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GROWTH PUZZLE:

An evaluation of Deepak Lal's Hindu Equilibrium

Abstract

The aim of this degree project was to make a quantitative evaluation of Deepak Lal's thesis, which claims that India's economic prosperity has been limited by four parameters; uncertain labor supply, political instability, climatic uncertainty and a set of distinctive social attitudes and beliefs. By using the regression method of event studies, a quantitative analysis has been done where the process of reforms in 1991 in India has been set as the event date and Pakistan used as a control variable. The main result, thus, is that it is the process of reforms in 1991 rather than a decrease of Lal's four parameters that has had an impact of economic growth in India.

Key words: Hindu equilibrium, India, economic growth

Course 659, Degree Project in Economics
Tutor: Örjan Sjöberg

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1. Preface

This degree project has been a long journey with many ups and downs and there are a few people whom we would like to thank that made this project possible.

First and foremost we would like to thank our tutor, Örjan Sjöberg, who has been helpful and enlightened us with his great knowledge. The most difficult part of a project like this is always the beginning, including choosing a subject that is sufficiently interesting, where you can find adequate data and do a solid research; with the goal to increase the scientific wealth. Örjan truly helped us with this difficult task.

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2. Introduction

India is the largest democracy in the world today with a fast growing economy (Anon., 2010). The last five years average GDP has been 8,4 percent according to The World Bank (2010a) and India's economic future is an often discussed subject in newspapers. India became independent in 1947 and has since then until the 1980's had a stagnant average growth rate at 3,5 percent, which is referred to as the Hindu equilibrium (Lal, 2005, p.6). The Indian economist Deepak Lal has analyzed India's stagnant growth, its underlying factors and how it could be altered. The underlying parameters that he focuses on are in short the uncertain labor supply, political instability, climatic uncertainty and a set of distinctive social attitudes and beliefs (Lal, 2005, p.383-386).

The purpose of this degree project is to evaluate Deepak Lal's thesis and come to the conclusions whether it is the change of his underlying parameters that have increased the economic growth in India. This will be done by an attempt to answer the question formulation: *Is it the disappearance or decrease of the four parameters suggested by Deepak Lal that have undermined the Hindu equilibrium?*

There is a large supply of literature including hypotheses on India's future but the literature on the factors underlying the bright future expectations is scarce. Our interest in developing economies raised our motivation to try to understand the most important factors for the change in Indian economic growth. Deepak Lal has made an effort to understand India's economic situation through its history and he has not been afraid to put weight on factors that specifically characterize India. The fourth parameter about social attitudes and beliefs is according to Lal (2005, p.262) the most important one and is closely linked to Hinduism and the caste system. Sweden has one of the least religious populations in the world and it has been important for western societies to establish peoples' actions rather than God as the causes of events (Brunsson, 1990; Erneborg, 2009). Since Lal argues that the social attitudes and beliefs that derive from the ancient Hinduism must change in order to end the Hindu equilibrium, we find the link between economic growth and the strength of the religion interesting, since we both grew up in Sweden. Lal is a recognized economist and claims his thesis with little vagueness; therefore it is interesting to evaluate the thesis itself but also the consequences of such confident statements (Princeton University Press, 2010).

3. Theoretical frame of reference

Our purpose is to evaluate the thesis that Lal works out in detail in his book *The Hindu Equilibrium India c. 1500 B.C – 2000 A.D.*, which is an abridged and revised edition of the books *The Hindu Equilibrium Volume 1 Cultural Stability and Economic Stagnation: India c. 1500 B.C – A.D 1980* and *The Hindu Equilibrium Volume 2 Aspects of Indian Labour*. Even though the economic growth in India has increased from the 1980's, Lal (2005) has not changed the main conceptions of his thesis, argued in his first books. He emphasizes four parameters, which he sees as restrictions for an increased growth rate in India and mentions how they have changed or how they most likely will change in the future. The four parameters are, as mentioned before, uncertain labor supply, political instability, climatic uncertainty and a set of distinctive social attitudes and beliefs.

The uncertain labor supply has its origin in the fact that India for most part of its history has been a labor scarce country but also one with relatively labor intensive agriculture. Lal (2005, p.383) stresses that an alteration of this parameter has taken place in the twentieth century mostly due to the development of modern medicine. Concerning the political instability he argues that the traditional unstable imperial rule and the ensuing periodic breakdown of any centrally imposed law and order that have characterized India throughout history must be replaced by a united India with stable institutions. He explicates further that the survival of Indian democracy, the loss of the congress hegemony and the emergence of coalition governments are steps in the right direction. The third parameter is the climatic uncertainty that mainly refers to the uncertainty of the monsoon as well as the uneven spread of rain in the country. With the great risk involved in the inability to control the supply of water, agriculturists have found it more desirable to spread their risks than to set up profit-maximizing agrarian systems. The development of different irrigation systems is helping to reduce the climatic uncertainty. The fourth and last parameter is the one emphasized as the most important in his book and it concerns a set of distinctive social attitudes and beliefs (Lal, 2005, p. 386). It is above all the negative attitudes towards trade and commerce that he finds problematic. These attitudes derive from the status of different social classes that developed in the pre-colonial millennia in India and the treatment of the social class with the lowest status, the *Dasas* (a term later to be synonymous with slave), was the first step towards the establishment of caste (Lal, 2005, p. 22). Throughout history the social class with the highest status, the *Brahmanas* (priests), have looked down upon the *Vaishyas* (merchants) as self-interested people only concerned about making a profit. Lal (2005, p.385) argues that this fourth parameter, the opposition between status and

money, hardly has been altered and thus is a major restriction for the shattering of the Hindu Equilibrium.

Indian GDP increased markedly after the process of reforms began in 1991 and Lal has included a discussion about the importance of the reforms in the revised edition of his book, but he has not made any attempt to change the main conceptions of his thesis and include the reforms as a new main parameter. There is not much criticism or evaluation of Lal's thesis to be found but there are articles written on the importance of the process of reforms, which can be looked upon as an indirect criticism of Lal's thesis. The assumption that Indian social beliefs or Indian culture has had an impact on the country's economic growth and development, that Lal (2005, p. 262) claims as the most important parameter, is nearly invalidated by Gordon Corera (1998) in his article *India: the economy*. He argues instead that the process of reforms has been crucial for India's economic development. One example is how the process of reforms has facilitated for entrepreneurs by changing the license process that is compulsory when starting a firm from including eighty steps before the reform and only four after the reform. Arvind Virmani (2004) gives a view more similar to Lal's, arguing that Indian economic growth has been remarkably stable and points out only two phases of growth from the time of independence. The first is from 1951-1980, which he calls "Indian-socialist" rate of growth and the second from 1980, which he refers to as the "Bharatiya" rate of growth. He argues that the process of reforms that started in 1980 and further developed in 1991 led to an investment and manufacturing boom not before seen in the economic history of India. With the knowledge that there is literature arguing that the process of reforms has been crucial for Indian economic development and the fact that the growth rate after 1991 has been considerably higher than 3,5 percent, which it was on average during the period from 1950 to 1980, we find it important to include the impact of the process of reforms on the economic growth in India during our analysis to be able to evaluate Lal's thesis properly.

Lal is in his book describing India's economic situation mainly from a qualitative point of view and that is not surprising since the start of his analysis takes place in 1500 B.C. and quantitative data from that time is inaccessible. However, given the frame for this degree project we believe that a quantitative analysis is superior to a qualitative one to the extent that is possible. Therefore a quantitative analysis with regressions will be done and Lal's thesis will primarily be evaluated in the light of the results from the regressions performed.

4. Delimitation

A country's current social and economic situation depends on its history and Lal (2005) is careful not to simplify his analysis. Given the instructions for this degree project we have found a need to delimit the analysis to the time period from Indian independence in 1947 until year 2000. This delimitation is necessary for two particular reasons other than the fact that an analysis for a longer time period would be too large to cover given the instructions. First and foremost, the access to quantitative data is fundamental for the analysis and that delimits the possible time period. Far behind in time data is inaccessible and since the reports are lagging it is difficult to find data for the most recent time. In 1947, right before India became independent from British colonial rule there was a partition of India because of the oppositions between Hindus and Muslims in the country. This resulted in independence for two countries in 1947, Pakistan the 14th of August and India the 15th of August (Global Sikh News, 2009). Therefore Pakistan has the potential to be used as a control variable in the regressions that will be performed and that is the other reason why our analysis is delimited to the specific time period between 1947 and 2001.

To achieve the purpose of this degree project we find it important to break down the analysis into some worked out hypotheses and see if they hold. The hypotheses are as follows:

- 1. Some of Lal's four parameters are unequal for India and Pakistan*
- 2. The process of reforms in 1991 has had an impact on the economic growth in India*
- 3. The unequal parameters between the countries have had an impact on the economic growth in India*

5. Method

Different methods will be used to see if the main hypotheses, used to evaluate Lal's thesis, hold. The first challenge is to find quantitative measures for the qualitative parameters that Lal is considering. The reason why Lal, who to judge by his previous works is a mathematical economist, uses qualitative data has two plausible reasons, first that data for the time period he covers is inaccessible and second that it is difficult to quantify the parameters without simplifying the analysis. We are aware of that our quantifying of Lal's parameters somewhat is simplifying his thesis but we find the quantifying necessary given the instructions for the size of this degree project. When the parameters are quantified a comparison between them for India and Pakistan will be done. This comparison is important since it will determine which of the parameters to

include in the regressions and the parameters that can be excluded due to similar circumstances in both countries. This comparison will determine if the first hypothesis holds, that is if some of Lal's four parameters are unequal for India and Pakistan. Further on, regressions will be performed to determine whether the second and the third hypotheses hold. A regression that evaluate if the process of reforms have had an impact on economic growth will be performed and followed up by a country specific regression if the first regression gives the result that the process of reforms has had an impact on economic growth using event studies. The results of these regressions will determine if the second hypothesis holds, that is if the process of reforms in 1991 has had an impact on the economic growth in India. The last regression will further be supplemented with any unequal parameter for the countries and thereby help to determine if the third hypothesis holds, that is if the unequal parameters between the countries have had an impact on the economic growth in India.

