are relatively developed regions in Turkey.

Comparatively, these properties are almost vice versa in less developed regions: low GNP per capita and energy use; a high proportion of the labor force in the primary occupations (especially, agriculture); a relatively shorter life expectancy rate; low literacy rate; etc. The high rate of population growth in the developed region is due to the fact that the role of decline in birth rate is relatively less than that of the death rate. Consequently, a less developed region has a different age structure of the population from that of a more developed region. South Eastern Anatolia Region and Eastern Anatolia regions in Turkey can be given as an example of less developed regions.

2.1.3. Definition of Regional Development

The regional development concept entered economic literature after the Second World War and the problem of economic and social development attained spatial dimensions as well. Similar to the term region, ‘development’ seems to defy definition. Therefore, in the literature, there are many definitions of regional development. In this study, we shall consider the use of the word in the ordinary language denoting human and societies ‘well-being.

According to Sharma and Kumar, “... development is a progressive change in norms, values, beliefs and standard of living of people in between two points of time to get

better one. Since, the rate of progressive change varies from region to region, hence, regional disparities reflect in the levels of development" (Sharma and Kumar, 1993, pp.65-66).

The Human Development Report of 1991, published by the United Nations Development Program, stated: "the basic objective of human development is to enlarge the range of people's choices to make development more democratic and participatory. These choices should include access to income and employment opportunities, education and health, and a clean and safe physical environment. Each individual should also have the opportunities to participate fully in communicating decisions and to enjoy human, economic and political freedoms" (UNDP, 1991, p.i).

In the Fisher's book of 'Geography and Development', regional development is defined as "...the process by which the political, social, and especially, economic structures of a country are improved for the purpose of assuring the well-being of its populace. The results of this process are highly varied when viewed from a global perspective" (Fisher, 1995, p.17).

2.1.4. Measurements of Regional Development

Development can be measured in many ways and different indicators incorporate different dimensions to the concept of development. One of the most common approaches used by most authorities on economic development to distinguish developed from developing ones is the measure of 'per capita income', "...which is determined both by the volume of production and the size of the population" (Alexander and Kumaran, 1992, p.14). Per capita consumption of energy and percentage of the labor force in primary activities, etc. are other widely used indicator in the development studies. They are basically a reflection of the level of productivity of an economy.

Moreover, since regional problems may change in each level of development, in each level relevant factor should be taken into account. Industrial sector mustn't be

accepted as the sole policy for regional development. Other sectors such as; agriculture, tourism, or mining also can be very useful for the economic development of certain regions.

However, "development is not exclusively an economic process; rather it requires and generates significant change in the social, demographic, and biologic dimensions of a society" (Fisher, 1995, p.98). Some 'regional development and inequality' researchers such as Myrdal (1957), Kuznets (1966), Fred Hirch (1977), Romer (1989), Barro (1991) and Young (1991,1993) emphasized the importance of non-economic factors in the development studies. Certain affected dimensions include fertility and mortality rates, longetivity of life, literacy rate, water supply, housing condition, roads and communication, and so on. Therefore, it should be said that as well as economic measures, infrastructure and socio-demographic measures are also important in development[3]. Recently, it is seen that these measures are occasionally employed in the development studies.

Another important measures of development are related to the status of women and children. For example, female participation in the labor force, female literacy, infant mortality rates, primary school enrollment of children. "These additional measures of development, when examined carefully, reinforce the realization that women and children in developmentally lagging societies often bear disproportionately the burden of poverty, thereby ensuring a cycle of continuing poverty" (Fisher, 1995, p.98).

Consequently, we can say that different indicators incorporate different dimensions to the concept of development. All economic, social, demographic and cultural indicators are the central factors of development and all jointly make a contribution to the level of development (Alexander and Kumaran, 1992, pp.14-15). Hence,

[3] Even, the studies show that the "socio-demographic" variables, especially those related with the female education, fertility and the household size, were more effective than the "economic" variables in discriminating the inter-regional development differences in Turkey in 1990-94 (Gedik et al.,2000; Süer and Şahin, 2002)

many observers argue that no single indicator (and certainly not GDP per capita, despite its widespread use) can adequately summarize level of development.

Therefore, a great deal of work has been undertaken by various agencies to compile a set of indicators which measure the social and economic development. The UNDP, for example, introduced a concept of 'Human Development' in 1990 and measures this concept by an index called 'Human Development Index (HDI)'. This index is a composite index that takes into account health standards and education attainments, as well as income in measuring development. The variables used in the calculation of this index are literacy ratio, schooling ratio, infant mortality rate, and GDP per capita (UNDP, 2001).

Moreover, the experts from the United Nations Secretariat and IMF, OECD and the World Bank selected 48 indicators by a consensus to measure progress towards the 'Millennium Development Goals'[4] in 189 nations over the period 1990 and 2015. Among these variables, there are educational and health (schooling ratios, illiteracy ratios, mortality rates, etc.), and infrastructure related variables (proportion of urban population with access to improved water source, etc.) as well as economic variables (income and energy use, etc.)[5] (UN, url:http://www.un.md/mdg/toolkit/ Millennium_Indicators.doc).

Likewise, The OECD Rural Development Programme was launched in 1991 with the aim of analyzing opportunities and options for rural development. A central part of this Programme was its activity on rural indicators. They selected a basic set of indicators addressing economic, demographic, social and environmental dimensions of rural development. The indicators are identified following four general subjects: population and migration (density, household size, net migration, dependency ratios, etc.); social well-being and equity (GDP p.c., infant mortality rate, schooling, etc.);

[4] In September 2000, 147 heads of State and Government, and 189 nations in total, in the United Nations Millennium Declaration committed themselves and defined a number of goals and targets, called as 'Millennium Development Goals', for combating poverty, hunger, disease, illiteracy, environmental degradation and discrimination against women (UN, url: http://unstats.un.org/unsd/mi/ mi_highlights.asp).

[5] See Chapter 5 for whole list of the variables.

economic structure and performance (unemployment rates, sectoral shares in labor force, etc.); and environment and sustainability (agricultural area, water withdrawal, emission, etc.)[6] (OECD, 1994 and 1996).

In the European Union (EU), the regional units are based on The Nomenclature of Territorial Units for Statistics (NUTS)[7]. Therefore, it was necessary to establish NUTS for Turkey for its admission to the EU. Consequently, the working groups established by the State Planning Organization and The State Institute of Statistics made a study for the Classification of Regional Units using various statistical indicators. These indicators were related to GDP, demographic structure (such as, schooling ratios and average household size), unemployment, sectoral distribution of GDP and labor force, services and infrastructure, etc.[8] (Kuşçu, 2002, p.4).

2.2. Regional Development Plans

In the 'regional development and inequality' studies, 'planning' is an administrative tool used to provide effective usage of existing resources and to provide the coordination between these usages in the direction of social, economic and environmental development (SPO, 2000, pp.9-10). Therefore, "Regional planning is essentially a process of orderly and systematic anticipation of the future of a region, involving recommendations of the necessary remedial and constructive actions by public and private agencies to achieve the objectives of the plan" (The Encyclopedia of Britannica, 1971, p.83).

Almost all countries have development plans. "Not all countries which have plans, however, actually engage in planning, that is, consciously coordinate policies to achieve stated goals. In some academic circles, development planning is defined rather narrowly to consist essentially of the construction of macro-economic models,

[6] See Chapter 5 for whole list of the variables.
[7] It "…was created by Eurostat to provide a single uniform breakdown of territorial units for the production of regional statistics for the European Union" (General Secretariat for the EU Affairs, url: http://www.euturkey.org.tr).
[8] See Chapter 5 for whole list of the variables.

yet very few underdeveloped countries place much reliance on mathematical techniques in formulating government policy" (Griffin and Enos, 1970, p.ix).

"The development of a region usually requires such a large investment in money and resources and so strongly affects a nation's entire economy that the investment can only be made with respect to the nation's entire resources and economic goals. This is especially true of developing countries. If there is no established national policy, the objectives of a regional plan can only be tentative" (Encyclopedia of Americana, 1982, p.344)

Regional development plans have been and are being applied in the United States, Southern Italy, Spain, Germany, France, Brazil, etc. in order to remove the development differences among regions, which emerged as a result of unjust distribution of development factors by economic geography. The role of the government is important in applying the development policies in those underdeveloped regions. Central governments usually establish local development agencies in underdeveloped regions, and establish and assign a local budget for these development agencies in order to enable them to practice their policies within autonomy to some extend. With extended authority, these local agencies connect the central and local governments and try to harmonize the investments of public and private sectors.

Some well-known Regional Development Programs in the world have been applied by the *Cassa per il Mezzogiorno* (Southern Development Fund) in the Mezzogiorno i.e., in the South and some parts of Central Italy; and by *Tennessee Valley Authority*, set up in Tennessee Valley in the United States.

2.2.1. The Case of Mezzogiorno

Southern Italy and the two main islands, Sicily and Sardinia, comprise more than one third of the country's population, but their development has been lagging behind the Center and the North. "Industrialization is not as extensive as in the north, and as a

result the per capita income and standard of living in S Italy is considerably lower…. Illiteracy in the Mezzogiorno is significantly higher than the national average" (The Columbia Encyclopedia, url: http://www.bartleby.com/65 /me/Mezzogio.html). By any standards (GNP per capita, basic welfare indicators including literacy, availability of infrastructure, productivity of industry and services sector) there is a permanent gap with the rest of the country. Therefore, in the last fifty years an impressive, but scarcely effective, development policies have been tried to counteract this situation.

After the Second World War, the Italian Government emphasized the promotion of the economic development in Southern Italy, so the first significant effort to implement regional development policies was initialized. An agency, called *Cassa per il Mezzogiorno* (Southern Development Fund) was set up by Italian government in 1950 to plan and execute a large program of public investment and to stimulate social and economic development, initially over a ten-year period in the Mezzogiorno, an area comprises the modern Italian regions of Abruzzi, Campania, Molise, Puglia, Basilicata, Calabria, and the islands of Sicily and Sardinia (The Columbia Encyclopedia, url: http://www.bartleby.com/65/me/ Mezzogio.html).

Despite the political control of the government, The *Cassa* held a broad autonomy in decision planning and financial management, as well as large financial resources. Between 1950 and 1960, the aim of the territorial policies was to promote the development of the south through modernizing agriculture and strengthening basic infrastructure, such as construction of modern roads, schools and hospitals. The *Cassa* initially succeeded in raising local living standards, so that the inequalities in the overall standards of living between the Mezzogiorno and the rest of the Italy decreased (OECD, 2001, p.73).

From the late 1950s to the end 1970s, the goal was to industrialize the Mezzogiorno. Although the Mezzogiorno experienced increasing process of industrialization, which was primarily driven by state-owned firms and a few private firms, it did not industrialize as a whole. "…the lack of accountability, mismanagement and

insufficient incentives for profitability resulted in over-investment. The C*assa* lost its original efficiency and degenerated into political patronage. The enactment of a constitutional provision to create regional governments in the mid-1970s did not produce significant changes" (OECD, 2001, pp.14-15). The *Cassa* did not succeed in narrowing the economic disparities between the north and south. The main sectors were steel and energy, but serious problems of restructuring in 1970s affected these sectors (OECD, 2001, p.33). Most private firms closed down. Moreover, manufacturing industry did not developed in the south in the scale required and tended to be capital- intensive rather than labor-intensive.

In 1986, an attempt took place at reforming the Cassa, which promoted small-scale industry and tourism, facilitated irrigated agriculture, but this reform could not produce significant changes. The 1992 economic and political crisis had disruptive effects on the old territorial policies. The public extraordinary intervention ended and privatization of state-owned enterprises started as a response to this crisis. Thus, the public investments in the Mezzogiorno dropped and most people and firms suffered from a reduction in employment and income (OECD, 2001, pp.77-78). "The structural adjustments and precautionary saving induced by policy changes slowed down economic growth: the 1992-1996 average annual GDP growth rate in the south was only 0.3 per cent, while the national growth rate stood at a modest 1.2 per cent" (OECD, 2001, p.63).

One of the problems of the country is the increasing *unemployment rate*, which increased from 10.5 in 1986 to 11.2 in 1993. Compared with the national averages, the unemployment rates of the regions in the South Italy were very high in 1986, 1993 and probably also in 1995, and there were increases in the unemployment rates. The numbers of regions show that Campania, Basilicata and Sicily had higher unemployment rates relative to other regions. However, it can be said that only Campania showed a substantial decrease in unemployment between 1993 and 1995, while the other regions showed increase (see Table 2.1).

Table 2.1. Unemployment Rates in South Italy

Regions	1986 (%)	1993 (%)	1995 (%)
Campania	16.6	22.8	10.8
Abruzzi	11.7	12.4	25.6
Molise	7.1	15.6	25.6
Puglia	14.3	15.6	-
Basilicata	21.0	23.0	-
Calabria	15.4	19.6	-
Sicily	15.1	23.1	23.3
Sardinia	20.2	19.8	20.8
Italy	10.5	11.2	-

(Source: Elmas, 2001, p.78)

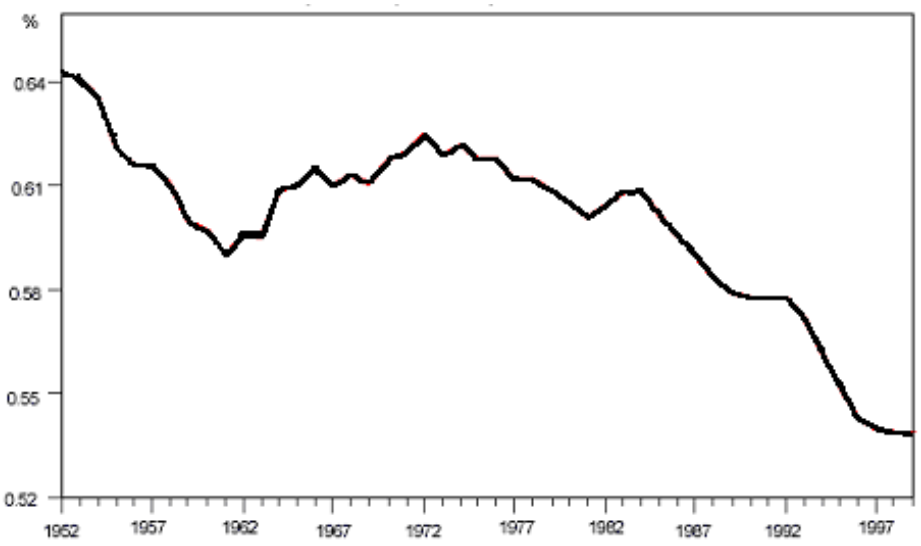

Figure 2.1. The Mezzogiorno's GDP Gap: Southern GDP per capita in percent of Centre-North (Constant prices; 3 years moving averages) (Source: Boltho, 2002,p.1).

As a result, "Italy's experience in trying to reduce the large income gaps that have long existed between the two halves of the economy has usually been considered as disappointing. Despite a very sizeable development effort, the gap in GDP per capita between the Mezzogiorno and the North-Central part of the country has remained stubbornly in place. Indeed, in volume terms, it has actually increased between the early 1950s and the late 1990s" (Boltho, 2002, p.1). Only, from the early 1960s to

the mid 1970s, there was a convergence in terms of GDP per capita (see Figure 2.1). As in the case of unemployment rate, the project could not perform a relative improvement in terms of the GDP per capita in the region.

2.2.2. The Case of the Tennessee Valley

The Tennessee River Basis covers an area of the most disadvantaged areas of the South, which comprises parts of seven states - Tennessee, Kentucky, Virginia, North Carolina, Georgia, Alabama, and Mississippi. The major portion of the valley lies in Tennessee (TVA, url: http://www.tva.gov/abouttva/ keyfacts.htm).

The Tennessee Valley of the USA was less developed relatively to the rest of the country. The people of the valley were very poor and illiterate. Per capita income was $317 in 1929 - just 45% of the national average of $703 (TVA, 1968, p.13). "In 1930, the percentage of rural illiteracy was 8.8 - twice as high as that in the urban areas. At this time there were 18,536 persons between the ages of 10 and 20, and about 127,000 persons 21 years old and over, who were illiterate" (New Deal Network, url: http://newdeal.feri.org/guides/ tnguide/ch12.htm).

Tennessee Valley Authority (TVA) was created by the Act of Congress and approved by the president on May 18, 1933. It was a public agency in the form of a corporation and the nation's largest public power company, which was charged with the comprehensive regional planning, agricultural development, social and economic improvement in the Tennessee River Basin (TVA, url: http://www.tva.gov/abouttva/ keyfacts.htm).

The purposes of the regional planning and developmental activities of the TVA are outlined in section 23 of the Act: "…for the especial purpose of bringing about in said Tennessee drainage basin and adjoining territory… (1) the maximum amount of flood control; (2) the maximum development of said Tennessee River for navigation purposes; (3) the maximum generation of electric power consistent with flood control and navigation; (4) the proper use of marginal lands; (5) the proper method of reforestation… ; (6) the economic and social well-being of the people living in said

river basin" (Clapp, 1971, p.184) It appears that a unified water-control program with the system of multipurpose dams and reservoirs and the production of electricity have become the core of a regional planning and developmental program of TVA.

"As a regional development agency, TVA supplies low-cost, reliable power, supports a thriving river system, and stimulates sustainable economic development in the public interest. TVA operates fossil-fuel plants, nuclear, and hydropower plants, and it manages the nation's fifth-largest river system to minimize flooding, maintain navigation, provide recreational opportunities, and protect water quality in the 41,000-square-mile watershed" (TVA, url: http://www.tva.gov/abouttva/keyfacts.htm).

What made TVA successful is that its works were carried on with the cooperation of many Federal and State agencies, particularly the agricultural extension services of the land grant colleges and universities.

The most dramatic change came from the electricity generated by TVA dams. The availability of low-cost electricity has attracted large numbers of businesses and industries to the area, providing desperately needed jobs. However, this resulted with the large reductions in the number of persons working on farms. For example, employment on farms in the region decreased 60 percent from 1929 to 1960. The reduction of more than a half-million farm workers was offset by an increase in the number of nonfarm jobs. Nonfarm employment increased 173 percent between 1929 and 1966 in the region (TVA, 1968, pp.8-9).

A decline in the dependence on low income agriculture as a source of employment and a rapid expansion of higher paying nonfarm jobs have been the major factors contributing to the growth of income in the region. Per capita income in the region increased from $317 in 1929 to $2,075 in 1966. The increase in per capita income in the region was faster than in the Nation, therefore a narrowing of the income gap appeared (from 45 percent of national average in 1929 to 70 percent in 1966) (TVA, 1968, pp.12-13) (See Table 2.2 and Figure 2.2).

Table 2.2. Per Capita Income (Current Dollars)

Year	Region	U.S.	(Region / U.S.)*100
1929*	317	703	45
1933*	168	375	45
1945*	784	1234	64
1950*	890	1496	59
1960*	1420	2215	64
1966*	2075	2963	70
1979**	7314	9235	79
1989**	15153	18571	82
1994**	19405	22312	87
1999**	23556	27789	85

(Source: *TVA, 1968, p.13; ** Tennessee Valley Profile 2002, url: http://www.bizsites.com/TVA/ecodev.html)

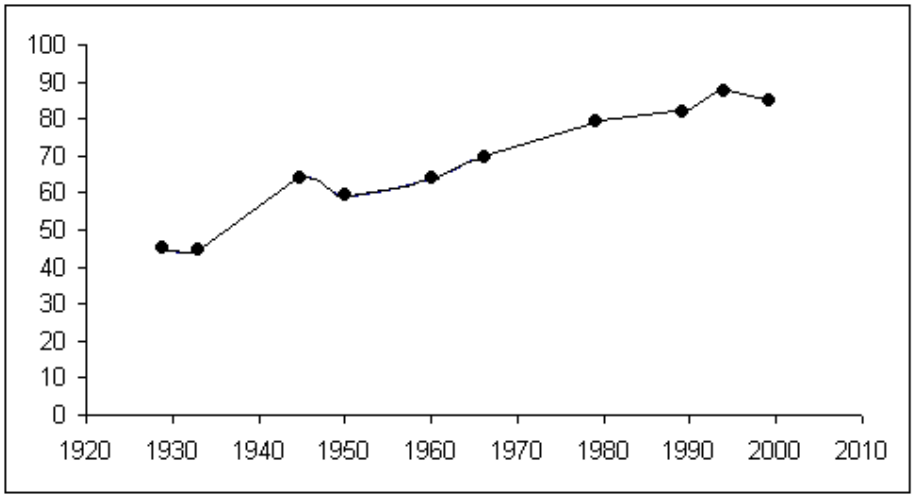

Figure 2.2. Region / U.S. per capita income

(Source: Table 2.1)

With continued rapid growth of the national economy and active development programs in the region, it is reasonable to say that the regional income inequality continued to decrease in later years, too. The per capita income in the region increased from $7,314 in 1979 to 23,556 in 1999 (from 79 percent of the national average to 85 percent in the said years) (see Table 2.2 and Figure 2.2).

Today, "The Tennessee Valley economy encompasses about $253 billion in gross product, $206 billion in personal income, 3.9 million in total nonfarm payroll employment and 8.4 million in population. This is approximately 3 percent of the United States totals" (Tennessee Valley Profile 2002, url: http://www.bizsites.com/ TVA/ ecodev.html).

"By the 1960s many of the regional problems of underdevelopment had been overcome, per capita income had increased dramatically, and rapid out migration had ended. However, the TVA continues to seek ways to make the largely rural area an attractive alternative to overcrowded cities. In the late 1960s and early 70s the TVA began to place greater emphasis on environmental protection as industrialization and rising living standards resulted in greater demands on the environment" (The Columbia Encyclopedia, url: http://www.bartleby.com/65 /te/TennVA.html).

2.2.3. Evaluation

We have examined two well-known Regional Development Programs in the world applied by the *Cassa per il Mezzogiorno* (Southern Development Fund) in the Mezzogiorno in Italy; and by Tennessee *Valley Authority* (TVA) in Tennessee Valley in the United States. These Regional development programs provided an increase in production in the affected region, due to large amounts public investments in infrastructure, improved credit facilities, etc. (Cornelius and Trueblood, 1975, p.19). By these criteria these programs might be considered eminently successful, but the effects of increases in production on the regional development and the level of regional inequality is to be questioned.

In the case of Italy, the development of the South region always had the priorities in regional development plans in the country. In 1950s, many investments were made for modernizing agriculture and strengthening basic infrastructure. In 1960s and 1970s, the investments were in the direction of the industrialization of the region. Due to the mismanagement of the Cassa, lack of accountability, and insufficient incentives, the region could not be industrialized as was expected (OECD, 2001,

pp.14-15). In spite of the attempts to promote the industry, tourism, and irrigated agriculture in 1986, significant changes could not be achieved. When the transfer of funds were stopped in the early 1990s, it is realized that there was no structural improvement in the region (Elmas, 1991, p.129), and the unemployment in the region was still very high relative to the South Italy. Therefore, it can be said that the project of Mezzogiorno could not succeed in narrowing the economic disparities between the north and the south, even the inequality increased between 1950s and the late 1990s, except early 1960s and mid 1970s.

On the other hand, in the case of USA, the government approached the regional development problems by making permanent investments for the improvement of resources (Elmas, 2001, p.129). Many investments were made in irrigation, generation of electricity, and navigation projects in the less developed region of the country since the establishment of TVA in 1933. TVA became successful in serving for the aims of development of the region. What made TVA successful was that its works were carried on with the cooperation of many Federal and State agencies, particularly the agricultural extension services of the land grant colleges and universities. Especially, the low-cost electricity attracted large numbers of businesses and industries to the region, and resulted with high increase in the number of nonfarm jobs, which are higher paying jobs relative to farm jobs. Since the increase in per capita income in the region was faster than in the nation, the income gap between the region and the rest decreased.

The Southeastern Anatolia region is the less developed region of Turkey; and The Southeastern Anatolia Project (GAP) was prepared with the purposes of the development of the region and the reduction of the inequality between the GAP region and the rest of Turkey. This project seems to be similar with TVA in terms of the means used for the development of the region. That is, a unified irrigation program with the system of multipurpose dams and reservoirs and the production of electricity were the core of the GAP as in the case of TVA. But, the question is whether the GAP has been successful since the project was put into effect in the early 1990s.

CHAPTER 3

REGIONAL DEVELOPMENT IN TURKEY; AND THE SOUTHEASTERN ANATOLIA PROJECT (GAP)

As in every developing and developed countries, the dilemma of regional development and disparities also existed in Turkey since the foundation of the new Turkish Republic. Many development policies were developed and practiced to reduce the differences, especially between the west and east of the country, starting from the first years of the republic without getting the desired results in the balanced development among regions.

3.1. Regional Development Disparities in Turkey

Regional development disparities in Turkey appear as a result of geographical, historical and socio-political factors. In terms these factors, the east part of Turkey seems more disadvantageous than the rest of the country.

Geographical factors, such as topography, climate, vegetation, availability of resources, etc. had the biggest impact on the regional inequalities in Turkey as all are closely related with the development opportunities of a region. An imaginary line passing Sakarya, Eskişehir, Ankara and Adana points out that the western part is suitable for development with fertile land, warm and cool climate, whereas the eastern part has disadvantages with high mountains, plateaus, and severe climate conditions (very hot in the summer and very cold in the winter) which are disadvantageous for increased agricultural productivity or to establish industrial plants.

Other than geographical factors, historical, political and cultural factors also play a significant role. Looking from historical and socio-political factors, it is seen that the development disparities between the east and the west Turkey have its roots even in the Ottoman Empire beginning from 16th century. In those times, great production plants were established in order to, especially, meet the needs of the army and the palace, in locations near Istanbul. Therefore, in the subsequent years, initial industrialization movements started in the west part of the country. Furthermore, in the East, the landowners were the local authorities (like pashas, agas and sheiks) in the Ottoman period (Özden, 1999, p.48). Therefore, most of the people in the East were dependent on feudal lords. This situation caused not only between regional but also within-regional development inequalities.

With the beginning of the new Turkish Republic, the government was interested in the reduction of the regional inequalities, and many attempts were made to meet the regional development requirements of the East. However, almost all of the public and private production investments were established in the West due to the availability of hospitable geographical conditions, skilled human capital, accessibility to ports and highways, and closeness to domestic and international markets.

3.2. Regional Planning and Development Policies in Turkey

In 1923, the Turkish Republic was newly established. Turkey was a predominantly agrarian and the whole country had the characteristics of under development due to the First World War. "The share of the agriculture within the Turkey's GDP…was standing at around 40 percent in 1923, whereas the industry had a share of approximately 13 percent in the same year" (Turkish Daily News, url: http://www. turkishdailynews.com).

In those years, the dominating subject in the Turkish Politics was the development of 'national economy'. The first attempt on this issue was the İzmir Economy Congress

that was assembled in February 1923. The general policy was to disperse investments throughout the country. Although Turkish economic policy was relatively liberal (that is, based on private enterprise), the state made significant investments when big amount of investment was in question (Zürcher, 1993, pp.283-284). In 1930's, state investments were directed to urban areas and industrialization activities rather than agricultural activities. Railroads were built to link the major urban areas in various regions in the country (Gedik, 2003, p.100).

To establish Ankara the capital of the Republic in 1923 was the first important step for the economic development of Anatolia. The Law for the 'Encouragement of Industry (Teşvik-i Sanayi)' of 1927 encouraged private enterprise. However, "except for the small movement to Ankara, private industrialists tended to remain in the traditional development centers of the western coast" (Rivkin, 1965, p.74). On the other hand, "…urban-industrial public investments were dispersed into the Anatolian heartland (rather than concentrated), and away from the traditional urban-industrial core (i.e. from Istanbul in particular and from the Marmara and Aegean regions in general). Thirty-five out of 50 state factories were located in various regions in the hinterland" (Gedik, 2003, pp.100-101). In spite of these kind of attempts, a significant economic development could not be observed in the Eastern Anatolia. Besides, the world economic crisis in 1929 affected Turkey, especially Turkish agricultural exports (Zürcher, 1993, p.285).

In 1933, the first 'Five Year Plan' was prepared. Then, Turkey adopted of multi-party system of democracy in 1945, which was the turning point in the history of Turkey. With the Western Military Alliance and Marshall Plan in the 1950s, an important amount of international grants and loans were achieved. Investments were directed at not only urban but also rural areas. The establishment of highways which made rural areas accessible to urban centers, mechanization of agriculture, extensive irrigation programs, and the change in agriculture from substance farming to cash crops provided the opportunity to produce for larger markets and caused high urbanization in the country. The state's development policy continued and many

factories were established by the state throughout the country between 1950 and 1960 (Gedik, 2003, p.101).

In 1958, the Ministry of Resettlement and Reconstruction and the Department of Regional Planning were established to solve the problems of rapid urbanization. The Department of Regional Planning prepared Eastern Marmara and Zonguldak Regional Plans in scope of its duty, but the plans could not be finalized.

In 1961, the State Planning Organization (SPO) was established. The duty of preparing National Development Plans was given to this organization. "Among its planned development objectives, a decrease in regional disparities was very important" (Gedik, 2003, p.101). In spite of the first Five Year Plan of 1933, the *planned period* of Turkey accepted to be started with the 1st National Development Plan in 1963. As being different from the previous plan, the Five Year Plan dealt with all the aspects of the economic and social development within a broad context. (Turkish Daily News, url: http://www.turkishdailynews.com). If each Five Year Development Plan is examined in terms of regional planning, it is observed that each plan aims at balanced regional development in the country.

According to *the 1st Five Year Plan (1963-1967)*, development would be achieved by making investments on a number of fertile production activities. The basis of balanced regional development would be taken into consideration in the distribution of investments. Therefore, the priorities would be given to the projects in the under-developed areas (Mutlu, 2002, p.403).

During the period of this plan, four development regions were established and the projects for these regions were prepared: East Marmara Planning Project, Zonguldak Project, Çukurova Regional Project, and Antalya Project.

In *the 2nd Five Year Plan (1968-1972)*, development poles were proposed. It was regarded that these centers would spread the economic and social development to their vicinities. The public investments were directed especially to these strategic

centers which were located in the under-developed regions. It was planned to attract the private investment to these centers by providing and improving infrastructure, by tax reduction, etc. However, this plan did not provide any different perspective from the 1st Five Year Plan in terms of regional planning studies (SPO, 2000, p.28).

In *the 3rd Five Year Plan (1973-1978)*, regional development and planning approach was very superficial with respect to the 1st and 2nd Five Year Plans. The idea behind this superficiality was that trying to remove development differences in a short time period would cause an economically ineffective distribution of resources, so capital accumulation and economic development will slow down. The regional inequalities were assumed to be solved by the effective studies of the local administrations and activating local resources of the region in long term. For this reason, the regional planning studies started before for some specific regions were given up and the term 'Priority Development Areas' (Kalkınmada Öncelikli Yöreler) started to be used in this plan (SPO, 2000, p.28).

In *the 4th Five Year Plan (1979-1983)*, the approach of regional development and planning was similar to the previous plan. It was proposed to make labor division, to reduce the planning decisions to the level of local government, to provide a balanced distribution of the services, industry and the infrastructure to the whole country and to regulate the incentives so as to activate the local resources and potential (SPO, 2000, pp.28-29).

In *the 5th Five Year Plan (1985-1989)*, the importance of the regional development increased in development and planning process. The plan clearly stated the necessity of preparing regional plans. Therefore, it was proposed to prepare regional plans in the regions having development potentials in specified sectors for the acceleration of development and the effective use of the local resources.

In the 5th plan, the duty of preparing plan was given to the SPO. The 'functional regions', having the most relation between their settlement units were proposed. These regions were developed independently from the administrative borders. As a

result, 16 functional regions were determined by the SPO. (The centers of these regions were: İstanbul, Bursa, Eskişehir, İzmir, Ankara, Konya, Adana, Samsun, Kayseri, Sivas, Malatya, Gaziantep, Trabzon, Erzurum, Elazığ and Diyarbakır). This was an important step for the regional planning which distinguished this plan from the previous ones (SPO, 2000, p.29).

During the period of this plan, the studies for the development of infrastructure, especially in the developing regions, were made by the public sector. For example, the Urban Development Project of the Çukurova Metropolitan Region was prepared, the legal foundation of the GAP was established in 1989 and the GAP Master Plan was prepared during the period of this plan. By these projects, it is seen that serious attempts were made in this plan for the reduction of inequalities with respect to the previous ones (SPO, 2000, p.29).

In *the 6th Five Year Plan (1990-1994)*, the concept of regional planning left its place to the concept of 'regional development'. Instead of the 16 regions which were determined in the previous plan, Priority Development Areas were considered to be important in the regional planning. In this respect, the plan proposed a new settlement system in order to provide a more balanced distribution in order to reduce the density of population and industry, and to reduce the movements towards metropolitan regions, and to manipulate the between- and within-region migration (SPO, 2000, pp.29-30). For the purpose of decreasing the inequalities, the Priority Development Areas were put in practice but without getting the desired results in the balance of industrial distribution between the regions.

One of the main principles of this plan was to take into consideration EU regional policies in deciding regional policies in Turkey. The other one was giving priority to environmental aspect in the economic and physical planning (SPO, 2000, p.30).

In *the 7th Five Year Plan (1996-2000)*, dealt with the regional development in accordance with the aim of 'Achieving Regional Balances' under a separate heading. One of the main principles of this plan was the idea that 'sustainable development'

should be considered as a whole with its components (economical-social-cultural-political) and it should be taken into account in the direction of reducing regional inequalities to establish national integrity. In this plan, it is believed that sectoral preferences and spatial analysis must be dealt with together.

In this direction, it was planned to prepare regional development plans for relatively underdeveloped regions of the country, especially for the Southeastern and Eastern Anatolia, by considering their resources and development potentials. In this respect, the 'Action Plan' was prepared for the provinces of the Southeastern and Eastern Anatolia, which are geographically integrated. Then, 'Emergency Support Program' was applied in 1994 for the urgent needs of these provinces (SPO, 2000, p.30).

In the period of 7th Five Year Plan, other regional development projects and regional planning studies were accelerated. The Development Project of Yeşilırmak River Basin, the Eastern Anatolia Project (DAP) and the Development Project of Eastern Black Sea Region (DOKAP) were started, and Zonguldak-Bartın-Karabük Regional Development Project was completed. Preliminary studies of the Eastern Mediterranean Regional Development Project and the Marmara Regional Plan were also started. In addition to these, the studies on the GAP were continued (SPO, 2000, p.30).

In summary, all the five-year plans aimed at a balanced regional development in the country. This goal and its related strategies were repeated in each of the plans. Until the 4th Five Year plan, since the plans were based fundamentally on sector studies and surveys of a number of branches of activities without recourse to area development methods, the desired results in the balanced industrial distribution among the regions could not be achieved. The regional development plans which were started in the 1st Five Year Plan could not be completed, as they could not be institutionalized. With the 5th Year Plan, the regional development plans have gained an importance and, especially with the institutionalization of GAP in 1989.

3.3. The Southeastern Anatolia Project (GAP)

In the Southeastern Turkey, the initial planning works started in the 1960s with two basin projects of irrigation and hydraulic energy production on the Euphrates and Tigris. In 1977, these two basin projects were coined as 'Southeastern Anatolia Project (GAP)'. Then, in 1986, the duty of ensuring development activities in Southeastern Anatolia within the framework of integrated regional planning and addressing the coordination of these activities was given to the SPO (GAP, url: http://www.gap.gov.tr).

Then, in the late 1980s, the GAP project was transformed into a multi-sector social and economic development program for the GAP Region. Its basic objectives are to eliminate regional development inequalities by improving living standards and income levels of people; and contributing to such national goals as social stability and economic growth by enhancing productivity and employment opportunities of the rural sector (GAP, url: http://www.gap.gov.tr).

"Since development related activities to be started in the region were rather comprehensive and since the need for ensuring rapid development was urgent, it was decided to establish a separate entity to be in charge of GAP activities" (GAP RDA, 2001a, p.22). The GAP Regional Development Administration was institutionalized upon the Government Decree no. 388 in Force of Law (published in the Official Journal no. 20344) on 6 November 1989. The core duty assigned to this new organization was to plan and realize all efforts and activities for the development of the region in the context of a 'comprehensive regional planning approach' that covers all economic and social sectors in consistency (GAP, url: http://www.gap.gov.tr; GAP RDA, 2001a, p.22).

In 1994, the GAP Social Action Plan was developed to provide a general framework for social and human development related initiatives in the context of the GAP. "The basic strategies of the project include fairness in development, participation, environmental protection, employment generation, spatial planning and infrastructure development" (GAP, url: http://www.gap.gov.tr).

The project area encompasses 9 administrative provinces in the basins of the Euphrates and Tigris and in Upper Mesopotamia (Adıyaman, Batman, Diyarbakır, Gaziantep, Kilis, Mardin, Siirt, Sanlıurfa and Sırnak). The GAP Region extends a surface area of 75,358 km^2, which corresponds to 9.7 percent of the total surface area of Turkey (See Map 3.1). According to the results of the 2000 General Population Census, the population of the GAP region is 6,608,619, which corresponds to 9.7 % of the total population of the country (67,803,927) (GAP, url: http://www.gap.gov.tr; GAP RDA, 1998, p.1).

Figure 3.1. The Map of the Southeastern Anatolia Project
(Source: GAP, url: http://www.gap.gov.tr)

3.3.1. The GAP Master Plan

The GAP Master Plan, which was prepared for the period 1989-2005, has been the main guide used for this purpose. Four basic strategies were identified as follows (GAP, url: http://www.gap.gov.tr):

- To develop and manage water and land resources both for irrigation and urban and industrial use,

- To improve land use by introducing better farm management, agricultural practices and crop patterns,
- To encourage manufacturing industries by giving special weight to agriculture related and local resource based production lines,
- To improve social services and urban infrastructure facilities to better respond to the needs of local people and to attract and keep qualified personnel in the region.

The main scenario of the GAP Master Plan was to transform the region into an 'Agriculture Based Export Center'. According to the maximum growth scenario of the Master Plan, it was estimated that GDP in the GAP region was expected to grow annually by the rate of 7.7%. When 2005 is taken as the target year, the GAP Master Plan gave the following percentages indicating the predicted changes in economic structure over the base year 1985 in Table 3.1.

Table 3.1. Changes in Economic Structure (%)

Sectors	1985	2005
Agriculture	40	25
Industry	16	24
Construction	7	4
Services	37	47

(Source: GAP RDA, 2001a, p.25)

The State Hydraulic Works (DSİ) was engaged in the water resources development of the region and 13 projects were prepared for this aim. Upon the completion of the projects, the construction of 22 dams and 19 hydraulic power plants (HPPs), generation of 27 billion kWh of hydraulic energy a year, and irrigation of 1.7 million hectares of land were planned in the GAP Master Plan. The planned irrigation area corresponds to 20% of total irrigable land in Turkey, and the planned annual hydraulic energy production to 22% of total electric energy potential in the country (GAP, url: http://www.gap.gov.tr; GAP RDA, 2001a, p.16, 22, 26).

As of the year of 2001, the GAP region has 12 completed dams and 6 HPPs in operation, and 1 dam and 1 HPP under construction. In 2001, Turkeys Hydraulic energy output is 23.9 billion kWh. In this total, the GAP region has a share of 47.9% with an output of 11.5 billion kWh. In the same year, the share of the GAP region in the total energy production of Turkey (123 billion kWh) is 9.3% (total means hydraulic +thermal). In terms of physical realization, 70% of irrigation projects are already in operation, 4% under construction, 19% is at the stage of constructing out and finally 7% is at planning stage (see Figure 3.2) (GAP RDA, 2001b, pp.11-13).

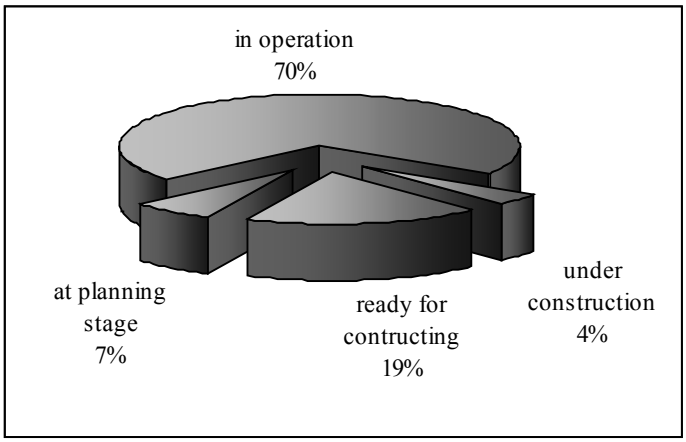

Figure 3.2. Physical realization of GAP hydraulic energy projects as of the end of the 2001 (Source: GAP RDA, 2001b, pp.11-13)

Moreover, as of the end of 2001, 215.080 hectares of land has been brought under irrigation by DSİ. In terms of physical realization, 12% of irrigation projects are already in operation, 8% under construction, 25% is at the stage of constructing out and finally 55% is at planning stage. Irrigation will naturally increase agricultural output as well (see Figure 3.3) (GAP RDA, 2001b, pp.14-15).

The agricultural development targets of the GAP Master Plan consists of: "…raising levels of income in the rural sector; providing inputs for industrial enterprises in the region; creating employment opportunities so as to minimize out-migration and encouraging export oriented production in the region" (GAP, url:

http://www.gap.gov.tr). For example, as it is possible to reap two crops a year in the region, the region accounted for 41.6 % of the total cotton output of Turkey in 1998. The region is also quite fit for animal husbandry; therefore, the GAP Administration focus on genetic improvement and development of advanced breeding techniques.

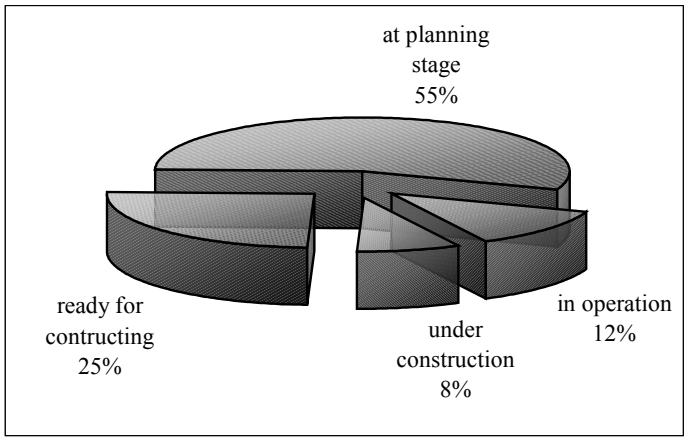

Figure 3.3. Physical realization of GAP irrigation projects as of the end of 2001 (Source: GAP RDA, 2001b, pp.14-15)

As indicated above, one of the main targets of the GAP Master Plan was to transform the region into an 'Agriculture Based Export Center'. For this aim, various projects were prepared to attract private sector investments into the region, and to enhance employment opportunities. Thus, "industry related public investments launched in the GAP region mainly target the completion of necessary infrastructure for industrial development" (GAP RDA, 2001a, p.34). Airports, organized industrial zones (OIZs), and small industrial sites (SISs) were planned in the GAP Master Plan.

In this context, the region has 2 free trade zones, 6 active OIZs with their full infrastructure and 18 finished SISs. Moreover, there are 9 OIZs under construction and 19 SISs under construction in the region. Furthermore, GAP Entrepreneur Support and Guidance Centers (GAP-GIDEM), providing information and consulting services to local, national and international entrepreneurs who plan to launch investments in the region, were established (GAP RDA, 2001b, p.19; GAP, url: http://www.gap.gov.tr).

3.3.2. The GAP Social Action Plan

The GAP Social Action Plan is based on especially the findings of five social studies and surveys[9], which were mainly focused on the status, problems and expectations of specific social groups including women, children, adolescents, children working in streets, the urban poor, landless peasants and small farmers, etc. Following the completion of these studies and surveys between 1992 and 1994, the GAP Social Action Plan was planned in 1994 in order to meet certain requirements rapidly. A general framework for social and human development related initiatives in the context of the GAP were prepared. The plan includes seven headings as organization and participation, population movement and settlement, agricultural extension, employment, education, health, ownership and use of land. It was planned that the project will be completed until the year 2010 (GAP, url: www.gap.gov.tr).

The main target of the social policies of the Action Plan is the sustainable human development in the region. The basic function of social policies constitute improvements in the quality of services and life and maintaining a balanced development so as to ensure at least modern living standards for all sections of population by the participation of the poor to the process of development, improved access to social services including health and education, employment generation and expansion of the coverage of social protection (GAP, url: www.gap.gov.tr).

Consequently, a series of social projects were developed and implemented within this framework and in line with principles of the Action Plan. These social projects are, for example, Multi-Purpose Community Centers (The ÇATOM), Youth to Youth Social Progress, Rehabilitation of Children Working in Streets, and GAP Region Health Project.

[9] The conducted studies and surveys in the region to identify the needs and potentials of the region are (GAP RDA, 1998, p.6; GAP RDA, 1999, p.131) as follows: (a) Trends of social change in the GAP region, (b) Population movements in the GAP region, (c) Status of women and their integration into the development process in the GAP region, (d) Problems of employment and resettlement in affected by dam lakes in the GAP region, (e) Socio-economic studies on the management, operation and maintenance of GAP irrigation systems.

In 1997, the Program for Sustainable Development in the GAP Region was prepared in cooperation with the UNDP with the basic objective of reducing socio-economic disparities in the GAP Region. The project underlines the human dimension of development through its pilot projects in such diverse fields as basic social services (education, health, housing); gender equality; urban management; environmental sustainability; institutional and social capacity building and people's participation.

3.3.3. Financing the GAP

3.3.3.1. Cumulative investments

GAP investments consist of the sum total of various economic and social projects and activities of different organizations and agencies in various sectors. Allocations for these investments by various social and economic organizations and agencies are made from the budgets of these organizations and agencies.

The GAP related duty allocations can be divided as follows: the TPAO in the mining sector, TEIAS and TEDAS in the energy sector, Turk Telekom in the communication sector and Cadastral Affairs in the services sector, whose investment programs in the region considered as a part of the GAP. In line with information received from these agencies, total investment figure for the GAP region is achieved.

According to the GAP Master Plan, the total cost of the project, met by public financing in the period 1990-2005 is estimated as nearly 22 quadrillion 505 trillion TL at 2002 fixed prices. As end of the 2001, nearly 10 quadrillion 831 trillion TL was spent for the project, giving the realization rate of 48% (see Table 3.2). In order to allow comparisons with other projects, the total fixed investment cost of GAP is expressed as 32 billion USD. As stated previously, actual investments which give a cash realization rate of 48% amounts to 15 Billion USD as of the end of the 2001 (GAP, url: http://www.gap.gov.tr; GAP RDA, 2001b, pp.5, 9).

Looking by sectors, as end of the 2001, it is observed that the rate of realization is 46% in economic sectors and 71.7 % in social sectors. Mining and energy have the highest realization rates, 100 % and 78.7 %, respectively among the economic

sectors, while education and health has the highest realization rate of 85 % among the social sectors (see Table 3.2 and Figure 3.4).

Table 3.2. Cost by Sectors as of the End-2001 in GAP
(Billion TL at 2002 Prices)

		Total Cost (Required Funds)	Cumulative Investments by the end of 2001	Realization (%)
Economic Sectors	Agriculture	6 811 714	1 144 319	16.8
	Mining	522 393	530 243	100.0
	Manufacturing	1 005 673	408 021	40.6
	Energy	7 236 872	5 696 882	78.7
	Transport.+Commun.	4 982 234	1 677 455	33.7
	Tourism	37 823	9 495	25.1
	TOTAL	20 546 708	9 446 416	46.0
Social Sectors	Housing	217 702	76 730	35.2
	Education+Health	597 004	507 231	85.0
	Other Public Services	1 094 444	781 478	71.4
	TOTAL	1 909 150	1 369 288	71.7
GRAND TOTAL		22 505 859	10 831 855	48.1

(Source: GAP, url: www.gap.gov.tr; GAP RDA, 2001b, p.9)

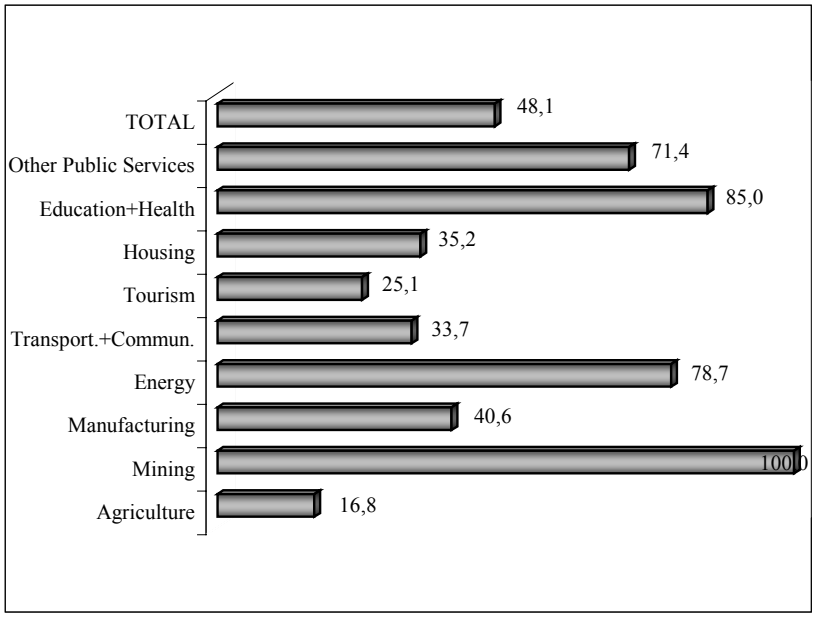

Figure 3.4. Sectoral cash realization as of the end of 2001 in GAP (%)
(Source: Table 3.2)

3.3.3.2. Comparative trends of public investment allocation

Looking at the annual trend of GAP investments in the period 1990-2001, it is observed that the region has, on average, an annual share of 7.3% in total public investment allocations with the exception of the last two years. This is below 10%, which is the share of the region in both total geographical area and population of the country (see Table 3.3 and Figure 3.5).

Table 3.3. Comparative Trends in Public Investments in GAP, 1990-2002
(Billion TL at 2002 prices)

	TURKEY		GAP		
Year	Investment Allocation	Increase (%)	Investment Allocation	Increase (%)	Share of GAP in National Total (%)
1990	8 096 812		657 842		8.1
1991	7 586 379	-6.3	647 700	-1.5	8.5
1992	7 854 199	+3.5	576 716	-10.9	7.3
1993	7 488 466	-4.6	567 911	-1.5	7.6
1994	5 870 933	-21.6	442 000	-22.2	7.5
1995	4 227 556	-28.0	305 862	-30.8	7.2
1996	5 375 971	+27.1	371 335	+21.4	6.9
1997	5 802 429	+7.9	446 283	+20.2	7.7
1998	8 427 492	+45.2	560 380	+25.6	6.6
1999	7 680 218	-8.9	450 654	-19.6	5.9
2000	8 939 816	+16.4	639 454	+41.9	7.1
2001	8 836 021	-1.2	434 792	-32.0	4.9
2002	9 855 000	+11.5	531 658	+22.2	5.4

(Source: GAP, url: www.gap.gov.tr; GAP RDA, 2001b, p.10)

Moreover, the public investment allocations to GAP display a rather serious falling trend at real prices from 657 trillion TL in 1990 to 305 trillion TL in 1995. However, after the Social Action Plan, the public investments in total increased, on average, by 22 % in the years between 1995 and 1998. In 1999, when the negative growth took place in terms of the overall performance of the economy, GAP was allocated about 450 trillion TL at 2002 prices. This amount was raised by 42 % to reach 639 trillion. Then, "in 2001, however, as a result of the inclusion of special funds in the general budget and restrictions on investments as foreseen by the stability program…" (GAP

RDA, 2001a, p.45), the total public investments in the GAP region decreased by 32% compared to the previous year. In 2002, this value increased by 22 % over previous year (see Table 3.3 and Figure 3.5).

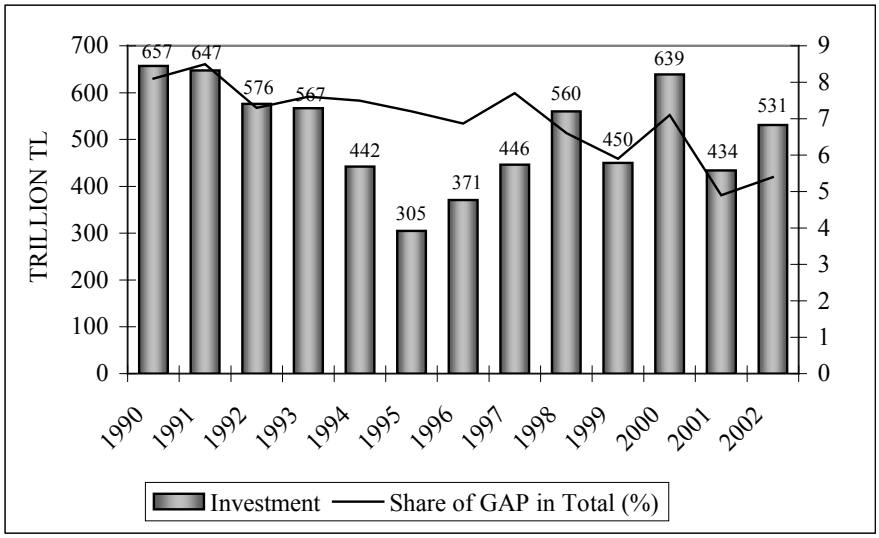

Figure 3.5. Public investments in the GAP, 1990- 2002 (Trillion TL at 2002 prices) (Source: Table 3.3)

3.3.3.3. External relations and funds

As a development project which emphasizes 'sustainable development', the GAP is recently enjoying popularity in international circles. Consequently, GAP RDA has developed joint projects and programs with several international institutions including United Nations Development Programme (UNDP), UN Food and Agriculture Organization (FAO), the World Bank, and European Union (EU). They have supplied technical and financial assistance to be utilized for the socio-economic development of the region (GAP, url: www.gap.gov.tr; GAP RDA, 2000, p.49)

Firstly, the joint work of the GAP Administration and United Nations Development Program (UNDP) started in 1997 for the project of 'Sustainable Development in the GAP region'. The program covers 28 sub-projects, which focus on the youth, disadvantaged groups and urban poverty. "With a total cost profile of 5.2 million

USD, the program is presently financed by the government of Turkey and UNDP. … UNDP is mainly engaged in mobilizing further funds to the program from other parties" (GAP RDA, 2002, p.49). For this purpose, the protocol of a fund of 2.2 million USD was signed with the Swiss Development Cooperation and UNDP in June 2000. Moreover, "Cooperation of the GAP Administration and UNICEF ensured the contribution of US $ 60.000 by the latter for the ÇATOM's" (GAP RDA, 1999, p.132).

Secondly, the relations between GAP Administration and FAO were initiated in October 1997 "…in order to investigate the possibilities of cooperation and to share GAP experience with FAO as well as the international community particularly with the Turkish Republics" (GAP, url: www.gap.gov.tr), under the name of 'GAP-FAO Rural Development Program'. This program consists of 10 sub-projects, which aims to raise the income levels of the rural population.

Thirdly, the World Bank issued a total grant of 650,000 US $ for two projects related to the development of urban and rural infrastructure in 1997 and 1998. These projects are Şanlıurfa-Harran Plains On-Farm and Village Development Project; and GAP Urban Planning and Sanitation Project. (GAP, url: www.gap.gov.tr ; GAP RDA, 2000, p.50).

Lastly, "The GAP Administration has been preparing project proposals to have access the European Union funds and conveying these proposals to the Union through the Undersecretary of Treasury since 1996" (GAP RDA, 2000, p.51). Upon the Helsinki Summit of 2000, a grant of 43.5 million Euros became available for the GAP Regional Development Program (GAP RDA, 2000, p.51). The specific objectives of this joint program are: "to increase employment opportunities and creation of new jobs through supporting local entrepreneurs, to generate income activities supporting rural population, to restorate and renovate the rich cultural sites in the Region so as to conserve the cultural heritage and promote the touristic potential, to improve environmental conditions through creating environmental awareness in the Region" (GAP, url: www.gap.gov.tr) .

3.3.4. The Socio-economic Characteristics of the GAP region

In this section, the changes in the basic characteristics of the GAP region and its constituent provinces in terms of the socio-demographic, economic, and infrastructure and service related variables in 1990 and 2000 will be examined. A comparison also will be made between the average values of the Turkey and those of the region.

3.3.4.1. Social and demographic characteristics

- **Population and Population Growth Rate**

The *population* of Turkey grew approximately 20 percent and increased from 56 473 035 to 67 803 927 in the last 10 years. In the same period, the population of GAP region grew with approximately 28 percent and increased from 5 157 160 in 1990 to 6 608 619 in 2000 (see Table 3.4). While the population of GAP region had a share of 9.1 percent in the total population of the country in 1990, its share increased to 9.7 percent in 2000. This indicates that the annual growth rate of the population of the GAP region was higher than that of the country. The highest population share in the region was for Diyarbakır (21%) in 1990; and in Şanlıurfa (22%) in 2000 (see Table C.1 in Appendix C).

The rural-urban composition of the population in the country as well as in the region changed during the last decade. According to the 1990 census, the percentage of population in the urban areas of the country was 59 (see Table 3.4). This increased to 64.9 percent in 2000. While the urbanization in the region was 55.7 percent in 1990, it increased to 62.7 percent in 2000. Although the figures are lower in the region than those of the country in 1990, the region had the higher increase in the urban population share relative to the country. One of the reasons of this was the uneven distribution of land, which led to the rural-to-urban migration. This increased level of urbanization resulted in various urban problems in the areas of education and health services.

Table 3.4. Population, level of urbanization and population growth rate

	Population		Urban population and level of urbanization					Annual growth rate of pop. (%)
			1990		2000		2000/1990	
	1990	2000	Urban	%	Urban	%		
TURKEY	56473035	67803927	33326351	59,0	44006274	64,9	1,10	1,83
GAP	5157160	6608619	2873801	55,7	4143136	62,7	1,13	2,48

(Source: SIS, 2003a,109-111)

Moreover, for some of the provinces in the region (i.e., Adıyaman, Mardin, Siirt, and Şırnak), while the proportion of population living in the villages was more than the proportion of population living in the urban areas in the census year 1990, urban population exceeded rural population for the first time in 2000 (see Table C.1 in Appendix C).

Annual population growth rate is very high in the region during the last decade. The average annual population growth rate in the region was 2.48 percent while it was 1.83 percent for the country (see Table 3.4). Thus, population growth rate in GAP region is approximately 30 percent higher than the national average. In the region, Şanlıurfa has the highest annual population growth rate with 3.66 percent; whereas, Kilis has the negative growth rate with –1.27 percent in the same period (see Table C.1 in Appendix C). Negative growth rate in Kilis might be as a result of rapid migration to urban areas and declining fertility[10].

Since the region is experiencing net out-migration, the reason of the high population growth rate in the region is the high level of fertility rate. In 2000, fertility rate of the region was 4.65, and it was 2.53 for Turkey (see Table 3.5).

[10] Kilis had the lowest fertility rate of 3.54 in the region in 2000 (see Table C.2 in Appendix C).

- **Total fertility rate**

There was a slight decrease in fertility rate from 2.65 to 2.53 in national level in the last decade (see Table 3.5). Fertility rate in the region was traditionally high compared to the national averages. It is interesting to note that in contrast to national trend, the regional fertility rate increased from 4.37 to 4.65. In the provincial level, while Gaziantep, Şanlıurfa, Batman, Şırnak showed an increasing fertility rate, the rest showed decreasing fertility rate (see Table C.2 in Appendix C). This situation might reflect the high net out-migration of young population to other regions having better job opportunities. Besides, it might show the failure in the course of family planning practices in those provinces.

Table 3.5. Total fertility rate, infant mortality rate and household size

	TURKEY			GAP		
Variable	1990	2000	2000/1990	1990	2000	2000/1990
Total fertility rate	2,65	2,53	0,95	4,37	4,65	1,06
Infant mortality rate	67	43	0,64	66	46	0,70
Household size	4,97	4,71	0,95	6,69	6,8	1,02

(Source: SIS, 2003b)

- **Household size**

The average size of households in Turkey was 4.97 in 1990, and decreased to 4.71 in 2000 (see Table 3.5). In contrast to the country, the GAP region showed an increase in the household size from 6.69 to 6.80 during the same period. Like fertility, the figures in the GAP region were 44 percent higher than the national average. For the provinces of Mardin, Siirt, Şanlıurfa, Batman and Şırnak, the household size was more than the regional average (see Table C.2 in Appendix C). The reason of this situation can be related to the increase in fertility rate.

- **Infant Mortality rates**

Infant mortality rates (IMR) underwent substantial improvements during the last decade in the whole country. The IMR was 67 per thousand in 1990 and decreased to 43 per thousand in 2000 (see Table 3.5). The GAP region performed a decreased IMR in the same trend like the country as a whole. While 66 infants out of 1000 live born infants died before completing age one in 1990 in the region, this figure dropped to 46 in 2000. Among the provinces in the region, Siirt had the highest values with 80 per thousand in 1990 and 63 per thousand in 2000 (see Table B.2 in Appendix B). "Considering that the IMR is under 10 per thousand in the developed countries, Turkey is still much different from the developed countries in this issue" (Toros, 1993, p.iv)

- **Age Structure of Population**

The *total age dependency ratios* in Turkey were generally high in 1990 and 2000. But the indicators of the GAP region were even higher than those of the country. The total age dependency ratio in Turkey was 64.6 percent in 1990 and it reduced to 55.1 percent in 2000. In the same interval in the region, the values were 99.2 and 85.2 percent, respectively (see Table 3.6). It is interesting to note that for all of the provinces (except Adıyaman and Gaziantep), the total age dependency ratios were higher than 100 percent in 1990 and decreased under this value in 2000. Much of these reductions resulted from the relative decline in the size of the 0-14 age group (see Table C.3 in Appendix C).

Table 3.6. Age structure of the population (%)

	TURKEY			GAP		
Variable	1990	2000	2000/1990	1990	2000	2000/1990
Total age dependency ratio	64,67	55,10	0,85	99,22	85,25	0,86
Youth dependency ratio	59,08	46,27	0,78	94,58	79,43	0,84
Elderly age dependency ratio	7,01	8,83	1,26	5,21	5,95	1,14
Proportion of 0-14 age group	34,96	29,86	0,85	47,16	42,74	0,91

(Source: SIS, 1996, pp. 92-93; SIS, 2003a, pp.90-91; SIS, 2003b)

While there was a decrease in the *youth dependency ratio* in the country from 59 percent in 1990 to 46.2 percent in 2000, there was a slight increase in the *elderly age dependency ratio* from 7 percent to 8.8 percent in the same period (see Table 3.6). These changes are also observed in the region and in its constituent provinces. In the region, the youth dependency ratio decreased from 94.5 to 79.4 percent, and the elderly age dependency ratio increased from 5.2 to 5.9 percent. Among the provinces, while Batman had the highest youth dependency ratio of 108.6 percent in 1990 and 92.6 percent in 2000, Mardin had the highest elderly age dependency ratio of 5.9 percent in 1990 and 7.4 percent in 2000 (see Table C.3 in Appendix C).

Distribution of population according to age in the region, indicates that almost 47 percent of the whole population is under 15 years of age in 1990. It decreased to 42 percent in 2000. Although, there are reductions in the *percentages of 0-14 age group* for all of the provinces, the values are considerably higher than those of Turkey in both census years, which are 34 and 29 percent, respectively (see Table 3.6 and Table C.2 in Appendix C). Thus, "at one hand, it might mean to have young human resource potential, on the other hand a necessity to provide education and create job opportunities for them constitutes a serious problem" (GAP RDA, 1998, p.11).

- **Education**

The *literacy ratio* in Turkey was 80 percent in 1990 and it rose to 87 percent in 2000 (see Table 3.7). The ratio of literacy in the region increased from 60 percent to 73 percent in the same period. It is important to note that almost half of the population in most of the provinces was illiterate in 1990; but the literacy increased during the last decade in these provinces. While the highest literacy ratio was for Gaziantep, the lowest literacy ratio was for Şırnak in both of the census years (see Table C.4 in Appendix C).

The rate of literacy display important gender variations and male literacy rates are much higher than female literacy rates. Taking the country as a whole, the figures for female and male literacy were 71 and 88 percent in 1990, respectively (see Table

3.7). These figures were 80 and 93 percent in 2000. However, the literacy ratios are even lower and the gap between female and male is even larger in the region. While the female and male literacy ratios in the region were 44 and 75 percent in 1990, they increased to 60 and 85 percent in 2000. It is sad to say that in 2000, more than half of the female population was still illiterate in most of the provinces in the region (except Adıyaman, Gaziantep and Kilis) (see Table C.4 in Appendix C).

Table 3.7. Literacy ratios by sex (%)

	TURKEY			GAP		
Variable	1990	2000	2000/1990	1990	2000	2000/1990
Total literacy ratio	80,46	87,3	1,09	60,42	73,22	1,21
Female literacy ratio	71,95	80,64	1,12	44,77	60,16	1,34
Male literacy ratio	88,78	93,86	1,06	75,53	85,77	1,14

(Source: SIS, 1996, pp. 94-97 and SIS, 2003a, pp.88-89)

Compared with the Turkish average, the *schooling ratios in primary education* in the region are also very low. The schooling ratio in the country was 82 percent as of the school year 1990-1991 and 91 percent as of the school year 1999-2000 (see Table 3.8). For the region, these numbers were 67 and 79 percent, respectively. Among the provinces in the region, Gaziantep had the highest schooling ratio with 93 percent in 1990-91 and 98 percent in 1999-2000 (see Table C.4 in Appendix C).

In the GAP region, while the schooling ratio was 55 percent for females and 77 percent for males in 1990, these ratios increased to 69 percent for females and 89 percent for males in 2000 (see Table 3.8). Even though the schooling ratio of females increased more than that of the males, a difference between sexes still exists. Again, the highest schooling ratios for both sexes were for Gaziantep (see Table C.5 in Appendix C).

The *total schooling ratios in secondary education* in Turkey are lower compared to those in primary education. The average schooling ratio of the country was 36 percent in 1990-1991 and increased to 54 percent in 1999-2000 (see Table 3.9). It is

realized that almost half of the population did not go to the secondary schools in the country. The situation in the GAP region is much worse than in Turkey. The total schooling ratio in the region was 18 percent in 1990-1991 and rose to 29 percent in 1999-2000. It is realized that the ratio increased approximately 1.55 times during the last decade in the region. While Gaziantep had the highest schooling ratio (more than 30 percent), Şırnak had the lowest ratio (less than 16 percent) for both of the schooling year (see Table C.6 in Appendix C).

Table 3.8. Schooling ratios in primary and secondary education (%)

	TURKEY			GAP		
Variable	1990	2000	2000/1990	1990	2000	2000/1990
Sch. ratio in pri. edu.	82,76	91,89	1,11	67,00	79,82	1,19
Sch. ratio of girls in pri. edu.	75,95	87,05	1,15	55,11	69,61	1,26
Sch. ratio of boys in pri.edu.	89,17	96,43	1,08	77,73	89,08	1,15
Sch. ratio of sec.edu	36,30	54,97	1,51	18,8	29,14	1,55
Sch. ratio of girls in sec.edu	28,25	47,06	1,67	9,99	18,54	1,86
Sch. ratio of boys in sec.edu	44,01	62,43	1,42	27,37	39,12	1,43

(Source: Unpublished studies of SIS)

As in the case of the primary education, the schooling ratio in secondary education increased for both sexes during the last decade. In the region, while the schooling ratio in secondary education was 9 percent for females and 27 percent for males in 1990-1991, this ratio increased to 18 percent for females and 39 percent for males in 1999-2001 (see Table 3.8). Among the provinces in the region, Şırnak has the lowest schooling ratio; approximately 1 percent for female and 9 percent for male in 1990-1991, and 5 percent for female and 27 percent for male in 1999-2000 (see Table C.6 in Appendix C).

3.3.4.2. Economic characteristics

- **GDP and GDP per capita by kind of activity**

In Turkey, GDP per capita exhibited an increase between 1990 and 2000 (see Table 3.9). The GAP region enjoyed a much lower levels of GDP p.c. relative to national averages both in 1990 and 2000. Furthermore, although the GAP policies gave an initial boost to economic growth in the region, the regional GDP p.c. decreased in the last decade. In the provincial level, all of the provinces except Şanlıurfa and Şırnak showed a reduction in GDP p.c. (see Table C.7 in Appendix C).

When the GDP p.c. in terms of sectoral activities are examined, it is observed that the country exhibited higher levels of GDP p.c. than the region except in agricultural sector. Since the major activity of the people in the GAP region is agricultural, in contrast to the country, GDP p.c. in the agricultural sector is higher than those in the other sectors in both of the census years. In the country, while there was an increase in GDP p.c. in industrial and commercial sector, there was a reduction in the agricultural sector. However, in the region, while there was a slight increase in GDP p.c. for only commercial sector, and a slight reduction in the agricultural sector. This situation is surprising when we think that the GAP project gave special weights to the agricultural related production activities. Furthermore, reduction in the industrial sector in the GAP region was significant.

Table 3.9. GDP per capita and GDP per capita by kind of activity

	TURKEY			GAP		
Variable	1990	2000	2000/1990	1990	2000	2000/1990
GDP p.c.	1487467	1751950	1,18	957210	918196	0,96
GDP p.c. in ind. sec.	394022	494631	1,26	218009	177079	0,81
GDP p.c. in agr. sec.	253777	235411	0,93	265414	260584	0,98
GDP p.c. in com. sec.	298411	390155	1,31	169226	171682	1,01

(Source: SIS,1997 and 2002b)

Sectoral shares in GDP may provide a first indication of the main economic bases of the provinces. The numbers in provincial level show that while industrial activities were dominant in Gaziantep, Şanlıurfa and Batman, the agricultural activities were dominant in Şanlıurfa and Kilis (see Table C.7 in Appendix C).

- **Per capita bank deposits and credits**

The GAP region revealed much lower levels of per capita bank deposits and credits compared to national averages in 1990 and 2000. The bank deposits p.c. in the region was 87.6 million dollars and increased almost two times to 171.9 in 2000 (see Table 3.10). The region showed less increase in terms of bank credits p.c. relative to bank deposits p.c., from 74.3 million dollars in 1990 to 120.9 in 2000. Among the provinces, Gaziantep and Kilis seems to have higher per capita bank deposits and credits than other provinces (see Table C.8 in Appendix C).

Table 3.10. Per capita bank deposits and credits, electricity consumption p.c. and the number of private motor vehicle per 1000 people

	TURKEY			GAP		
Variable	1990	2000	2000/1990	1990	2000	2000/1990
Bank deposits p.c.	560,7	1397,3	2,49	87,6	171,9	1,96
Bank credits p.c.	451,9	655,9	1,45	74,3	120,9	1,63
Electricity consumption p.c.	0,829	1,433	1,73	0,433	0,854	1,97
Total private motor vehicle per 1000 people	29,00	73,26	2,53	8,37	21,86	2,61

(Source: SIS, 1991 and 2001; Türkiye Bankalar Birliği, url: http://www.tbb.org.tr/asp/donemsel.asp; Türkiye Elektrik Dağıtım Anonim Şirketi, 2001, pp.193-194; Türkiye Elektrik Kurumu Genel Müdürlüğü, 1991, pp.67-68)

- **Electricity consumption and private motor vehicle**

Per capita electricity consumption and the number of private motor vehicles per thousand people might represent consumption better than GDP p.c. According to the statistics, the *per capita electricity consumption*in the country was 0.829 MWh in 1990; it increased to 1.433 MWh in 2000 (see Table 3.10). The region had almost

half of these values in both of the census years (0.433 MWh in 1990 and 0.854 MWh in 2000)[11]. In 2000, while the highest consumption value was for Gaziantep, the lowest values are seen in Diyarbakır and Kilis (see Table C.9 in Appendix C).

Similarly, the region had smaller *number of motor vehicle per thousand people* relative to the national level in the last decade. While the number of motor vehicle per thousand people was 29 in 1990 and 73 in 2000 in the country; it was 8.37 and 21.86 in the region (Table 8.10). Moreover, the statistics show that Gaziantep had the highest number of private motor vehicles per thousand, which increased from 15.72 to 50.83 during the last decade. But these values are still lower than the national averages (see Table C.9 in Appendix C).

- **Non-agricultural labor force and unemployment**

The low *non-agricultural labor force* in an area might mean that the economy in that area is based on agricultural activities. Since the economy of the GAP region is based on agricultural activities, the proportion of non-agricultural labor force in total is lower in the region than in the country. Only 33 percent of total labor force worked in non-agricultural activities in 1990 (see Table 3.11). This value increased slightly to 38 percent in the last decade. The respective values were 46 and 52 percent for the country.

Table 3.11. Non-agricultural labor force and unemployment

	TURKEY			GAP		
Variable	1990	2000	2000/1990	1990	2000	2000/1990
Unemployment	5,4	8,9	1,65	8,4	13	1,55
Non-agr.labor force	46	52	1,13	33	38	1,15
Non-agr. female labor force	18	24	1,33	6	13	2,17
Non-agr. male labor force	62	67	1,08	49	56	1,14

(Source: SIS, 1996, pp.50-53; SIS, 2003a, pp. 100-101; and SIS, 2003b)

[11] Since the illegal use of electricity is very common, especially, in the region, the real electricity consumption values are much more higher than these values.

On the other hand, it is observed that the proportion of non-agricultural labor force showed important gender variation at the country level as well as at the regional level. The participation of females in the non-agricultural activities was much lower than that of males. Taking the country as a whole, the figures for females and males were 18 and 62 percent, respectively, in 1990 (see Table 3.11). The gap seems to be remained almost the same in 2000 (24 percent vs. 67 percent).

In the case of the GAP region, the values were much more lower than those of the country. But there were large improvement in the region during the last decade. The values for females and males were 6 and 13 percent, respectively, in 1990 (see Table 3.11). These values increased to 13 percent and 56 percent, respectively, in 2000. As most of the indicators, these indicators also showed highest values in Gaziantep in both of the census years (see Table C.10 in Appendix C).

One of the most important problems in the country is the increasing *unemployment rate*[12]. According to the 1990 numbers, the rate of unemployment in the country is 5.4 percent, which increased to 8.9 percent in 2000 (see Table 3.11). Compared with the Turkish values, the unemployment rate in the region was higher in both years. It rose from 8.4 percent to 13 percent. The numbers of provinces show that Şırnak and Batman had a higher increase in unemployment relative to other provinces (see Table C.10 in Appendix C).

3.3.4.3. Infrastructure and service indicators

- **Educational Services**

The region is behind the country standards in terms of the number of teachers per thousand students in both of the educational level. In the *primary education*, while the national average of the number of teachers per thousand students is 29 in 1990 and increased to 32 in 2000, it was 22 and increased to 24 in the regional level (see

[12] It is important to note that these rates are only for the registered unemployed population. Therefore, it can be said that the real unemployment rate is much more higher than these figurers.

Table 3.12). Among the provinces in the region, Kilis[13], Adıyaman and Siirt had the highest values. Only Şırnak had a decreasing value (from 20 to 19) which might be due to the high increase (approximately 2 times) in schooling relative to the number of teacher in this province (see Table C.11 in Appendix C).