6. Data

The attempt has been to use quantitative data in the analysis to the extent that has been possible. To be able to determine if the first hypothesis holds similar data for both India and Pakistan has been required to be able to make correct comparisons between the countries. This has caused some problems since data for Pakistan has been inadequate compared to data for India. Therefore the data for Pakistan has delimited how well the four parameters have been compared between the countries. Since all of the regressions are time series it has been a desire to find annually reported data. This has been another difficult task since much data is reported only once each decade or estimated annually. When annually estimated data has been obtainable, it has been used preferably to data reported only once each decade. GDP growth rate is the dependent variable in all of the regressions and it has therefore been of importance to obtain annually reported growth rates for both countries. In cases where only data for India has been required it has been a great limitation that we have not had access to the database Indiastat. Much data have been found in different statistical yearbooks from 1947 provided by Stockholm Public Library. Different statistical databases such as Aquastat provided by Food and Agriculture Organization of the United Nations and Laborsta provided by International Labour Organization have been of importance. Specific data to be able to quantify the last parameter, a set of distinctive social attitudes and beliefs, have been difficult to find since India has not been

reporting data on some of the things that we found appropriate to use as proxies in the regressions.

7. Analysis of hypothesis 1: *Some of Lal's four parameters are unequal for India and Pakistan*

The purpose of this analysis is to see if the hypothesis that some of Lal's four parameters are unequal for India and Pakistan holds. This will be done in three steps for each parameter. First a quantification of the parameter will be made and the choice of measure will be closely discussed. Second there will be a comparison of the parameter between India and Pakistan, which will result in a decision regarding if to include the parameter in the regression or not. Third an analysis of how the parameter has been altered and conclusions on whether it has decreased or disappeared will be made.

7.1 Uncertain labor supply

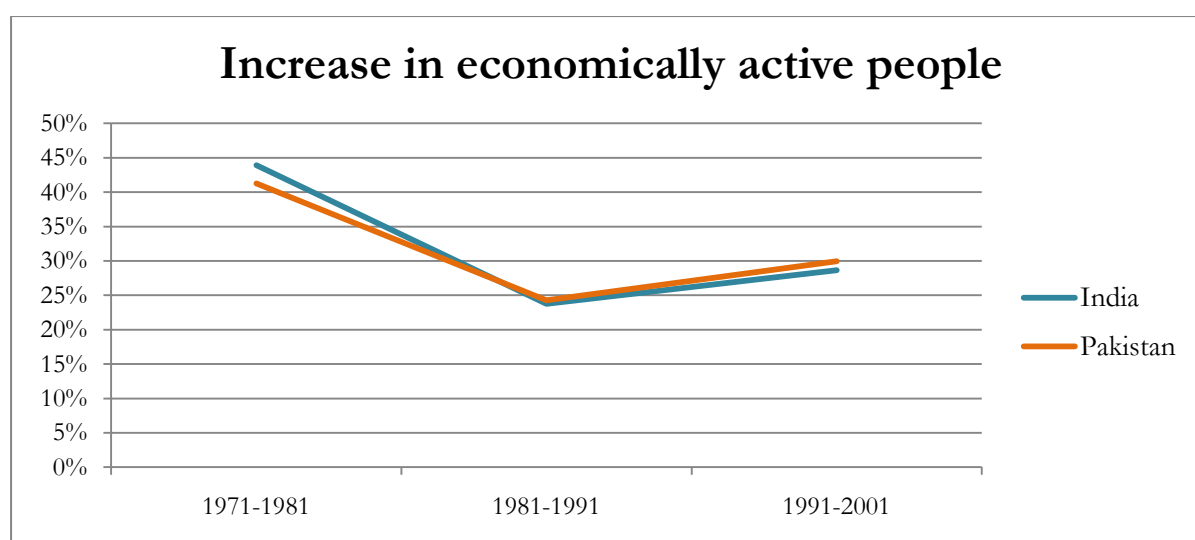
The first parameter is uncertain labor supply and Lal (2005, p.38-39) stresses that the land-man ratio was large until the beginning of the twentieth century. He argues that India has had a problem because of demographic stability for most of its history even though this equilibrium population has deviated much because of the four horsemen of the Apocalypse - famine, disease, pestilence and war (Lal, 2005, p.40). The importance of population growth is further emphasized when he argues that a change of this parameter has taken place in the twentieth century due to the development of modern medicine (Lal, 2005, p.383). He argues further that the labor to land ratio between 1950 and 1970 was nearly constant and that it has grown by 1,25 percent annually since then until year 2000 (Lal, 2005, p. 279). One main point of the argument is that the population growth in India has not lead to an increase in unemployment. He claims that unemployment in India has been low and even declined during the 70's and the 80's, without the cost of an increase in invisible unemployment (Lal, 2005, p. 325). Since India has had a relatively labor-intensive agriculture but at the same time been a labor scarce country, more workers would give a higher economic growth by taking advantage of the unused land.

In the light of Lal's discussion we have decided to use economically active population in India and Pakistan during the period 1961 to 2001 as a quantification of his first parameter; uncertain labor supply. It would have been preferable to have data for the complete time period but that has not been accessible. Data concerning estimated workers is good for India during the complete time period but poor for Pakistan and has therefore not been used as the measure of quantification. We regard the data of the economically active population, defined as '(...) all

persons of either sex who furnish the supply of labour for the production of goods and services during a specified time-reference period' by International Labour Organization (2010a), as credible and credibility has determined what measure to use for the parameter. Since the land area has been constant in India and decreased in Pakistan after the secession of East Pakistan in 1971(the establishment of Bangladesh) we argue that the same increase of the economically active population in both countries before and after the process of reforms in 1991 means that the parameter can be excluded from the regressions (Talbot, 1998). An increase in the economically active population in India imply that more people work at the same time as the land area is constant and such a result would give a decrease of Lal's first parameter.

The increase in economically active people has been almost identical between the countries since 1971 with a higher increase between 1971 and 1981 than for the following periods as can be seen in *Figure 7.1.1*. For all observed data see Appendix 13.4. There is a difference between India and Pakistan for the time period 1961 to 1971 and since data before that time is inaccessible it is possible that there have been differences in the time period from 1947 until 1961. The purpose of this analysis is however to see if the first hypothesis holds and then to be able to conclude what parameters to include and exclude in the regressions. The data available covers a time period both before and after the process of reforms in 1991 and can therefore be used as support for this purpose. We argue that the first parameter can be excluded from the regression because the increase in economically active people between India and Pakistan is almost identical for a sufficient time period.

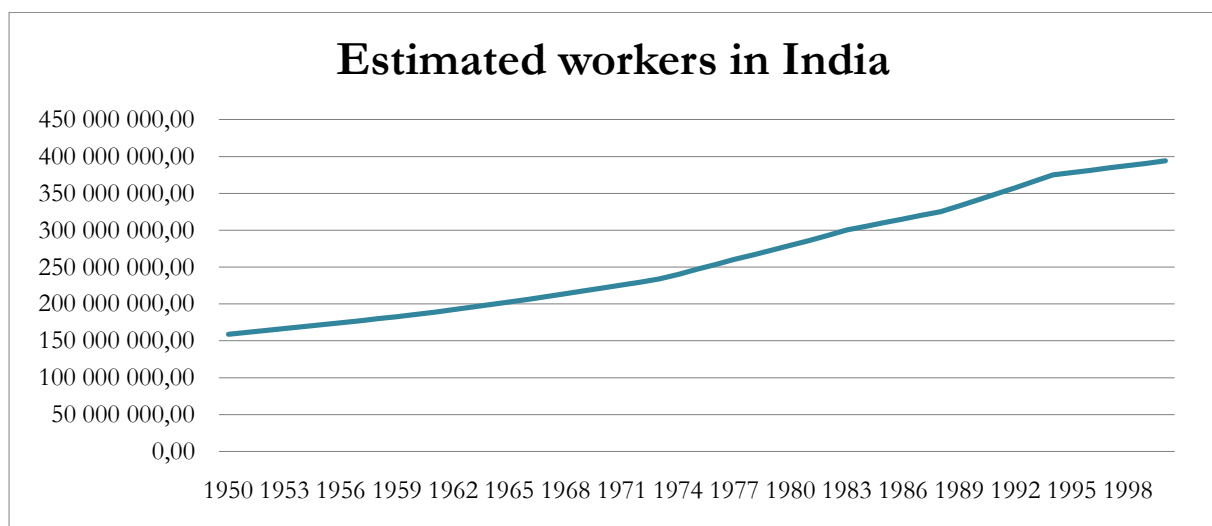
Figure 7.1.1: Increase in economically active people in percentage in India and Pakistan from year 1971 to 2001



Source: International Labour Organization (2010b).

The main purpose of this degree project is to evaluate Lal's thesis and for that reason a discussion about if the first parameter has decreased or disappeared is of importance. There has been an increase in economically active people during most of the analyzed time period but since data on this measure is inadequate for some parts of the time period it is difficult to argue how this first parameter has changed based on this data. The data on estimated workers in India is however available on annually basis from 1950 to 2000 and will be used as support for the comments on the altering of Lal's first parameter. The argument for workers as a quantification of the first parameter is the same as the one used for economically active population. If there has been an increase in workers throughout the analyzed time period and the land area is constant, then more of the unused land area can be utilized which is reasonable to lead to an increase in economic growth.