Table 3.12. Number of teachers per 1000 student

Variable	TURKEY			GAP		
	1990	2000	2000/1990	1990	2000	2000/1990
No of teac. per 1000 stud. in prim.edu.	29	32	1,10	22	24	1,09
No of teac. per 1000 stud. in sec.edu.	79	62	0,78	62	49	0,79

(Source: Unpublished studies of SIS)

On the other hand, it is interesting that the number of teachers per thousand students in the secondary education decreased in the region and its constituent provinces (except Şanlıurfa) as well as in the country in the last decade. This might be because the increase in schooling in secondary education was relatively higher than the increase in the number of teachers. While the number of teachers per thousand students is 79 in 1990, which decreased to 62 in 2000 in the country, it was 62 and decreased to 49 in the region (see Table 3.12). Among the provinces, although Şırnak had the highest number of teachers per thousand students (84) in 1990, it decreased to the lowest value (39) in 2000 (see Table C.11 in Appendix C).

- **Health Services**

The number of health personnel (physician, practitioner, dentist, nurse, sanitarian, and midwife) per 1000 people can be considered as the measure of accessibility to health services. Although there was substantial improvement in health services in the region in the last decade, it was still much lower than the country averages in 2000. For example, while the number of physicians per thousand people was 0.43 in 1990,

[13] Kilis performed the highest numbers of teacher per thousand students in terms of both educational level in 2000 (44 in primary education and 93 in secondary education). These values are even higher than the national averages. This is due to the smaller number of students rather than higher number of teachers in this province.

which increased to 0.543 in 2000 in the country, it was 0.187 and rose to 0.188 in the region (see Table 3.13). The highest increase was in the number of practitioners, and the lowest increase was in the number of physicians and midwifes.

Table 3.13. Number of health personnel per 1000 people

	TURKEY			GAP		
Variable	1990	2000	2000/1990	1990	2000	2000/1990
Physician	0,430	0,543	1,26	0,187	0,188	1,01
Practitioner	0,441	0,685	1,55	0,188	0,362	1,93
Dentist	0,183	0,232	1,27	0,057	0,064	1,12
Nurse	0,775	1,027	1,33	0,421	0,607	1,44
Sanitarian	0,360	0,655	1,82	0,258	0,427	1,66
Midwife	0,537	0,612	1,14	0,365	0,367	1,01

(Source: SIS, 1992, PP.101-106; Sağlık Bakanlığı, 2002, pp.31-33)

- **Asphalt road ratio in rural settlements**

The asphalt road ratio in rural settlement in the region is lower than the Turkish average. However, there was an increase in terms of this indicator in the region and its constituent provinces as well as in the country during the last decade. While this ratio is 25.6 percent in 1990 and increased to 45.2 percent in 2000 in the country, it was 19.1 percent and rose to 36.2 percent in the region (see Table 3.14). According to the statistics, the largest amount of investments was made in Gaziantep, so that the asphalt road ratio in this province increased four times from 22.7 percent to 90.7 percent (see Table C.13 in Appendix C).

Table 3.14. Asphalt road ratio and population ratio with adequate drinking water supply in rural settlements

	TURKEY			GAP		
Variable	1990	2000	2000/1990	1990	2000	2000/1990
Asphalt road ratio	25,68	45,23	1,76	19,12	36,24	1,90
Pop. with adequate drinking water supply	71,37	84,98	1,19	53,79	74,44	1,38

(Source: Köy Hizmetleri Genel Müdürlüğü, 1991 and 2001)

- **Population ratio with adequate drinking water supply in rural settlements**

It is well known that the GAP region is the region receiving under average precipitation of nation and suffering from limited ground and surface resources. Therefore, the rural settlements of the GAP region face serious problems in terms of adequate drinking water supply in 1990. Almost half of the rural population in the region had no adequate water supply and there was a big gap between the national and the regional average. However, in the last decade, important improvements was made in the region, so that the percentage of rural population with adequate drinking water supply increased from 53 percent in 1990 to 74 percent in 2000. In the country, it was 71 and 84, respectively (see Table 3.14).

3.3.4.4. Evaluation

The GAP was prepared as a multi-sectoral, integrated regional development project and aimed to accelerate the socio-economic improvement of the GAP region. Therefore, large amounts of investments were made for various economic and social projects during the last decade. It was expected that in concurrence with agricultural development, there would be an increase in the income level of the individuals, an improvement in demographic structure, and would result in an overall socio-economic development. Subsequently, the Section 3.3.4 examined the changes due to the project, in the basic characteristics of the GAP region and its constituent provinces in comparison to Turkey, in terms of the socio-demographic, economic, and infrastructure and service related variables.

In summary, it can be noted that, in absolute terms, the picture in the region was traditionally negative in every respect compared to the whole country. In other words, the national averages were better than regional averages in terms of all socio-economic indicators.

Table 3.15. Improvement in the GAP Region in Absolute terms

No	Variable	2000/1990	
25	Total private motor vehicle	2,61	
28	Non-agr. female labor force	2,17	
24	Electricity consumption	1,97	
22	Total bank deposits	1,96	
33	No of practitioner	1,93	
38	Asphalt road ratio	1,90	
16	Sch. ratio of girls in sec. edu	1,86	
36	No of sanitarian	1,66	
23	Total bank credits	1,63	
15	Sch. ratio of sec. edu	1,55	
35	No of nurse	1,44	
17	Sch. ratio of boys in sec. edu	1,43	
39	Pop. with adequate drinking water supply	1,38	
10	Female literacy ratio	1,34	
13	Sch. ratio of girls in pri. edu.	1,26	
9	Total literacy ratio	1,21	
12	Sch. ratio in pri. edu.	1,19	
27	Non-agr. labor force	1,15	
14	Sch. ratio of boys in pri. edu.	1,15	
29	Non-agr. male labor force	1,14	
11	Male literacy ratio	1,14	
1	Urbanization level	1,13	
34	No of dentist	1,12	
30	No of teac. per stud. in prim.edu.	1,09	
21	GDP in commercial sector	1,01	
37	No of midwife	1,01	
32	No of doctor (specialist)	1,01	
8	Proportion of 0-14 age group	0,91	
5	Total age dependency ratio	0,86	
6	Youth dependency ratio	0,84	
3	Infant mortality rate	0,70	
26	Unemployment	1,55	
7	Elderly age dependency ratio	1,14	
2	Fertility rate	1,06	
4	Household size	1,02	
20	GDP in agricultural sector	0,98	
18	GDP	0,96	
19	GDP in industrial sector	0,81	
31	No of teac. per stud. in secon.edu.	0,79	

IMPROVEMENT

RECESSION

(Source: Table 3.4-3.14)

However, the GAP region performed an improvement in absolute terms between 1990 and 2000 for all of the indicators except unemployment rates, elderly age dependency ratio, fertility rate, household size, GDP p.c., GDP p.c. in industrial and agricultural sectors, and the number of teachers per thousand students in secondary education (see Table 3.15). The highest "improvement" was for the number of private motor vehicle p.c. and non-agricultural female labor force, with more than 2 times of increased compared to 1990. Those with improvement level between 1.5 and 2.0 were about infrastructure, per capita bank deposits and credits, health services, and schooling ratios in the secondary education. On the other hand, the highest "recession" in the region was for the unemployment rate (more than 1.5 times); followed by the number of teachers per student in secondary education and GDP p.c. in industrial sector; and to a lesser degree, in GDP p.c. and GDP p.c. in agricultural sector, and some of the demographic variables, such as fertility rate and household size.

CHAPTER 4

METHODOLOGY

Since the objective of the study is to examine the regional inequality in Turkey, we have to make a choice with respect to the inequality index to employ. For many years, many statisticians, mathematicians and economists have developed a variety of measures for the purposes of determining the degree of inequality especially in the income distribution. Percentile ratios – e.g., 95th-to-20th percentile household income ratios – and the proportion of households in various income classes are some of the simple measures that can be used. These are mostly based on income data. There are many other, both simple and complicated measures that can be used for other variables other than income (Ryscavage, 1999, pp.24-34).

"Of course, there can be no single 'best' index of inequality since there are a number of distinct aspects of inequality in which one may be interested and some coefficients are more suited to reflect one aspects and some another" (Champernowne, 1974, p.787). However, there are a number of criteria that play central role in inequality analysis, in terms of theory as well as practical application. These criteria are also used to classify inequality measures in terms of their acceptability. Therefore, in this part, firstly, we attempt to explore the underlying criteria for the selection of appropriate inequality measures, and then we discuss the nature and properties of well-known inequality measures in the literature with respect to these criteria.

4.1. Criteria for the Selection of Good Measures of Inequality

There are a number of criteria while selecting measures of inequality for comparison (Akita et al., 1999; Allison, 1978; Atkinson, 1980; Bourguignon, 1979; Champernowne, 1974; Estudillo, 1997; Glewwe, 1986; Osberg, 1984; Ryscavage, 1999; Sen, 1997; Shorrocks, 1980; Tsakloglou, 1993). These can be explained as follow:

1. *Range from zero to one*. This condition requires that the index must take the value 'zero' for all distributions in which all individuals have identical scores, and a positive value when two or more individuals differ. If one man always receives everything and the others get nothing, the index has its maximum value 'one'.

2. *Invariance with respect to increase or decrease of the size of variable (mean independency)*. More precisely this is the requirement that the value of index should be unaffected when pairs of variable are all multiplied by the same positive scalar. For example, if each income is multiplied by, say 5%, the inequality should be the same "...since, in absolute amounts, the rich benefits more than the poor" (Allison, 1978, p. 866). On the other hand, if a positive constant is added to each pairs of variable, the inequality should be decreased.

3. *Invariance with respect to the number of persons (population-size independency)*. According to this criterion, the index should be unchanged if we keep the proportionate distribution of persons unchanged, even if the total number of persons increase or decrease.

4. *Pigou-Dalton principle of transfers*. This criterion was developed by Dalton and can be stated as: if a transfer of $h>0$ is made from a person with income y_i to another with lower income y_j (where $y_i-h>y_j+h$), then inequality decreases. In other words, any positive transfer from a richer person to a poorer person, other things remaining the same, always reduces the index of

inequality, regardless of how poor or rich or the amount of income transferred. This appears to be an attractive and quite reasonable criterion.[14]

However, it is also important to examine the relative sensitivity to transfers of inequality measures which satisfy the principle of transfers, because there are important differences in sensitivity to transfers at different levels of variable among the inequality measures. For example, while some measures are sensitive to transfers at all levels of income, others are sensitive to only transfers at high levels or transfers on the same side of the mean (Atkinson, 1980, p.31). These differences in sensitivity provide a basis for the selection of inequality measures. For instance, if one is most concentrated about changes in inequality at high-income levels, he should choose the inequality measure most sensitive at high-income levels.

5. *Decomposability*. This criterion corresponds to some kind of 'aggregativity' property and permits some decomposition of the total inequality. A decomposable inequality measure can be defined as a measure such that the total inequality of a population is the sum of the inequality 'within' its groups, weighted by coefficients depending on their aggregate characteristics, and of the inequality 'between' them.

   "The main idea behind decomposability of inequality measures can be traced to the *analysis of variance* (or ANOVA), a traditional method of evaluating 'how much' of the variance in a variable (such as income) can be 'explained' by relevant characteristics (such as age, sex, race, schooling, or work experience). The key formula of ANOVA links overall income variance to 'between-group' and 'within-group' variances" (Sen, 1997, pp. 149,150)

[14] Champernowne says that "Any index which is the arithmetic mean of a strictly convex function of variable certainly satisfies this criterion… Since if f(x) is strictly convex, f(x+h) + f(y-h) > f(x) + f(y) when x>y and h>0 " (Champernowne, 1974, p.790).

An additively decomposable inequality index for *n* individual of a population with income distribution *y* can be expressed as follows:

$$\begin{aligned} I(y;n) &= I_W + I_B \\ &= I(y^1, ..., y^G; n) \\ &= \sum w^G{}_g \, I(y^g; n_g) + I_B \end{aligned}$$

"...where $w^G{}_g$ is the weight attached to subgroup g in a decomposition into G subgroups, and I_B is the between-group term, assumed to be independent of inequality within the individual subgroups" (Shorrocks, 1980, p.614)

It is clear that decomposable inequality measures differ only by the weights given to the inequality within the subgroups of the population. For an income inequality, "Naturally, the most appealing candidates for this weighting system are the population and income shares of the subgroups" (Bourguignon, 1979, p.902-903). When the weights of the within groups' component is income shares, the inequality index is weakly additively decomposable since, e.g., "…the within-group component (even when using a mean-independent measure) will change if all the incomes of one particular group are multiplied by a common factor, k, because the weights change under an income-weighted scheme" (Glewwe, 1986, pp.256-257). Whereas, if the weights are population shares, the inequality index is strictly additively decomposable because a change in the between-group inequality affects the within-groups inequality.

4.2. Inequality Measures

For most of the remainder of the paper, the discussion focuses on the inequality measures most commonly used in the empirical studies. These include the following eight measures: The range, the relative mean deviation, the variance and the coefficient of variation, the variance of logarithms, the Gini coefficient and Lorenz curve, and the Theil's Entropy measure. All inequality measures will be discussed in terms of income distribution inequality.

4.2.1. The range

Consider a population with n individual, i= 1,..., n, and yi is the income score of individual i. If the average level of variable is μ, then (Sen, 1997, p.25):

$$\sum_{i=1}^{n} yi = n\mu$$

The relative share of income belonging to individual i is xi (= yi / Σyi). That is:

$$yi = n\mu xi.$$

"Perhaps the simplest measure is based on comparing the extreme values of the distribution, i.e., the highest and the lowest income levels. The range can be defined as the gap between these two levels as a ratio of mean income" (Sen, 1997, p.24). Then, the range E can be written as:

$$E = (Maxi\ yi - Mini\ yi) / \mu$$

When we consider the criteria above, firstly, it can be said that when all individuals receive identical income, then E = 0. On the other hand, when one individual have all the income and the rest gets nothing, then E = n. Generally, E ranges from 0 to n.

However, it is very clear that there are difficulties with this measure of inequality in terms of invariance with respect to variable and population. The index E "…ignores the distribution in between the extremes" and concentrates on the extreme values only (Sen, 1997, p.25). Therefore, it fails to satisfy the conditions of mean and population-size independency and the Pigou-Dalton principle of transfers. For example, the Figure 4.1 shows this deficiency of the range E. "The distribution AA' has a wider range E than BB', but most people under AA' enjoy the mean income μ with only a few aberrations. On the other hand BB' involves a division of the population into two distinct classes of the rich and the poor" (Sen, 1997, p.25). Although these two distributions have totally different structure, it is obvious that both have identical inequality values when the range E's of both distributions are calculated.

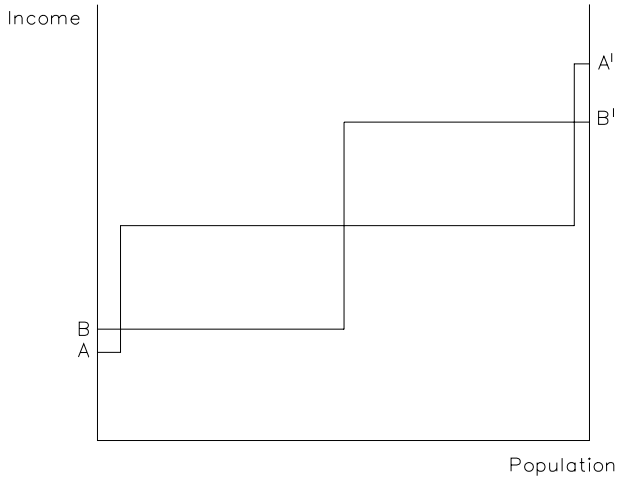

Figure 4.1. Two different income distributions (Source: Sen, 1997, p.25)

4.2.2. The relative mean deviation

Relative mean deviation (MD) represents the averaged sum of the absolute differences from the mean of the distribution. The measure MD compares income y of each individual i to the mean μ for all n individual.

$$MD = (\sum_{i=1}^{n} | y_i - \mu |) / n \quad \text{(Mulligan, 1993, p.350)}$$

"This index used as a convenient substitute for the mean deviation about the median, which would be slightly lower in value" (Mulligan, 1993, p.350). If income is divided absolutely equally MD = 0, if all income is received by only one individual MD = 2(n-1)/n (Sen, 1997, pp.25-26).

Unlike the range E, MD takes into account not only the extreme values but also the entire distribution. Therefore, this inequality measure meets the condition of independency with respect to equal proportional changes in population or income. However, it fails to satisfy the Pigou- Dalton condition, because it is not at all sensitive to any positive transfer from a poorer person to a richer person if both of them are on the same side of the mean. For example, 1 dollar is transferred from the poorest individual to someone richer but having less than the mean. This 1 dollar

transfer "...would add to one gap and reduce another gap by exactly the same amount, and since these gaps are simply added up in the process of arriving..." at MD, the inequality index would not be affected by this transfer (Sen, 1997, p.26).

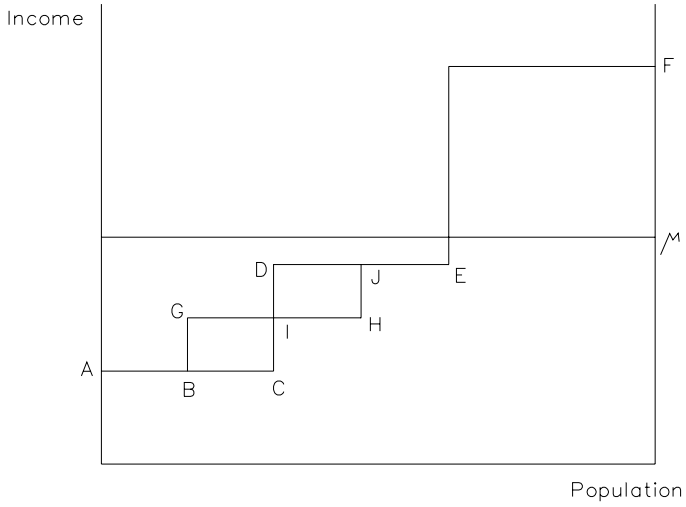

Figure 4.2. Income distribution (Source: Sen, 1997, p.26)

We can see this process in the Figure 4.2. The distribution ABCDEF is transformed into ABGHJEF by income transfer from the poorest to the richer. The level of inequality remains the same because the increase of the gap by BGIC is exactly compensated by the decrease of the gap by DIHJ. As an inequality index, MD is reduced in value when transfers occur across the 'dividing line' of the mean (Sen, 1997, p.26).

4.2.3. The variance and the coefficient of variation

If y_i is the income score of individual i, μ is the arithmetic mean income, and n is the number of people in a society, then the variance of the distribution is calculated as following (Sen, 1997, p.27; Osberg, 1984, p.30):

$$V = \frac{1}{n} \sum_{i=1}^{n} (\mu - y_i)^2$$

In the case of variance, any transfer from a poorer individual to a richer individual, other things remaining the same, always increases the inequality. However, the variance of the income distribution is not particularly a good measure of inequality because it is not independent with respect to equal proportional changes in population or income. Therefore, if we normalize the variance by dividing its square root by the mean income, it would be unaffected by such changes (Osberg, 1984, p.21). The resulting measure is a commonly used measure called as the 'coefficient of variation' (Sen, 1997, p.27; Osberg, 1984, p.30):

$$CV = \frac{\sqrt{V}}{\mu}$$

The coefficient of variation will always register a decline in inequality when an income transfer from a richer person to a poorer person takes place. Because of the way it is constructed, the coefficient of variation is sensitive to income transfers for all income levels. However, it is important to examine the relative sensitivity of the measure at different income levels. In the case of the coefficient of variation, the effect of the transfer "...would be independent of the income level at which it was made. If, therefore, one wanted to give more weight to transfers at the lower end of the distribution then at the top, this measure would not be appropriate" (Atkinson, 1980, p.33).

Theil (1967) attempted to decompose the squared coefficient of variation (CV^2) as between-group and within-group of inequality. But this decomposition had some drawbacks, since within-set components, including their weights, were not independent of the between-set component and the weights do not sum to one. Therefore, it can be said that coefficient of variance fails to satisfy the decomposition property (Theil, 1967, pp.124-125).

This well-known measure is used in a number of recent articles (see, e.g., Long and Ng, 2001; Lyons, 1997; Petrakos, 2000; Shaoguang and Angang, 1999; Tsui, 1991; and Xiaobin, 1996).

4.2.4. Variance of the logarithm

The formulation of the variance of the natural logarithm (L) has similarities with the formulation of variation. However, in this case, the inequality "...is obtained simply by taking the logarithms of each income and computing the variance of the transformed scores" (Allison, 1978, p.867). It is represented simply by the formula:

$$L = \frac{1}{n} \sum_{i=1}^{n} (\log y_i - \log \mu)^2$$

Theil (1967) provides the decomposition of the variance of the logarithm. Consider y_i as the income of the individual i, and n_g as the number of people in set S_g, g = 1,..., G, and $n = \Sigma n_g$ for the total population. If the geometric mean income μ of whole population, and μ_g of set S_g, then (Theil, 1967, pp.123-124)[15]:

$$\log \mu = \frac{1}{n} \sum_{i=1}^{n} (\log y_i)$$

$$\log \mu_g = \frac{1}{n_g} \sum_{i \in S_g} (\log y_i) \qquad \text{,where g = 1,...,G.}$$

Both are connected by the formula:

$$\log \mu = \sum_{g=1}^{G} \left(\frac{n_g}{n} \log \mu_g \right)$$

Next, the variance of the logarithms of the income:

$$\frac{1}{n} \sum_{i=1}^{n} (\log y_i - \log \mu)^2 = \frac{1}{n} \sum_{i=1}^{n} [\log (y_i / \mu)]$$

which can be decomposed as follows:

$$\frac{1}{n} \sum_{g=1}^{G} \sum_{i \in S_g} [(\log y_i - \log \mu_g) + (\log \mu_g - \log \mu)]^2$$

[15] In his book (1967), Theil uses the symbols z_i as the income of individual i, and Z as the geometric mean income. However, for the consistency with the explanations of the previous inequality measures, I use y_i for the income of individual i, and μ for the geometric mean income.

This equals to:

$$L = \frac{1}{n}\sum_{i=1}^{n}[\log(y_i/\mu)]^2 = \sum_{g=1}^{G}\left[\frac{n_g}{n}(\log(\mu_g/\mu))^2\right] + \sum_{g=1}^{G}\left[\frac{n_g}{n}\left[\frac{1}{n_g}\sum_{i\in S_g}(\log(y_i/\mu_g))^2\right]\right]$$

In the equation above, the first term to the right of the equality sign refers to the between-group inequality, while the following term refers to the weighted average of the within-group inequality. The weights are equal to the population shares, n_g/n; therefore the inequality measure L is strictly additively decomposable inequality index (Theil, 1967, p.124; Glewwe, 1986, p.258; Estudillo, 1997, p.75) .

One advantage of taking logarithm, "… in contrast with taking the variance or the standard deviation of actual values, is that it eliminates the arbitrariness of the units and therefore of absolute levels…" (Sen, 1997, pp.28-29). Thus, the scale-invariance problem of the variance is eliminated.

Another difference with the coefficient of variation is that, here, the deviation is taken from the geometric mean rather than from the arithmetic mean but in the income distribution literature using geometric mean seems more seldom. Because, "its disadvantage is that the variance of the income logarithms is the second moment extension of the geometric mean of the individual incomes. The arithmetic mean (the per capita income) is more convenient, because it is directly related to total (national) income. The information measure is preferable in this respect, because it deals with (deflated) per capita income" (Theil, 1967, p.124).

On the other hand, like the CV, the L is mean and population-size independent, since it is unaffected by equal proportional increases in all incomes or population. In addition, another advantage of this measure is its sensitivity to transfers at all income levels when Pigou-Dalton principle is considered. However, since "...incomes are expressed in logarithms, high incomes are compressed so that deviations from the mean income are accentuated at the bottom of the distribution. Consequently, changes in the bottom half of the income distribution will have a greater impact on

this measure than those in the upper half" (Ryscavage, 1999, p.38). Besides, at very high-income levels (greater than 2,718 times the geometric mean), any transfer of income from a poorer person to a richer person decreases the inequality (Allison, 1978, p.868). In summary, although the variance of logarithms is mean and population independent, it violates the basic condition of Pigou-Dalton condition when relatively high incomes are involved.

This inequality measure has been used in a number of recent articles (see, e.g., Akita et al., 1999; Estudillo, 1997; Glewwe, 1986; Tsakloglou, 1993).

4.2.5. The Gini coefficient and Lorenz curve

The Gini coefficient (G) is the most widely used aggregate measure of inequality for the whole population in an economy (Bhatta, 2001; Deininger and Squire, 1998; Estudillo, 1997; Glewwe, 1986; Kanbur and Zhang, 1999; Mayer, 2001; Morril, 2000; Papanek and Kyn, 1986; Persky and Tam, 1994; Suarez and Roura, 1993; and Tsui, 1991). It is defined as the ratio between the average absolute differences between all possible pairs of income in a population. The Gini concentration ratio may be defined as (Allison, 1978, p.867):

$$G = \frac{\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j|}{2\mu}$$

where, yi and yj are the incomes of the ith and jth individuals (or households), μ is the average income, and n is the number of individual (or households) in a population.

The G index also has a popular graphical interpretation called 'Lorenz curve'. Lorenz curve draws cumulative percentage distributions of the numbers of household incomes in the 'vertical axis' corresponding to cumulative percentage distributions of the numbers of households in the 'horizontal axis' ranked according to household incomes from the bottom to the top (See Figure 4.3). The G index is equal to the ratio

of the area between the diagonal line OB of absolute equality and the Lorenz curve to the triangular region OAB.

When the income is equally distributed in the population, the G index takes the minimum value ‘zero’; and Lorenz curve would coincide with the diagonal line OB (perfect equality). By contrast, if one person (or households) receives all the income, and the others get nothing, the index have its maximum value ‘one’; and the Lorenz curve would follow the right-angled line 0AB (perfect inequality). Thus, The G index satisfy the condition that requires the range from zero to one.

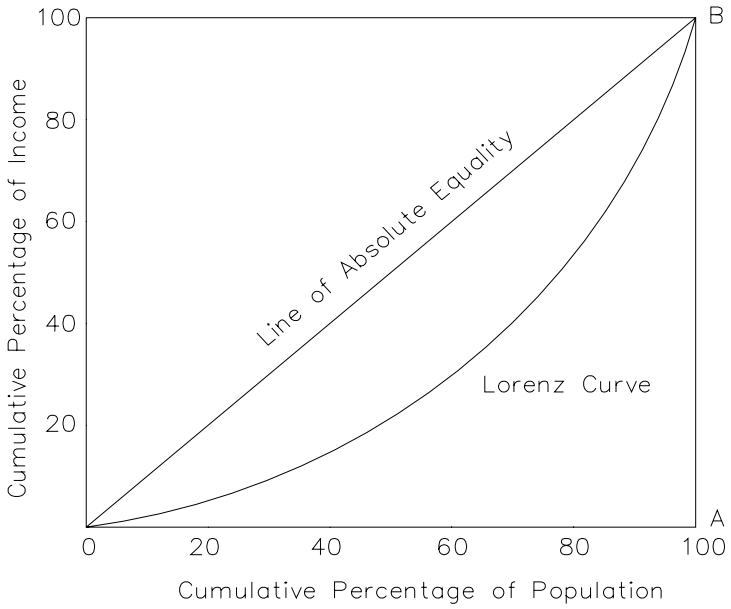

Figure 4.3. Lorenz curve

The G coefficient is widely used by income economists because it satisfies the mean and population-size independency property, requiring that any proportional changes in income or population do not change the inequality level; and the Pigou- Dalton condition, where the index is reduced for any transfers from the rich to the poor.

However, G is more sensitive to changes that occur in the middle ranges of income distribution than among the very poor or the very rich, since its sensitivity to transfers depends on household's rank rather than their numeric scores. Thus, "an income transfer of a certain amount will have a much greater impact in the middle because there are more households involved than a similar transfer of income at the lower or upper ends of the distribution" (Ryscavage, 1999, p.39).

On the other hand, this index has serious drawback that it fails to satisfy the additively decomposability condition, which requires that total inequality is expressed as the sum of the within- and between-group inequality.

4.2.6. Theil's inequality indices

The Theil's index of inequality was proposed by Theil (1967), using the notion of entropy discussed in information theory. As pointed out by Theil (1967, pp.91-92), if there are N individuals in a society and their income shares are y_i ($i= 1,...,N$), then the entropy of the income shares $y_1, ..., y_N$ is

$$H(y) = \sum_{i=1}^{N} y_i \log \frac{1}{y_i}.$$

He asks "Does information theory supply us with a 'natural' measure of income inequality among N individuals which is based on these y's?" (Theil, 1967, p.91) The equation above show that, in the complete equality case, where all individuals earn the same income $(y_i = 1/n)$, the index takes its minimum value *zero*. On the other hand, in the complete inequality case, where one individual's income is equal to total income ($y_i=1$), all others earning nothing at all ($y_j=0$), the index takes the maximum value of *logN*. Therefore, "*H(y)* is nothing else than the entropy of the income shares $y_1, ..., y_N$" (Theil, 1967, p.91) and it looks like a measure of equality.

Then, he suggests that there are G sets S_1, …, S_G and each individual belongs to exactly one such set. If N_g is the population of S_g (g=1, …, G), then the total entrophy is as follows (Theil, 1967, p.93):

$$H(y) = \sum_{g=1}^{G} \left[\sum_{i \in S_g} y_i \log \frac{1}{y_i} \right]$$

Then, he decomposes this equation as between-set and within-set entropy:

$$H(y) = \sum_{g=1}^{G} y_g \log \frac{1}{y_g} + \sum_{g=1}^{G} y_g H_g(y)$$

where, $H_g(y) = \sum_{i \in S_g} \frac{y_i}{Y_g} \log \frac{1}{y_i / Y_g}$, Y_g is the income share of S_g.

The way he passes from the notion of entropy to 'inequality' is as follows. He modifies the entropy *H(y)* of an income distribution by subtracting *H(y)* from its maximum value of *logN,* which indicates equality maximum. Then, he obtains the index of inequality (Theil, 1967, p.91):

$$LogN - H(y) = \sum_{i=1}^{N} y_i \log N y_i .$$

This shows clearly that the inequality index takes the value of 0 when there is complete equality, and LogN when there is complete inequality. When he decomposes the inequality index above as between-set and within-set inequality, he gets:

$$\sum_{i=1}^{N} y_i \log \frac{y_i}{1/N} = \sum_{g=1}^{G} Y_g \log \frac{Y_g}{N_g / N} + \sum_{g=1}^{G} Y_g \left[\sum_{i \in S_g} \frac{y_i}{Y_g} \log \frac{y_i / Y_g}{1/N_g} \right]$$

where, the population shares Ng/N are the prior probabilities, while the income shares Y_g are the posterior probabilities. Therefore, the expected information of the indirect message transforms the population shares into the income shares.

Up to now, we see that how Theil developed the inequality index using the notion of entropy discussed in information theory. There are two inequality indices purposed by Theil: Theil's index T and the Theil's index J.

The first inequality index T is the same with the inequality index derived from the notion of entropy discussed above. If the concern is income inequality in a society again, the Theil's index T can be measured as follows:

$$T = \sum_{i=1}^{G} y_i \log(y_i/p_i),$$

where p_i is the population share of the group i and y_i is income share. The index T uses income shares as weights.

In order to use the property of decomposability of the index T, which allows examining the magnitudes and trends in inequality among groups as well as within groups, we can group the population on the basis of, e.g., income intervals, age, sex, race, occupations, region, the level of education, and so on. If N individuals in a society are divided into G (1,2,..., G) groups where N_g denotes the number of people in group g , then (Quadrado et al., 2001a and 2001b; Theil, 1967 and 1989):

$$N = \sum_{g=1}^{G} N_g$$

If p_g denotes the population share of group g and y_g is the income share of that group ($p_g = \sum_i p_i$ and $y_g = \sum_i y_i$), the index T given in equations above can be decomposed into the between and within-group inequality as follows:

$$T = \sum_{g=1}^{G} y_g \log(y_g/p_g) + \sum_{g=1}^{G} y_g (T_g) = T_B + T_W$$

where,

$$T_g = \sum_{i \in p_g} (y_i/y_g) \log [(yi/y_g) / (pi/p_g)]$$

The within-group inequality is independent of between-group inequality. Moreover, in the case of the index T, the prior probabilities are the population shares p_i, while the posterior probabilities are the income shares y_i. Therefore, the expected information of the indirect message transforms the population shares into the income shares.

The second inequality index J is analogous to the measure discussed above. It is known as 'Theil's second inequality index' in the literature, which is the natural logarithm of the ratio of arithmetic to the geometric mean income of the distribution (Anand and Kanbur, 1993, p. 39; Theil, 1989, p.147).

This inequality measure is similar with the Theil's index T with the exception of the roles of the population and income shares. In this case, "the expected information content of the indirect message which transforms the income shares as prior probabilities into the population shares as posterior probabilities" (Theil, 1967, p. 125).

Using the same notations above, the Theil's index J can be measured as follows (Theil, 1989, p.147):

$$J = \sum_{i=1}^{G} p_i \log(p_i/y_i),$$

In this case, the weights are the population shares. The equation above can be decomposed into the between and within-group inequality as follows (Theil, 1989, p.147):

$$J = \sum_{g=1}^{G} p_g \log(p_g/y_g) + \sum_{g=1}^{G} p_g (J_g) = J_B + J_W$$

where,

$$J_g = \sum_{i \in p_g}^{G} (p_i/p_g) \log [(pi/p_g) / (yi/y_g)]$$

If the Theil's inequality indices T and J are examined in terms of the criteria that should be met by an inequality index, both of the index T and J satisfy the property of mean independency, requiring that the index should not change when all incomes change proportionally; and the property of population-size independency, requiring that the index remains unchanged if the number of people at each level of groups is changed by the same proportion.

Moreover, it should be noted that the weighting structure also provides a criterion for the measures that can be decomposable. The Theil's indices are the only inequality indices "...with sum up exactly to 1. The sum of the weights for the other measures exceeds or falls short of unity by an amount proportional to the between-group term, clouding the interpretation of the within-group term" (Sen, 1997, p.155).[16]

Finally, both of the inequality indices T and J satisfy the criterion of the Pigou-Dalton principle of transfers; that is, any income transfer from a richer to a poorer person implies a decline in the values of the both inequality indices. "The size of the change in the Theil' index of inequality for any given transfer of income, however, depends on the changes in the *ratio to* average income of the incomes of the individuals involved in the transfer" (Osberg, 1984, p.23).

The Theil's indices of T and J exhibit a difference in this case. While the index T is more sensitive to changes in the richer groups, the index J is more sensitive to changes in the poorer groups (Akita et al., 1999, pp.204-205; Akita, 2003, p.59, Estudillo, 1997, p.74). In other words, if income transfers occur in the lower end of the distribution, similar to the variance of the natural logarithm, it will have their greatest affect on the index J. Whereas the index T will be affected mostly when an income transfer occurs in the upper end of the distribution; because the total within-group inequality is largely dominated by the inequality within a group which have larger share (Theil, 1967, p.126)

Another difference between the Theil's indices T and J is that, as it is stated above, in the calculation of total inequality *T*, the within-group inequality is weighted by that group's income share (y_g); whereas, in the calculation of total inequality *J*, the within-group inequality is weighted by that group's share of total population (p_g). Therefore, the former is weakly decomposable inequality index, which means the elimination of inequalities between groups affects the value of the within groups components; whereas the latter is strictly decomposable inequality index, which

[16] For example, the weights of another decomposable inequality measure 'squared coefficient of variation' do not sum to 1.

means the elimination of the inequalities between groups leaves the within group component unchanged as the population shares used as weights do not change (Akita et al., 1999, p.205; Glewwe, 1986, p.258; Tsakloglou, 1993, p.56).

Furthermore, Theil's starting point was the Entropy *H(y)* which is regarded as income equality. In order to get the income inequality measure, he subtracted *H(y)* from its maximum value of *logN*. This is all right for the index T since the index uses the population shares as prior probabilities and income shares as posterior probabilities. However, in the case of the index J, "…we have to take the income shares…as prior probabilities and transform them to the population shares … as posterior probabilities. The simple entropy concept does not work; we have to apply the indirect message idea immediately. Also, one may argue that it is against intuition not to take the equal population shares as a starting point but to consider them as 'posterior'" (Theil, 1967, p.127).

As a conclusion, the Theil's indices have the following properties: (1) they can be decomposed into between-group inequality and within-group inequality, (2) they are 'mean independent', (3) they are 'population-size independent', and (4) they satisfy the principle of transfers of Pigou-Dalton. The Theil's indices have been used by many economists to decompose the overall increase in inequality into between groups' and within groups' inequality (see, e.g., Akita et al., 1999; Akita, 2003; Estudillo, 1997; Glewwe, 1986; Quadrado et al., 2001a and 2001b; Park, 2000; Theil, 1967, 1972 and 1989; Tsakloglou, 1993; Tsui, 1993; and Ying, 1999).

4.2.7. Comparisons of the Inequality Measures

In this chapter, we discussed the well-known inequality measures and try to explore the criteria for the selection of indices for our analyses. According to the many economists (such as, Akita et al., 1999; Allison, 1978; Atkinson, 1980; Bourguignon, 1979; Champernowne, 1974; Estudillo, 1997; Glewwe, 1986; 1984; Sen, 1997; Shorrocks, 1980; Theil, 1967 and 1972; Tsakloglou, 1993; Ryscavage, 1999), a suitable inequality measure should satisfy four properties: (a) mean independency,

requiring that if all incomes are multiplied by a constant, the inequality remains unchanged; (b) population-size independency, implying that when the number of people in each group is changed by the same proportion, the inequality remains constant; (c) the Pigou-Dalton Principle, requiring that any income transfer from poorer to richer represents an increase in the inequality index; (d) additively decomposability, requiring the total inequality can be written as the sum of the between and within group inequality. When we require the above stated first three criteria to hold for all possible partitions of the population, then this leaves four measures: the coefficient of variation, the variance of logarithms, the Gini coefficient and the Theil's inequality indices.