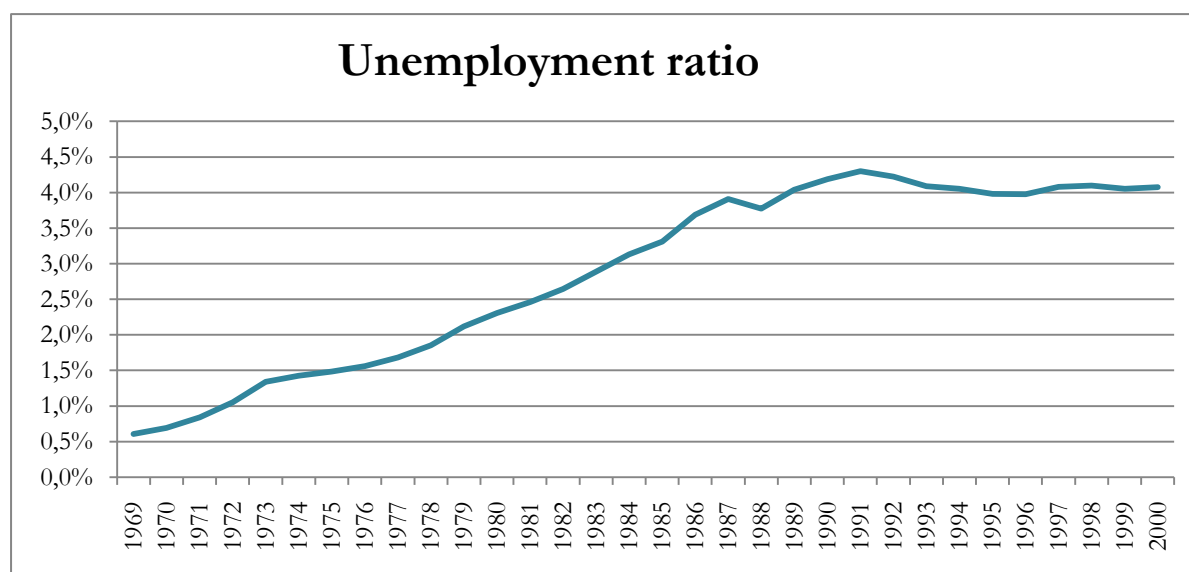
Figure 7.1.2: Number of estimated workers in India from year 1950 to 2000



Source: Sivasubramonian (2004).

It appears from the diagram on estimated workers in India that there has been a growth in workers throughout the time period. That Lal's first parameter has decreased based on the quantification that has been done is reasonable. It is more difficult to argue if the first parameter has disappeared altogether. Our interpretation of Lal's argumentation is that the population must increase to decrease the unused land area but without the cost of a too large increase in unemployment. There will be a time lag from newborn until they are capable of working, however if the unemployment reaches higher levels in macroeconomic terms around 9 to 10 percent this would argue that the first parameter has disappeared and that the economy is instead suffering from labor supply excess.

Figure 7.1.3: Number of unemployed of the total population in percentage in India from year 1969 to 2000



Source: International Labour Organization (2010c).

The unemployment rate has been low during the observed period from 1969 to 2000, as can be seen in *Figure 7.1.3*. The highest unemployment level is as low as 4,3 percent and we will therefore argue that Lal's first parameter has decreased but not disappeared.

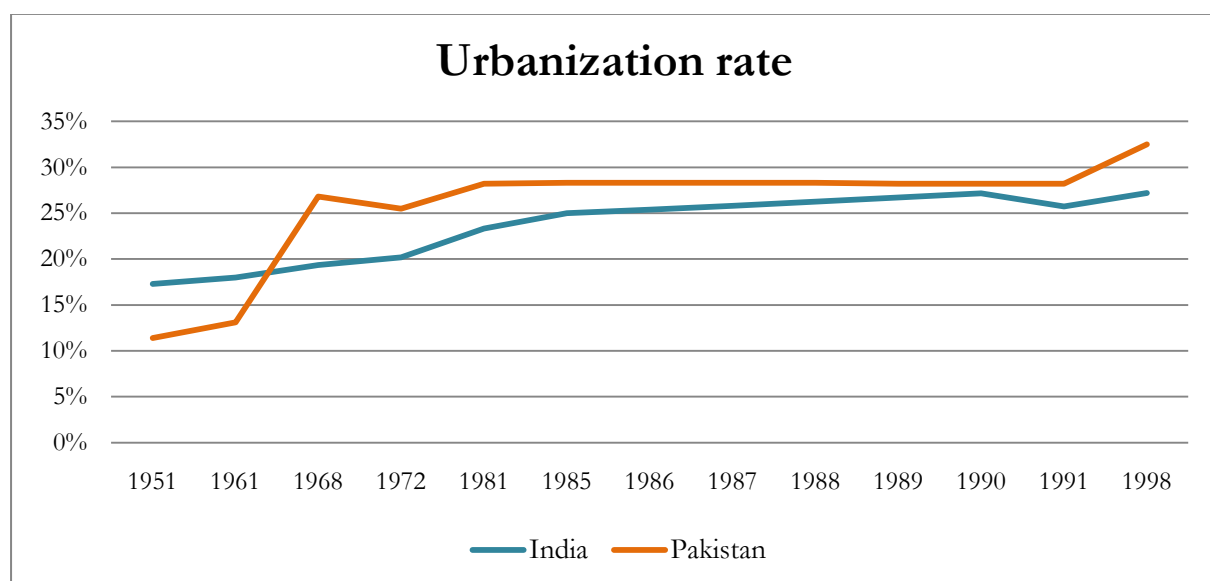
7.2 Political instability

The second parameter concerns political instability in India. Lal (2005, p.37) is picturing the Indian history as one of the rise and fall of different empires with the consequence of periodic breakdowns of centrally imposed law and orders. The political instability has led to a highly decentralized nature of the economic system, which gave small incentives for the chieftains to disturb the life in the village communities. Lal (2005, p.384) means that the tradition of payments of a customary share of the village output to the current chieftain in return for peace and quiet for the population in the village communities have made the continuance of the village communities possible. He explicates further that the survival of Indian democracy, the loss of the congress hegemony and the emergence of coalition governments are of importance for a more politically stable India. He also emphasizes the importance of Gandhi and his work *Hind Swaraj* for the maintenance of the traditional civilization (Lal, 2005, p.260-61). The argumentation is that Gandhi was opposed to Western education, industrialization and other modern forces and that he advocated for the village communities survival. This meant that he fought against what could have undermined the Hindu equilibrium (Lal, 2005, p.261). From a

statement in *Hind Swaraj* that the three major agents of Western civilization, railways, lawyers and doctors were destroying India, Lal concludes that all of the three agents were changing the parameters of the Hindu equilibrium. In the light of Lal's discussion it seemed relatively straightforward to use the three agents of Western civilization (as he calls them) as different quantifications of the second parameter. Similar data for India and Pakistan was however difficult to obtain and delimited that possibility.

Since Lal (2005, p.384) argues that the survival of Indian democracy and emergence of coalition governments are of importance for an alteration of this parameter the emergence of coalition governments will be used as a quantification of the second parameter and as a base for the comparison between the countries. Lal (2005, p.261) also claims village communities to be an essential part of the Hindu Equilibrium and because of that urbanization will be used as another quantification of this second parameter. Since political instability besteds the village communities, we argue that the parameter has decreased if there is an increase in the ratio; urbanized population to total population, during the observed time period.

Figure 7.2.1: Number of urbanized people of total population in percentage in India and Pakistan from year 1951 to 2000



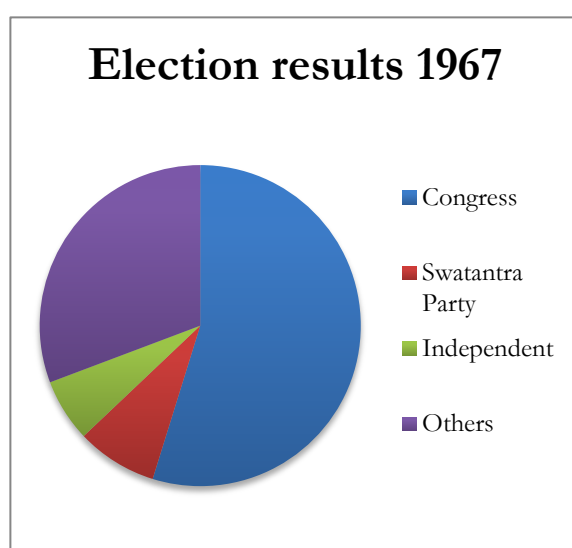
Source: United Nations Demographic yearbook, various years.

The urbanization rate has been similar in the two countries even though Pakistan's urbanization rate has been somewhat more fluctuating throughout the analyzed time period. Between 1968 and 1998, both countries have had an increase in urbanization somewhere around 6 to 8 percent. Data concerning the first observations are somewhat problematic since the government of Pakistan and United Nations Demographic Yearbook are reporting different numbers. The

numbers from United Nations Demographic Yearbook have been chosen due to their credibility. However, the data reported by the government of Pakistan would have given a more similar picture of the urbanization rate. We find a reason to believe that the partition of India and consequently migration of millions of people can have affected the data on urbanization in Pakistan since it takes time to settle in a new chaotic environment (Talbot, 2005, p.95). The explanation for the low numbers of the first two observations can thereby be the result of people migrating, waiting for a possibility to settle in the cities. The overall trend is that the urbanization rate increases in both countries throughout the time period and it is sufficiently similar to conclude that this first quantification of the second parameter indicates that it can be excluded from the regression.

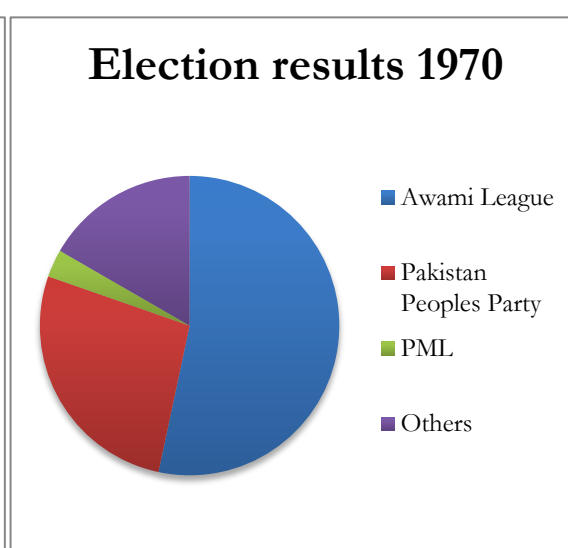
The second quantification of this parameter is the emergence of coalition governments in both countries. With a coalition government several interests and views are represented during decision-making, which makes the country more democratic, thus less politically instable. India held the first general election in 1952 but the first general elections in Pakistan was not realized until 1970 (Parliament of India, 2010a; Talbot, 1998, p.194-95). The elections from closest in time before 1970 for India and in 1970 for Pakistan have similarities even though it was the first election for Pakistan and the fourth for India. The dominating party has 55 percent of the seats in India and 53 percent of the seats in Pakistan

Figure 7.2.2: Distribution of seats in the election in India in 1967 showing the three dominating parties and others



Source: Parliament of India (2010b).