Table 4.1. Properties of Inequality Measures

Inequality Measure	Mean independency	Population-size independency	Pigou-Dalton Condition	Additive Decomposability
Range	No	No	No	No
Relative mean deviation	Yes	Yes	No	No
Variance	No	No	No	No
Coefficient of variation	Yes	Yes	Yes	No
Variance of the logarithm	Yes	Yes	Yes	Yes
Gini coefficient	Yes	Yes	Yes	No
Theil's indices	Yes	Yes	Yes	Yes

The Gini index is a well known and the most commonly used inequality index; however, due to its failure to satisfy the decomposability property, it does not provide any special advantages over the other three measures. On the other hand, although the coefficient of variation has a decomposability property, within-set components are not independent of the between-set components, and the weights do not sum to 1. Thus, when we take into consideration all criteria, there are only two inequality measures to be left; the variance of logarithms and the Theil's inequality indices (see Table 4.1).

However, the variance of the logarithm has a disadvantage of being decomposable around the geometric mean rather than arithmetic mean. In other words, in the case of the income distribution, the variance of the logarithms is the second moment extension of the geometric mean of the individual incomes. Therefore, using geometric mean is more seldom. On the other hand, Theil's indices use the arithmetic mean (the per capita income); so, these indices appear more convenient than variance of the logarithm (Theil, 1967, p.124, and 1972, p.108)

Moreover, in analyzing inequality, it is important to examine the relative sensitivity to transfers of inequality measures which satisfy the Pigou-Dalton Principle, because each inequality measure has differences in sensitivity to transfers at different levels of variable. For example, the Theil's index T and coefficient of variation are more sensitive to transfers at high-income groups, while the Theil's index J and logarithm of variation are more sensitive to transfers at low-income groups. On the other hand, the Gini index is more responsive to changes in distribution among the middle-income groups.

As a result of the comparison of the inequality measures, the Theil's indices seems to be suitable inequality measure according to those properties stated above. However, as was noted before, there are two type of Theil's inequality measure. The first one is the Theil's index T, using income shares as weights, and the second one is the Theil's index J, using population shares as weights. As discussed previously, Theil's starting point was the Entropy. In the index T, this concept works well since the index uses the population shares as prior probabilities and income shares as posterior probabilities. On the other hand, the simple entropy concept does not work in the case of the index J, since we take income shares as prior probabilities and transform them to the population shares as posterior probabilities. Therefore, we chose the Theil's index T as a measure of inequality in this study.

4.3. Selected Case studies: Application of Theil's index T

The Theil's index T has been used by many economists to calculate the inequality with the aim of decomposing the overall change in inequality occurring into between groups and within groups inequality. The methodology chosen to employ in the inequality decomposition depends on the number of the level of the observation units. If one takes the two-level hierarchical structure; e.g., region-province in a country, the one-stage nested Theil's index is carried out. On the other hand, if it is necessary to employ three or more level hierarchical structure; e.g., region-province-district; then, the two-stage nested Theil's index should be used. In the two-stage nested analysis, one obtains within-province inequality measures, as well as the between-region and between-province inequality measures (see, e.g., Akita, 2003).

There have been numerous studies on inequality in different countries, reflecting continued interest in how development benefits are distributed among different population subgroups and regions. In this section, we will deal with some of them using the inequality index T (e.g., Theil, 1967 and 1972; Glewwe, 1986; Tsakloglou, 1993; Estudillo, 1997; Akita et al., 1999; Ying, 1999; Park, 2000; Akita, 2003) in the literature.

4.3.1. Application of the One-Stage Nested Theil's Decomposition Method

One-Stage Nested Theil's Decomposition Method is the most widely used method to measure the between groups and within groups inequality. If we take income as a variable to measure the inequality in a society, p_i and y_i is the population and income share of class i, the formulation of the index T is:

$$T = \sum_{i=1}^{G} y_i \log(y_i/p_i),$$

This provides the overall income inequalities in a society. If p_g denotes the population share of group g and y_g is the income share of that group ($p_g = \sum_i p_i$ and

$y_g = \sum_i y_i$), the overall inequality equation above can be decomposed into the between and within-group inequality as follows:

$$T = \sum_{g=1}^{G} y_g \log(y_g/p_g) + \sum_{g=1}^{G} y_g \left(\sum_{i \in p_g}^{G} (y_i/y_g) \log [(y_i/y_g) / (p_i/p_g)] \right)$$

4.3.1.1. Theil's books 'Economics and Information Theory' (1967) and "Statistical Decomposition Analysis" (1972) became the main sources for the inequality studies. In his books, he took into account the inequality measures in detail and developed a decomposable inequality measure called by his name 'Theil's index'. He provided two examples of inequality decomposition using the samples of the US population and the sample of the world population.

4.3.1.1-a In one of his analysis (Theil, 1967 and 1972), he purpose to explore income inequality among the states of the United States between 1929 and 1961. The income concept used is the state personal income. He applied the index T to n=49 states of the United States by aggregating them into eight sets of states: New England (consisting of 6 states), Middle east (6), Great Lakes (5), Plains (7), Southeast (12), Southwest (4), Rocky Mountain (5), and Far West (4).

The numerical results of the analysis show that there was considerable reduction in overall inequality *T* from 0.0718 in 1929 to 0.0197 in 1961. This trend is also observed in the between and in the within-sets inequalities as well. Moreover, it is realized that the contribution of the between-set inequality to the overall inequality is always higher than that of the within-set inequality, which ranges from 77.9 % to 83.6 %, but it exhibits a considerable reduction after 1955 from 80.3 % to 77.9 % (see Table 4.2).

Table 4.2. Income Inequality in the United States, 1929-1961

Year	Overall Inequality T	Between-Set Inequality T_B	Within-Set Inequality T_W	T_B/T (%)
1929	0.0718	0.0592	0.0125	82.5
1930	0.0795	0.0665	0.0130	83.6
1935	0.0607	0.0503	0.0104	82.8
1940	0.0587	0.0477	0.0104	82.3
1945	0.0267	0.0220	0.0047	82.4
1950	0.0256	0.0210	0.0046	82.1
1955	0.0220	0.0176	0.0043	80.3
1960	0.0200	0.0158	0.0041	79.2
1961	0.0197	0.0153	0.0044	77.9

(Source: Theil, 1967, p.103)

4.3.1.1-b. In another study in the book (Theil 1967 and 1972), Theil aims to examine the income inequality among countries for the years 1949, 1957, and 1976. For the first two years, the income data are the estimates of the past realization. For the last year, the income data are conditional forecasts. In this analysis, he groups 54 countries of the world into six set: North America and Northwest Europe (including 13 countries), Southern Europe (4), Near East (6), Africa (5), Asia (8), and Latin America (18).

The results of the analysis indicate that the overall inequality decreases slightly from 0.530 in 1949 to 0.526 in 1957, but is expected to increase to 0.576 in 1976. The contribution of the between-set inequality to overall inequality is on the increase and accounts for a larger proportion of the total, which ranges from 86% to 94.6%. When the regional inequality values are examined, it is seen that North America and Northwest Europe, Africa and Latin America have a regular decrease in income inequality; for the other cases, this regularity cannot be said (see Table 4.3).

Table 4.3. Income Inequality Among 54 Countries, 1949,1957,1976

	1949	1957	1976
Total inequality	0.530	0.526	0.576
Between-set inequality	0.456	0.462	0.545
Within-set inequality	0.074	0.064	0.031
Inequality within			
N.America and Northwest Europe	0.077	0.062	0.021
Southern Europe	0.034	0.013	0.061
Near East	0.041	0.166	0.083
Africa	0.051	0.038	0.012
Asia	0.040	0.061	0.027
Latin America	0.145	0.089	0.080
% of between-set inequality in total	86.0	87.9	94.6

(Source: Theil, 1967, p.109)

4.3.1.2. Ying (1999), in his paper 'China's changing regional disparities during the reform period', purposes to examine the regional inequalities between 1978 and 1994, using provincial per capita income. He utilizes the index T and he groups the 30 provincial units of China into two sets: coastal provinces and noncoastal (interior) provinces.

The main conclusion of the study is that the overall inequality T decreases from 0.069 in 1978 to 0.037 in 1990; then, starts to increase, reaching 0.047 in 1994. When the regional decomposition of the inequality is examined, it is seen that the between-region inequality stays generally constant around 0.11 until 1986. However, by 1988, it starts to increase and becomes 0.026 in 1994. The within-region component T_W has always a falling trend between 1978 and 1994 (from 0.057 to 0.021). Moreover, it is realized that the contribution of the within-region inequality to overall inequality decreases from 82.6 % to 44.9 % (see Table 4.4).

Table 4.4. Inequality Decomposition by Theil's Index T in China

Year	Overall Inequality T	Between-Region Inequality T_B	Within-Region Inequality T_W	T_W/T (%)
1978	0.069	0.012	0.057	82.6
1980	0.060	0.011	0.049	81.3
1982	0.050	0.011	0.038	77.3
1984	0.045	0.011	0.034	75.0
1986	0.044	0.012	0.032	71.9
1988	0.042	0.015	0.027	65.1
1990	0.037	0.014	0.024	63.9
1992	0.042	0.021	0.021	50.9
1994	0.047	0.026	0.021	44.9

(Source: Ying, 1999, p.62)

4.3.1.3. 'A note on North-South inequality, 1960-1995' of D. Park (2000) is one of the study using the index T as an inequality measure. The aim of the study is to examine trends in inter-country income inequality during the period 1960-1995. The sample consists of 133 countries and territories, and he divides the sample into the North (23 developed countries) and the South (110 developing countries) in order to examine the evolution of global income inequality. He uses the variable, 'per capita incomes' which are estimated on the basis of purchasing power parity rather than exchange rates, because it allows more accurate international comparisons of incomes.

The results show that overall inequality among 133 countries remains more or less constant during the period under study, falling from 0.5117 in 1960 to 0.5046 in 1995. Moreover, it is realized that North- South inequality T_B (which ranges from 67% to 75 %) dominates the weighted within-region inequality T in the overall inequality. North-South inequality T_B does not change perceptibly (a rise from 0.3668 in 1960 to 0.3796 in 1995, with a wave in time) (see Table 4.5).

Weighted within- region inequality T_W increases from 0.1449 in 1960 to 0.1748 in 1980; then it decreases from 0.1748 in 1980 to 0.1250 in 1995 (see Table 4.5).

However, inequality within North appears to decrease significantly and steadily from 0.0884 to 0.0150 between 1960 and 1995. On the other hand, inequality within South rises from 0.2304 in 1960 to 0.3520 in 1980, and then declines to 0.2432 in 1995 (see Table 4.5).

Table 4.5. International Income Inequality by Regions, 1960-1995

Year	Overall inequality T	North-South inequality T_B	Weighted within-region inequality T_W	$\frac{T_B}{T}$ (%)	Inequality within-region T_G	
					North (n=13)	South (n=110)
1960	0.5117	0.3668	0.1449	71.7	0.0884	0.2304
1965	0.5479	0.3995	0.1484	72.9	0.0638	0.2795
1970	0.5448	0.3976	0.1472	73.0	0.0366	0.3088
1975	0.5367	0.3625	0.1742	67.5	0.0279	0.3610
1980	0.5294	0.3546	0.1748	67.0	0.0253	0.3520
1985	0.5133	0.3559	0.1574	69.3	0.0260	0.3053
1990	0.5320	0.3842	0.1478	72.2	0.0179	0.2951
1995	0.5046	0.3796	0.1250	75.2	0.0150	0.2432

(Source: Park, 2000, p.178)

4.3.1.4. With the study of 'Decomposing Regional Income Inequality in China and Indonesia Using Two-stage Nested Theil's Decomposition Method', Akita (2003) aims to apply and present the two- stage nested Theil's decomposition method to regional income inequality in China and Indonesia, using GDP per capita. As a prelude to the two-stage nested Theil's Decomposition analysis, he applies the one-stage nested Theil's decomposition method. He uses province-level GDP and population data for the one-stage analysis, and district level data for the two-stage analysis. Here, the one-stage nested Theil's decomposition analysis is taken into account.

In the case of China, he uses the data belonging to the years between 1990-1997 for the one-stage Theil, and divides China into four regions. In the case of Indonesia, the study period for the one-stage analysis is 1993-1997, and Indonesia is divided into five regions.

The results of the one-stage analysis, in the case of China shows that the overall income inequality T increases significantly from 0.057 in 1990 to 0.088 in 1994. But, after 1994, it becomes stable at around 0.085. The significant increase in overall inequality T between 1990 and 1994 is due entirely to an increase in the between-region component T_B (from 0.035 to 0.064). In contrast, the within-region component T_W was quite stable. Thus, the percentage contribution of the between-region inequality increased from 61% in 1990 to 73% in 1994 (see Table 4.6).

Table 4.6. Inequality Decomposition by Theil's Index T
for China 1990-1997

Year	Overall inequality T	Between-region inequality T_B	Within-region inequality T_W	$\frac{T_B}{T}$ (%)
1990	0.057	0.035	0.022	61.4
1991	0.064	0.041	0.023	64.1
1992	0.075	0.050	0.025	66.7
1993	0.084	0.059	0.025	70.2
1994	0.088	0.064	0.024	72.7
1995	0.086	0.063	0.023	73.3
1996	0.083	0.061	0.022	73.5
1997	0.085	0.062	0.023	72.9

(Source: Akita, 2003, p.74)

In the case of Indonesia, when the mining sectors are included, overall regional inequality T decreases slightly from 0.181 in 1993 to 0.172 in 1997. However, when mining sector is excluded, it increases slightly from 0.144 to 0.149. This reflects the declining importance of the mining sectors in regional economic development in Indonesia. In contrast to China, the within-region inequality T_W contributed to about

88% of the overall inequality, whether including or excluding the mining sectors (see Table 4.7).

Table 4.7. Inequality Decomposition by Theil's Index T
for Indonesia 1993-1997

	Including mining sectors				Excluding mining sectors			
Year	Overall inequality T	Between-region inequality T_B	Within-region inequality T_W	T_W/T (%)	Overall inequality T	Between-region inequality T_B	Within-region inequality T_W	T_W/T (%)
1993	0.181	0.023	0.158	87.3	0.144	0.015	0.129	89.6
1994	0.179	0.023	0.156	87.2	0.144	0.016	0.128	88.9
1995	0.176	0.022	0.154	87.5	0.146	0.015	0.131	89.7
1996	0.173	0.021	0.152	87.9	0.147	0.016	0.131	89.1
1997	0.172	0.021	0.151	87.8	0.149	0.017	0.132	88.6

(Source: Akita, 2003, p.74)

4.3.1.5. In his paper 'The distribution of income in Sri Lanka in 1969-70 and 1980-81', Glewwe (1986) purpose to analyze the income inequality in Sri Lanka. He uses both income and expenditure data from the Socio-Economic Surveys undertaken in 1969-70 and 1980-81. He chooses the three measures of inequality for the group decompositions: the two Theil's index T and J, and the variance of the logarithm of income L. However, here, we will deal with only the inequality index T.

In the study, the basic unit of observation is individual under the assumption that household income is distributed evenly among all household members. Group decomposition is calculated separately by dividing the population: (1) into the three groups by sectors, being the urban, rural, and estate sectors, and (2) into the four groups by ethnic background of the households, being Sinhalese, Sri Lankan Tamils, Indian Tamils, and all other remaining groups, and (3) into the six groups by the educational level attained by the main earner of the household, being those with no education, those with only a primary school education (grades 1-5), those with a middle school education (grades 6-10), those who passed the OGCD examination

(grade 10), those who passed AGCE examination (grade 12), and those with college and post-graduate educations.

The results of the inequality decomposition by sectors, ethnic groups of households or education of main earner, indicate an increase in overall inequality from 0.2561 to 0.3594 between 1969-70 and 1980-81 when income is examined. Whereas, the overall inequality decreases from 0.2158 to 0.1893 when expenditure is examined (see Table 4.8).

Table 4.8. Inequality Decomposition by the Theil's Index T for Sri Lanka

		Income				Expenditure			
	Year	Total Ineq. T	Between-Group Ineq. T_B	Within-Group Ineq. T_W	T_B/T (%)	Total Ineq. T	Between-Group Ineq. T_B	Within-Group Ineq. T_W	T_B/T (%)
By Sectors	1969-70	0.2561	0.0248	0.2313	9,7	0.2158	0.0131	0.2027	6.1
	1980-81	0.3594	0.0199	0.3395	5.5	0.1893	0.0099	0.1794	5.2
By ethnic groups	1969-70	0.2561	0.0044	0.2517	1.7	0.2158	0.0023	0.2135	1.1
	1980-81	0.3594	0.0045	0.3549	1.3	0.1893	0.0011	0.1882	0.6
By education	1969-70	0.2561	0.0740	0.1821	28.9	0.2158	0.0481	0.1677	22.3
	1980-81	0.3594	0.0569	0.3025	15.8	0.1893	0.0358	0.1535	18.9

(Source: Glewwe, 1986, pp.261, 263, 269, 270)

The general conclusion drawn from the decomposition is that the between-group component always accounts for only a small amount of total inequality and decreases for all three decomposition measures whether income or expenditure is examined. It is observed that the percentage of the between-sector inequality decreases from 9.7% of the total inequality in 1969-70 to 5.5 % in 1980-81 using income data; and from 6.1% in 1969-70 to 5.2 % in 1980-81 using expenditure data. The share of the between-ethnic group inequality decreases from 1.7% of the total inequality in 1969-70 to 1.3 % in 1980-81 using income data; and from 1.1% in 1969-70 to 0.6 % in 1980-81 using expenditure data (see Table 4.8).

Comparing the decomposition results by sectors and ethnic group with those by educational level of the main earner, it is seen that the contributions of the between-group components to overall inequality is much for the educational level. The percentage of the between-group inequality by educational level of main earners decreases from 28.9% of the total inequality in 1969-70 to 15.8 % in 1980-81 using income data; and from 22.3% in 1969-70 to 18.9 % in 1980-81 using expenditure data (see Table 4.8).

4.3.1.6. In his paper 'Income inequality in the Philippines, 1961-91', Estudillo (1997) chooses the four measures of inequality: the two Theil's indices T and J, the variance of the logarithm V, and the Gini coefficient G. However, here, we will deal only with the inequality index T.

The index T is conducted for the years 1965, 1971, 1985, and 1991 using household income data taken from the Family Income and Expenditure Surveys. Group decomposition of inequality is calculated separately by dividing the household population: (1) into the three groups by sector of employment, being the urban and rural, (2) into the six groups by age of household head, being less 25 age group, 25-34 age group, 35-44 age group, 45-54 age group, 55-64 age group, and 65 and over age group, and (3) into the seven groups by the educational level of the household head, being those with no education, who are primary education undergraduate, primary education graduate, secondary education undergraduate, secondary education graduate, collage education undergraduate, and collage education graduate.

The results of the inequality decomposition by sectors, age or education of household head, shows changes in overall inequality during the period 1965-91 (ranges from 0.17 to 0.19). These changes seem to be due to the changes in the values of the within-group inequalities, since the between-group inequality values are almost constant and accounted for less than 6% for all the years (see Table 4.9).

The general finding drawn from the decomposition is that the within-group component always accounts for larger amount of total inequality for all the

decomposition variables, and ranges from 68 % to 98%. Among the decomposition variables, age seems to be the least determinant of income inequality with its 2-3 % contribution to overall inequality (see Table 4.9).

Table 4.9. Inequality Decomposition by the Theil's Index T for the Philippines, 1965-1991

	Year	Overall Inequality T	Between-Group Inequality T_B	Within-Group Inequality T_W	T_W/T (%)
By Location	1965	0.18	0.03	0.15	85
	1971	0.19	0.03	0.16	86
	1985	0.17	0.03	0.14	82
	1991	0.18	0.02	0.16	89
By Age	1965	0.18	0.01	0.17	97
	1971	0.19	0.01	0.18	97
	1985	0.17	0.01	0.16	97
	1991	0.18	0.01	0.17	98
By Education	1965				
	1971	0.19	0.05	0.14	75
	1985	0.17	0.05	0.12	68
	1991	0.18	0.06	0.13	68

(Source: Estudillo, 1997, pp.79-80)

4.3.1.7. Another study using the Theil's index T as an inequality measure is Tsakloglou's study 'Aspects of inequality in Greece: Measurement, decomposition and intertemporal change, 1974, 1982' (1993). As in the Glewwe's study above, he utilizes the Theil's index T and J, and the variance of the logarithm L in his paper and applies them to the distribution of consumption expenditure per equivalent adult for the inequality measurement in Greece, using the primary data of two Greek Household Expenditure Surveys of 1974 and 1981/1982. Again, here, we will deal with only the analysis using the index T.

He groups the household members: (1) into nine groups by region of residence, (2) into two groups by locality of residence, (3) into seven groups by age of household head, and (4) into four groups by educational level of household head.

The results of the inequality decomposition according to different factors show a decrease in overall inequality T from 0.200 in 1974 to 0.159 in 1982 (see Table 4.10).

Table 4.10. Inequality Decomposition by the Theil's Index T for Greece, 1974-1982

	Year	Overall Inequality T	Between-Group Inequality T_B	Within-Group Inequality T_W	T_W/T (%)
By Region	1974	0.200	0.023	0.177	88.7
	1982	0.159	0.014	0.145	91.4
By Locality	1974	0.200	0.019	0.181	90.4
	1982	0.159	0.014	0.145	91.0
By Age	1974	0.200	0.006	0.194	96.9
	1982	0.159	0.007	0.152	95.5
By Education	1974	0.200	0.048	0.152	75.9
	1982	0.159	0.030	0.129	80.9

(Source: Tsakloglou, 1993, pp.58-60)

The general conclusion drawn from the decomposition is that the within-group component accounts a larger amount of overall inequality, ranges from 75.9 to 96.9, regardless of the decomposition factor. The contribution of the within-region inequality to overall inequality increases for all the decomposition factors except age of household head (see Table 4.10).

4.3.1.8. With his paper 'Inequality in the distribution of household expenditures in Indonesia: a Theil decomposition analysis', Akita and his friends (1999) aim to explore the factors and forces underlying income inequality in Indonesia. They employ Gini and two Theil indices T and J, using household expenditure data from the 1987, 1990, and 1993 National Socio-Economic Surveys. Moreover, in the calculation of the inequality indices, they rely on decile information, not on the raw data, since they did not have access to the original data set. It should be noted also

that their study uses current price data, rather than constant price data. The study uses household size as the unit of analysis and examines the level of inequality among households by using household expenditure levels.

For the inequality decomposition as between and within-group inequality, they group the household members according to location (urban-rural), province, age, education, household size, and gender of household heads. Here, only the results of the analysis using the index T will be given.

The findings of the study using the index T show that the overall inequality first slightly decreases between 1987 and 1990; then it continues to increase between 1990 and 1993 for every factors of decomposition (see Table 4.11).

Table 4.11. Inequality Decomposition by the Theil's Index T for Indonesia

	Year	Overall Inequality T	Between-Group Inequality T_B	Within-Group Inequality T_W	T_B/T (%)
By Location	1987	0.241	0.055	0.186	22.8
	1990	0.238	0.052	0.186	21.8
	1993	0.257	0.063	0.194	24.5
By Province	1987	0.247	0.042	0.205	17.0
	1990	0.245	0.041	0.204	16.7
	1993	0.266	0.050	0.216	18.8
By Age	1987	0.240	0.011	0.229	4.5
	1990	0.223	0.010	0.214	4.3
	1993	0.251	0.013	0.238	5.1
By Education	1987	0.235	0.071	0.164	30.1
	1990	0.234	0.074	0.160	31.6
	1993	0.265	0.086	0.179	32.6
By Gender	1987	0.238	0.008	0.229	3.5
	1990	0.221	0.008	0.213	3.5
	1993	0.248	0.007	0.240	3.0
By Household Size	1987	0.241	0.065	0.176	27.0
	1990	0.229	0.064	0.165	27.8
	1993	0.254	0.061	0.194	23.9

(Source: Akita et al., 1999, pp.207, 209, 212, 214-216)

When the between-group inequalities are examined, it is observed that between-group component accounts for a smaller proportion of the total, which ranges from 3.0 % to 32.6 %. The decomposition variables age and gender are not significant determinants of expenditure inequality, as the between- group components ranges from 3 % to 5 % of the total inequality. . Whereas, the other decomposition variables seem to be more important in overall inequality, as they contribute more than 16% to total inequality. Among those, education is the major determinant of expenditure inequality with its 30-33 % contribution to overall inequality (see Table 4.11).

4.3.2. Application of the Two-stage Nested Theil Decomposition Method

The two-stage nested Theil decomposition method's is not widely used method to measure the between groups and within groups inequality. This method is used when it is needed to utilize three or more level of hierarchical structure. If the hierarchical structure in a country is, for example, region-province-district, one obtains within-province inequality measures, as well as the between-region and between-province inequality measures.

If 'region-province-district' is the hierarchical structure of a country, using a district as the underlying regional unit, Akita (2003, pp.59-61) provides the formulation of overall regional income inequality (*Theil's index T*) as:

$$T_d = \sum_i \sum_j \sum_k \left(\frac{y_{ijk}}{Y} \right) \log \left(\frac{y_{ijk} / Y}{n_{ijk} / N} \right),$$

where i is region, j is province, and k is district. The Theil index T can be decomposed into the within-province inequality (T_{WP}), the between-province inequality (T_{BP}), and the between-region inequality (T_{BR}) as follow:

$$= \sum_i \sum_j \left(\frac{Y_{ij}}{Y} \right) T_{ij} + \sum_i \left(\frac{Y_i}{Y} \right) T_{pi} + T_{BR}$$

$$= T_{WP} + T_{BP} + T_{BR}$$

"The within-province component is a weighted average of within-province income inequalities (T_{ij}), while the between-province component is a weighted average of between-province income inequalities (T_{pi})" (Akita, 2003, p.61)

In his paper, namely 'Decomposing Regional Income Inequality in China and Indonesia Using Two-stage Nested Theil Decomposition Method', Akita (2003) applies and presents the two- stage nested Theil's decomposition method to regional income inequality in China and Indonesia, using GDP per capita. Akita takes the three-level hierarchical structure of a country (region-province-district), and decomposes the overall regional income inequality as the between-region, between-province and within-province inequality. Therefore, different from one-stage analysis above (see Section 4.3.1.4), he uses district level data for the two-stage analysis.

The two-stage analysis is conducted only for 1997 because of the available data in the district level. He divides China into four regions and Indonesia into five regions. He applies two Theil's inequality decomposition methods: Theil's index T and J. We will discuss only the Theil's index T.

In the case of *China,* in 1997, the results of the two-stage analysis indicate that overall regional income inequality is 0.235 as measured by the index T. Decomposition of the overall inequality into the within-province, between-province, and between-region components by the index T show that 64% of the total inequality is due to the within-province inequality; while the between-province and between-region components accounted for 10% and 26%, respectively, of the total inequality (see Table 4.12).

In the case of *Indonesia* in 1996, the decomposition analysis is applied by including and excluding the oil and gas sectors. Total regional inequality as measured by the index T, including and excluding the oil and gas sectors, is 0.345 and 0.281, respectively. After excluding the oil and gas sectors, the within-province component contributed to 49% of the overall inequality. However, the between-province and

between-region inequality components accounted for, respectively, 44% and 7% of the total regional inequality (see Table 4.12).

Table 4.12. Two-stage Nested Inequality Decomposition

	CHINA		INDONESIA			
			Inc. mining sec.		Exc. mining sec.	
	Theil T	%	Theil T	%	Theil T	%
Within-province	0.150	63.8	0.171	49.4	0.136	48.4
Between-province	0.025	10.5	0.152	44.1	0.124	44.2
Between-region	0.061	25.7	0.022	6.5	0.021	7.4
Overall inequality	0.235		0.345		0.281	

(Source: Akita, 2003, pp.75-77)

4.3.3. Evaluation

The general conclusion drawn from the section 4.3 is that the one-stage nested Theil's decomposition method is the most widely used method relative to the two-stage nested Theil's decomposition method. The latter is used when it is needed to utilize three or more level of hierarchical structure. In this case, one obtains, for example, within-province inequality, as well as the between-region and between-province inequality if the hierarchical structure used in the study is in terms of region-province-district levels. In this respect, Akita's study (2003) is the only study discussed in this thesis which applied the two-stage nested Theil's decomposition method.

Section 4.3 examined various studies on inequality in different countries. In the calculation of inequality, some of them calculated the inequality spatially among areas which are defined according to urban-rural, regions, and countries (e.g., Theil, 1967 and 1972; Ying, 1999; Park, 2000; Akita, 2003); while the others examined the inequality among different population subgroups which are defined according to

non-spatial characteristics, e.g., education, age, sex, household size, income, sector of employment, etc. (e.g. Glewwe, 1986; Estudillo, 1997; Tsakloglou, 1993; Akita et al., 1999). This shows that the grouping the population into subgroups changes according to the aim of the inequality studies.

Since the aim of this thesis is to examine the impact of Southeastern Anatolia Project on the inter-regional inequality, we will divide Turkey as the "GAP region" and the "rest of Turkey" (see Section 5.1). Because of our "aim" in this study and because of the fact that most of the available "data" is in the province level, the one-stage nested Theil's decomposition method will be employed. The results of our analyses will give us the total inequality (between provinces in the country), between-region inequality (between the GAP region and the rest of Turkey), and within-region inequality (within-GAP and within the rest of Turkey). In this thesis, the main emphasis is on the between-region inequality. The other two subject are discussed in the Appendices.

Besides, all of the studies stated above examine the economic inequality using income or expenditure data. However, in this thesis, not only the economic related variable (i.e., GDP p.c.), but also the socio-demographic, infrastructure and service related variables will be included (see Section 5.2).

CHAPTER 5

DATA

Since the objective of the study is to examine the regional inequality in Turkey, we have to make choices with respect to certain issues like geographical units to utilize, and the data to analyze. In this chapter, we will give place to these issues.

"Measuring regional disparities may be complicated by the problem of choosing the level of territorial subdivision at which observation are to be made" (Shaugang and Angang, 1999, p.45). In this study, province is accepted as unit of observation due to the availability of data.

Furthermore, as the administrative division of Turkey has changed many times after 1990, the eight new provinces (Bartın, Ardahan, Iğdır, Yalova, Karabük, Kilis, Osmaniye, and Düzce) increased the number of provinces from 73 in 1990 to 81 in 2000. Therefore, the analyses of inequality in 1990 will be made according to the 73 provinces, while those in 2000 will be made according to the 81 provinces.

5.1. Regional Division

The first issue concerns the regional division of Turkey which will be used in the analyses of the inequality. Since the aim of this study is to examine the impact of Southeastern Anatolia Project on the inter-regional inequality between the GAP region and the rest, Turkey is divided into 2 regions. First one is the 'GAP region', which encompasses 9 administrative provinces (Adıyaman, Batman, Diyarbakır, Gaziantep, Kilis, Mardin, Siirt, Şanlıurfa and Şırnak). Second one is the "rest of Turkey", consisting all the remaining provinces.

5.2. Data and Variable Descriptions

Another important issue in the study is the selection of the variables which will be used in the analyses of inequality. In this process, we took into consideration those variables used by (1) UNDP in the calculation of Human Development Index; (2) the consensus of UN Secretariat, IMF, OECD and the World Bank in the context of 'Millennium Development Goals'; (3) those variables selected by OECD Rural Development Programme; and (4) those variables used in the establishment of NUTS for Turkey.

The first group of the variables includes literacy ratio, schooling ratio, infant mortality rate, and GDP per capita. These variables are used in the calculation of 'Human Development Index (HDI)' to measure the human development in the countries (UNDP, 2001).

The second group of the variables includes the 48 indicators decided by a consensus of the experts from the United Nations Secretariat and IMF, OECD and the World Bank to measure progress towards the 'Millennium Development Goals' in 189 nations over the period 1990 and 2015. These variables are as follows (UN, url:http://www.un.md/mdg/ toolkit/Millennium_Indicators.doc):

- Proportion of population below $1 (PPP) per day
- Poverty gap ratio
- Share of poorest quintile in national consumption
- Prevalence of underweight children under five years of age
- Proportion of population below minimum level of dietary energy consumption
- Net enrolment ratio in primary education, girls, boys, total
- Proportion of pupils starting grade 1 who reach grade 5, girls, boys, total
- Literacy rate of 15-24-year-olds, women, men, total
- Ratio of girls to boys in primary, secondary and tertiary education
- Ratio of literate women to men of 15- to 24-year-olds
- Share of women in wage employment in the non-agricultural sector
- Proportion of seats held by women in national parliament
- Under-five mortality rate
- Infant mortality rate
- Proportion of 1-year-old children immunized against measles
- Maternal mortality ratio
- Proportion of births attended by skilled health personnel
- HIV prevalence among 15-to-24-year-old pregnant women
- Condom use rate of the contraceptive prevalence rate

- Number of children orphaned by HIV/AIDS
- Prevalence and death rates associated with malaria
- Proportion of population in malaria risk areas using effective malaria prevention and treatment measures
- Prevalence and death rates associated with tuberculosis
- Proportion of tuberculosis cases detected and cured under directly observed treatment short course
- Proportion of land area covered by forest
- Ratio of area protected to maintain biological diversity to surface area
- Energy use (kg oil equivalent) per $1 GDP (PPP)
- Carbon dioxide emissions (per capita) and consumption of ozone-depleting CFCs
- Proportion of population using solid fuels
- Proportion of population with sustainable access to an improved water source, urban and rural
- Proportion of urban population with access to improved sanitation
- Proportion of households with access to secure tenure (owned or rented)

The third group of variables is established in The OECD Rural Development Programme in 1991 with the aim of analyzing opportunities and options for rural development. These variables reflect the economic, demographic, social and environmental dimensions of rural development. The variables are as follows (OECD, 1994 and 1996):

- Population density
- Population change (Total change, natural balance, net migration)
- Proportion of population by age and sex
- Household size classes (persons per households, percentage of children)
- Proportion of population by class
- Labor force participation (by sex)
- Total change in employment by age and sex
- Unemployment by age and sex
- Sectoral shares of employment
- Sectoral shares of value added
- Value added per worker
- Investment (private and public)
- GDP p.c.
- Personal income
- Persons per room
- Proportion of households with flush toilets etc.
- Infant mortality rate
- Percentage of post secondary school graduates (25+)
- Crime rate per inhabitants
- Mountains (km^2 over 600 m)
- Land use (agriculture and forest)

- Protected areas
- Threatened species
- Solids and water (erosion risk, nutient balance, water withdrawal)
- Air quality (Balance, emission, immission)

The fourth group of the variables is used for the Classification of Regional Units (NUTS) in Turkey by the working groups established by the State Planning Organization and The State Institute of Statistics. It was necessary to establish NUTS for Turkey for its admission to the EU[17]. Consequently, three levels of NUTS were established according to the criteria, such as administrative division, population size, economic and social harmony and regional development plans: 12 units in NUTS 1 level (regions), 26 units in NUTS 2 level (sub-regions), and 81 units in NUTS 3 level (provinces) (Kuşçu, 2002, p.10). The variables used in the Classification of Regional Units are as follows:

- Population size
- Population density
- Average population growth rate
- Average height in a province
- Urbanization level
- Net migration
- Average household size
- Schooling ratio in primary education
- Schooling ratio in middle education (junior high school)
- Number of population per doctor
- Population under social insurance
- GDP p.c.
- GDP p.c. in industrial sector
- The value of agricultural production
- GDP p.c. in husbandry
- Total bank deposits
- Total bank credits
- Estimated employment
- Unemployment rate
- Length of asphalt road per kilometer square
- Tax revenue

[17] Moreover, this new classification of the regional units will be important for Turkey to compile and develop regional statistics; to realize the socio-economical analysis of regions; to determine of the framework of regional policies; and to create comparable and suitable statistical database with the EU Regional Statistics System. Consequently, this issue took place among the short-term objectives of National Plan prepared by Turkey for the Adoption of Acquis Communautaire. With the Decision of Council of to Ministers No: 2002/4720 dated 22 September 2002, the NUTS are defined through Turkey (SIS, url: http://www.die.gov.tr/abkd/English_ab/ news.htm#ab).

As it is seen from the lists, there are many variables reflecting the level of development in the economic, socio-demographic, educational, health, infrastructure, and environmental conditions in a country. However, taking into consideration the availability and consistency with the aim of this thesis, 39 socio-economic indicators are selected for this research to illustrate regional disparities and uneven development between the GAP region and the rest of Turkey. These indicators include 17 socio-demographic, 12 economic, and 10 infrastructural and service related variables (see Table 5.1).

The data generally relate to the 1990 and 2000 Population Census years. Only the variables related to schooling ratio and student/teacher ratio are for 1990-1991 and 1999-2000 schooling years.

Unless indicated otherwise, the data sources are generally the various publications of State Institute of Statistics (SIS) and Köy Hizmetleri Genel Müdürlüğü. In the next sections, the selected socio-demographic, economic, and infrastructural and service related variables and their definition will be given.

5.2.1. Socio-demographic variables

The distribution of population seems indispensable for any inequality analysis. Indices reflecting the population distribution by location and age (such as, level of urbanization and dependency ratios) provide bases for the description of demographic characteristics of the regions and regional inequalities. Moreover, infant mortality rate, fertility rate and average household size are other widely used indicators of the socio-demographic features of the society.

Level of education is another important aspect in describing regional inequalities. Therefore, the two following type of educational variables were chosen in this study: Literacy ratios and schooling ratios by sex. The definitions of the socio-demographic variables selected as indicators of the social, demographic and educational development areas are follows:

1. *Urbanization level*: The ratio of city population to total population. Here, city population refers to the "population of municipal areas of the province and district centers" (SIS, 2003a, p.17). The data source: SIS (1996, pp. 8-9 and 2003a, pp.82-83).

2. *Total fertility rate*: "The average number of live births that a woman would have under the assumption that she survived to the end of her reproductive life (15 to 49 years of age) and bore according to a given age specific fertility rate" (SIS, 2003a, p.20). In other words, it is "the average number of children that would be born alive to a woman during her life time if she were to bear children at each age in accord with prevailing age-specific fertility rates" (UNDP, 2000, p.282).

   Another indicator that can be used in interpretation of fertility is the average number of children per women at '45-49' age group, which is the end of fertility period. Due to the unavailability of the appropriate data of total fertility rate which is described above, this indicator is used in the inequality analyses. The data source: SIS (2003b).

3. *Infant mortality rate*: "In a certain year, the number of infants who die under 1 year old per 1000 live born infants. It has been indirectly estimated with Brass-Trussell method" (SIS, 2003a, p.21). The data source: SIS (2003b).

4. *Household size*: "The average number of persons in the households[18]" (SIS, 2003a, p.21). In other words, ASH= total population of households/ total number of households. The data source: SIS (2003b).

[18] "Household: One person or group of persons with or without a family relationship who live in the same house or in the same part of a house, who share their earnings and expenditures, who take part in the management of the household and who render services to the household" (SIS, 2003a, p.21).

5.1. The List of the Variables

Socio-demographic variables

1 Urbanization level
2 Total fertility rate
3 Infant mortality rate
4 Household size
5 Total age dependency ratio
6 Youth dependency ratio
7 Elderly age dependency ratio
8 Proportion of 0-14 age group
9 Total literacy ratio
10 Female literacy ratio
11 Male literacy ratio
12 Gross schooling ratio in primary education
13 Gross schooling ratio of girls in primary education
14 Gross schooling ratio of boys in primary education
15 Gross schooling ratio of secondary education
16 Gross schooling ratio of girls in secondary education
17 Gross schooling ratio of boys in secondary education

Economic variables

18 Gross Domestic Product (GDP)
19 GDP in industrial sector
20 GDP in agricultural sector
21 GDP in commercial sector
22 Total bank deposits
23 Total bank credits
24 Total electricity consumption
25 Total private motor vehicle
26 Unemployment rate
27 Non-agricultural active labor force
28 Non-agricultural active female labor force
29 Non-agricultural active male labor force

Infrastructure and service related variables

30 Number of teacher per student in primary education
31 Number of teacher per student in secondary education
32 Total number of doctor (specialist)
33 Total number of practitioner
34 Total number of dentist
35 Total number of nurse
36 Total number of sanitarian
37 Total number of midwife
38 Asphalt road ratio in rural settlements
39 Population with adequate drinking water supply

5. *Total age dependency ratio*: "The number of persons at '0-14' and '65 and over' age group per 100 persons at '15-64' age group. Total age dependency ratio = $[(P_{0-14} + P_{65+}) / (P_{15-64})] *100$" (SIS, 2003a, pp.18-19). The data source: SIS (2003b).

6. *Youth dependency ratio*: "The number of persons at '0-14' age group per 100 persons at '15-64' age group" (SIS, 2003a, p.19). The data source: SIS (2003b).

7. *Elderly age dependency ratio*: "The number of persons at '65 and over' age group per 100 persons at '15-64' age group" (SIS, 2003a, p.19). The data source: SIS (2003b).

8. *Proportion of 0-14 age group*: It is the proportion of the number of persons at '0-14' age group to the total number of people in a province. The data source of 1990: SIS, 1996, pp. 92-93. On the other hand, the proportion of 0-14 age group in 2000 is calculated using the primary data from SIS (2003a, pp.90-91).

9. *Total literacy ratio*: "Number of persons who know how to read and write per 100 persons at 6 years of age and over. In other words, the proportion of the literate population to the population 6 years of age and over" (SIS, 2003a, p.20). The data source: SIS (1996, pp. 94-97 and 2003a, pp.88-89).

10. *Female literacy ratio*: The proportion of the female literate population to the female population 6 years of age and over. The data source: SIS (1996, pp. 94-97 and 2003a, pp.88-89).

11. *Male literacy ratio*: The proportion of the male literate population to the male population 6 years of age and over. The data source: SIS (1996, pp. 94-97 and 2003a, pp.88-89).

12. *Gross schooling ratio in primary education*[19]: Gross Schooling Ratio "…is obtained by dividing the total number of students in a specific level of education by the population in the theoretical age group. A: Total number of enrollment B: Total population in the theoretical age group. Schooling ratio = A/B…. The theoretical age groups at primary education and at secondary education are accepted respectively 6-13 and 14-16 on the basis of the completed age of enrollment" (SIS, 2002a, p.x).

    Therefore, gross schooling ratio in primary education is computed by dividing the total number of students in primary education to the population in the theoretical age group (6-13 age group).

    Due to the unavailability of the comparable data in 1990 and 2000, schooling ratios are computed using unpublished studies of SIS. The number of students by age and sex for 1990-1991 and 2000-2001 schooling years are taken from SIS National Education Statistics Department. Moreover, the population estimations in the theoretical age groups for 1991 and 2000 are taken from SIS Division of Population and Demography Analytical Studies Department.

13. *Gross schooling ratio of girls in primary education*: The proportion of the total number of female students in primary education to the female population in the theoretical age group (6-13 age group).

14. *Gross schooling ratio of boys in primary education*: The proportion of the total number of male students in primary education to the male population in the theoretical age group (6-13 age group).

[19] Primary education "… has been undergone 8-year compulsory education with law no. 4306 dated 18-August-1997 since 1997-1998 school year. … Primary education covers the education in the age group 6-13" (SIS, 2002a, p.viii). For 1990, the number of student in the junior high schools (ortaokul) was included in the number of students of the primary schools and thus all the calculations of schooling ratio in primary education for 1990 were made consistent between 1990 and 2000.

15. *Gross schooling ratio of secondary education*[20]: The proportion of the total number of students in secondary education to the population in the theoretical age group (14-16 age group).

16. *Gross schooling ratio of girls in secondary education*: The proportion of the total number of female students in secondary education to the female population in the theoretical age group (14-16 age group).

17. *Gross schooling ratio of boys in secondary education*: The proportion of the total number of male students in secondary education to the male population in the theoretical age group (14-16 age group).

5.2.2. Economic variables

GDP, as the most frequently used measure of economic development, provides a natural starting point of inequality studies. However, non-agricultural labor force and unemployment statistics are other important indicators for the assessment of the economic development in different parts of a country. Therefore, as well as GDP and its sectoral shares, change in the non-agricultural labor force for male and female populations are important indicators. Moreover, there are also other indicators reflecting the economic welfare of the society (such as, electricity consumption and number of private motor vehicle). The definitions of the economic variables used in this study are as follows:

18. *Gross Domestic Product* (at 1987 prices, million TL): "Gross Domestic Product is a value which is equal to the sum of all the goods and services produced by residential units in domestic production activities in an economy in a given period of time, minus the total inputs which are used in the production of these goods and services" (SIS, 2002b, p.xxi). In the analyses, we use the GDP per capita, which is the ratio of GDP of a province to the

[20] "Secondary education: After primary education, it covers at least 3-year general, vocational and technical education institutions" (SIS, 2002a, p. viii), which are called as high schools (lise).

total population of that province. The data source: SIS (1997, pp. 659-661 and 2002b, pp. 191-192)

19. *GDP in industrial sector* (in producer's value at 1987 prices, million TL): It is the ratio of the sum of the values of all the industrial goods and services, minus the total inputs that are used in the production of these goods and services, in a province to the total population of that province. The industrial activities include mining and quarrying, manufacturing, electricity, gas, and water (SIS, 2002b, pp.xxi-xxiii). The data source: SIS (1997 and 2002b)

20. *GDP in agricultural sector* (in producer's value at 1987 prices, million TL): It is the ratio of the sum of the values of all the agricultural goods and services, minus the total inputs that are used in the production of these goods and services, in a province to the total population of that province. Agricultural activities include agriculture and livestock production, forestry, and fishing (SIS, 2002b, pp.xxi-xxiii). The data source: SIS (1997 and 2002b)

21. *GDP in commercial sector* (in producer's value at 1987 prices, million TL): It is the ratio of the sum of the values of all the commercial goods and services, minus the total inputs that are used in the production of these goods and services, in a province to the total population of that province. Commercial activities include wholesale and retail trade, and hotel restaurant services (SIS, 2002b, pp. xxi-xxiii). The data source: SIS (1997 and 2002b)

22. *Total bank deposits* (million ABD dollar): It is the ratio of the money that is invested to the banks by official and private persons for purposing profit and security in a province to the total population of that province (SIS, 2003c, p.xvi). Source: Türkiye Bankalar Birliği, url: http://www.tbb.org.tr/asp/donemsel.asp.

23. *Total bank credits* (million ABD dollar): It is the ratio of the money that is borrowed from the bank by official and private persons for their various needs in a province to the total population of that province. The data Source: Türkiye Bankalar Birliği, url: http://www.tbb.org.tr/asp/donemsel.asp

24. *Total electricity consumption* (MWh): It is the ratio of the total amount of electricity consumption in a province to the total population of that province. The data source: Türkiye Elektrik Dağıtım Anonim Şirketi (2001, pp.193-194) and Türkiye Elektrik Kurumu Genel Müdürlüğü (1991, pp. 67-68).

25. *Total private motor vehicle*: It is the ratio of the total number motor vehicles "… used without commercial gain belongs to private persons, organizations or institutions and carries special license plates issued by Traffic Department" in a province to the total population of that province (SIS, 2001, p:viii) to the total population. The data source: SIS (1991, p.4 and 2001, pp.6-8)

26. *Unemployment rate*: "Number of unemployed persons per 100 persons in labor force. In other words, the proportion of the unemployed population to the population in labor force" (SIS, 2003a, p.22). The data source: SIS (2003b)

27. *Non-agricultural active labor force*: It is the ratio of economically active population in non-agricultural activities (all activities except agriculture, hunting forestry and fishing) to total economically active population. The primary data source: SIS (1996, pp.50-53 and 2003a, pp. 100-101)

28. *Non-agricultural active female labor force*: It is the ratio of economically active female population in non-agricultural activities (all activities except agriculture, hunting forestry and fishing) to total economically active female population. The primary data source: SIS (1996, pp.50-53 and 2003a, pp. 100-101)

29. *Non-agricultural active male labor force*: It is the ratio of economically active male population in non-agricultural activities (all activities except agriculture, hunting forestry and fishing) to total economically active male population. The primary data source: SIS (1996, pp.50-53 and 2003a, pp. 100-101)

5.2.3. Infrastructure and service variables

In addition to the well-being of the people of the provinces, such as level of the education or health; the level and quality of the infrastructure and services related to education, health, etc. are included in this study. The definitions of the variables in terms of infrastructure and service are as follows:

30. *Number of teachers per student in primary education*: The proportion of the total number of teachers[21] to the total number of student in the primary education. The number of students and teachers for 1990-1991 and 2000-2001 schooling years in primary education are taken from SIS National Education Statistics department.

31. *Number of teachers per student in secondary education*: The proportion of the total number of teacher to the total number of student in the secondary education. The number of students and teachers for 1990-1991 and 2000-2001 schooling years in secondary education are taken from SIS National Education Statistics department.

32. *Total number of* doctors (specialists): The ratio of the number of all specialists working in public and private sectors to the total population. The data source: SIS (1992, pp.101-106) and Sağlık Bakanlığı (2002, pp.31-33)

33. *Total number of practitioners*: The ratio of the number of all practitioners and assistant doctors working in public and private sectors to the total

[21] Covers only permanent teaching staff.

population. The data source: SIS (1992, pp.101-106) and Sağlık Bakanlığı (2002, pp.31-33)

34. *Total number of dentists*: The ratio of the number of all dentists working in public and private sectors to the total population. The data source: SIS (1992, pp.101-106) and Sağlık Bakanlığı (2002, pp.31-33)

35. *Total number of nurses*: The ratio of the number of all nurses[22] working in public and private sectors to the total population. The data source: SIS (1992, pp.101-106) and Sağlık Bakanlığı (2002, pp.31-33)

36. *Total number of sanitarians*: The ratio of the number of all sanitarians working in public and private sectors to the total population. The data source: SIS (1992, pp.101-106) and Sağlık Bakanlığı (2002, pp.31-33)

37. *Total number of midwives*: The ratio of the number of all midwives working in public and private sectors (includes village midwifes, also) to the total population. The data source: SIS (1992, pp.101-106) and Sağlık Bakanlığı (2002, pp.31-33)

38. *Asphalt road ratio*: It is the proportion of the sum of the all Highway Department (TCK) asphalt road and Rural Affairs (Köy Hizmetleri) asphalt road in rural settlements[23] to the total rural settlements roads. The primary data source: Köy Hizmetleri Genel Müdürlüğü (1991 and 2001, pp.23-28)

39. *Population with adequate drinking water supply*: It is the proportion of rural settlement population with adequate drinking water supply to total rural settlement population. The primary data source: Köy Hizmetleri Genel Müdürlüğü (1991 and 2001, pp.118-119)

[22] It "…also covers nurses graduated from a school of nursing and assistant nurses" (SIS, 1992, p.101)
[23] Rural settlements include villages and sub-settlements

CHAPTER 6

EMPRICAL ANALYSES AND FINDINGS

The problems of unbalanced regional growth and associated regional inequalities at national level have been an important theoretical and practical issue for more than three decades. Although the average level of development has increased at a particular rapid rate, a number of regions have apparently failed to keep up at national level in most countries. In other words, "since, some regions are developed economically but backward socially, whereas some others are developed socially and backward economically, therefore, it becomes essential to study the levels of socio-economic development over different regions so as to ensure the removal of regional imbalances effectively" (Tripathi and Tiwari, 1993, p.61). Problem of regional inequalities in developing countries has assumed such a magnitude that it becomes inevitable to study these regional disparities in detail.

Therefore, in this chapter, we will discuss the empirical findings of the between-regional inequality analyses for Turkey in terms of socio-demographic, economic, and infrastructure and service related variables. The inequality analyses are made for 1990 and 2000, that is, before the GAP is put into effect and 10 years after of its implementation. The findings of 1990 and 2000 will be compared to understand the changes in the inequalities due the GAP. Although this thesis is ultimately concerned with the between-region inequality, the total and the within-region inequality will also be discussed in the Appendices.

In this Chapter, we shall study the empirical findings of the between-region inequality of Turkey for the years 1990 and 2000. Firstly, we will discuss the

findings of between-region inequality as measured by Theil's index T. Then, we will examine the change in the GAP region relative to the rest of Turkey. These analyses will be handled in terms of the above-mentioned three groups of variables.

6.1. Between-region Inequality: Theil's Index T

This section provides us to examine whether inequality between the GAP region and the rest of Turkey, as measured by Theil's index T, decreased or increased for each of our variables. In other words, we shall be able to see whether the GAP has been effective in terms of between-region inequality in Turkey during the period between 1990 and 2000.

If we take GDP as the variable to measure the inequality, then the equation of the total between-region inequality is as follows (Theil, 1967 and 1989):

$$T_B = \sum_{g=1}^{G} y_g \log\left(\frac{y_g}{p_g}\right),$$

where y_g is the share of region g in terms of the income and p_g is the population share of that region.

6.1.1. Inequality in terms of socio-demographic variables

The inequality between the GAP region and the rest of Turkey decreased for literacy ratios, schooling ratios in primary education, and urbanization level. The highest inequality reduction was for male literacy ratio; followed by urbanization level. The inequality decreased approximately 3 times for these variables. Moreover, it is important to note that the literacy and schooling ratios of "males" had higher inequality reduction compared to those of "females" in primary education. This may shows that how people give more importance to the education of males relative to the education of females. The other variable whose inequality remained fairly the same was total age dependency ratio (see Table 6.1 and Figures 6.1-2).

Table 6.1. Between-region inequality in terms of socio-demographic variables

No	Variable	Between-region inequality 1990	2000	2000/1990	Improv.*
11	Male literacy ratio	0,0011	0,0004	0,35	+
1	Urbanization level	0,0002	0,0001	0,38	+
14	Sch. ratio of boys in pri.edu.	0,0012	0,0005	0,40	+
9	Total literacy ratio	0,0031	0,0014	0,44	+
10	Female literacy ratio	0,0075	0,0035	0,46	+
12	Sch. ratio in pri. edu.	0,0026	0,0014	0,54	+
13	Sch. ratio of girls in pri. edu.	0,0054	0,0033	0,61	+
16	Sch. ratio of girls in sec.edu	0,0309	0,0301	0,98	+
15	Sch. ratio of sec.edu	0,0156	0,0170	1,08	-
5	Total age dependency ratio	0,0101	0,0112	1,11	-
17	Sch. ratio of boys in sec.edu	0,0091	0,0103	1,13	-
6	Youth dependency ratio	0,0139	0,0186	1,34	-
4	Household size	0,0038	0,0060	1,57	-
8	Proportion of 0-14 age group	0,0056	0,0090	1,61	-
7	Elderly age dependency ratio	0,0030	0,0057	1,89	-
2	Fertility rate	0,0060	0,0124	2,07	-
3	Infant mortality rate	0,0000	0,0008	253,84	-

*Improvement means a decrease in inequality

On the other hand, the regional inequality increased for infant mortality rate[24], fertility rate, elderly and youth age dependency ratios, the proportion of 0-14 age group, and the household size. Inequality for the fertility rate increased approximately 2 times (see Table 6.1 and Figures 6.1-2).

[24] The between-region inequality for this variable increases from 0.0000 to 0.0008, which equals to approximately 253 times increase. It is better to explain this situation by examining the values of the infant mortality rate for GAP region and the rest of Turkey. Table D.3 in Appendix D indicate that the part of the GAP region in total regional inequality increases from -0.0008 to 0.0145, while the part of the rest of the Turkey decreases from 0.0008 to -0.0137. This means that the share of the GAP region in terms of the number of infants who die under 1 year old exceeds the share of GAP region in terms of the number of children born alive in last year during 1990-2000, and vice versa for the rest of the Turkey. That is, there is a recession for the GAP region while there is a big improvement for the rest of the Turkey. This may indicate that the nation-wide campaign of inoculation of infants beginning with early 1990's was more successful in the rest of Turkey relative to that in the GAP region.

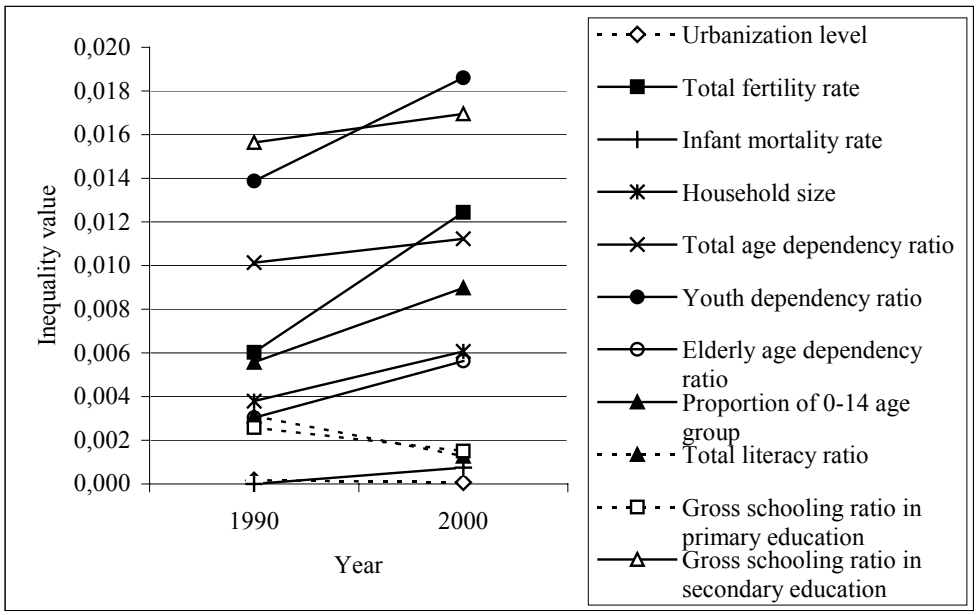

Figure 6.1. Between-region Inequality in Terms of Socio-demographic Variables

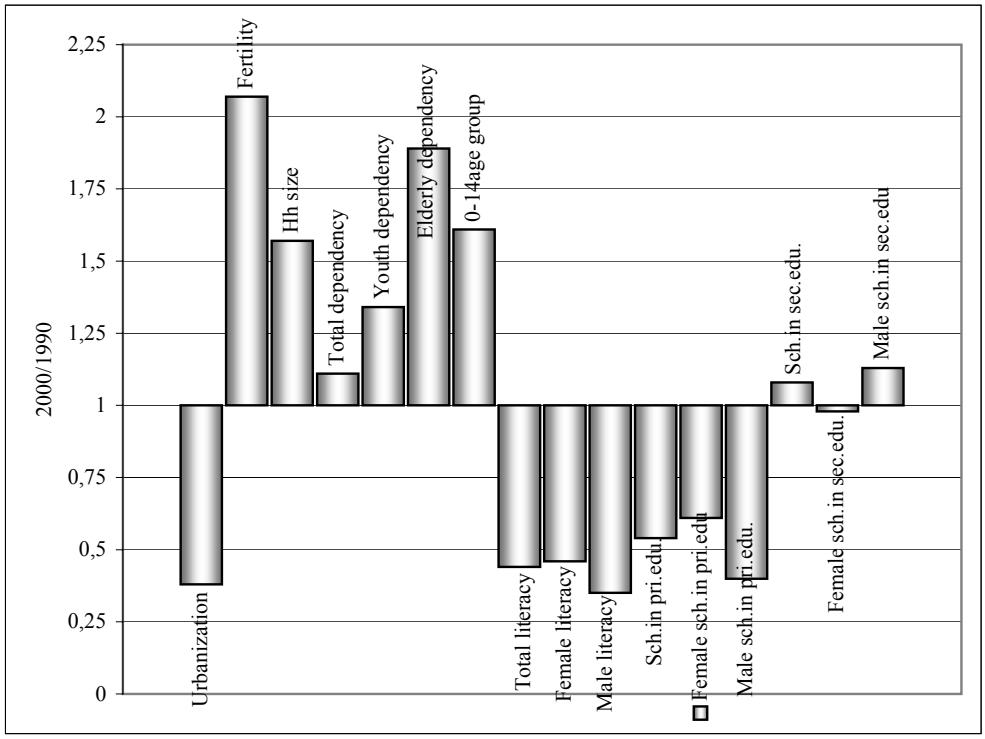

Figure 6.2. Between-region Inequality in Terms of Socio-demographic Variables
Note: Infant mortality rate is not included in the figure due to too high change in the inequality value.

As a conclusion, it is interesting to note that most of the variables which show regional inequality reduction are in the "education" such as, literacy and schooling in primary education, where "males" had higher inequality reduction compared to those of "females". The variables with almost no change in regional inequality are schooling ratios in "secondary" education and total dependency ratio. On the other hand, regional inequality increases are in the "demographic" variables, such as infant mortality rate, fertility rate, dependency ratios, and household size. This reflects the fact that it is relatively more difficult and needs time to get an improvement in terms of the "demographic" indices relative to "educational" indices, especially those related to males and schooling in primary education.

6.1.2. Inequality in terms of economic variables

The between-region inequality decreased almost half for the proportion of non-agricultural male labor force from 1990 to 2000. The other variables with relatively less inequality decreases are unemployment, the proportion of non-agricultural labor force, and total electricity consumption (see Table 6.2 and Figures 6.3-4).

Table 6.2. Between-region inequality in terms of economic variables

No	Variable	Between-region inequality 1990	2000	2000/1990	Improv.*
12	Non-agr. male labor force	0,0021	0,0010	0,46	+
10	Non-agr.labor force	0,0039	0,0028	0,71	+
9	Unemployment	0,0111	0,0079	0,71	+
7	Electricity consumption	0,0137	0,0102	0,74	+
11	Non-agr. female labor force	0,0253	0,0250	0,99	+
6	Total bank credits	0,0523	0,0525	1,00	-
8	Total private motor vehicle	0,0345	0,0357	1,04	-
5	Total bank deposits	0,0537	0,0643	1,20	-
1	GDP	0,0097	0,0146	1,50	-
2	GDP in industrial sector	0,0166	0,0289	1,74	-
4	GDP in commercial sector	0,0115	0,0210	1,83	-
3	GDP in agricultural sector	0,0002	0,0006	3,02	-

*Improvement means a decrease in inequality

The variables whose regional inequality remained fairly the same are the proportion of non-agricultural female labor force, total bank credits and deposits, and private motor vehicle (see Table 6.2 and Figures 6.3-4).

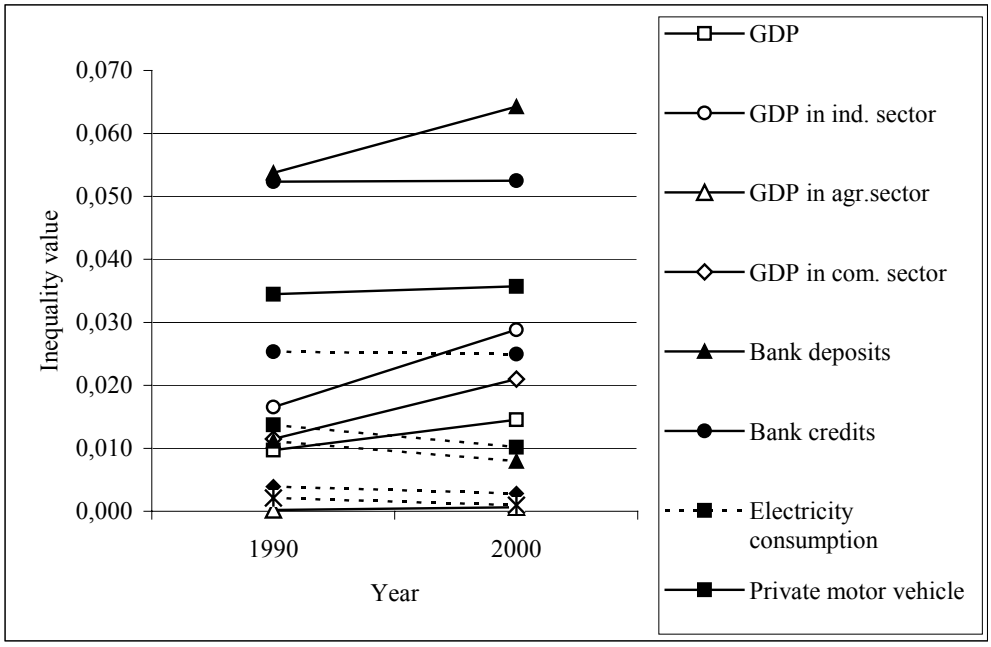

Figure 6.3. Between-region Inequality in Terms of Economic Variables

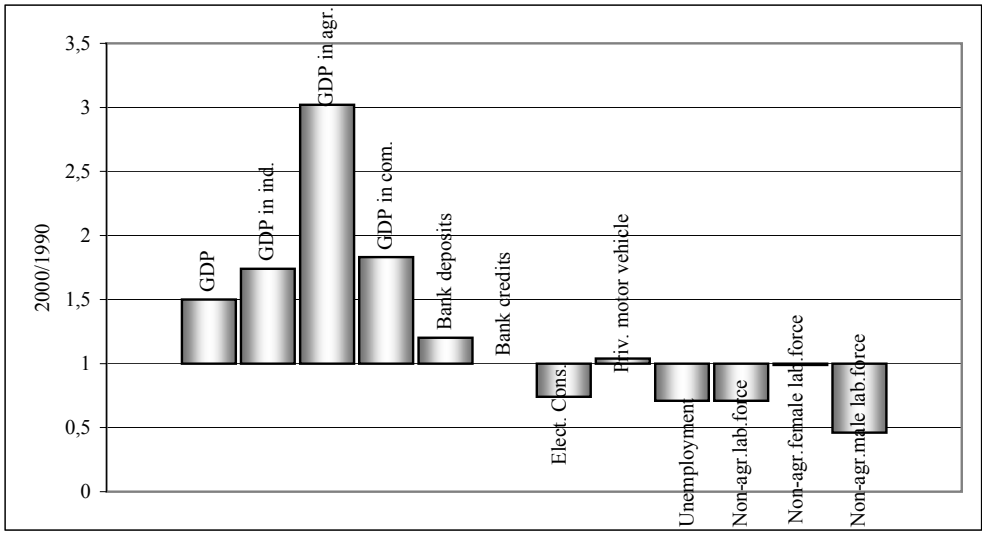

Figure 6.4. Between-region Inequality in Terms of Economic Variables

On the other hand, the increase in the between-region inequality is evident for all of the four variables related to GDP. When we think that the GAP Master Plan gave special weights to the agriculture related production facilities in a region where the agriculture was already important, it is not surprising that the highest regional inequality increase belonged to GDP in agricultural sector, where the regional inequality increased approximately 3 times during the last decade (see Table 6.2 and Figures 6.3-4).

In summary, it can be said that while the reduction in inequality or the improvement was mostly for the variables related to non-agricultural labor force and unemployment, the opposite was for the variables related to acquired money. However, it should be noted that among the variables related to non-agricultural labor force, while that of males almost halved, that of females had almost no change.

6.1.3. Inequality in terms of infrastructure and service related variables

There was considerable inequality reduction for proportion of rural population with adequate drinking water supply and asphalt road ratio in rural settlements. Decrease of three times for the variable related to adequate drinking water supply should be emphasized (see Table 6.3 and Figures 6.5-6).

The least change in the inequality between the GAP region and the rest of Turkey occurred in the number of nurses and dentists, and the number of teachers per student in primary and secondary education (see Table 6.3 and Figures 6.5-6)

Increasing between-region inequalities were also evident for all the remaining health services related variables. The highest regional inequality increase belongs to the number of practitioners, where the regional inequality increased 1,84 times; followed by the number of midwives, sanitarians, and doctors (specialists) (see Table 6.3 and Figures 6.5-6).

Table 6.3. Between-region inequality in terms of infrastructure and service related variables

No	Variable	Between-region inequality 1990	2000	2000/1990	Improv.*
10	Pop. with adequate drinking water supply	0,0040	0,0012	0,29	+
9	Asphalt road ratio	0,0036	0,0025	0,70	+
6	No of nurse	0,0124	0,0104	0,84	+
2	No of teac. per stud. in sec.edu.	0,0014	0,0014	1,05	-
5	No of dentist	0,0318	0,0389	1,23	-
1	No of teac. per stud. in prim.edu.	0,0040	0,0050	1,27	-
3	No of doctor (specialist)	0,0201	0,0302	1,50	-
7	No of sanitarian	0,0045	0,0074	1,65	-
8	No of midwife	0,0057	0,0100	1,73	-
4	No of practitioner	0,0078	0,0143	1,84	-

* Improvement means a decrease in inequality

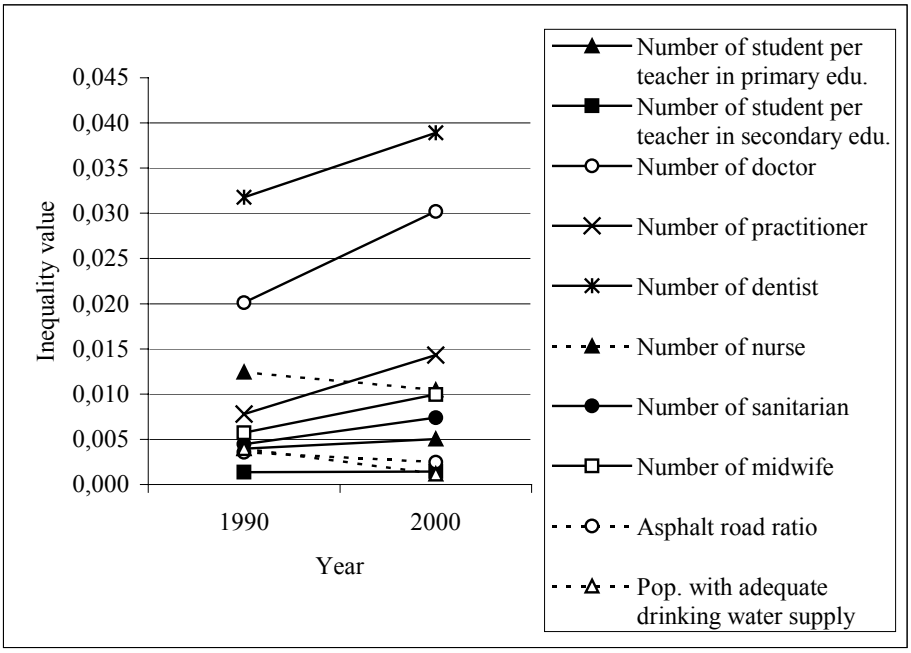

Figure 6.5. Between-region Inequality in Terms of Infrastructure and Service Related Variables

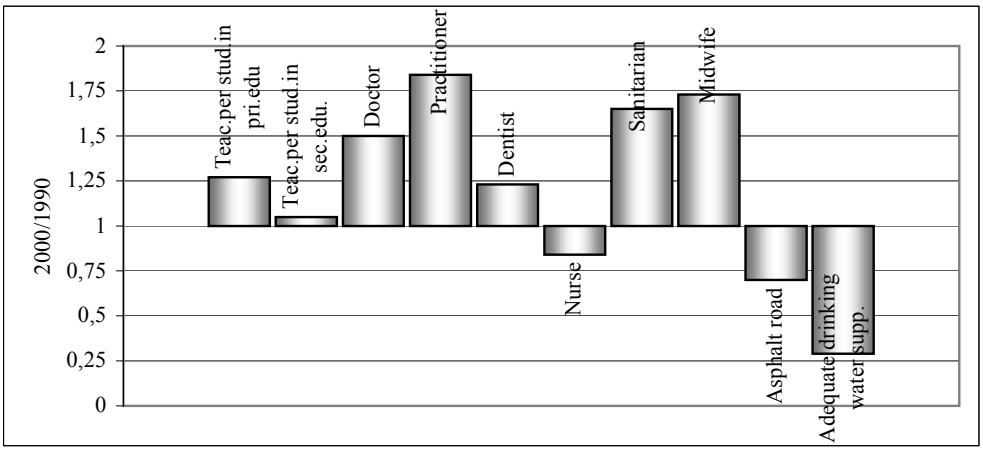

Figure 6.6. Between-region Inequality in Terms of Infrastructure and Service Related Variables

As a conclusion, it can be said that the regional reduction occurred mostly for the infrastructure related variables, while the regional inequality rise was for the variables related to health and educational services.

6.1.4. Summary of the change in between-region inequality

The Section 6.1.1-3 examined the changes in the regional inequality in terms of Theil's index T, and for each of the socio-demographic, economic, and infrastructure and service related variables in Turkey between 1990 and 2000. Subsequently, all the 39 variables together are merged and sorted according to the change in their total regional inequality (see Table 6.4).

The general conclusion drawn from the table is that the inequality between the GAP region and the rest of Turkey decreased for 16 variables, which correspond to almost 40 % of the total, and increased for the remaining 23 variables (60 %) during the last decade. In general terms, the decrease in the inequality was observed in the infrastructure, urbanization, and education related variables. The increase, on the other hand, took place in demographic, GDP p.c., and health services. These will be discussed in detail below.

Table 6.4. Between-region Inequality

No	Variable	2000/1990	
39	Pop. with adequate drinking water supply	0,29	
11	Male literacy ratio	0,35	
1	Urbanization level	0,38	
14	Sch. ratio of boys in pri. edu.	0,40	
9	Total literacy ratio	0,44	
10	Female literacy ratio	0,46	
29	Non-agr. male labor force	0,46	→ Inequality decreased to half
12	Sch. ratio in pri. edu.	0,54	
13	Sch. ratio of girls in pri. edu.	0,61	
38	Asphalt road ratio	0,70	
27	Non-agr. labor force	0,71	
26	Unemployment	0,71	
24	Electricity consumption	0,74	
35	No of nurse	0,84	
16	Sch. ratio of girls in sec. edu	0,98	
28	Non-agr. female labor force	0,99	→ No change in inequality
23	Total bank credits	1,00	
25	Total private motor vehicle	1,04	
31	No of teac. per stud. in secon.edu.	1,05	
15	Sch. ratio of sec. edu	1,08	
5	Total age dependency ratio	1,11	
17	Sch. ratio of boys in sec. edu	1,13	
22	Total bank deposits	1,20	
34	No of dentist	1,23	
30	No of teac. per stud. in prim.edu.	1,27	
6	Youth dependency ratio	1,34	
18	GDP	1,50	
32	No of doctor (specialist)	1,50	
4	No of household	1,57	
8	Proportion of 0-14 age group	1,61	
36	No of sanitarian	1,65	
37	No of midwife	1,73	
19	GDP in industrial sector	1,74	
21	GDP in commercial sector	1,83	
33	No of practitioner	1,84	
7	Elderly age dependency ratio	1,89	→ Inequality doubled
2	Fertility rate	2,07	
20	GDP in agricultural sector	3,02	
3	Infant mortality rate	253,84	

(Source: Tables 6.1-3)

The highest inequality reduction was for the variable "population with adequate drinking water supply" in rural settlements, with 3 times decrease between 1990 and 2000. For the following variables, which are male literacy ratio, urbanization level, schooling ratio of boys in primary education, total and female literacy ratios, the inequality decreased more than half (see Table 6.4).