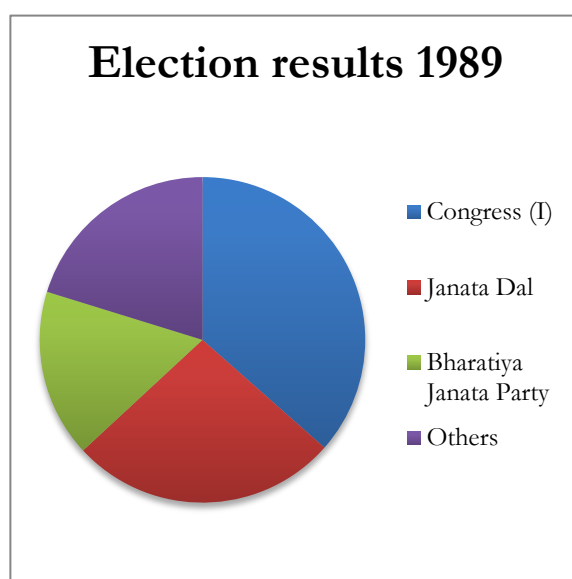
Figure 7.2.3: Distribution of seats in the election in Pakistan in 1970 showing the three dominating parties and others



Source: Pakistan Elections (2010).

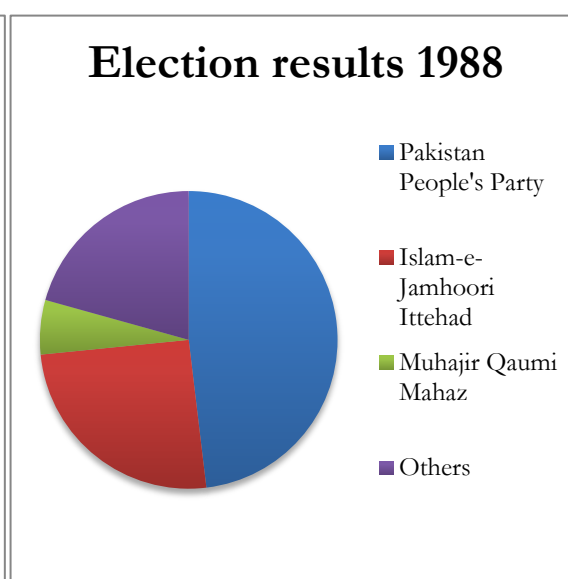
The elections in 1977 are also similar between the countries with the dominating party having 67 percent of the seats in India and 72 percent of the seats in Pakistan. There is an emergence of coalition governments when two or more political parties form a government according to the National Encyclopedia (2010) and that happens in 1989 in India and in 1988 in Pakistan (Tehelka, 2010; Encyclopedia of the Nations, 2010).

Figure 7.2.4: Distribution of seats in the election in India in 1989 showing the three dominating parties and others



Source: Parliament of India (2010b).

Figure 7.2.5: Distribution of seats in the election in Pakistan in 1988 showing the three dominating parties and others



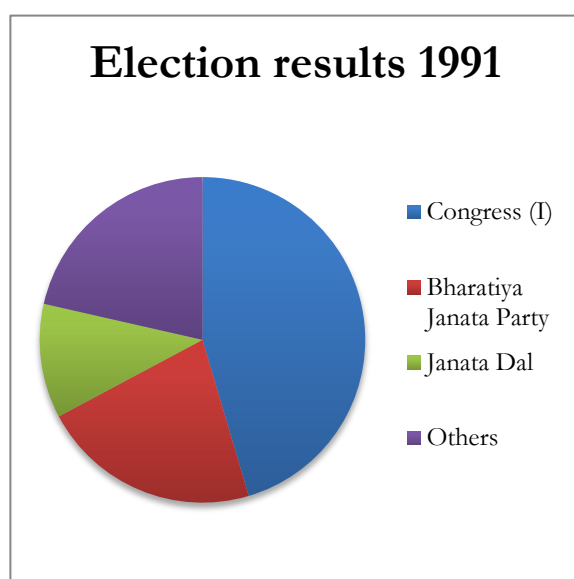
Source: Pakistan Elections (2010).

To be able to exclude a parameter from the regression, the circumstances in both countries must be similar before as well as after the event variable, which in our case is the process of reforms in 1991. Therefore if the parameter will be excluded it is of importance to study the coalition governments after 1991 and find a sufficient similarity between the countries. The election in 1993 in Pakistan and the one in 1991 in India, which are the most closely related in time, show to be similar with the dominating parties having 42 and 45 percent of the seats respectively as seen in Figures 7.2.6 and 7.2.7. This indicates that the circumstances have been sufficiently similar after the process of reforms in 1991. We find that the results from this second quantification of the parameter political instability indicate that the parameter is equal for India and Pakistan in the regard needed for a conclusion of whether the parameter is to be included in the regression. Both countries have had a hard time maintaining coalition governments even if the development in Pakistan has been less stable than that in India for the complete time after the event. Since we have argued that both of the quantifications of the second parameter indicate equal

circumstances between the countries we will argue that this parameter can be excluded from the regression.

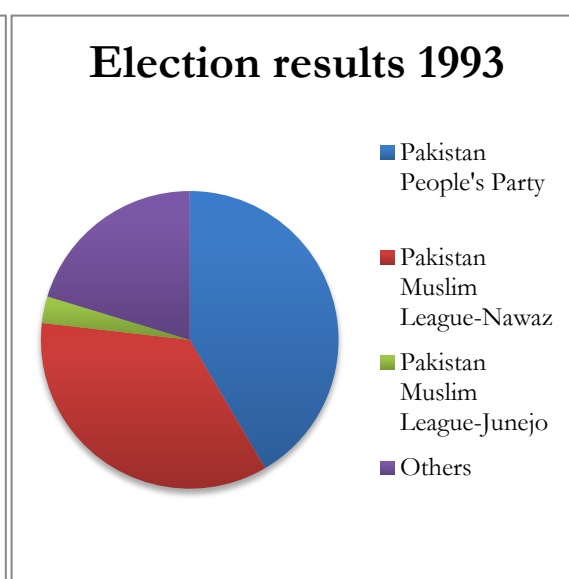
Both the increasing urbanization rate and the emergence and the maintenance of coalition governments in India suggest that there has been a decrease of Lal's second parameter but we will not go as far as arguing that this parameter has or is close to disappearance.

Figure 7.2.6: Distribution of seats in the election in India in 1991 showing the three dominating parties and others



Source: Parliament of India (2010b).

Figure 7.2.7: Distribution of seats in the election in Pakistan in 1993 showing the three dominating parties and others



Source: Pakistan Elections (2010).

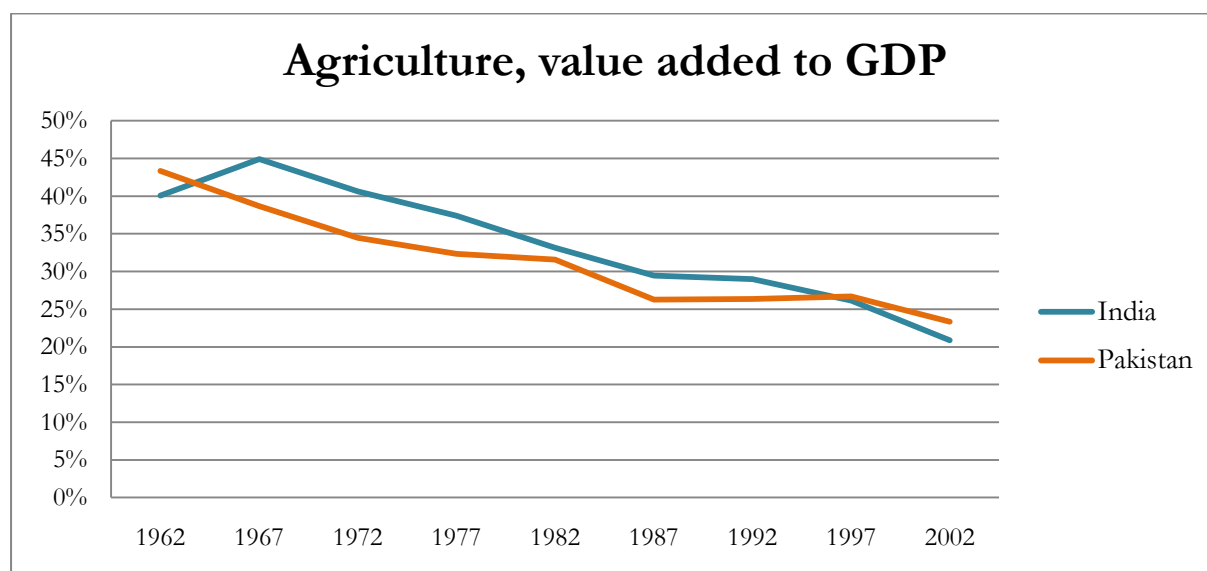
7.3 Climatic uncertainty

This third parameter called climatic uncertainty refers to the obstacle in uncertain water supply that decreases the possibility for agriculturists to profit-maximize (Lal, 2005, p. 385). Throughout history, agriculturists have been unwilling to invest in high-value but risky crops because of the erratic nature of the monsoon and the limited irrigation systems (Lal, 2005, p.105). Lal (2005, p.175) argues that irrigation without doubt is the major input in the development of agriculture. To be able to transform the traditional agriculture there is a need for irrigation as well as for fertilizers and high yields varieties. This will consequently lead to an increased demand for labor and to an increase in the real labor incomes (Lal, 2005, p.284). For a change in this parameter to occur Lal (2005, p.284) argues that a massive public investment in irrigation is required. When agriculturists can control the supply of water, they have the possibility to set up profit-maximizing agrarian systems and thereby an increase in economic growth is probable. Since Lal

is arguing the importance of massive public investments in irrigation, data of investments in irrigation for both countries would have been desirable. Data for India is available and suggests an increase in public investments but data for Pakistan is scarce and therefore public investments in irrigation cannot be used as a quantification of the third parameter. Data on irrigated areas would have been a good quantification of this parameter as well, but also in this respect data for Pakistan is inadequate. The key argument is that more irrigation would lead to a more productive agriculture and consequently an increase in economic growth.