It is important to note that the level of inequality reduction in the non-agricultural labor force, literacy ratios and schooling ratios in the primary education differs according to the sex. Those related to males showed bigger decreases in the regional inequality. Moreover, the level of change in inequality varied according to the level of education. The schooling ratios in the primary education had bigger reduction relative to those in the secondary education. These findings may reflect the discrimination in the education of males and females in Turkey; and the difficulty in having an improvement in the schooling in the secondary education relative to the primary education (see Table 6.4).

The variables for which the between-region inequality rose more than double are infant mortality rate, GDP in agricultural sector and fertility rate. The variables for which the regional inequality increased more than 1.5 times are elderly age dependency ratio; other GDP related variables; the health services; the proportion of 0-14 age group; and household size (see Table 6.4).

For the remaining variables, it can be said that the inequality between the GAP region and the rest of Turkey changed slightly, such as schooling ratio of girls in secondary education, the proportion of non-agricultural female labor force, bank credits and deposits, private motor vehicles, and the number of teachers per student in secondary education, and schooling ratio in secondary education (see Table 6.4).

6.2. Change in the GAP region relative to the rest of Turkey

In the above section, we discussed the changes in the regional inequality between the GAP region and the rest of Turkey. Although the inequality decreases, the situation in the GAP region may worsen in absolute terms; or may get better in absolute terms, but may worsen in relative terms (relative to the rest of Turkey) and vice versa. In Chapter 3, when the "absolute values" of the GAP region are examined, it is observed that the region was improved between 1990 and 2000 for all of the variables except fertility rate, household size, elderly age dependency ratio, GDP p.c., GDP p.c. in industrial and agricultural sectors, unemployment rates and the number of teachers in secondary education. In this section, the aim is to understand the change in the GAP region "relative" to the rest of the Turkey by examining the ratio of the shares of the GAP region.

In case of income, for example, we want to have a higher ratio (y_g / p_g); in other words, income share relative to population share ($y_g > p_g$). When we compare the results of 1990 and 2000, if the ratio "y_g / p_g" increases, it means an "improvement"[25] for the GAP region. If this ratio decreases, it means a "recession" for the region.

On the other hand, if we take into account of the infant mortality rate, y_g would be the share of that region in terms of the number of infants who die under 1 year old and p_g would be the share of GAP region in terms of the number of children born alive in last year. In this case, opposite to income, we want to have lower share in terms of number of children who die relative to the share in terms of the number of children born alive. In a case like this, when we compare the ratios "y_g / p_g" of 1990 and 2000, if the numerical result increases, it means a "recession" for the region. If the ratio decreases, it means an "improvement" for the region.

Consequently, we can consider total fertility rate, age dependency ratios, proportion of 0-14 age group and unemployment in the same way as infant mortality rate, while the rest of the variables can be considered as income.

[25] Here, improvement does not mean a reduction in the between-region inequality.

6.2.1. Change in terms of socio-demographic variables

The GAP region showed a relative "improvement" for most of the socio-demographic variables. Among these variables, the highest relative improvement in the region is for female literacy ratio; followed by total literacy ratio and the schooling ratio of girls in primary education (see Table 6.5). The findings is interesting in that those related to education of females showed bigger improvement than those related to education of males. Moreover, the region performed bigger relative improvement for the schooling ratios in primary education relative to those in secondary education. This was because by the 8-year primary education is made compulsory.

Table 6.5. Change in the GAP region relative to the rest of Turkey in terms of socio-demographic variables

		Ratio of the shares of the GAP region			
No	Variable	1990	2000	2000-1990	Improv.*
11	Male literacy ratio	0,851	0,914	0,063	+
1	Urbanization level	0,943	0,966	0,023	+
14	Sch. ratio of boys in pri.edu.	0,872	0,924	0,052	+
9	Total literacy ratio	0,751	0,839	0,088	+
10	Female literacy ratio	0,622	0,746	0,124	+
12	Sch. ratio in pri. edu.	0,809	0,867	0,058	+
13	Sch. ratio of girls in pri. edu.	0,726	0,799	0,073	+
16	Sch. ratio of girls in sec.edu	0,353	0,394	0,041	+
15	Sch. ratio of sec.edu	0,518	0,530	0,012	+
17	Sch. ratio of boys in sec.edu	0,622	0,626	0,004	+
7	Elderly age dependency ratio	0,739	0,662	-0,077	+
5	Total age dependency ratio	1,534	1,538	0,004	-
6	Youth dependency ratio	1,631	1,705	0,074	-
4	Household size	0,738	0,686	-0,052	-
8	Proportion of 0-14 age group	1,349	1,431	0,082	-
2	Fertility rate	1,435	1,666	0,231	-
3	Infant mortality rate	0,994	1,095	0,101	-

* If there is a "relative" improvement for the region it takes the sign (+), and vice versa.

Although the GAP region showed a recession in absolute terms for only total fertility rate and household size, the region exhibited a relative "recession" for most of the demographic variables. Among these variables, the highest recession was for fertility rate; followed by infant mortality rate, the proportion of 0-14 age group, youth dependency ratio, and household size (see Table 6.5). These findings, again, supports the fact that it is more difficult and needs time to get an improvement in the demographic indices relative to educational indices.

6.2.2. Change in terms of economic variables

The GAP region performed a relative "improvement" for the variables related to GDP in agricultural sector, unemployment, electricity consumption, non-agricultural male labor force, non-agricultural labor force and, bank credits, and total private motor vehicle (see Table 6.6). It is interesting to note that, although the absolute values of the region show that there is an increase in unemployment from 8.4 % in 1990 to 13 % in 2000 (see Table 3.11), relative values shows that there is also an improvement for this variable in the region relative to the rest of Turkey. This may indicate that the situation in terms of the unemployment in the rest of Turkey got worse relative to the GAP region during the last decade.

The level of change in the ratio of shares indicates that the biggest relative improvement was for GDP in agricultural sector, followed by electricity consumption and non-agricultural male labor force. This again reflects the special weights of the GAP Master Plan to agricultural related production facilities in the region. For the rest of the variables, there were slight changes in the improvement (see Table 6.6).

On the other hand, the GAP region displayed a "recession" relative to the rest of Turkey in terms of non-agricultural female labor force, bank deposits, and GDP related variables except GDP in agricultural sector during the last decade (see Table 6.6). Only the findings related to GDP and GDP in industrial sector are consistent with those of absolute values. In other words, the region revealed a recession for

these variables in both relative and absolute terms (see Table 6.6 and Tables C.7-10 in Appendix C).

Among the variables for which the GAP region showed a recession, the highest change was for GDP in industrial sector; followed by GDP in commercial sector and GDP. For the remaining variables, the recession was much less, i.e., for the total bank deposits, and the non-agricultural female labor force (see Table 6.6).

Table 6.6. Change in the GAP region relative to the rest of Turkey in terms of economic variables

		Ratio of the shares of the GAP region			
No	Variable	1990	2000	2000-1990	Improv.*
12	Non-agr. male labor force	0,781	0,848	0,067	+
10	Non-agr.labor force	0,708	0,748	0,040	+
9	Unemployment	1,545	1,457	-0,088	+
7	Electricity consumption	0,522	0,596	0,074	+
6	Total bank credits	0,164	0,184	0,020	+
8	Total private motor vehicle	0,288	0,298	0,010	+
3	GDP in agricultural sector	0,938	1,107	0,169	+
11	Non-agr. female labor force	0,334	0,331	-0,003	-
5	Total bank deposits	0,156	0,123	-0,033	-
1	GDP	0,591	0,524	-0,067	-
2	GDP in industrial sector	0,479	0,358	-0,121	-
4	GDP in commercial sector	0,558	0,440	-0,118	-

* If there is a "relative" improvement for the region it takes the sign (+), and vice versa.

6.2.3. Change in terms of infrastructure and service related variables

Although the absolute values of the GAP region shows that the region performed an improvement for all of the variables except the number of teachers per student in secondary education, the region revealed a relative “recession” for the number of teachers per student in primary education and the variables related to the health

services (except nurse). Among these variables the highest change in the recession is for the number of practitioners; followed by the number of doctors and midwives. The region performed slight recession for the rest of the variables (see Table 6.7).

On the other hand, GAP region showed a relative "improvement" for the infrastructure related variables with largest improvement in the population with adequate drinking water supply and asphalt road ratio in rural settlements, the number of nurses, and the number of teachers per student in the secondary education. Among all these variables, the GAP region got worse in absolute terms only in terms of the number of teachers per student in secondary education, but it had improvement in relative terms (see Tables 3.12 and 6.7). This might mean that absolute worsening in this variable is less in the GAP region than in the rest of Turkey.

Table 6.7. Change in the GAP region relative to the rest of Turkey in terms of infrastructure and service related variables

No	Variable	Ratio of the shares of the GAP region 1990	2000	2000-1990	Improv.*
10	Pop. with adequate drinking water supply	0,753	0,876	0,123	+
9	Asphalt road ratio	0,744	0,801	0,057	+
6	No of nurse	0,542	0,591	0,049	+
2	No of teac. per stud. in sec.edu.	0,787	0,798	0,011	+
5	No of dentist	0,312	0,274	-0,038	-
1	No of teac. per stud. in prim.edu.	0,738	0,736	-0,002	-
3	No of doctor (specialist)	0,433	0,345	-0,088	-
7	No of sanitarian	0,716	0,651	-0,065	-
8	No of midwife	0,680	0,600	-0,080	-
4	No of practitioner	0,631	0,528	-0,103	-

* If there is a "relative" improvement for the region it takes the sign (+), and vice versa.

6.2.4. Summary of the change in the GAP region

The Section 6.2.1-3 examined the change in the GAP region relative to the rest of Turkey in terms of each of the socio-demographic, economic, and infrastructure and service related variables during the period of 1990 and 2000. Subsequently, all the

39 variables together are merged and sorted according to the change in their ratio of shares (see Table 6.8).

The general conclusion drawn from the ratio of the shares of the GAP region is that the GAP region showed a recession "relative" to the rest of Turkey for almost 45 % of the variables, and a relative improvement for 55 % of the variables during the last decade (see Table 6.8). The variables for which the region showed relative "recession" are mostly related to demographic characteristics of the region, GDP related variables (except GDP in agriculture), and health and educational services. All of the demographic variables exhibited recession. The highest relative recession is for fertility rate; followed by GDP's in industrial and commercial sectors, the number of practitioners, infant mortality rate, the number of doctors (specialists), and the proportion of 0-14 age group.

On the other hand, in general, the region showed a relative "improvement" for the variables which are mostly related to the education (i.e., literacy and schooling ratios), non-agricultural male labor force, unemployment, and infrastructure. The biggest relative improvement was for GDP in agricultural sector; followed by female literacy ratio, population with adequate drinking water supply in rural settlements, total literacy ratio, and unemployment (see Table 6.8).

6.3. Summary of the Findings

According to the GAP, it was expected that in concurrence with overall socio-economic development in the region, there would be a decrease in the inequality between the GAP region and the rest of Turkey. Subsequently, the Sections 6.1-2 examined the changes in the total between-region inequality in terms of Theil's index T, and the changes in the GAP region relative to the rest of Turkey during 1990-2000, in terms of the socio-demographic, economic, and infrastructure and service related variables.

Table 6.8. Relative Change in the GAP Region

No	Variable	2000-1990	
30	No of teac. per stud. in prim.edu.	-0,002	
28	Non-agr. female labor force	-0,003	
5	Total age dependency ratio	0,004	
22	Total bank deposits	-0,033	Low
34	No of dentist	-0,038	▲
4	Household size	-0,052	
36	No of sanitarians	-0,065	
18	GDP	-0,067	RECESSION
6	Youth dependency ratio	0,074	
37	No of midwife	-0,080	
8	Proportion of 0-14 age group	0,082	
32	No of doctors (specialist)	-0,088	
3	Infant mortality rate	0,101	
33	No of practitioner	-0,103	▼
21	GDP in commercial sector	-0,118	Big
19	GDP in industrial sector	-0,121	
2	Fertility rate	0,231	
17	Sch. ratio of boys in sec. edu	0,004	
25	Total private motor vehicle	0,010	
31	No of teac. per stud. in secon.edu.	0,011	
15	Sch. ratio of sec. edu	0,012	Low
23	Total bank credits	0,020	▲
1	Urbanization level	0,023	
27	Non-agr. labor force	0,040	
16	Sch. ratio of girls in sec. edu	0,041	
35	No of nurse	0,049	
14	Sch. ratio of boys in pri. edu.	0,052	
38	Asphalt road ratio	0,057	
12	Sch. ratio in pri. edu.	0,058	IMPROVEMENT
11	Male literacy ratio	0,063	
29	Non-agr. male labor force	0,067	
13	Sch. ratio of girls in pri. edu.	0,073	
24	Electricity consumption	0,074	
7	Elderly age dependency ratio	-0,077	
26	Unemployment	-0,088	
9	Total literacy ratio	0,088	▼
39	Pop. with adequate drinking water supply	0,123	Big
10	Female literacy ratio	0,124	
20	GDP in agricultural sector	0,169	

(Source: Tables 6.5-7)

The general conclusion is that the findings of the between-region inequality and the relative change in the GAP region are almost consistent with each other for 80 percent of the variables. That is, except 8 variables, if there is a relative improvement in the region, it means a reduction in the regional inequality, and vice versa. But, this may not necessarily mean an improvement in absolute terms. Therefore, if we group the variables in terms of absolute and relative change in the region and between-region inequality, we obtain 5 main groups of variables (see Table 6.9).

The first group includes the variables for which the region performed an "improvement" for all three of criteria. That is, while there was an improvement in the region in absolute and relative terms, there was also a reduction in between-region inequality. These variables are mostly related to urbanization, electricity consumption, non-agricultural labor force, infrastructure, and educational level (e.g., literacy ratios, schooling ratios in primary education, and schooling ratios of girls in secondary education) (see Table 6.9).

In the second group, although the between-region "inequality" increased, the situation in the GAP region got better in "absolute" and "relative" terms. This might mean that the improvement in the rest of Turkey was larger than in the region. The variables in this group are related to schooling ratios in secondary education, bank credits, and private motor vehicle (see Table 6.9)

In the third group, the GAP region revealed an improvement in "absolute" terms for the variables related to infant mortality rate, total and youth dependency ratios, proportion of 0-14 age group, the number of teachers in primary education, and GDP in commercial sector, bank deposits, and health services. However, in terms of these variables, the region exhibited "relative" recession and the between "inequality" increased (see Table 6.9). This indicates the lower level of improvement in the region relative to in the rest of Turkey.

Table 6.9. Improvement in the GAP region

No	Variable	Absolute change in the GAP region	Between region inequality*	Relative change in the GAP region	
1	Urbanization level	+	+	+	
9	Total literacy ratio	+	+	+	
10	Female literacy ratio	+	+	+	
11	Male literacy ratio	+	+	+	
12	Sch. ratio in pri. edu.	+	+	+	1
13	Sch. ratio of girls in pri. edu.	+	+	+	
14	Sch. ratio of boys in pri. edu.	+	+	+	
16	Sch. ratio of girls in sec. edu	+	+	+	
24	Electricity consumption	+	+	+	
27	Non-agr. labor force	+	+	+	
29	Non-agr. male labor force	+	+	+	
35	No of nurses	+	+	+	
38	Asphalt road ratio	+	+	+	
39	Pop. with adequate drinking water	+	+	+	
28	Non-agr. female labor force	+	+	-	
15	Sch. ratio of sec. edu	+	-	+	
17	Sch. ratio of boys in sec. edu	+	-	+	2
23	Total bank credits	+	-	+	
25	Total private motor vehicle	+	-	+	
3	Infant mortality rate	+	-	-	
5	Total age dependency ratio	+	-	-	
6	Youth dependency ratio	+	-	-	
8	Proportion of 0-14 age group	+	-	-	
21	GDP in commercial sector	+	-	-	3
22	Total bank deposits	+	-	-	
30	No of teac. per stud. in prim.edu.	+	-	-	
32	No of doctors (specialist)	+	-	-	
33	No of practitioner	+	-	-	
34	No of dentists	+	-	-	
36	No of sanitarians	+	-	-	
37	No of midwives	+	-	-	
26	Unemployment	-	+	+	
7	Elderly age dependency ratio	-	-	+	
20	GDP in agricultural sector	-	-	+	4
31	No of teac. per stud. in secon.edu.	-	-	+	
2	Fertility rate	-	-	-	
4	Household size	-	-	-	5
18	GDP	-	-	-	
19	GDP in industrial sector	-	-	-	

*If there is inequality reduction, it takes the sigh (+), and vice versa.
(Source: Tables 3.15, 6.4, and 6.8)

The fourth group covers the variables for which the region "relatively" improved, but got worse in "absolute" terms and the between-region "inequality" increased. That is, the level of worsening in the rest of Turkey was higher than in the GAP region in terms of these variables. These variables are elderly age dependency ratio, GDP in agricultural sector, and the number of teachers per student in secondary education (see Table 6.9).

For the last group, in contrast to first one, the region exhibited "recession" in absolute and relative terms, and the between-region inequality increased. These variables are fertility rate, household size, GDP, and GDP in industrial sector (see Table 6.9).

It is important to note that the level of improvement in the GAP region in both absolute and relative terms and the level between-region inequality reduction in the non-agricultural labor force, literacy ratios and schooling ratios in primary education varies according to the sex. That is, those related to males showed higher improvement /bigger inequality reduction. Another point is that the schooling ratios in primary education had higher improvement /bigger inequality reduction relative to those in the secondary education. These findings may reflect the discrimination in the education of females, and the difficulty in having an improvement in the schooling in secondary education relative to primary education.

As a conclusion, the GAP project had positive impact on the region in terms of absolute values. That is, the region exhibited improvement for all of the 39 variables except 8 variables (fertility rate, household size, elderly age dependency ratio, GDP p.c., GDP p.c. in industrial and agricultural sectors, unemployment rates and the number of teachers in secondary education). However, the project was less effective in terms of the improvement of the region relative to the rest of Turkey; and in the reduction of the inequality between the region and the rest of the Turkey.

CHAPTER 9

CONCLUSION

The basic question posed and answered in this thesis is that what are the effects of increases in production and regional development during the period 1990-2000 in the GAP region in general on the level of between-region inequality in terms of socio-demographic, economic, and infrastructure and service related factors.

Regional disparities existed in Turkey since the foundation of the new Turkish Republic. Though efforts have been made to eliminate them during the planned period, the situation is still persisting. Although the regional planning was regarded as a part of the National Development Plans, the regional policies and instruments applied were not sufficient for reducing the regional inequalities. With the 5th Five Year Plan, the regional development plans gained an importance, especially with the institutionalization of South Eastern Anatolia Project (GAP) in 1989.

The GAP project, which is the biggest regional development project in Turkey, is an ambitious project in terms of the geographical area it covers, its physical magnitudes and objectives when compared with the similar other projects throughout the world (such as the Tennessee Valley Authority (TVA) in the United States; and the Cassa per il Mezzogiorno in Italy).

The GAP was planned and implemented in accordance with a long-term master plan and a social action plan. The GAP Master Plan was prepared as a multi-sectoral, integrated regional development project for the period of 1989-2005, and aimed to accelerate the socio-economic improvement of the GAP region. This project seems quite similar with TVA in terms of the means used for the development of the region.

That is, a unified irrigation program with the system of multipurpose dams and reservoirs and the production of electricity were the core of the GAP. Consequently, the GAP Administration started a project to assess the socio-economic status and potentials in the region with a new or enhanced ways of income generating sectors in addition to agricultural sector.

As in the case of two well-known regional plans, the GAP led to rapid increases in agricultural production in the project area, due to public investments in irrigation and other infrastructure improved credit facilities. Most of the government's investments were concentrated in the production sectors, where significant productivity increases were achieved. Traditional substance crops were replaced by commercial crops, and modern production techniques were adopted, new industrial and service areas were opened, etc. By these criteria this project might be considered eminently successful.

It is clear that the GAP Master Plan policies gave an initial boost to economic development rather than social development of the region. That is, the master plan was an economic plan rather than a social plan. Economic development does not directly and immediately improve other factors. Therefore, in 1994, the GAP Social Action Plan was prepared towards sustainable development to solve problems of social structure in the region, and expected to be completed in 2010. Subsequently, a significant number of social and economic research projects were carried out focusing on issues such as health care, education of adult and women, and employment generation.

Although a comprehensive investment program was under implementation since the start of the project, social sector had the share of only 10% in total investment allocation of the project. As of the end of the 2001, nearly 10 quadrillion 831 trillion TL was spend for the project, giving the realization rate of 48%. Looking by sectors, the rate of realization was 46% in economic sectors and 71.7% in social sectors. Mining and energy had the highest realization rates, 100% and 78.7%, respectively among the economic sectors; while education and health had the highest realization rate of 85% among the social sectors.

In concurrence with overall socio-economic development in the region, it was expected that there would be a decrease in the inequality between the GAP region and the rest of Turkey. The GAP seems to be successful when measured in terms of actual values. Likewise, when the inequality criterion is applied, the project is questionable. For example, the project of Mezzogiorno could not succeed in narrowing the economic disparities between the north and the south due to the mismanagement of the Cassa, lack of accountability, and insufficient incentives (OECD, 2001, pp.14-15). On the other hand, the TVA became successful in narrowing the income gap.

When the "absolute values" of the GAP region are examined in 1990 and 2000, it is observed that the regional averages were always worse than national averages in terms of all of the socio-economic indicators, except GDP p.c. in agricultural sector which may be due to the fact that the major activity in the GAP region is agricultural. However, the region performed an improvement between 1990 and 2000 for all of the 39 variables except fertility rate, household size, elderly age dependency ratio, GDP p.c., GDP p.c. in industrial and agricultural sectors, unemployment rate, and the number of teachers in secondary education. Among these, the decline in per capita income can be associated with the economic crises in 1990's, which caused also a decrease in per capita income in the national level. Therefore, in general, the GAP can be accepted as successful in absolute terms.

However, when we examine the findings of the regional inequality analyses, the situation is not as encouraging as in absolute terms. The project was less effective in the reduction of the inequality between the GAP region and the rest of the Turkey; and in terms of the improvement of the region relative to the rest of Turkey. The findings of the between-region inequality and the relative change in the GAP region were consistent with each other for almost 80 percent of the variables. That is, except 8 variables, if there was a relative improvement in the region, it also meant a reduction in the regional inequality, and vice versa.

The GAP region performed "relative improvement" especially for the variables related to GDP in agricultural sector, unemployment, educational level of people (i.e., literacy ratios and schooling ratios in primary education), electricity consumption, non-agricultural labor force, and infrastructure; it exhibited "recession" especially for the variables of fertility rate, infant mortality rate, household size, health services, and remaining GDP related variables.

Although the figures are lower in the region than those of the country in 1990, the region had the higher increase in the urban population share relative to the country, which resulted between-region inequality reduction. The reasons for this might be the uneven distribution of land and terrorist activities, which led to the rural-to-urban migration of young population. This situation exacerbates the problem of unplanned urbanization, shortage of municipal, education and health services, and prevents the improvement of the human resources. In the last years, the terrorist activities were greatly reduced and security is ensured in the villages. Therefore, more sources should be allocated for infrastructure and services for a healthy urbanization; and/or the migrants might be encouraged to return back to their villages in a planned way and necessary conditions should be created for a sustainable subsistence of these people.

It is important to note that the highest between-region inequality increase was mostly for the demographic variables (such as infant mortality rate, total fertility rate, household size, and dependency ratios). Because, in contrast to national trend, fertility rate and household size in the region exhibited an increase during the last decade. This indicates the failure in the course of contraception and family planning practices in the region. Therefore, the studies on the social development within the GAP should be completed as soon as possible since it is very difficult and takes time to get an improvement in terms of the demographic indices relative to other variables. More studies should be made to reduce the fertility rate and infant mortality rate. In the case of reducing fertility rate, the education of women in the

region should be provided, since according to existing studies, there is positive correlation between high fertility rate and low educational levels for females.

Within the framework of the GAP Social Action Plan, the Multi Purpose Community Centers (ÇATOM) were established to raise the status of women and integrating them into the development process by introducing a set of programs including skill training, literacy and various social programs (GAP, 2000, p.28). However, the gender discrepancies were considerable in terms of education and employment in terms of absolute and relative terms, and inequality. That is, the literacy and schooling rates, and the participation in non-agricultural activities of "females" in the GAP region were much lower than those of "males". Furthermore, those related to females showed lower decreases in the regional inequality. In the case of non-agricultural employment, this trend is not surprising when we think that the major activity in the GAP region is agricultural, which contains more than 60 % of the labor force; and the women work mostly in agricultural activities. Therefore, special efforts should be made for the betterment of the situation of the women in the region and to integrate them more fully into the development process.

Moreover, the schooling ratios in primary education had bigger reduction in inequality relative to those in secondary education. This finding indicates the impact of 8-year compulsory primary education and the difficulty in having an improvement in the schooling in secondary education relative to primary education. Therefore, more studies should be made to encourage people to send their children for the secondary education.

In the case of TVA, the availability of low-cost electricity, which was a result of the electricity generated by TVA dams, attracted large numbers of businesses and industries to the area, providing desperately needed jobs. This resulted with the large increase in the number of persons working in higher paying nonfarm jobs in the project area. A decline in the dependence on low-income agriculture as a source of employment and a rapid expansion of higher paying nonfarm jobs were the major factors contributing to the growth of income in the region. The increase in per capita

income in the region was faster than in the Nation, therefore a narrowing of the income gap could take place.

However, in the case of the GAP, we cannot yet see this process completed. The figures show that GDP p.c. did not experience improvement in the GAP, although the increase in non-agricultural labor force in the region was faster than in the nation, and the inequality between the GAP region and the rest of Turkey decreased. It is clear that the GAP Master Plan gave special weights to agriculture related production facilities in a region where agriculture was already important. Therefore, while the region performed relative improvement for GDP in agricultural sectors, it showed recession for those of other sector. However, since the value-added in agricultural sector is much lower relative to the other sectors, the inequality increased between the GAP region and the rest of Turkey for all the GDP related variables. Therefore, for a sufficient economic development in terms of employment and income, more job opportunities in non-agricultural activities should be created in the region.

Although there was substantial improvement in education and health "services" in the region in the last decade, it was still much lower than the country averages in 2000. Since the improvement in the region was slower than in the rest of Turkey, increasing between-region inequalities were evident for education and health services related variables. Improvement in these services will result in the improvement of the demographic variables (i.e., fertility rate, infant mortality rate, proportion of 0-14 age group). All of these show the importance and necessity of more investments on the services. However, considering that the investment allocations showed that the major part of the investments (with the realization rate of 85%) in education and health services the GAP region was already made, it can be said that this amount in the education and health was not sufficient. Therefore, more investments should be allocated to education and health services in order to increase the accessibility and quality.

The rural settlements of the region face serious problems in terms of adequate drinking water supply and asphalt road ratio in 1990. However, in the last decade,

substantial investments were made in infrastructure, and consequently significant improvements took place, so that the inequality between the GAP region and the rest of Turkey decreased considerably. However, they are still below the average for the nation even in 2000. In order to remove the inequality between the GAP region and the rest of Turkey in terms of infrastructure, the infrastructural projects should be completed as soon as possible.

The GAP would be a guide with its positive and negative sides for the other regional development projects and regional planning studies, which were accelerated in the period of 7th Five Year Plan. These projects are the Development Project of Yeşilırmak River Basin, the Eastern Anatolia Project (DAP) and the Development Project of Eastern Black Sea Region (DOKAP), Zonguldak-Bartın-Karabük Regional Development Project, the Eastern Mediterranean Regional Development Project, and the Marmara Regional Plan. The preliminary studies of these projects should give priority to socio-demographic development. Because, this thesis showed that it is more difficult and takes more time to get an improvement in the social and demographic indices relative to other indices.

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APPENDIX A.

TOTAL INEQUALITY IN TURKEY

In this Chapter, we shall discuss the changes in total inequality in Turkey between 1990 and 2000. As in the between and within-region inequality studies, the examination of the total inequality will be made for each sets of variables separately. Let's select income as a variable to measure the inequality and T represents total income inequality in Turkey. If the subscripts p_i and y_i denote the population and income share of province i, the overall inequality T is obtained as (Theil, 1967 and 1972):

$$T = \sum_{i=1}^{G} y_i \log(y_i/p_i)$$

We will also examine the contribution of between and within-region inequality to total inequality.

A.1. Inequality in Terms of Socio-demographic Variables

The results of the inequality analyses showed that the "overall" inequality decreased for all of the "educational" variables (i.e., literacy and schooling ratios) and urbanization during the period 1990-2000. The highest inequality reduction was for schooling ratio of boys in primary education with approximately 3 times decrease; followed by male literacy ratio, schooling ratio in primary education, schooling ratio of girls in primary education, total literacy ratio, and female literacy ratio. It is important to note that the literacy and schooling ratios in primary education of "males" had higher inequality decrease compared to those of "females" (see Table A.1 and Figures A.1-2).

Table A.1. Total Inequality in Terms of Socio-demographic Variables

No	Variable	Total inequality 1990	Total inequality 2000	Total inequality 2000/1990	Improv.*	% of between-region inequality in total 1990	% of between-region inequality in total 2000	% of between-region inequality in total 2000-1990
14	Sch. ratio of boys in pri.edu.	0,0456	0,0151	0,33	+	2,57	3,12	0,55
11	Male literacy ratio	0,0027	0,0009	0,34	+	40,66	42,30	1,64
12	Sch. ratio in pri. edu.	0,0510	0,0185	0,36	+	5,06	7,59	2,53
13	Sch. ratio of girls in pri. edu.	0,0613	0,0253	0,41	+	8,79	12,91	4,12
9	Total literacy ratio	0,0076	0,0033	0,44	+	41,05	41,18	0,13
10	Female literacy ratio	0,0181	0,0086	0,48	+	41,36	40,05	-1,31
17	Sch. ratio of boys in sec.edu	0,0718	0,0426	0,59	+	12,70	24,15	11,45
1	Urbanization level	0,0520	0,0319	0,61	+	0,32	0,20	-0,12
15	Sch. ratio of sec.edu	0,0993	0,0666	0,67	+	15,76	25,44	9,68
16	Sch. ratio of girls in sec.edu	0,1768	0,1200	0,68	+	17,46	25,10	7,64
5	Total age dependency ratio	0,0309	0,0277	0,90	+	32,85	40,57	7,72
3	Infant mortality rate	0,0161	0,0162	1,00	+	0,02	4,65	4,63
6	Youth dependency ratio	0,0412	0,0443	1,07	-	33,64	42,05	8,41
4	Household size	0,0192	0,0211	1,10	-	19,77	28,29	8,52
2	Fertility rate	0,0324	0,0365	1,13	-	18,62	34,09	15,47
8	Proportion of 0-14 age group	0,0172	0,0220	1,28	-	32,31	40,80	8,49
7	Elderly age dependency ratio	0,0307	0,0419	1,36	-	9,87	13,66	3,79
					Aver.	19,58	25,07	

*Improvement means a decrease in inequality

On the other hand, all of "demographic" variables (except total age dependency ratio) exhibited an inequality increase during the last decade. The highest total inequality increase belongs to the elderly age dependency ratio, where the inequality increased 1,36 times; followed by the proportion of 0-14 age group, fertility rate, household size, and youth dependency ratio (see Table A.1 and Figures A.1-2). This finding indicates the fact that it is more difficult and needs time to get an improvement in terms of the demographic indices relative to educational indices.

The results of the decomposition analysis show that the between-region component accounted for a smaller proportion of the total in both of the census years. In other words, the within-region inequality dominated the between-region inequality in the overall inequality. In 1990, the level of contribution was between 0.02 and 41.36 percent, with the average value of 19.58. In 2000, the contribution ranged between 0.20 and 42.30 percent, with an average of 25.07 percent. The contribution of the between-region inequality to overall inequality increased slightly in the period of 1990-2000 for all the variables except female literacy ratio and urbanization level (see Table A.1).

In both of 1990 and 2000, the contribution of the between- group components were more than 40 percent for only the variables related to literacy ratios. On the other hand, the least contribution was for the variables of the schooling ratio of boys in primary education, urbanization level, and infant mortality rate, where the contribution was less than 5 percent contribution in both years (see Table A.1).

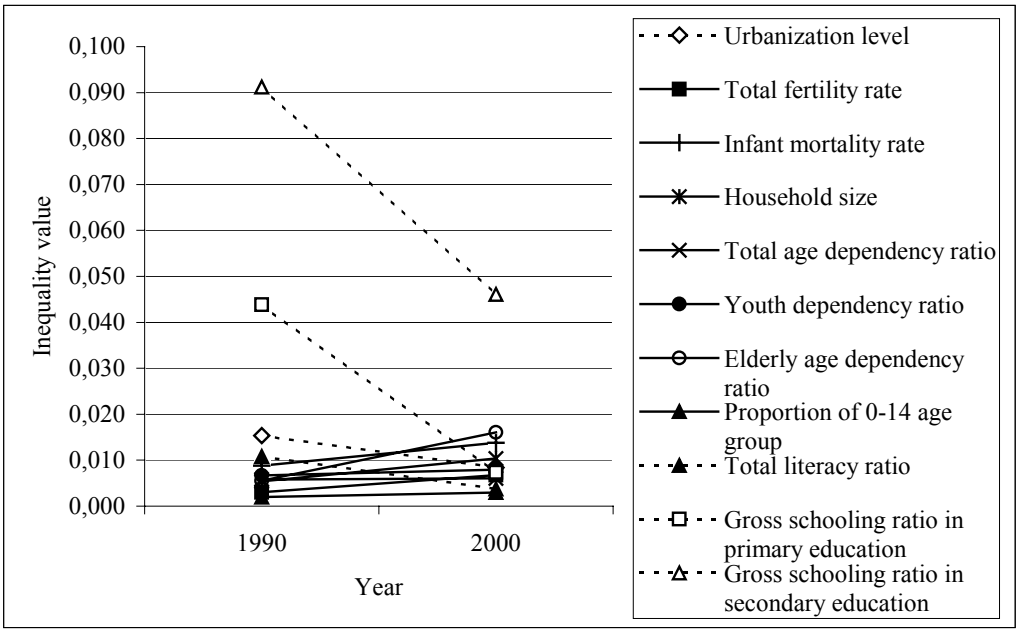

Figure A.1. Total Inequality in Terms of Socio-demographic Variables

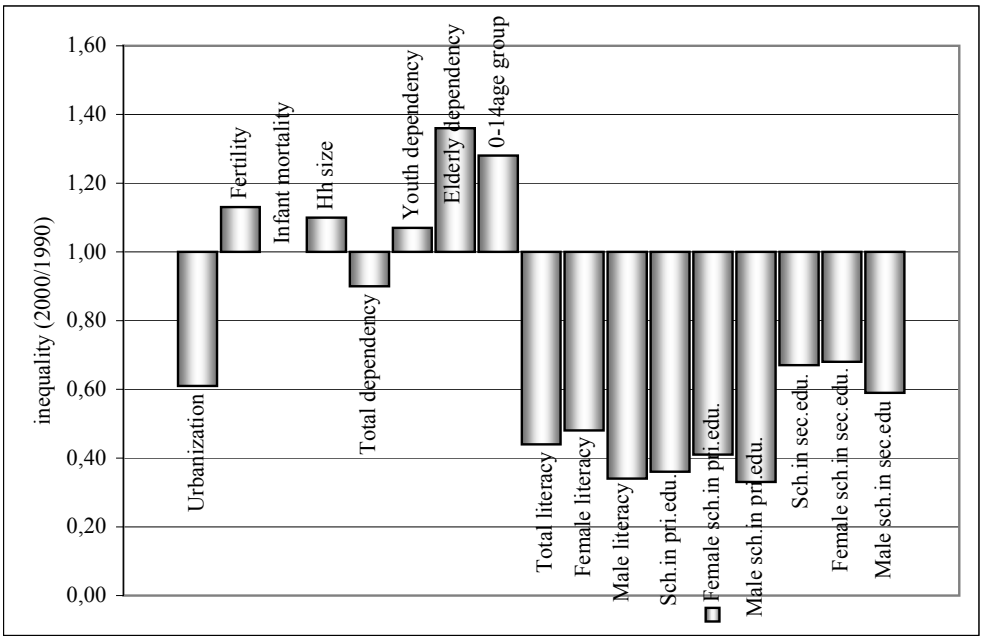

Figure A.2. Total Inequality in Terms of Socio-demographic Variables

A.2. Inequality in terms of Economic Variables

The "overall" inequality decreased slightly for all of the economic variables except GDP in agricultural sector, bank deposits, and GDP. While the highest inequality reduction was for the number of private motor vehicle per people, the highest inequality increase was for GDP in agricultural sector. However, it should be said that the change in the total inequality was very small for all of the economic variables (see Table A.2 and Figures A.3-4).

The economic variables show that the between-region component always accounted for smaller amount of overall inequality for all the decomposition variables, with the average values, such as 7.29 percent in 1990, and 8.60 percent in 2000. The contribution of the between-region inequality increased during the last decade except for the variables of the non-agricultural male labor force, electricity consumption, non-agricultural labor force, and unemployment (see Table A.2).

In both of the years, only the variables of unemployment, the number of private motor vehicle per person, and total bank deposits per person had more than 11 percent contribution of the between-region inequality. On the other hand, the lowest contribution was for non-agricultural total and male labor force, and GDP in agricultural sector, where the contribution was less than 5 percent contribution (see Table A.2).

Table A.2. Total Inequality in Terms of Economic Variables

No	Variable	Total inequality 1990	2000	2000/1990	Improv.*	% of between-region inequality in total 1990	2000	2000-1990
25	Total private motor vehicle	0,2721	0,1823	0,67	+	12,67	19,59	6,92
29	Non-agr. male labor force	0,0475	0,0356	0,75	+	4,43	2,73	-1,70
24	Electricity consumption	0,2098	0,1646	0,78	+	6,54	6,18	-0,36
27	Non-agr.labor force	0,1082	0,0851	0,79	+	3,63	3,29	-0,34
28	Non-agr. female labor force	0,4374	0,3801	0,87	+	5,79	6,57	0,78
26	Unemployment	0,0714	0,0638	0,89	+	15,58	12,46	-3,12
21	GDP in commercial sector	0,2316	0,2127	0,92	+	4,96	9,87	4,91
19	GDP in industrial sector	0,3662	0,3501	0,96	+	4,52	8,24	3,72
23	Total bank credits	0,5377	0,5336	0,99	+	9,73	9,84	0,11
18	GDP	0,1139	0,1161	1,02	-	8,52	12,54	4,02
22	Total bank deposits	0,4854	0,5542	1,14	-	11,07	11,60	0,53
20	GDP in agricultural sector	0,2018	0,2522	1,25	-	0,10	0,24	0,14
					Aver.	7,29	8,60	

*Improvement means a decrease in inequality

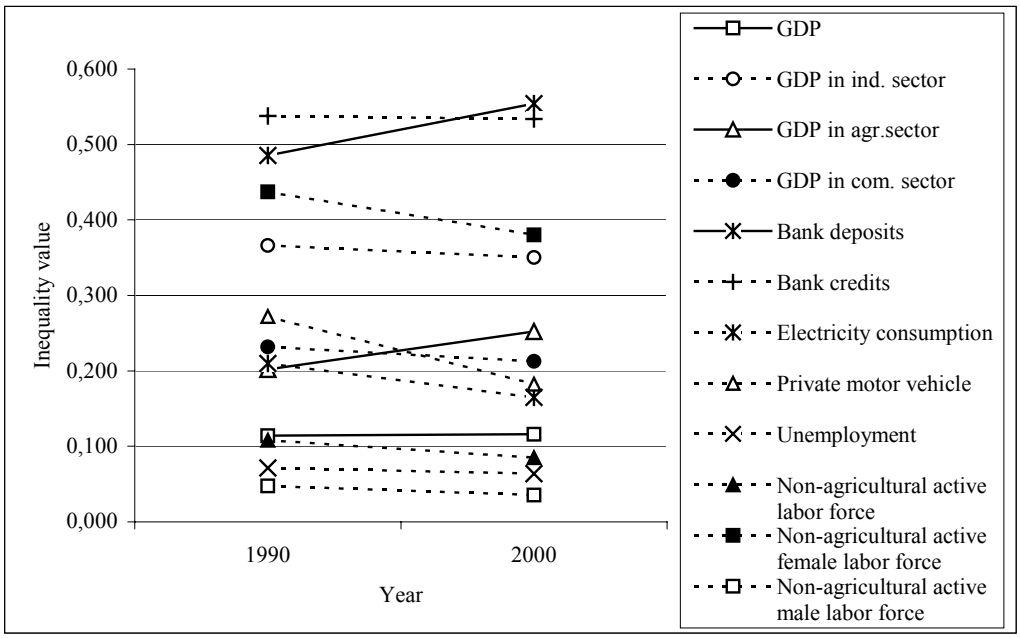

Figure A.3. Total Inequality in Terms of Economic Variables

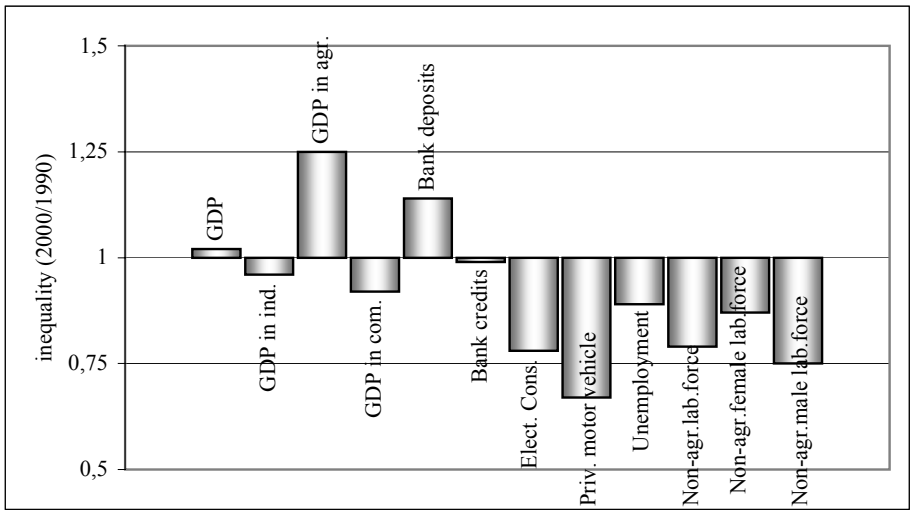

Figure A.4. Total Inequality in Terms of Economic Variables

A.3. Inequality in Terms of Infrastructure and Service Related Variables

There was an inequality reduction for all of the infrastructure and service related variables except the number of midwives and asphalt road ratio in rural settlements. The highest inequality reduction was for the population with adequate drinking water supply in rural settlements with 2 times decrease in total inequality. On the other hand, the highest inequality increase was for the number of midwives, where the total inequality increased 1.76 times. For the remaining variables, the overall inequality exhibited slight changes (see Table A.3 and Figures A.5-6).

The contribution of the between-region inequality to total inequality was very low, and had the average percentage of 8.97 percent in 1990 and of 11.57 percent in 2000. The contribution of between-region inequality increased during 1990-2000 except for the variables of the population with adequate drinking water supply and asphalt road ratio in rural settlements, and the number of midwives (see Table A.3).

In both of the years, the contribution of the between-region inequality was more than 10 % for the variables of the population with adequate drinking water supply in rural settlements, the number of nurses, the number of teachers per student in primary education, and the number of midwives. On the other hand, it was less than 10 percent in both of 1990 and 2000 for the number of teachers per student in secondary education, the number of sanitarians, and asphalt road ratio in rural settlements (see Table A.3).

Table A.3. Total Inequality in Terms of Infrastructure and Service Related Variables

No	Variable	Total inequality				% of between-region inequality in total		
		1990	2000	2000/1990	Improv.*	1990	2000	2000-1990
39	Pop. with adequate drinking water supply	0,0215	0,0107	0,50	+	18,46	10,85	-7,61
35	No of nurse	0,0936	0,0612	0,65	+	13,28	17,06	3,78
31	No of teac. per stud. in sec.edu.	0,0309	0,0219	0,71	+	4,37	6,49	2,12
32	No of doctor (specialist)	0,3335	0,2357	0,71	+	6,03	12,82	6,79
36	No of sanitarian	0,1066	0,0789	0,74	+	4,19	9,37	5,18
34	No of dentist	0,3332	0,2776	0,83	+	9,53	14,02	4,49
33	No of practitioner	0,1247	0,1043	0,84	+	6,24	13,71	7,47
30	No of teac. per stud. in prim.edu.	0,0311	0,0286	0,92	+	12,73	17,55	4,82
38	Asphalt road ratio	0,1395	0,1514	1,08	-	2,56	1,64	-0,92
37	No of midwife	0,0464	0,0818	1,76	-	12,36	12,16	-0,20
* Improvement means a decrease in inequality					Aver.	8,97	11,57	

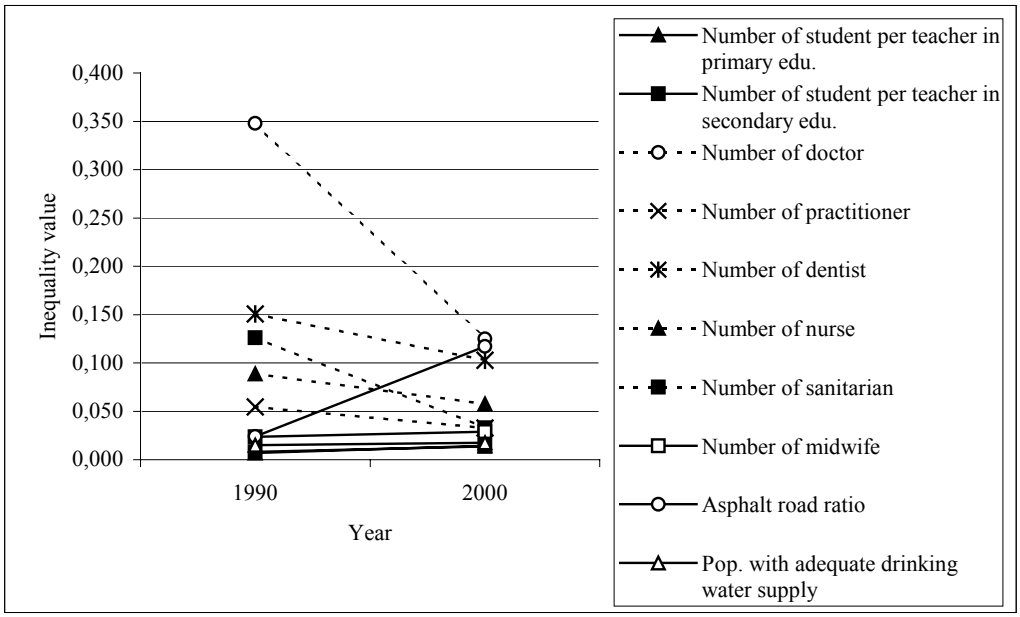

Figure A.5. Total Inequality in Terms of Infrastructure and Service Related Variables

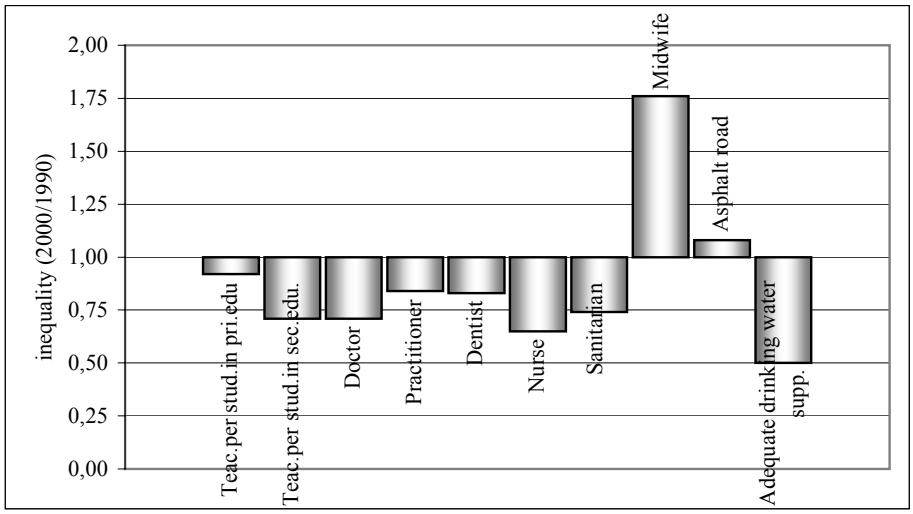

Figure A.6. Total Inequality in Terms of Infrastructure and Service Related Variables

A.4. Summary of Total Inequality

In the Sections A.1-3, the change in total inequality of Turkey has been examined in terms of each of the socio-demographic, economic, and infrastructure and service related variables for the years 1990 and 2000. Subsequently, all of the 39 variables together are merged and sorted according to the change in their total inequality (see Table A.4).

Although Turkey, in general, performed an absolute improvement for all of the indicators except GDP p.c. in agricultural sector, unemployment, and the number of teacher per thousand student in secondary education (see Tables C.7,9,11 in Appendix C), the total inequality in Turkey decreased for 29 out of 39 variables, which correspond to almost 75% of the total. For the remaining 10 variables (25%), the total inequality increased in the last decade. However, it should be noted that for most of the variables, the changes in total inequality was very small (see Table A.4).

The variables which performed largest inequality reduction are related to educational level (e.g., literacy and schooling ratios), and urbanization. The largest decline was for the variable "schooling ratio of boys in primary education", with almost 3 times decrease between 1990 and 2000. The inequality decreased more than half for the following variables: male literacy ratio, schooling ratio in primary education, schooling ratio of girls in primary education, total literacy ratio, and female literacy ratio, and population with adequate drinking water supply in rural settlements (see Table A.4). All of these may indicate the relatively higher success in the decrease of inequality between provinces in the course of education of the people and supply of drinking water for the rural population during the last decade.

However, it should be noted that the level of inequality reduction in literacy and schooling ratios and non-agricultural labor force changes according to the sex. That is, those related to "males" showed bigger decreases in the total inequality. Moreover, it is realized that the schooling ratios in primary education had bigger reduction in inequality relative to those in secondary education. These findings may

indicate the gender discrimination in Turkey; and the difficulty in having an improvement in the schooling in secondary education relative to primary education.

On the other hand, the total inequality in Turkey increased for the variables which are mostly related to demography, the number of midwives, and GDP in agricultural sector. The highest inequality increase was for the number of midwives, where the inequality rose 1.76 times. It was followed by elderly age dependency ratio, proportion of 0-14 age group, and GDP in agricultural sector (see Table A.4)

For the remaining variables, it can be said that the total inequality changed slightly, such as, GDP related variables (except in agricultural sector), infant mortality rate, youth and total dependency ratios, and the number of teachers per student in secondary education, schooling ratio in secondary education (see Table A.4).

Furthermore, the analyses show that the between-region component always accounted for smaller amount of overall inequality. In other words, the impact of the between-region inequality was very small relative to within-region inequality. But it exhibited a slight increase in the period of 1990-2000 for most of the variables.

In 1990, the highest between-region inequality contribution was for the socio-demographic variables. It was more than 32 percent for the variables related to literacy ratios, youth and total age dependency ratios, and proportion of 0-14 age group. On the other hand, the lowest contribution was for the variables of infant mortality ratio, GDP in agricultural sector, and urbanization, with less than 0.32 percent contribution (see Table A.5).

In 2000, the highest between-region inequality contribution was again for the socio-demographic variables. The contribution was more than 34 percent for fertility rate in addition to those variables noted above. On the other hand, the lowest contribution was for the variables of urbanization, GDP in agricultural sector, and the asphalt road ratio in rural settlements, with less than 1.64 percent contribution (see Table A.6).

Table A.4. Total Inequality

No	Variable	2000/1990	
14	Sch. ratio of boys in pri. edu.	0,33	
11	Male literacy ratio	0,34	
12	Sch. ratio in pri. edu.	0,36	
13	Sch. ratio of girls in pri. edu.	0,41	
9	Total literacy ratio	0,44	
10	Female literacy ratio	0,48	
39	Pop. with adequate drinking water supply	0,50 →	Inequality decreased to half
17	Sch. ratio of boys in sec. edu	0,59	
1	Urbanization level	0,61	
35	No of nurse	0,65	
15	Sch. ratio of sec. edu	0,67	
25	Total private motor vehicle	0,67	
16	Sch. ratio of girls in sec. edu	0,68	
31	No of teac. per stud. in secon.edu.	0,71	
32	No of doctor (specialist)	0,71	
36	No of sanitarian	0,74	
29	Non-agr. male labor force	0,75	
24	Electricity consumption	0,78	
27	Non-agr. labor force	0,79	
34	No of dentist	0,83	
33	No of practitioner	0,84	
28	Non-agr. female labor force	0,87	
26	Unemployment	0,89	
5	Total age dependency ratio	0,90	
21	GDP in commercial sector	0,92	
30	No of teac. per stud. in prim.edu.	0,92	
19	GDP in industrial sector	0,96	
23	Total bank credits	0,99	
3	Infant mortality rate	1,00 →	No change in inequality
18	GDP	1,02	
6	Youth dependency ratio	1,07	
38	Asphalt road ratio	1,08	
4	Household size	1,10	
2	Fertility rate	1,13	
22	Total bank deposits	1,14	
20	GDP in agricultural sector	1,25	
8	Proportion of 0-14 age group	1,28	
7	Elderly age dependency ratio	1,36	
37	No of midwife	1,76	

(Source: Tables A.1-3)

Table A.5. Contribution of Between-region Inequality in Total Inequality, 1990

No	Variable	%
10	Female literacy ratio	41,36
9	Total literacy ratio	41,05
11	Male literacy ratio	40,66
6	Youth dependency ratio	33,64
5	Total age dependency ratio	32,85
8	Proportion of 0-14 age group	32,31
4	Household size	19,77
2	Fertility rate	18,62
39	Pop. with adequate drinking water supply	18,46
16	Sch. ratio of girls in sec. edu	17,46
15	Sch. ratio of sec. edu	15,76
26	Unemployment	15,58
35	No of nurse	13,28
30	No of teac. per stud. in prim.edu.	12,73
17	Sch. ratio of boys in sec. edu	12,70
25	Total private motor vehicle	12,67
37	No of midwife	12,36
22	Total bank deposits	11,07
7	Elderly age dependency ratio	9,87
23	Total bank credits	9,73
34	No of dentist	9,53
13	Sch. ratio of girls in pri. edu.	8,79
18	GDP	8,52
24	Electricity consumption	6,54
33	No of practitioner	6,24
32	No of doctor (specialist)	6,03
28	Non-agr. female labor force	5,79
12	Sch. ratio in pri. edu.	5,06
21	GDP in commercial sector	4,96
19	GDP in industrial sector	4,52
29	Non-agr. male labor force	4,43
31	No of teac. per stud. in secon.edu.	4,37
36	No of sanitarian	4,19
27	Non-agr. labor force	3,63
14	Sch. ratio of boys in pri. edu.	2,57
38	Asphalt road ratio	2,56
1	Urbanization level	0,32
20	GDP in agricultural sector	0,10
3	Infant mortality rate	0,02

(Source: Tables A.1-3)

Table A.6. Contribution of Between-region Inequality in Total Inequality, 2000

No	Variable	%
11	Male literacy ratio	42,30
6	Youth dependency ratio	42,05
9	Total literacy ratio	41,18
8	Proportion of 0-14 age group	40,80
5	Total age dependency ratio	40,57
10	Female literacy ratio	40,05
2	Fertility rate	34,09
4	Household size	28,29
15	Sch. ratio of sec. edu	25,44
16	Sch. ratio of girls in sec. edu	25,10
17	Sch. ratio of boys in sec. edu	24,15
25	Total private motor vehicle	19,59
30	No of teac. per stud. in prim.edu.	17,55
35	No of nurse	17,06
34	No of dentist	14,02
33	No of practitioner	13,71
7	Elderly age dependency ratio	13,66
13	Sch. ratio of girls in pri. edu.	12,91
32	No of doctor (specialist)	12,82
18	GDP	12,54
26	Unemployment	12,46
37	No of midwife	12,16
22	Total bank deposits	11,60
39	Pop. with adequate drinking water supply	10,85
21	GDP in commercial sector	9,87
23	Total bank credits	9,84
36	No of sanitarian	9,37
19	GDP in industrial sector	8,24
12	Sch. ratio in pri. edu.	7,59
28	Non-agr. female labor force	6,57
31	No of teac. per stud. in secon.edu.	6,49
24	Electricity consumption	6,18
3	Infant mortality rate	4,65
27	Non-agr. labor force	3,29
14	Sch. ratio of boys in pri. edu.	3,12
29	Non-agr. male labor force	2,73
38	Asphalt road ratio	1,64
20	GDP in agricultural sector	0,24
1	Urbanization level	0,20

(Source: Tables A.1-3)

APPENDIX B.

WITHIN-GAP INEQUALITY

In this Chapter, we shall examine the empirical findings of the within GAP region inequality for the years 1990 and 2000. Examination of the within inequality will be made for each sets of variables, separately. These will provide the understanding about the changes in inequality among the provinces of the GAP region during the last decade. If the concern is income inequality in the region, then the within-GAP inequality *Tw* is measured as follows (Theil, 1967 and 1972):

$$Tw = \sum_{i \in p_g}^{G} (y_i/y_g) \; log \; [(y_i/y_g) / (p_i/p_g)],$$

where y_i is the income share and p_i is the population share of that province i (i=1,…9) located in the GAP region; p_g and y_g denote the population and income share of the GAP region.

B.1. Inequality in Terms of Socio-demographic Variables

The within-GAP inequality decreased for all the variables related to education and urbanization level. The highest inequality reduction was for schooling ratio of "males" in primary education; followed by total and female schooling ratios in primary education, total, male, and female literacy ratios. The inequality decreased more than 3 times for these variables. It is important to note that the literacy and schooling ratios of "males" had higher inequality reduction relative to those of "females" for both of the education level. This finding again supports the existence of the varying degrees of the gender discrimination in education within the region as well as in Turkey. Besides, schooling ratios in "primary" education exhibited higher

inequality reduction compared to those in "secondary" education. This may reflect the impact of 8-year compulsory primary education (see Table B.1 and Figure B.1-2).

On the other hand, the within-GAP inequality exhibited a raise for all the demographic, and health services related variables. Among them, elderly age dependency ratio had the highest regional inequality increase, followed by fertility rate, the household size, the proportion of 0-14 age group (see Table B.1 and Figure B.1-2). The increase in the inequality both for the elderly age dependency ratio and fertility rate might be due to the high out-migration of young working-age population to few provinces in the region where there are job opportunities.

Table B.1. Within-GAP Inequality in Terms of Socio-demographic Variables

		Within-GAP inequality			
No	Variable	1990	2000	2000/1990	Improv.*
14	Sch. ratio of boys in pri.edu.	0,0342	0,0043	0,13	+
12	Sch. ratio in pri. edu.	0,0438	0,0073	0,17	+
13	Sch. ratio of girls in pri. edu.	0,0657	0,0149	0,23	+
11	Male literacy ratio	0,0039	0,0010	0,27	+
9	Total literacy ratio	0,0108	0,0038	0,35	+
10	Female literacy ratio	0,0340	0,0123	0,36	+
17	Sch. ratio of boys in sec.edu	0,0705	0,0329	0,47	+
15	Sch. ratio of sec.edu	0,0912	0,0461	0,51	+
1	Urbanization level	0,0153	0,0084	0,55	+
16	Sch. ratio of girls in sec.edu	0,1675	0,0989	0,59	+
5	Total age dependency ratio	0,0058	0,0060	1,04	-
6	Youth dependency ratio	0,0067	0,0079	1,19	-
8	Proportion of 0-14 age group	0,0020	0,0029	1,48	-
3	Infant mortality rate	0,0088	0,0137	1,57	-
4	Household size	0,0054	0,0104	1,94	-
2	Fertility rate	0,0030	0,0067	2,25	-
7	Elderly age dependency ratio	0,0055	0,0160	2,92	-

*Improvement means a decrease in inequality

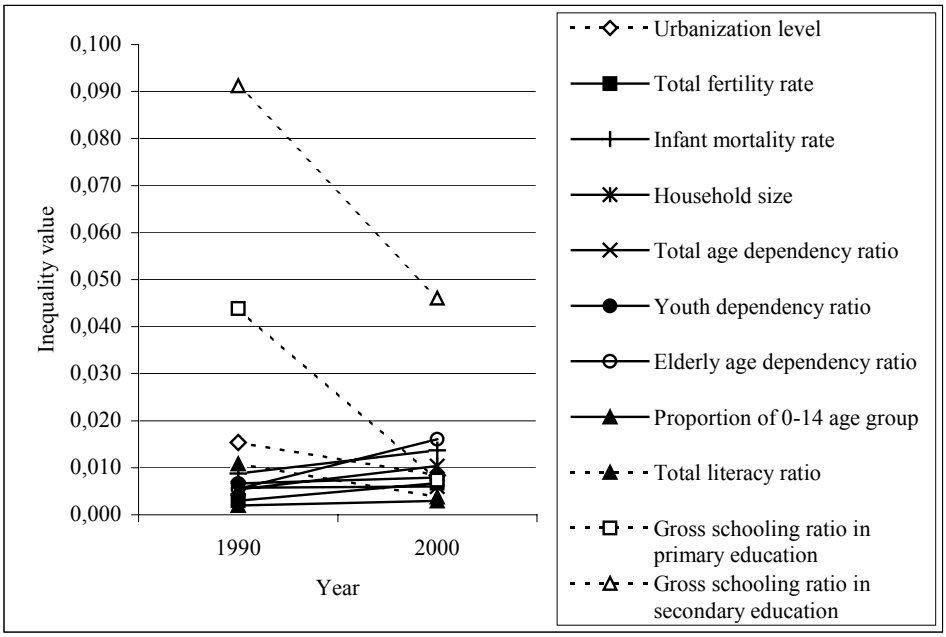

Figure B.1. Within-GAP Inequality in Terms of Socio-demographic Variable

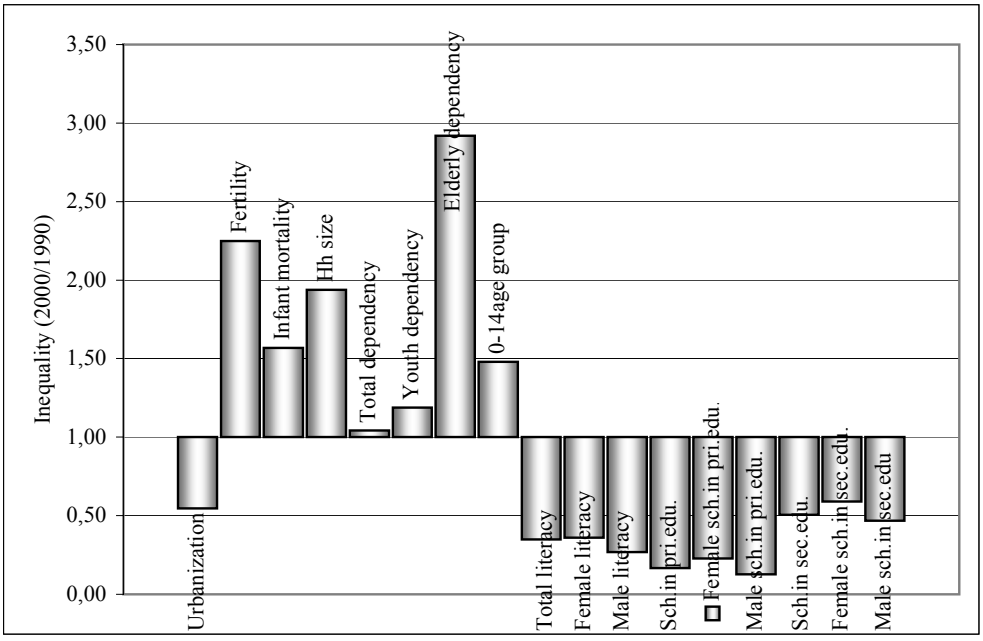

Figure B.2. Within-GAP Inequality in Terms of Socio-demographic Variables

B.2. Inequality in Terms of Economic Variables

The within-GAP inequality showed a reduction for half of the variables. While the inequality in the electricity consumption and unemployment decreased more than half from 1990 to 2000; the inequality declined slightly for GDP in industrial and commercial sector, GDP, and total bank credits (see Table B.2 and Figures B.3-4).

On the other hand, the increase in the within-GAP inequality is evident for GDP in agricultural sector, total bank deposits, total private motor vehicle, and non-agricultural labor force. It should be noted that non-agricultural "female" labor force had higher inequality increase than the "males". Similar to education, this finding reflects the existence of varying degrees of gender discrimination within the GAP region. The highest regional inequality increase was for GDP in agricultural sector, where the inequality increased more than 1.8 times during the last decade. This might reflect the concentration of agricultural production activities in some of the provinces, such as Şanlıurfa (see Table B.2 and Figures B.3-4).

Table B.2. Within-GAP Inequality in terms of Economic Variables

		Within-GAP inequality			
No	Variable	1990	2000	2000/1990	Improv.*
24	Electricity consumption	0,2051	0,0789	0,38	+
26	Unemployment	0,0274	0,0126	0,46	+
19	GDP in industrial sector	0,2553	0,1628	0,64	+
18	GDP	0,0692	0,0446	0,64	+
23	Total bank credits	0,3387	0,2686	0,79	+
21	GDP in commercial sector	0,4384	0,3608	0,82	+
29	Non-agr. male labor force	0,0220	0,0276	1,26	-
27	Non-agr.labor force	0,0385	0,0512	1,33	-
25	Total private motor vehicle	0,1386	0,2082	1,50	-
28	Non-agr. female labor force	0,0997	0,1521	1,53	-
22	Total bank deposits	0,1210	0,1918	1,59	-
20	GDP in agricultural sector	0,0483	0,0908	1,88	-

*Improvement means a decrease in inequality

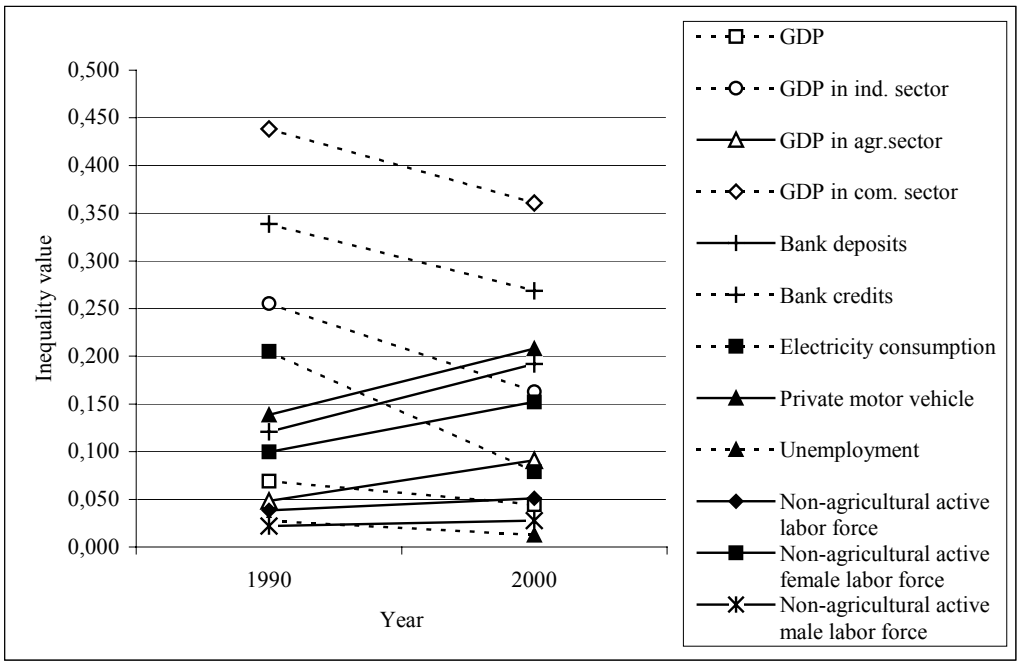

Figure B.3. Within-GAP Inequality in Terms of Economic Variables

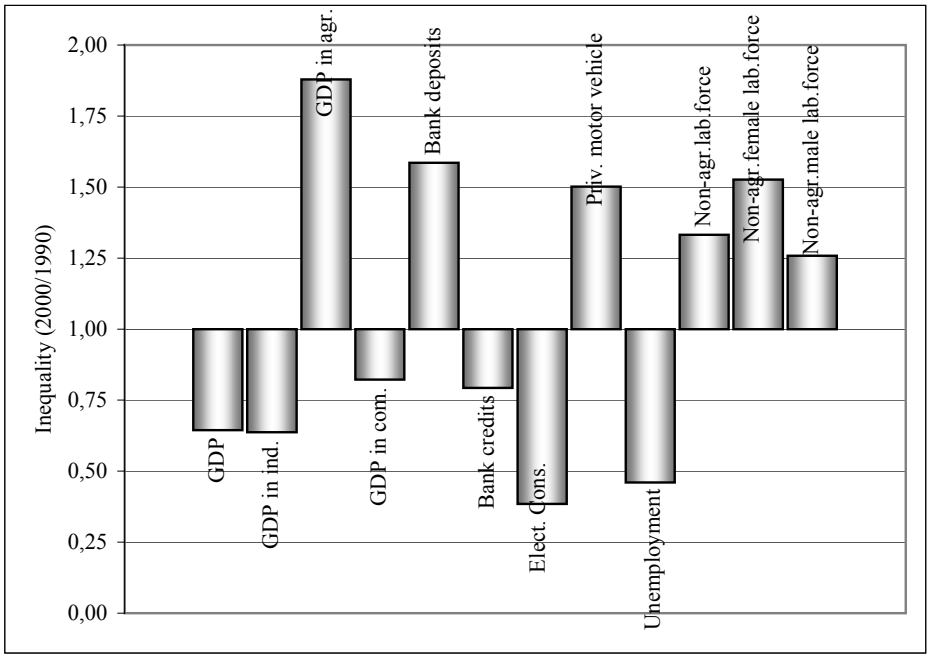

Figure B.4. Between-region Inequality in Terms of Economic Variables

B.3. Inequality in Terms of Infrastructure and Service Related Variables

The within-GAP inequality reduction occurred for all of the health services related variables except the number of midwives. The most change in inequality within the region occurred in the number of sanitarians; followed by the number of doctors (specialists). For these variables, the inequality decreased approximately 3 times (see Table B.3 and Figures B.5-6).

Table B.3. Within-GAP Inequality in Terms of Infrastructure and Service Related Variables

No	Variable	Within-GAP inequality 1990	2000	2000/1990	Improv.*
36	No of sanitarian	0,1262	0,0331	0,26	+
32	No of doctor (specialist)	0,3479	0,1250	0,36	+
33	No of practitioner	0,0547	0,0328	0,60	+
35	No of nurse	0,0887	0,0578	0,65	+
34	No of dentist	0,1507	0,1028	0,68	+
39	Pop. with adequate drinking water supply	0,0151	0,0176	1,17	-
37	No of midwife	0,0236	0,0289	1,23	-
31	No of teac. per stud. in sec.edu.	0,0080	0,0138	1,73	-
30	No of teac. per stud. in prim.edu.	0,0069	0,0144	2,08	-
38	Asphalt road ratio	0,0239	0,1171	4,90	-

* Improvement means a decrease in inequality

Although the absolute values of the provinces in the GAP region exhibited an improvement for all of the variables except the number of teachers per student in secondary education (see Table C.11-13 in Appendix C), the within-region inequality increased for educational services related variables, infrastructure, and the number of nurses. Among these variables the highest inequality increase (approximately 5 times) was for the asphalt road ratio in rural settlements; followed by the number of teachers per student in primary and secondary education; and to a much lesser degree the number midwives, and the proportion of rural population with adequate drinking water supply. The inequality increase in the number of teachers per student in primary education was higher than the inequality increase in secondary education

(see Table B.3 and Figures B.5-6). This might be due to the relatively high increase in schooling in primary education relative to the increase in the number of teachers, which caused inadequacy in the number of teachers in primary education in some provinces in the GAP region.

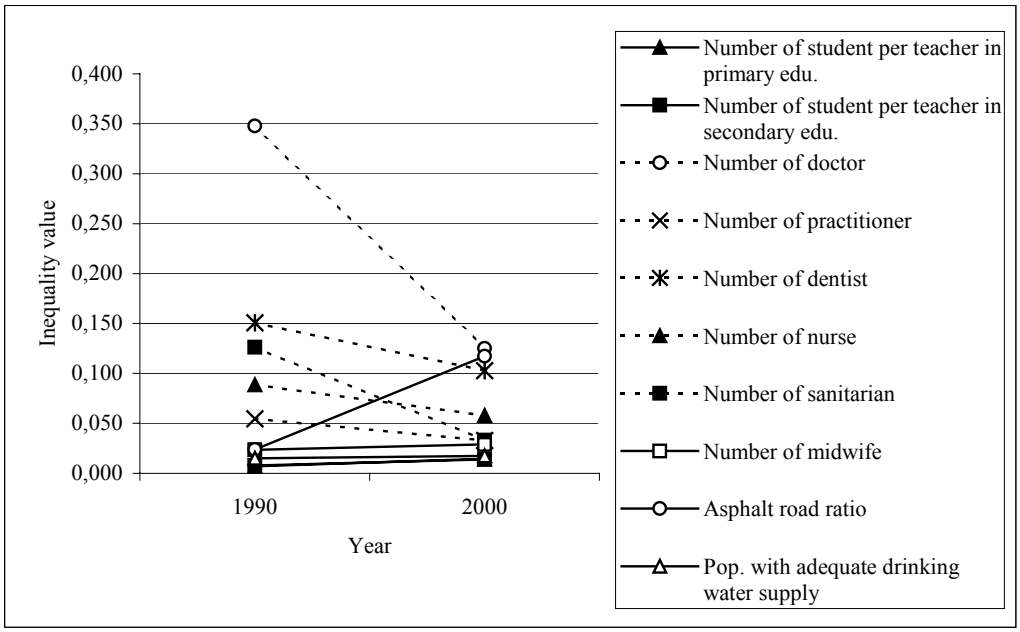

Figure B.5. Within-GAP Inequality in Terms of Infrastructure and Service Related Variables

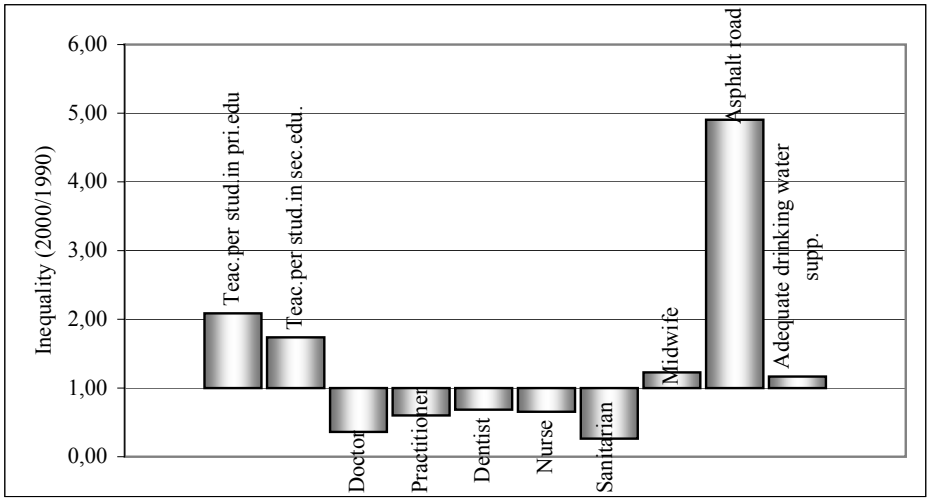

Figure B.6. Between-region Inequality in Terms of Infrastructure and Service Related Variables

B.4. Summary of the Change in Within-GAP Inequality

The Section 6.2.1-4 has examined within-GAP inequality in terms of each of the socio-demographic, economic, and infrastructure and service related variables for the years 1990 and 2000. Subsequently, all the 39 variables together are merged and sorted according to the change in their inequality (see Table B.4).