The measure, value added to GDP from agriculture, will be argued to consist of two main parts: equipment (irrigation, fertilizers and high yields varieties) and workforce in the agricultural sector. Since agriculture is practiced in rural areas, having a similar urbanization rate would imply that an equally large part of the workforce in agriculture is moving from the agricultural sector in favor for work in the cities. Based on this knowledge we argue that the measure, value added to GDP from agriculture, shows the difference in productivity between the countries due to equipment. This measure will therefore be used as a quantification of Lal's third parameter; climatic uncertainty. If the development of this measure shows to be similar for the countries before and after the process of reforms in 1991 we will argue that the parameter can be excluded from the regression.

Figure 7.3.1: Agriculture, value added to GDP in India and Pakistan in percentage from year 1962 to 2002

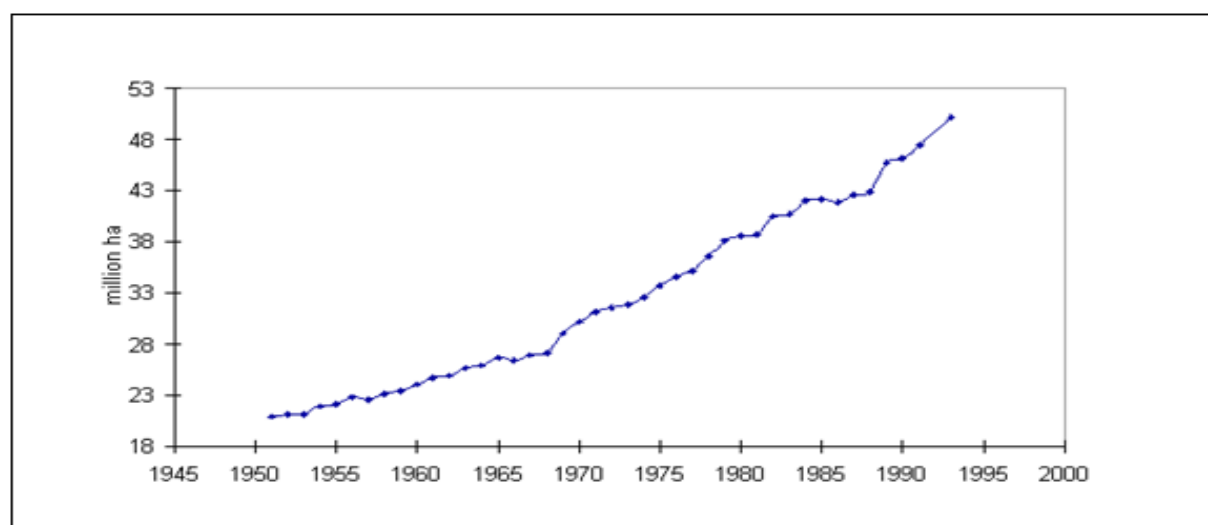


Source: Food and Agriculture Organization of the United Nations (2010a).

Figure 7.3.1 shows a similar trend for India and Pakistan for the observed time period. For exact numbers see Appendix 13.3. The value added to GDP from agriculture is decreasing in both countries, which is expected with economic development (the World Bank 2010b). With

everything else held constant this would suggest a less productive agriculture along the way towards current time. This is not reasonable and a better explanation is that agriculture has been more productive or remained the same productivity but due to an increase in the urbanization a smaller part of the population is engaged in agriculture. Since the trend is sufficiently similar between the countries we can conclude that the parameter climatic uncertainty can be excluded from the regression. As support for an evaluation of the alteration of Lal's parameter the accessible data on irrigated area for India will be used.

Figure 7.3.2: Evolution of irrigated area in India in million ha from year 1950 to 1993



Source: Food and Agriculture Organization of the United Nations (2010b).

Figure 7.3.2 shows that the irrigated area has increased overall during the analyzed time period. This suggests that Lal's third parameter has decreased but it is difficult to argue for a disappearance of the parameter.

7.4 Social attitudes and beliefs

This parameter is the one that Lal (2005, p.262) emphasizes as the most important one in the Hindu equilibrium. The negative attitudes towards trade and commerce have its origin from the way the *Brahmanas* (priests) throughout history have looked down upon the *Vaishyas* (merchants) (Lal, 2005, p.385). The *Brahmanas* (priests, teachers, and intellectuals), *Kshatriyas* (warriors, police, and administrators), *Vaishyas* (farmers, merchants and business people) together with the *Shudras* (artisans and workers) form the substance of the four social classes in Hindu India, the so-called *varnas* (ISKCON Educational Services, 2004). These *varnas* provided the framework for evolving the Hindu society, which consisted of several hierarchically ranked occupation and region-

specific subcastes (Lal, 2005, p. 23). Thus, we argue that the social attitudes towards trade and commerce are strongly connected to both caste and Hinduism. As early as the second half of the sixth century B.C. there was the appearance of a social class even lower than the *Shudras*, which came to be called the untouchables and their occupations, for example hunting and rush-weaving were regarded as extremely low (Lal, 2005, p.23). There has been and still is a tendency for oppressed castes to join some non-casteist sect instead of Hinduism, for example Buddhism (Lal, 2005, p. 26). Throughout Indian history, there has been a disjunction between commercial power and social status (Lal, 2005, p.263). Since the social attitudes and beliefs that Lal refers to has its origin in the old Hindu society and is closely linked to both the caste system and to Hinduism there is reason to believe that this parameter differ between India and Pakistan.

According to Talbot (1998, p.3-4) the need for a separate homeland for Muslims of India was called attention to already in the 1930's. Under the leader of the Muslim League, Mohammad Ali Jinnah, this need was fulfilled in 1947 when the partition of India took place and Pakistan was created. In 1956 Pakistan became an Islamic republic with only a small part of the population being Hindus. Due to the fundamental differences between Islam and Hinduism and the connection between Lal's fourth parameter and Hinduism together with the phenomena of caste, we conclude that there is a difference in the social attitudes and beliefs between the countries. Therefore this parameter must be controlled for in the regression and its affect on Indian economic growth will be evaluated under the analysis of the third hypothesis together with a discussion of the alteration of this parameter.

7.5 Conclusion of the analysis of hypothesis 1

After this analysis of the hypothesis: *Some of Lal's four parameters are unequal for India and Pakistan* we can conclude that the first three parameters, uncertain labor supply, political instability and climatic uncertainty are equal for India and Pakistan but the last parameter concerning a set of distinctive social attitudes and beliefs differ between the countries. Therefore the first hypothesis holds.

8. Analysis of hypothesis 2: *The process of reforms in 1991 has had an impact on the economic growth in India*

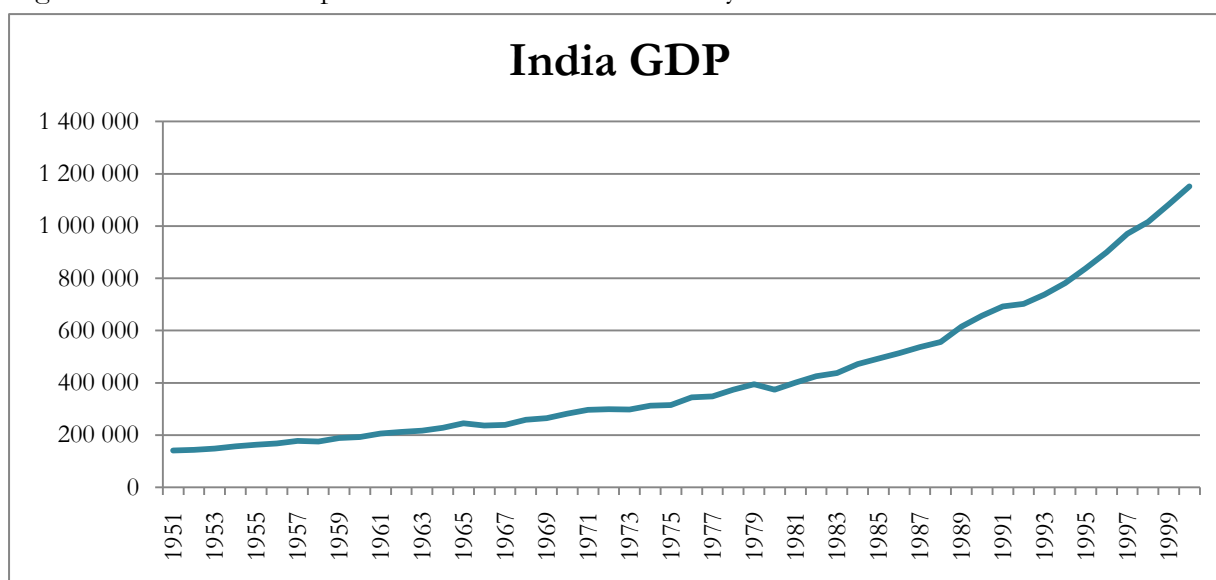
8.1 The process of reforms in 1991 in India

India was long a country restricted from the outside world in a closed economy. Its currency, the Rupee, was inconvertible and foreign goods had trouble reaching the Indian market because of high tariffs and import licensing (Gordon, 1998). On top of that, firms in India had difficulties running a company since they had major restrictions on how to conduct the business by the government, for example how much of a certain product to produce, which prices to set and how many employees to have. These are some of the obstacles they had to face, if they could make it through the process of having a firm, which meant having to go through the licensing process that included around eighty different steps. Lal (2005, p.312) observes in his thesis these obstacles as a part of the political process that the leaders were conducting and a set of political events during the later parts of the 1980's that led to what is known as the fiscal crisis in 1991.

Indian society was built on socialistic grounds, which were imprinted in the minds of the leaders. They believed that central planning and the protection of the domestic market was essential for development. This socialistic idea soon changed when the Soviet Union started dissolving in 1989 and India went into a fiscal crisis in 1991 and IMF had to save the bankrupt state. Among the first liberalizations were to remove the eighty licenses that companies needed in order to start a business. Firms could now control what they wanted to conduct and to what extent. The only industry that remained protected was the defense industry. Indian economy opened up for international trade, allowed foreign direct investments and cut off the tariffs from 87 percent in 1990 to 25 percent in 1995. The overvalued Rupee was devalued in 1993 and had a market-determined exchange rate (Gordon, 1998).