The general conclusion drawn from the table is that the within-GAP inequality, in other words the inequality among the provinces of the GAP region, decreased for 21 variables, which correspond to almost 54% of the total, and increased for the remaining 18 variables (46%) during the last decade. The variables for which the within-GAP inequality reduced are mostly related to educational level (i.e., literacy and schooling ratios), health services, urbanization, unemployment, and GDP related variables (except GDP in agricultural sector). The highest inequality reduction was for the variable "schooling ratio of boys in primary education", with more than 6 times decrease between 1990 and 2000. For the following variables, which are schooling ratio of in primary education, schooling ratio of girls in primary education, number of sanitarian, and male literacy ratio, the inequality decreased more than 3 times (see Table B.4).

On the other hand, the within-GAP inequality exhibited an increase during the last decade for the variables related to infrastructure, educational service, demography, and non-agricultural labor force. The highest inequality increase was for the variable "asphalt road ratio", with approximately 5 times increase. The other variables for which the within-region inequality increased more than double are elderly age dependency ratio, fertility rate, and the number of teacher per student in primary education (see Table B.4).

It is important to note that the level of inequality change in the non-agricultural labor force, literacy and schooling ratios varies according to the sex. That is, non-agricultural "female" labor force, literacy and schooling ratios showed larger increase in the within-GAP inequality. Another point is that the degree of change in inequality varied according to the level of education. That is, the schooling ratios in

Table B.4. Within-GAP Inequality

No	Variable	2000/1990	
14	Sch. ratio of boys in pri. edu.	0,13	
12	Sch. ratio in pri. edu.	0,17	
13	Sch. ratio of girls in pri. edu.	0,23	
36	No of sanitarian	0,26	
11	Male literacy ratio	0,27	
9	Total literacy ratio	0,35	
32	No of doctor (specialist)	0,36	
10	Female literacy ratio	0,36	
24	Electricity consumption	0,38	
26	Unemployment	0,46	
17	Sch. ratio of boys in sec. edu	0,47	
15	Sch. ratio of sec. edu	0,51	→ Inequality decreased to half
1	Urbanization level	0,55	
16	Sch. ratio of girls in sec. edu	0,59	
33	No of practitioner	0,60	
19	GDP in industrial sector	0,64	
18	GDP	0,64	
35	No of nurse	0,65	
34	No of dentist	0,68	
23	Total bank credits	0,79	
21	GDP in commercial sector	0,82	→ No change in inequality
5	Total age dependency ratio	1,04	
39	Pop. with adequate drinking water supply	1,17	
6	Youth dependency ratio	1,19	
37	No of midwife	1,23	
29	Non-agr. male labor force	1,26	
27	Non-agr. labor force	1,33	
8	Proportion of 0-14 age group	1,48	
25	Total private motor vehicle	1,50	
28	Non-agr. female labor force	1,53	
3	Infant mortality rate	1,57	
22	Total bank deposits	1,59	
31	No of teac. per stud. in secon.edu.	1,73	
20	GDP in agricultural sector	1,88	
4	Household size	1,94	
30	No of teac. per stud. in prim.edu.	2,08	→ Inequality doubled
2	Fertility rate	2,25	
7	Elderly age dependency ratio	2,92	
38	Asphalt road ratio	4,90	

primary education had bigger reduction in inequality relative to those in secondary education. These findings again reflect the gender discrimination in the education and economic activities; and the difficulty in having an improvement in the schooling in secondary education relative to primary education (see Table B.4).

APPENDIX C.

TABLES RELATED TO CHAPTER 3

Table C.1. Population, level of urbanization and population growth rate

	Population		Urban population and level of urbanization				Annual growth rate of pop. (%)
	1990	2000	1990		2000		
			Urban	%	Urban	%	
TURKEY	56473035	67803927	33326351	59,0	44006274	64,9	1,83
GAP	5157160	6608619	2873801	55,7	4143136	62,7	2,48
Adıyaman	510827	623811	222102	43,5	338939	54,3	1,99
Diyarbakır	1096447	1362708	595440	54,3	817692	60,0	2,17
Gaziantep	1010396	1285249	738245	73,1	1009126	78,5	2,41
Mardin	558275	705098	249032	44,6	391249	55,5	2,34
Siirt	243435	263676	110221	45,3	153522	58,2	0,79
Sanlıurfa	1001455	1443422	551614	55,1	842129	58,3	3,66
Batman	344121	456734	194664	56,6	304166	66,6	2,83
Sırnak	262006	353197	125264	47,8	211328	59,8	2,99
Kilis	130198	114724	87219	67,0	74985	65,4	-1,27

(Source: SIS, 2003a,109-111)

Note: The results of 1990 Population Census were adjusted according to the administrative division on the day of 2000 Population Census" (SIS, 2003a, p.109)

Table C.2. Total fertility rate, average household size, and infant mortality rate

	Total fertility rate		Average household size		Infant mortality rate	
	1990	2000	1990	2000	1990	2000
TURKEY	2,65	2,53	4,97	4,71	67	43
GAP	4,37	4,65	6,69	6,80	66	46
Adıyaman	4,72	3,66	6,57	6,26	67	42
Diyarbakır	4,74	4,51	6,92	6,76	75	57
Gaziantep	3,63	3,83	5,74	5,23	66	44
Mardin	5,59	4,98	7,41	7,72	63	43
Siirt	6,33	6,05	7,77	7,48	80	63
Sanlıurfa	4,36	4,83	6,79	6,93	51	37
Batman	4,36	5,27	7,69	7,60	51	50
Sırnak	4,36	7,06	8,05	8,25	51	51
Kilis		3,54		5,05		48

(Source: SIS, 2003b)

Table C.3. Age dependency ratios and 0-14 age group

	Total age dependency ratio		Youth dependency ratio		Elderly dependency ratio		% of 0-14 age group	
	1990	2000	1990	2000	1990	2000	1990	2000
TURKEY	64,67	55,10	59,08	46,27	7,01	8,83	34,96	29,86
GAP	99,22	85,25	94,58	79,43	5,21	5,95	47,16	42,74
Adıyaman	99,05	77,55	93,13	70,46	5,92	7,08	46,77	39,70
Diyarbakır	101,04	86,54	96,22	81,00	4,82	5,53	47,83	43,44
Gaziantep	82,60	71,13	76,93	64,66	5,67	6,47	42,09	37,80
Mardin	111,95	92,38	106,02	86,13	5,93	7,46	49,97	44,79
Siirt	113,93	99,23	108,44	92,65	5,49	6,59	50,67	46,51
Sanlıurfa	101,04	87,77	96,44	83,16	4,60	4,61	47,94	44,30
Batman	113,47	99,09	108,64	93,44	4,83	5,65	50,87	46,95
Sırnak	109,02	97,38	104,59	92,94	4,43	4,44	50,02	47,10
Kilis		70,24		59,55		10,68		35,03

(Source: SIS, 1996, pp. 92-93; SIS, 2003a, pp.90-91; SIS, 2003b)

Table C.4. Literacy ratios by sex (%)

	Total literacy rate		Female literacy rate		Male literacy rate	
	1990	2000	1990	2000	1990	2000
TURKEY	80,46	87,30	71,95	80,64	88,78	93,86
GAP	60,42	73,22	44,77	60,16	75,53	85,77
Adıyaman	67,36	79,83	54,65	70,62	80,28	89,17
Diyarbakır	56,26	69,57	38,82	55,38	73,05	83,50
Gaziantep	73,90	83,78	62,49	74,98	85,08	92,58
Mardin	54,12	71,20	36,37	56,81	71,57	84,91
Siirt	53,97	68,66	36,16	52,16	71,16	83,73
Sanlıurfa	56,20	67,67	38,65	52,26	72,77	82,15
Batman	57,62	70,96	40,27	57,45	74,22	84,37
Sırnak	40,80	65,75	20,49	44,85	58,41	82,50
Kilis		80,41		71,10		89,94

(Source: SIS, 1996, pp. 94-97 and SIS, 2003a, pp.88-89)

Table C.5. Schooling ratios in primary education by sex (%)

	Total schooling ratio in primary education		Female schooling ratio in primary education		Male schooling ratio in primary education	
	1990-91	1999-2001	1990-91	1999-2001	1990-91	1999-2001
TURKEY	82,76	91,89	75,95	87,05	89,17	96,43
GAP	67,00	79,82	55,11	69,61	77,73	89,08
Adıyaman	76,47	85,65	68,82	81,49	83,51	89,41
Diyarbakır	65,08	74,76	50,97	63,49	77,82	85,07
Gaziantep	93,51	98,40	86,36	91,94	100,08	104,48
Mardin	60,01	76,06	47,71	66,45	71,20	84,78
Siirt	55,48	73,10	40,61	56,91	68,54	87,59
Sanlıurfa	64,09	69,99	48,46	58,53	77,89	80,06
Batman	62,09	82,06	47,71	68,18	74,99	94,70
Sırnak	39,70	77,94	27,13	60,98	50,64	93,16
Kilis		96,26		88,18		103,93

(Source: Unpublished studies of SIS)

Table C.6. Schooling ratios in secondary education by sex (%)

	Total schooling ratio in secondary education		Female schooling ratio in secondary education		Male schooling ratio in secondary education	
	1990-91	1999-2001	1990-91	1999-2001	1990-91	1999-2001
TURKEY	36,30	54,97	28,25	47,06	44,01	62,43
GAP	18,80	29,14	9,99	18,54	27,37	39,12
Adıyaman	20,44	41,60	11,09	28,91	30,14	53,69
Diyarbakır	20,77	30,17	11,43	19,80	29,91	40,10
Gaziantep	30,03	39,05	19,52	28,34	39,70	48,97
Mardin	14,12	23,50	5,58	11,96	23,01	34,57
Siirt	16,47	27,97	8,04	11,13	25,21	43,94
Sanlıurfa	12,25	18,17	5,42	10,23	18,67	25,34
Batman	19,80	30,41	6,61	16,75	32,00	43,55
Sırnak	5,50	16,50	1,48	5,32	9,41	27,01
Kilis		44,20		38,00		51,30

(Source: Unpublished studies of SIS)

Table C.7. GDP per capita and GDP per capita by kind of activity

	GDP p.c.		GDP p.c. in industry		GDP p.c. in agriculture		GDP p.c. in trade	
	1990	2000	1990	2000	1990	2000	1990	2000
TURKEY	1487467	1751950	394022	494631	253777	235411	298411	390155
GAP	957210	918196	218009	177079	265414	260584	169226	171682
Adıyaman	1026523	788466	372611	187951	339829	244005	70877	107311
Diyarbakır	1021742	877936	301907	182119	252311	234284	166029	170407
Gaziantep	1319432	1355369	253008	313003	207225	167793	453522	422145
Mardin	735284	708981	65448	53183	298539	185335	113208	127504
Siirt	1465352	766365	419886	262015	367392	182296	38359	36996
Sanlıurfa	595810	866275	18873	99500	270906	460190	50879	52637
Batman	1035469	802250	442015	277733	358834	217768	38071	69758
Sırnak	253601	337163	15881	10422	118600	111782	3290	5006
Kilis		1742661		190013		462292		728671

(Source: SIS,1997 and 2002b)

Table C.8. Per capita bank deposits and credits

	Bank deposits p.c.		Bank credits p.c.	
	1990	2000	1990	2000
TURKEY	560,7	1397,3	451,9	655,9
GAP	87,6	171,9	74,3	120,9
Adıyaman	70,2	136,3	50,7	89,8
Diyarbakır	96,8	155,6	40,2	83,7
Gaziantep	163,1	399,1	198,1	319,8
Mardin	62,8	85,1	37,7	68,1
Siirt	49,3	83,4	32,9	45,5
Sanlıurfa	50,9	96,3	45,9	76,2
Batman	55,1	98,5	31,9	54,7
Sırnak	26,7	87,8	3,8	31,1
Kilis		252,8		104,6

(Source: Türkiye Bankalar Birliği,
url: http://www.tbb.org.tr/asp/donemsel.asp)

Table C.9. Electricity consumption and private motor vehicle

	Electricity Consumption p.c. (MWh)		Private motor vehicle per 1000 people	
	1990	2000	1990	2000
TURKEY	0,829	1,433	29,00	73,26
GAP	0,433	0,854	8,37	21,86
Adıyaman	0,368	0,831	7,57	21,73
Diyarbakır	0,261	0,514	6,49	12,25
Gaziantep	0,631	1,547	15,72	50,83
Mardin	0,609	0,822	5,01	9,66
Siirt	1,093	0,852	7,96	10,84
Sanlıurfa	0,431	0,723	7,98	20,73
Batman		0,669	4,19	11,56
Sırnak		0,629	0,24	4,87
Kilis		0,512		20,36

(Source: Türkiye Elektrik Dağıtım Anonim Şirketi, 2001, pp.193-194; Türkiye Elektrik Kurumu Genel Müdürlüğü, 1991, pp.67-68)

Table C.10. Labor force and unemployment

	% of non-agricultural labor force		% of non-agricultural female labor force		% of non-agricultural male labor force		Unemployment rate	
	1990	2000	1990	2000	1990	2000	1990	2000
TURKEY	46	52	18	24	62	67	5,4	8,9
GAP	33	38	6	13	49	56	8,4	13,0
Adıyaman	21	26	6	7	33	42	7,5	11,1
Diyarbakır	31	36	7	9	46	54	11,5	14,2
Gaziantep	50	61	11	19	66	77	7,7	11,4
Mardin	26	30	3	5	42	48	9,0	13,0
Siirt	28	43	3	6	46	65	6,6	10,7
Sanlıurfa	29	27	4	4	43	43	7,7	10,5
Batman	30	37	5	7	45	55	8,6	17,4
Sırnak	32	53	2	5	48	74	3,7	10,7
Kilis		45		8		64		6,2

(Source: SIS, 1996, pp.50-53; SIS, 2003a, pp. 100-101; and SIS, 2003b)

Table C.11. Number of teacher per 1000 student

	Number of teacher per 1000 student in primary education		Number of teacher per 1000 student in secondary education	
	1990-91	1999-2001	1990-91	1999-2001
TURKEY	29	32	79	62
GAP	22	24	62	49
Adıyaman	26	31	73	46
Diyarbakır	22	25	69	49
Gaziantep	20	20	56	44
Mardin	25	22	65	54
Siirt	28	29	71	55
Sanlıurfa	19	24	57	57
Batman	21	21	49	40
Sırnak	20	19	84	39
Kilis		44		93

(Source: Unpublished studies of SIS)

Table C.12. Number of health personnel per 1000 people

	Physician		Practitioner		Dentist		Nurse		Sanitarian		Midwife	
	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
TURKEY	0,430	0,543	0,441	0,685	0,183	0,232	0,775	1,027	0,360	0,655	0,537	0,612
GAP	0,187	0,188	0,188	0,362	0,057	0,064	0,421	0,607	0,258	0,427	0,365	0,367
Adıyaman	0,068	0,123	0,209	0,372	0,033	0,035	0,456	0,689	0,333	0,628	0,526	0,503
Diyarbakır	0,476	0,230	0,439	0,472	0,084	0,078	0,750	0,980	0,454	0,475	0,423	0,439
Gaziantep	0,218	0,352	0,262	0,401	0,096	0,114	0,370	0,519	0,136	0,328	0,315	0,331
Mardin	0,050	0,082	0,212	0,271	0,027	0,048	0,377	0,489	0,314	0,373	0,391	0,379
Siirt	0,070	0,095	0,386	0,353	0,045	0,034	0,357	0,626	0,374	0,565	0,460	0,436
Sanlıurfa	0,076	0,144	0,214	0,284	0,036	0,035	0,260	0,422	0,131	0,342	0,297	0,268
Batman	0,087	0,136	0,151	0,247	0,038	0,061	0,250	0,477	0,203	0,574	0,308	0,331
Sırnak	0,023	0,057	0,267	0,292	0,004	0,042	0,187	0,377	0,149	0,309	0,229	0,255
Kilis		0,209		0,784		0,078		0,950		0,732		0,706

(Source: SIS, 1992, PP.101-106; Sağlık Bakanlığı, 2002, pp.31-33)

Table C.13 Asphalt road ratio and population ratio with adequate drinking water supply in rural settlements

	Asphalt road ratio		% of pop. with adequate drinking water supply	
	1990	2000	1990	2000
TURKEY	25,68	45,23	71,37	84,98
GAP	19,12	36,24	53,79	74,44
Adıyaman	23,24	37,47	66,52	81,51
Diyarbakır	16,04	21,42	43,56	51,49
Gaziantep	22,79	90,70	66,00	76,74
Mardin	20,55	42,16	55,30	84,30
Siirt	25,04	26,93	66,77	80,63
Sanlıurfa	14,05	29,12	46,70	86,38
Batman	18,34	23,21	48,80	58,06
Sırnak	26,12	31,82	47,91	76,65
Kilis		76,80		76,91

(Source: Köy Hizmetleri Genel Müdürlüğü, 1991 and 2001)

APPENDIX D.

TABLES RELATED TO CHAPTER 6

Table D.1. Inequality in terms of urbanization level

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0520	0,0319	0,61
Between-region inequality	0,0002	0,0001	0,38
Southeastern Anatolia (GAP)	-0,0051	-0,0033	0,64
The rest of Turkey	0,0052	0,0033	0,64
Within-region inequality	0,0518	0,0318	0,61
Inequality within			
Southeastern Anatolia (GAP)	0,0153	0,0084	0,55
The rest of Turkey	0,0553	0,0342	0,62
% of between-region inequality in total	0,32	0,20	

Table D.2. Inequality in terms of fertility rate

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0324	0,0365	1,13
Between-region inequality	0,0060	0,0124	2,07
Southeastern Anatolia (GAP)	0,0346	0,0531	
The rest of Turkey	-0,0286	-0,0406	
Within-region inequality	0,0263	0,0241	0,91
Inequality within			
Southeastern Anatolia (GAP)	0,0030	0,0067	2,25
The rest of Turkey	0,0288	0,0261	0,91
% of between-region inequality in total	18,62	34,09	

Table D.3. Inequality in terms of infant mortality rate

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0161	0,0162	1,00
Between-region inequality	0,0000	0,0008	253,84
Southeastern Anatolia (GAP)	-0,0008	0,0145	
The rest of Turkey	0,0008	-0,0137	
Within-region inequality	0,0161	0,0154	0,96
Inequality within			
Southeastern Anatolia (GAP)	0,0088	0,0137	1,57
The rest of Turkey	0,0171	0,0157	0,92
% of between-region inequality in total	0,02	4,65	

Table D.4. Inequality in terms of household size

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0192	0,0211	1,10
Between-region inequality	0,0038	0,0060	1,57
Southeastern Anatolia (GAP)	-0,0206	-0,0254	
The rest of Turkey	0,0244	0,0314	
Within-region inequality	0,0154	0,0151	0,98
Inequality within			
Southeastern Anatolia (GAP)	0,0054	0,0104	1,94
The rest of Turkey	0,0161	0,0155	0,96
% of between-region inequality in total	19,77	28,29	

Table D.5. Inequality in terms of total age dependency ratio

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0309	0,0277	0,90
Between-region inequality	0,0101	0,0112	1,11
Southeastern Anatolia (GAP)	0,0496	0,0542	1,09
The rest of Turkey	-0,0394	-0,0430	1,09
Within-region inequality	0,0207	0,0165	0,79
Inequality within			
Southeastern Anatolia (GAP)	0,0058	0,0060	1,04
The rest of Turkey	0,0227	0,0180	0,79
% of between-region inequality in total	32,85	40,57	

Table D.6. Inequality in terms of youth dependency ratio

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0412	0,0443	1,07
Between-region inequality	0,0139	0,0186	1,34
Southeastern Anatolia (GAP)	0,0603	0,0744	
The rest of Turkey	-0,0464	-0,0558	
Within-region inequality	0,0274	0,0257	0,94
Inequality within			
Southeastern Anatolia (GAP)	0,0067	0,0079	1,19
The rest of Turkey	0,0303	0,0285	0,94
% of between-region inequlity in total	33,64	42,05	

Table D.7. Inequality in terms of elderly dependency ratio

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0307	0,0419	1,36
Between-region inequality	0,0030	0,0057	1,89
Southeastern Anatolia (GAP)	-0,0169	-0,0223	
The rest of Turkey	0,0199	0,0281	
Within-region inequality	0,0277	0,0362	1,31
Inequality within			
Southeastern Anatolia (GAP)	0,0055	0,0160	2,92
The rest of Turkey	0,0290	0,0373	1,29
% of between-region inequality in total	9,87	13,66	

Table D.8. Inequality in terms of the proportion of 0-14 age group

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0172	0,0220	1,28
Between-region inequality	0,0056	0,0090	1,61
Southeastern Anatolia (GAP)	0,0369	0,0500	
The rest of Turkey	-0,0313	-0,0410	
Within-region inequality	0,0117	0,0130	1,12
Inequality within			
Southeastern Anatolia (GAP)	0,0020	0,0029	1,48
The rest of Turkey	0,0130	0,0147	1,13
% of between-region inequality in total	32,31	40,80	

Table D.9. Inequality in terms of total literacy ratio

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0076	0,0033	0,44
Between-region inequality	0,0031	0,0014	0,44
Southeastern Anatolia (GAP)	-0,0182	-0,0134	
The rest of Turkey	0,0213	0,0147	
Within-region inequality	0,0045	0,0019	0,44
Inequality within			
Southeastern Anatolia (GAP)	0,0108	0,0038	0,35
The rest of Turkey	0,0040	0,0018	0,45
% of between-region inequality in total	41,05	41,18	

Table D.10. Inequality in terms of female literacy ratio

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0181	0,0086	0,48
Between-region inequality	0,0075	0,0035	0,46
Southeastern Anatolia (GAP)	-0,0248	-0,0196	
The rest of Turkey	0,0323	0,0231	
Within-region inequality	0,0106	0,0051	0,49
Inequality within			
Southeastern Anatolia (GAP)	0,0340	0,0123	0,36
The rest of Turkey	0,0093	0,0047	0,50
% of between-region inequality in total	41,36	40,05	

Table D.11. Inequality in terms of male literacy ratio

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0027	0,0009	0,34
Between-region inequality	0,0011	0,0004	0,35
Southeastern Anatolia (GAP)	-0,0117	-0,0075	
The rest of Turkey	0,0128	0,0079	
Within-region inequality	0,0016	0,0005	0,33
Inequality within			
Southeastern Anatolia (GAP)	0,0039	0,0010	0,27
The rest of Turkey	0,0014	0,0005	0,34
% of between-region inequality in total	40,66	42,30	

Table D.12. Inequality in terms of schooling ratio in primary education

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0510	0,0185	0,36
Between-region inequality	0,0026	0,0014	0,54
Southeastern Anatolia (GAP)	-0,0202	-0,0165	
The rest of Turkey	0,0228	0,0179	
Within-region inequality	0,0484	0,0171	0,35
Inequality within			
Southeastern Anatolia (GAP)	0,0438	0,0073	0,17
The rest of Turkey	0,0489	0,0184	0,38
% of between-region inequality in total	5,06	7,59	

Table D.13. Inequality in terms of schooling ratio of girls in primary education

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0613	0,0253	0,41
Between-region inequality	0,0054	0,0033	0,61
Southeastern Anatolia (GAP)	-0,0269	-0,0237	
The rest of Turkey	0,0323	0,0270	
Within-region inequality	0,0559	0,0220	0,39
Inequality within			
Southeastern Anatolia (GAP)	0,0657	0,0149	0,23
The rest of Turkey	0,0550	0,0229	0,42
% of between-region inequality in total	8,79	12,91	

Table D.14. Inequality in terms of schooling ratio of boys in primary education

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0456	0,0151	0,33
Between-region inequality	0,0012	0,0005	0,40
Southeastern Anatolia (GAP)	-0,0144	-0,0100	
The rest of Turkey	0,0156	0,0105	
Within-region inequality	0,0445	0,0146	0,33
Inequality within			
Southeastern Anatolia (GAP)	0,0342	0,0043	0,13
The rest of Turkey	0,0457	0,0162	0,35
% of between-region inequality in total	2,57	3,12	

Table D.15. Inequality in terms of schooling ratio in secondary education

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0993	0,0666	0,67
Between-region inequality	0,0156	0,0170	1,08
Southeastern Anatolia (GAP)	-0,0346	-0,0387	
The rest of Turkey	0,0502	0,0556	
Within-region inequality	0,0836	0,0496	0,59
Inequality within			
Southeastern Anatolia (GAP)	0,0912	0,0461	0,51
The rest of Turkey	0,0832	0,0499	0,60
% of between-region inequality in total	15,76	25,44	

Table D.16. Inequality in terms of schooling ratio of girls in secondary education

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,1768	0,1200	0,68
Between-region inequality	0,0309	0,0301	0,98
Southeastern Anatolia (GAP)	-0,0376	-0,0421	
The rest of Turkey	0,0684	0,0723	
Within-region inequality	0,1459	0,0899	0,62
Inequality within			
Southeastern Anatolia (GAP)	0,1675	0,0989	0,59
The rest of Turkey	0,1451	0,0895	0,62
% of between-region inequality in total	17,46	25,10	

Table D.17. Inequality in terms of schooling ratio of boys in secondary education

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0718	0,0426	0,59
Between-region inequality	0,0091	0,0103	1,13
Southeastern Anatolia (GAP)	-0,0297	-0,0337	
The rest of Turkey	0,0388	0,0440	
Within-region inequality	0,0626	0,0323	0,52
Inequality within			
Southeastern Anatolia (GAP)	0,0705	0,0329	0,47
The rest of Turkey	0,0621	0,0323	0,52
% of between-region inequality in total	12,70	24,15	

Table D.18. Inequality in terms of GDP

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,1139	0,1161	1,02
Between-region inequality	0,0097	0,0146	1,50
Southeastern Anatolia (GAP)	-0,0284	-0,0330	1,16
The rest of Turkey	0,0381	0,0476	1,25
Within-region inequality	0,1042	0,1015	0,97
Inequality within			
Southeastern Anatolia (GAP)	0,0692	0,0446	0,64
The rest of Turkey	0,1062	0,1046	0,98
% of between-region inequality in total	8,52	12,54	

Table D.19. Inequality in terms of GDP in industrial sector

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,3662	0,3501	0,96
Between-region inequality	0,0166	0,0289	1,74
Southeastern Anatolia (GAP)	-0,0322	-0,0358	1,11
The rest of Turkey	0,0487	0,0647	1,33
Within-region inequality	0,3496	0,3213	0,92
Inequality within			
Southeastern Anatolia (GAP)	0,2553	0,1628	0,64
The rest of Turkey	0,3539	0,3270	0,92
% of between-region inequality in total	4,52	8,24	

Table D.20. Inequality in terms of GDP in agricultural sector

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,2018	0,2522	1,25
Between-region inequality	0,0002	0,0006	3,02
Southeastern Anatolia (GAP)	-0,0055	0,0110	-1,99
The rest of Turkey	0,0057	-0,0104	-1,82
Within-region inequality	0,2016	0,2516	1,25
Inequality within			
Southeastern Anatolia (GAP)	0,0483	0,0908	1,88
The rest of Turkey	0,2159	0,2710	1,25
% of between-region inequality in total	0,10	0,24	

Table D.21. Inequality in terms of GDP in commercial sector

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,2316	0,2127	0,92
Between-region inequality	0,0115	0,0210	1,83
Southeastern Anatolia (GAP)	-0,0297	-0,0352	1,18
The rest of Turkey	0,0412	0,0562	1,36
Within-region inequality	0,2201	0,1917	0,87
Inequality within			
Southeastern Anatolia (GAP)	0,4384	0,3608	0,82
The rest of Turkey	0,2084	0,1841	0,88
% of between-region inequality in total	4,96	9,87	

Table D.22. Inequality in terms of total bank deposits

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,4854	0,5542	1,14
Between-region inequality	0,0537	0,0643	1,20
Southeastern Anatolia (GAP)	-0,0265	-0,0251	
The rest of Turkey	0,0802	0,0894	
Within-region inequality	0,4317	0,4899	1,14
Inequality within			
Southeastern Anatolia (GAP)	0,1210	0,1918	1,59
The rest of Turkey	0,4362	0,4936	1,13
% of between-region inequality in total	11,07	11,60	

Table D.23. Inequality in terms of total bank credits

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,5377	0,5336	0,99
Between-region inequality	0,0523	0,0525	1,00
Southeastern Anatolia (GAP)	-0,0271	-0,0304	
The rest of Turkey	0,0794	0,0829	
Within-region inequality	0,4854	0,4811	0,99
Inequality within			
Southeastern Anatolia (GAP)	0,3387	0,2686	0,79
The rest of Turkey	0,4876	0,4849	0,99
% of between-region inequality in total	9,73	9,84	

Table D.24. Inequality in terms of electricity consumption

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,2098	0,1646	0,78
Between-region inequality	0,0137	0,0102	0,74
Southeastern Anatolia (GAP)	-0,0310	-0,0301	
The rest of Turkey	0,0447	0,0402	
Within-region inequality	0,1961	0,1544	0,79
Inequality within			
Southeastern Anatolia (GAP)	0,2051	0,0789	0,38
The rest of Turkey	0,1956	0,1591	0,81
% of between-region inequality in total	6,54	6,18	

Table D.25. Inequality in terms of private motor vehicle

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,2721	0,1823	0,67
Between-region inequality	0,0345	0,0357	1,04
Southeastern Anatolia (GAP)	-0,0328	-0,0352	
The rest of Turkey	0,0672	0,0709	
Within-region inequality	0,2376	0,1466	0,62
Inequality within			
Southeastern Anatolia (GAP)	0,1386	0,2082	1,50
The rest of Turkey	0,2403	0,1447	0,60
% of between-region inequality in total	12,67	19,59	

Table D.26. Inequality in terms of unemployment

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0714	0,0638	0,89
Between-region inequality	0,0111	0,0079	0,71
Southeastern Anatolia (GAP)	0,0534	0,0433	
The rest of Turkey	-0,0422	-0,0354	
Within-region inequality	0,0603	0,0559	0,93
Inequality within			
Southeastern Anatolia (GAP)	0,0274	0,0126	0,46
The rest of Turkey	0,0649	0,0615	0,95
% of between-region inequality in total	15,58	12,46	

Table D.27. Inequality in terms of non-agricultural active total labor force

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,1082	0,0851	0,79
Between-region inequality	0,0039	0,0028	0,71
Southeastern Anatolia (GAP)	-0,0188	-0,0163	
The rest of Turkey	0,0227	0,0191	
Within-region inequality	0,1043	0,0823	0,79
Inequality within			
Southeastern Anatolia (GAP)	0,0385	0,0512	1,33
The rest of Turkey	0,1081	0,0842	0,78
% of between-region inequality in total	3,63	3,29	

Table D.28. Inequality in terms of non-agricultural active female labor force

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,4374	0,3801	0,87
Between-region inequality	0,0253	0,0250	0,99
Southeastern Anatolia (GAP)	-0,0291	-0,0285	
The rest of Turkey	0,0544	0,0534	
Within-region inequality	0,4121	0,3551	0,86
Inequality within			
Southeastern Anatolia (GAP)	0,0997	0,1521	1,53
The rest of Turkey	0,4206	0,3605	0,86
% of between-region inequality in total	5,79	6,57	

Table D.29. Inequality in terms of non-agricultural active male labor force

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0475	0,0356	0,75
Between-region inequality	0,0021	0,0010	0,46
Southeastern Anatolia (GAP)	-0,0146	-0,0104	
The rest of Turkey	0,0167	0,0113	
Within-region inequality	0,0454	0,0346	0,76
Inequality within			
Southeastern Anatolia (GAP)	0,0220	0,0276	1,26
The rest of Turkey	0,0469	0,0351	0,75
% of between-region inequality in total	4,43	2,73	

Table D.30. Inequality in terms of teacher per student in primary education

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0311	0,0286	0,92
Between-region inequality	0,0040	0,0050	1,27
Southeastern Anatolia (GAP)	-0,0215	-0,0264	
The rest of Turkey	0,0254	0,0315	
Within-region inequality	0,0272	0,0236	0,87
Inequality within			
Southeastern Anatolia (GAP)	0,0069	0,0144	2,08
The rest of Turkey	0,0287	0,0245	0,85
% of between-region inequality in total	12,73	17,55	

Table D.31. Inequality in terms of teacher per student in secondary education

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0309	0,0219	0,71
Between-region inequality	0,0014	0,0014	1,05
Southeastern Anatolia (GAP)	-0,0099	-0,0110	
The rest of Turkey	0,0112	0,0124	
Within-region inequality	0,0296	0,0205	0,69
Inequality within			
Southeastern Anatolia (GAP)	0,0080	0,0138	1,73
The rest of Turkey	0,0305	0,0208	0,68
% of between-region inequality in total	4,37	6,49	

Table D.32. Inequality in terms of doctor (specialists)

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,3335	0,2357	0,71
Between-region inequality	0,0201	0,0302	1,50
Southeastern Anatolia (GAP)	-0,0331	-0,0358	
The rest of Turkey	0,0532	0,0660	
Within-region inequality	0,3134	0,2055	0,66
Inequality within			
Southeastern Anatolia (GAP)	0,3479	0,1250	0,36
The rest of Turkey	0,3119	0,2085	0,67
% of between-region inequality in total	6,03	12,82	

Table D.33. Inequality in terms of practitioner

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,1247	0,1043	0,84
Between-region inequality	0,0078	0,0143	1,84
Southeastern Anatolia (GAP)	-0,0265	-0,0329	
The rest of Turkey	0,0343	0,0472	
Within-region inequality	0,1169	0,0900	0,77
Inequality within			
Southeastern Anatolia (GAP)	0,0547	0,0328	0,60
The rest of Turkey	0,1207	0,0933	0,77
% of between-region inequality in total	6,24	13,71	

Table D.34. Inequality in terms of dentist

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,3332	0,2776	0,83
Between-region inequality	0,0318	0,0389	1,23
Southeastern Anatolia (GAP)	-0,0332	-0,0346	
The rest of Turkey	0,0650	0,0735	
Within-region inequality	0,3014	0,2387	0,79
Inequality within			
Southeastern Anatolia (GAP)	0,1507	0,1028	0,68
The rest of Turkey	0,3058	0,2425	0,79
% of between-region inequality in total	9,53	14,02	

Table D.35. Inequality in terms of nurse

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0936	0,0612	0,65
Between-region inequality	0,0124	0,0104	0,84
Southeastern Anatolia (GAP)	-0,0303	-0,0303	
The rest of Turkey	0,0427	0,0408	
Within-region inequality	0,0811	0,0508	0,63
Inequality within			
Southeastern Anatolia (GAP)	0,0887	0,0578	0,65
The rest of Turkey	0,0807	0,0504	0,62
% of between-region inequality in total	13,28	17,06	

Table D.36. Inequality in terms of sanitarian

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,1066	0,0789	0,74
Between-region inequality	0,0045	0,0074	1,65
Southeastern Anatolia (GAP)	-0,0219	-0,0272	
The rest of Turkey	0,0263	0,0346	
Within-region inequality	0,1021	0,0715	0,70
Inequality within			
Southeastern Anatolia (GAP)	0,1262	0,0331	0,26
The rest of Turkey	0,1004	0,0741	0,74
% of between-region inequality in total	4,19	9,37	

Table D.37. Inequality in terms of midwife

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0464	0,0818	1,76
Between-region inequality	0,0057	0,0100	1,73
Southeastern Anatolia (GAP)	-0,0239	-0,0299	
The rest of Turkey	0,0297	0,0398	
Within-region inequality	0,0407	0,0718	1,77
Inequality within			
Southeastern Anatolia (GAP)	0,0236	0,0289	1,23
The rest of Turkey	0,0418	0,0745	1,78
% of between-region inequality in total	12,36	12,16	

Table D.38. Inequality in terms of asphalt road ratio

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,1395	0,1514	1,08
Between-region inequality	0,0036	0,0025	0,70
Southeastern Anatolia (GAP)	-0,0200	-0,0187	
The rest of Turkey	0,0236	0,0212	
Within-region inequality	0,1359	0,1489	1,10
Inequality within			
Southeastern Anatolia (GAP)	0,0239	0,1171	4,90
The rest of Turkey	0,1441	0,1518	1,05
% of between-region inequality in total	2,56	1,64	

Table D.39. Inequality in terms of population with adequate drinking water supply

	1990	2000	Ratio of 2000 to 1990
Total inequality	0,0215	0,0107	0,50
Between-region inequality	0,0040	0,0012	0,29
Southeastern Anatolia (GAP)	-0,0230	-0,0147	
The rest of Turkey	0,0270	0,0159	
Within-region inequality	0,0176	0,0095	0,54
Inequality within			
Southeastern Anatolia (GAP)	0,0151	0,0176	1,17
The rest of Turkey	0,0178	0,0085	0,48
% of between-region inequality in total	18,46	10,85	