All these changes led to an enormous liberalization in the Indian economy. Observing the GDP growth rate in *Figure 8.1.1* with a much steeper slope after 1991, it seems to show an immediate result from the reforms.

Figure 8.1.1: GDP development in India in Rs crore from year 1951 to 2001



Source: Sivasubramonian (2004).

In 1991 the GDP growth rate was only 1,06 percent but increased to 5,48 percent in 1992 and reached to 7,60 percent in 1995 (World Bank 2010a). Lal (2005, 315) claims in his thesis that the process of reforms was for the benefit of the country, however he does not recognize these as the important change in history of development; “But a great deal needs to be done to complete the reforms needed to integrate India fully with the world economy.” (Lal 2005, p.316). He is convinced that these reforms only led to a temporary upswing in the economy in order for it to fall back after a few years and then return the country to a state where it was before the process of reforms were initiated. Lal (2005, p.364) recognizes that India has been stuck in a planned economy for centuries and needs to replace that with a market economy for one main reason; to abolish the one pillar that holds up the Hindu equilibrium – social attitudes and beliefs. What Lal believes essentially to be the only way out of the Hindu equilibrium is to adopt the capitalistic thinking of the west and get rid of the Hindu way of thinking. “Ultimately the only way to prosperity is the adoption of that much derided model of Anglo-Saxon capitalism.” (Lal 2005, 364).

8.2 Event study

Agreeing with Lal but being convinced that the reforms have had more impact on GDP growth rate than just temporarily, this had to be tested quantitative with the help of event studies. With the help of event studies we can measure what the expected GDP growth rate should have been if the event should not have taken place. The advantage with using event studies is that other

factors are held constant, meaning only the event occurs. The reforms that took place in India in 1991 did not take place in Pakistan, which was on the agenda for the Pakistani president Pervez Musharraf when he came to the power much later in 1999 (Ekenstén-Möller, 2008). Pakistan is therefore a group that can be used as the control variable with India as the treatment group. There are many advantages of using Pakistan as the control group, since the two countries were one country under British governance until the partition of India in 1947 and have therefore similarities that can exclude variables as argued in the analysis of the first hypothesis.

Event studies creates four groups; control group before the event, control group after the event, treatment group before the event and treatment group after the event, making it possible to measure the differences-in-difference between the groups after and before. Using the differences-in-difference method to compute the values of the groups allows us to difference away any permanent differences between the groups and any common trend affecting both groups. In the case that there is no treatment effect, the average change in the response variable will be the same for both the treatment and the control group (aka. the parallel trends assumption). We control for heteroskedasticity by applying robust standard errors in our regressions.

8.3 The regressions

The datasets collected are time series of the GDP growth from 1951 till 2001 in India and in Pakistan and 1991 is set as the event date. All data can be found in the Appendix 13.1. Starting off with a simple regression, the first one performed had the form:

$$GDPgrowth_{it} = \beta_0 + \delta_0 event_t + u_{it}$$

This gives a result of whether the process of reforms has had an impact on growth rate or not. The results from the regression can be seen in *Table 8.3.1*. With this simple form, without controlling for the country variable we should not get any significant results since the reforms have been carried out in India and not in Pakistan. As seen in *Table 8.3.1*, the coefficient on the event variable is insignificant and cannot be excluded from being zero. This is a solid foundation for building up an event study regression.

Table 8.3.1: Results from **standard OLS regression** of the true model $GDP_{growth_{it}} = \beta_0 + \delta_0 event_t + u_{it}$, controlled for heteroskedasticity.

	GDPgrowth
event	0,152 (0,543)
constant	4,688*** (0,339)
N	102

robust standard errors in parenthesis

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

The second regression done had the form:

$$GDP_{growth_{it}} = \beta_0 + \delta_0 event_t + \beta_1 India_i + \delta_1 India_i * after_{it} + u_i$$

The variable of interest is the interaction term $India_i * event_t$ which gives the differences-in-difference estimator. Here we control for the event taken place in one country and not in the other one that is; there is a difference in growth rate due to the event in one country and not in the other one. The differences-in-difference estimator is calculated according to Table 8.3.2.

Table 8.3.2: Showing the differences-in-difference estimator

	Before 1991	After 1991	After- Before
Pakistan	β_0	$\beta_0 + \delta_0$	δ_0
India	$\beta_0 + \beta_1$	$\beta_0 + \beta_1 + \delta_0 + \delta_1$	$\delta_0 + \delta_1$
		Difference-in- Differences estimator	δ_1

Source: Woolridge (2009).

The results from the regression can be seen in Table 8.3.3

Table 8.3.3: Results from **standard OLS regression** of the true model $GDP_{growth_{it}} = \beta_0 + \delta_0 event_t + \beta_1 India_i + \delta_1 India_i * event_t + u_{it}$, controlled for heteroskedasticity.

	GDP growth rate
event	-1,249* (0,690)
India	-1,132* (0,673)
India*event	2,803*** (1,027)
constant	5,254*** (0,419)

N 102

robust standard errors in parentheses

* p<0.10

** p<0.05

*** p<0.01

8.4 Has the process of reforms in 1991 had an impact on GDP growth rate in India?

The reforms allegedly made the foreign direct investment and the growth of the private sector in India possible. Firms could now run a business that could profit-maximize without having the intervention of the government. Therefore, this question can only be answered if the differences-in-difference estimator is positive and significantly different from zero. That would be an indication that the process of reforms has had an effect. This is what can be observed in the regression results. A $\hat{\delta}_1 = 2,803$ implies that the average GDP growth rate in India increased by 2,803 percent units per year after the process of reforms in 1991 compared to Pakistan. This figure is significant at a 1 percent level and the conclusion that the reforms have had an impact on growth rate in India but not in Pakistan can be drawn. We can therefore conclude that the second hypothesis: *The process of reforms in 1991 has had an impact on the economic growth in India*, holds. This setup seems to be closer to the true model, since the results are more significant. The average growth rate for Pakistan before the event is 5,25 percent and after the event 1,25 percent lower with a 10 percent significance level. The average growth rate for India before the events is 1,13 percent lower than in Pakistan and after the events is 1,68 percent higher. Can we go as far as arguing that firms are profit maximizing now because GDP has grown and licenses, that were barriers for firms to start up, are gone? Not quite with the data available, but it does not reject that hypothesis either.

Table 8.4.1: Average GDP growth rates for India and Pakistan, before 1991 and after 1991 from the regression results

	Before 1991	After 1991	After- Before
Pakistan	5,25%	4,00%	-1,25%
India	4,12%	5,68%	1,55%
		Difference-in- Differences estimator	2,80%

8.5 Problems with the regression

One problem with this regression is the number of observations, which were limited to the year 2001 because of the delimitation of this degree project. What we have observed in later years in India are that the growth rate has increased on even higher levels and is competing with China's rate of growth (World Bank, 2010). One reason for this is the time lag problem. The process of reforms is as the name calls it – a process, not a specific event. The event study is therefore flawed concerning a correct regression analysis since all of these changes do not have an immediate effect on the economy. India has long been a country dependent on its agriculture, changing this to a society with more focus on services such as IT and thus creating technological comparative advantages, do not happen over one year (Di Lodovico, et al., 2001). The highly positive effect of these changes on GDP growth rate can, as mentioned, be seen much later. *Figure 8.1.1* shows the GDP development in India from 1951 to 2001.

Another problem that we always are concerned about is that there might be an omitted variable, which can lead to an endogeneity problem. This regression, as mentioned earlier, is assuming all other factors between the countries equal, except for the event. The four parameters affecting growth rate according to Lal are not all equal between the countries as the case has been made. Social beliefs, which is the most important parameter according to Lal (2005, p.262) differ between the countries and have therefore got to be included in the regression. This is more than problematic since there are no measures for social beliefs directly, which leaves the use of proxies the only method to solve this problem with.

8.6 Conclusions of the analysis of hypothesis 2

After this analysis of the hypothesis: *The process of reforms in 1991 has had an impact on the economic growth in India* we can conclude that the process of reforms has had a positive impact on Indian GDP growth rate. Therefore the second hypothesis holds.

9. Analysis of hypothesis 3: *The unequal parameters between the countries have had an impact on the economic growth in India*

9.1 Proxies for social attitudes and beliefs

The fourth parameter concerning the social attitudes and beliefs that Lal argues is the most important one in the Hindu equilibrium is difficult to quantify and therefore a proxy will be required. He argues that it is the negative attitude towards trade and commerce that is most problematic but also that this attitude is closely linked to Hinduism and the phenomena of caste. It would have been preferable to find a proxy that is strongly correlated with these specific attitudes towards trade and commerce but since that has been problematic, proxies strongly correlated to Hinduism and caste will be used. The social beliefs in Pakistan will be set to 0. We will argue that any quantified variable that correlates (not necessarily perfectly) with the parameter social attitudes and beliefs can be used as a proxy, but the most difficult part will be to find reasonable proxies. In the following analysis, six different proxies will be used in an attempt to distinguish whether this fourth parameter has had an impact on the economic growth in India.

9.2 Railway ratio

Lal (2005, p. 261) argues that the survival of the village communities have been a constraint for the shattering of the Hindu equilibrium. A population that lives fairly isolated from the surrounding world is not affected directly by the thoughts and ideas of other people and it is thereby reasonable that they maintain the same attitudes and beliefs for a long time. If communication possibilities open up and people start to travel and experience new things, they will (even if they do not question their own beliefs) see that different attitudes than their own exists. The expansion of railways in India is facilitating people's ability to move across the country, therefore we will argue that the change of investments in railways is correlated with the parameter social attitudes and beliefs and can be used as a proxy for this variable.

Table 9.2.1: Results from running an OLS regression with **measurement error model** of $GDPgrowth_{it} = \beta_0 + \delta_0 event_t + \beta_1 India_i + \delta_1 India_i * event_t + railwayrate_{it} + u_{it}$, controlled for heteroskedasticity.

	GDP growth rate
event	-1,249* (0,697)
India	-1,015 (0,836)
India*event	2,556* (1,322)
railwayrate	-0,441 (4,693)
constant	5,254*** (0,424)

N 86

robust standard errors in parentheses

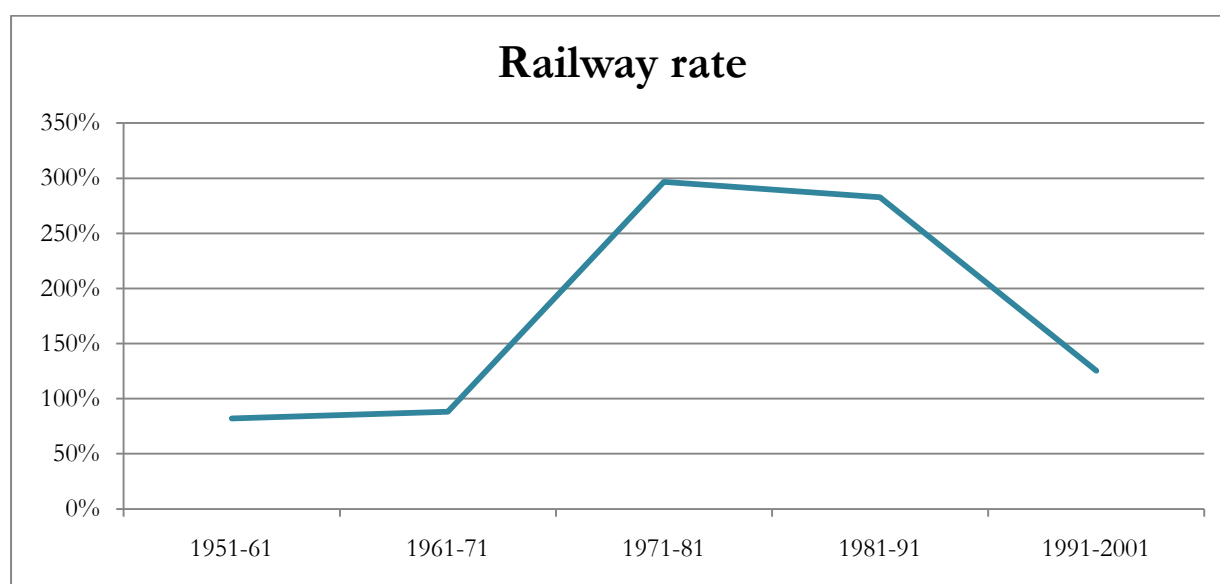
* p<0.10

** p<0.05

*** p<0.01

The variable railway rate is as seen in *Table 9.2.1* not significant on any of the established significance levels. Adding the proxy for social beliefs into the regression has not had a significant impact on growth rate, which means that it could be excluded from it. When we control for the change in railway rate what happens with the other variables is that they become less significant, except for the constant that carries the same coefficient and significance level as in the setup in *Table 8.3.3*. The constant captures, as mentioned, the control group before the event; Pakistan before 1991. Making the variables less significant compared to the setup regressed earlier can indicate two things. Either, the correlation between the proxy and the control variable is weak and therefore the variable, social beliefs, is not represented well in the regression. Or, given that the railway rate is a good measure of social beliefs, the insignificant results should point in the direction that the parameter's alteration has not had an effect on growth rate. As we can see in *Figure 9.2.1* the change in railway investments have massively increased until the 1970's, and afterwards decreased compared to earlier years, however not once gone below 0 percent, meaning that the amount of money spent on railways have increased in absolute terms during the complete time period analyzed. This would suggest that the railways have been in an expansionary process since the 50's and led to an India with village communities less isolated. In spite of this trend, railway rate has not led to an increase in GDP growth rate.

Figure 9.2.1: Percentage change in the amount invested in railways in India from year 1951 to 2001



Source: Stateman's yearbook, various years.

9.3 Education rate

Lal (2005, p.133) claims that the introduction of Westerns education has had effect on the Hindu society, mainly in the long run. If people obtain a basic education they learn how to read, write and count and are able to make sense of newspapers and books. They can then utilize the accessible information. If people obtain higher education they learn to think logically and solve problems. They are also taught how to think critically and evaluate sources. Therefore, we argue that education is correlated with social attitudes and beliefs and can be used as a proxy. However a higher education is regarded to have a greater impact on social beliefs than a basic education and it has been taken into consideration when working out the education ratio. Twice the weight has been given to higher education and then the sum of basic- and higher education has been divided by the total population.

Table 9.3.1: Results from running an OLS regression with **measurement error model** of $GDPgrowth_{it} = \beta_0 + \delta_0 event_t + \beta_1 India_i + \delta_1 India_i * event_{it} + educationrate_{it} + u_{it}$, controlled for heteroskedasticity.

	GDP growth rate
event	-1,249* (0,698)
India	-1,774 (2,094)
India*event	3,163** (1,517)
educationrate	5,750 (15,526)
constant	5,254*** (0,424)

N 82

robust standard errors in parentheses

* $p < 0.10$

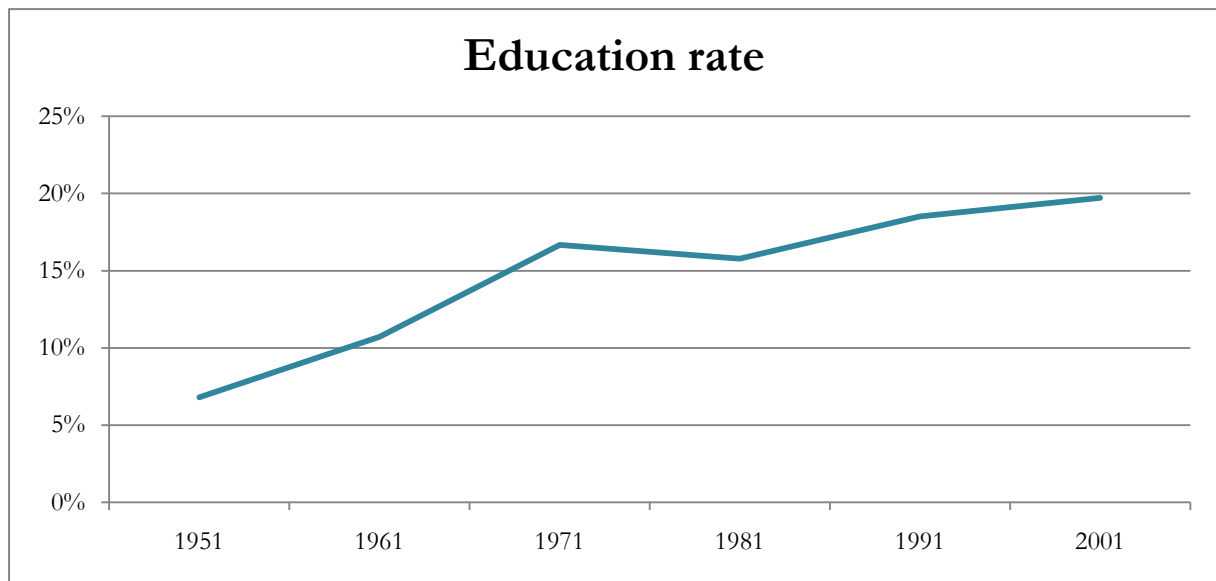
** $p < 0.05$

*** $p < 0.01$

Given the results from the former regression, these results present a similar interpretation. The proxy education rate is insignificant and brings down the other variables to less significant levels. However, one difference that is observable is that the interaction term India*event is more significant with a higher coefficient, indicating that adding this control variable results in a higher difference between the average GDP growth rate in India and Pakistan. But no conclusions can be drawn because of the proxy's insignificance.

The argument that education rate does a poor job in explaining GDP growth rate because of weak correlation to social beliefs does not seem reasonable. In *Figure 9.3.1* we can observe that the education rate has increased from being only around 6 percent in 1951 to nearly 20 percent in 2001. Given that the proxy, education rate, correlates well with social beliefs, the results indicate that social beliefs do not significantly affect the GDP growth rate.

Figure 9.3.1: The sum of basic education and higher education (times two) divided by the total population in India from year 1951 to 2001



Source: Stateman's yearbook, various years.

9.4 Sex ratio

The two most important rituals for Hindu women in India is marriage and to give birth to a boy (Mullatti, 1995). This implies the difference between men and women in the society. The sex ratio in India has been in favor for men during the complete time period that have been analyzed. From 1947 to 2001 the average sex ratio has been 935 women on 1000 men in India. Comparing it to the average sex ratio for Sweden, a country considered to have one of the highest levels of gender equality in the world, shows a large difference (Swedish Institute, 2010). The average ratio is 1012 women on 1000 men in Sweden (*Stateman's yearbook*, various years). However, Lal (2005, p.320-321) argues that since the life expectancy at birth for females has been rising along with the rising sex ratio, it could not have been a rising sex bias against females. But he also argues that there is an absence of natural explanations for some of the states where evidence of sex-selective abortions have been found. It would have been preferable to use the sex ratio in these states as a proxy for social beliefs but since data is inaccessible the sex ratio for the country will be used.

Table 9.4.1: Results from running an OLS regression with **measurement error model** of $GDP_{growth_{it}} = \beta_0 + \delta_0 event_t + \beta_1 India_i + \delta_1 India_i * event_t + sexratio_{it} + u_{it}$, controlled for heteroskedasticity.

	GDP growth rate
event	-1,249* (0,708)
India	-58,248 (117,372)
India*event	2,43* (2,514)
sexratio	59,836 (124,661)
constant	5,254*** (0,430)

N 57

robust standard errors in parentheses

* p<0.10

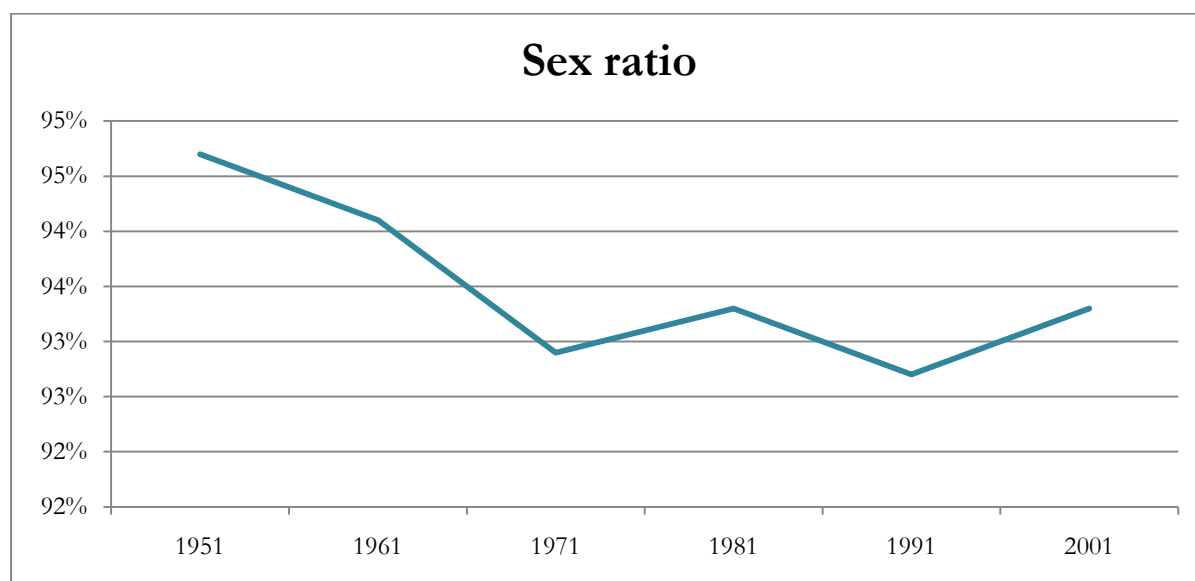
** p<0.05

*** p<0.01

The proxy variable, sex ratio, is highly insignificant in this setup as well. One difference in this measure is that if it correlates well with social beliefs, it suggests that the parameter has increased since the 1950's, as can be seen in *Figure 9.4.1*. This implies that social beliefs, the most important parameter in withholding the Hindu equilibrium has increased at the same time as GDP growth rate in India has increased; which goes in opposite direction to what Lal (2005, p.262) predicts.

Arguing that the sex ratio is a good proxy, the development of the sex ratio indicates that there has been an increase in economic growth without social beliefs being decreased. This suggests that there are other factors than the decrease of Lal's four parameters that have affected the economic growth in India.

Figure 9.4.1: Number of women per 1000 number of men in India from year 1951 to 2001



Sources: Demographic yearbook, various years.

9.5 Hindu rate

Since the social attitudes and beliefs are closely connected to both Hinduism and caste, a transformation of the part of the population that is Hindus would imply a change in the social beliefs of the total population. The fourth parameter is also connected to caste and since Lal (2005, p.26) argues that there is a tendency for oppressed castes to opt out of Hinduism, we argue that the number of Hindus of the total population would be a good proxy for social beliefs.

Table 9.5.1: Results from running an OLS regression with **measurement error model** of $GDPgrowth_{it} = \beta_0 + \delta_0 event_t + \beta_1 India_{it} + \delta_1 India_{it} * event_t + hindurate_{it} + u_{it}$, controlled for heteroskedasticity.

	GDP growth rate
event	-1,249* (0,708)
India	102,339 (70,323)
India*event	-0,695* (2,849)
hindurate	-125,217 (84,609)
constant	5,254*** (0,430)

N 57

robust standard errors in parentheses

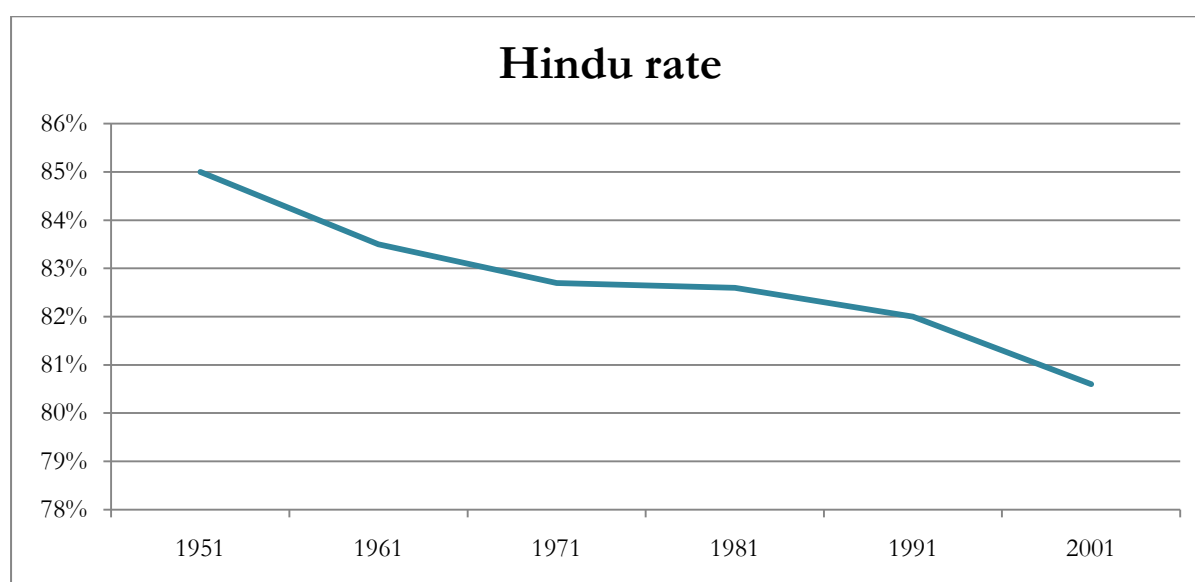
* p<0.10

** p<0.05

*** p<0.01

The constant in the regression representing Pakistan before 1991 is not changing through the regressions and is highly significant. Having experimented with three different social belief proxies, together with this fourth proxy none of them give significant results, no matter how they have changed. This suggests that the parameter does not have a significant impact on GDP growth rate. The number of Hindus in the population should be highly correlated with the strength of the social beliefs in India. As we can see in *Figure 9.5.1* the number of Hindus has declined from around 85 percent of the population in the 1950's to close to 80 percent in 2001. This decrease should result in social beliefs being reduced in India, and according to Lal high growth rates. What we can observe is that, there are high growth rates but these are not correlated with the Hindu rate in the population.

Figure 9.5.1: Number of Hindus divided by total population in percentage in India from year 1951 to 2001



Source: Stateman's yearbook, various years.

9.6 Birth rate

Lal (2005, p.317) argues that the birth rate has declined during the last century and explains it as the consequence of a decline in infant mortality and thus a change in families' breeding habits. A decline in birth rate can also suggest that women have new tasks outside the home and therefore are unable to take care of several children. One of the most important rituals for Hindu women in India is to give birth to a boy but if the birth rate declines then each woman give birth to fewer children and thus the probability to have a boy decreases. This would suggest a decrease in the valuation of the ritual of birth giving to a boy. We argue that birth rate is correlated with the fourth parameter concerning social beliefs and therefore can be used as a proxy.

Table 9.6.1: Results from running an OLS regression with **measurement error model** of $GDP_{growth_{it}} = \beta_0 + \delta_0 event_t + \beta_1 India_i + \delta_1 India_i * event_t + birthrate_{it} + u_{it}$, controlled for heteroskedasticity.

	GDP growth rate
event	-1,249* (0,707)
India	7,929 (7,214)
India*event	-1,351 (2,840)
birthrate	-20,070 (10,380)
constant	5,254*** (0,430)

N 59

robust standard errors in parentheses

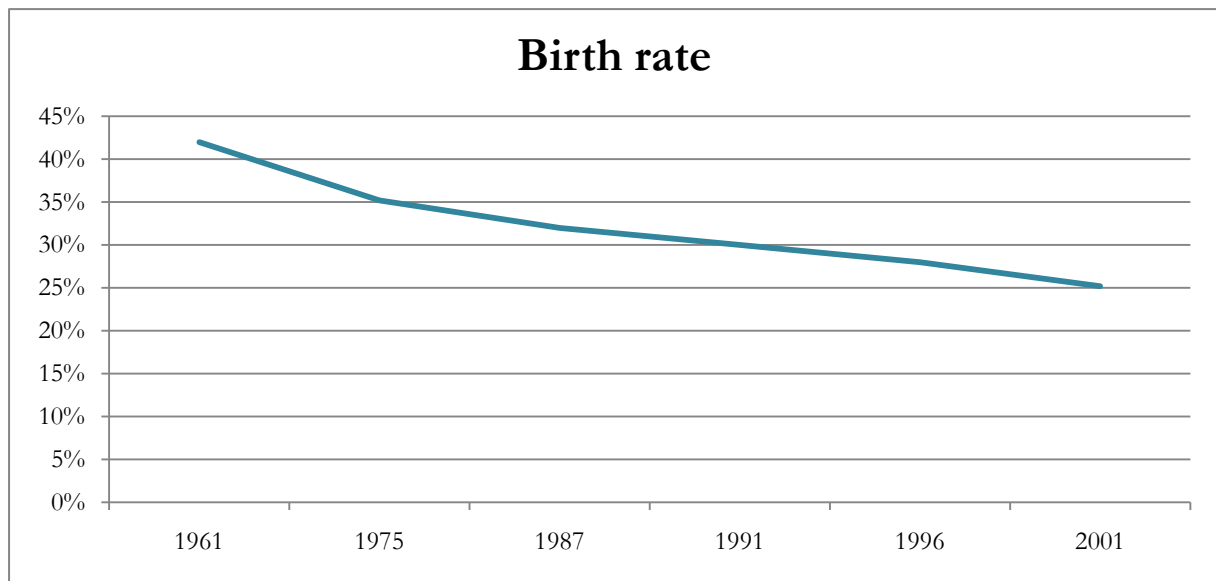
* $p < 0.10$

** $p < 0.05$

*** $p < 0.01$

The proxy birth rate does not give any different results than the other proxies in the same regression setup. It is highly insignificant although the birth rates have gone down. Given that the proxy is well correlated with social beliefs, there is no correlation between the social beliefs in India and the GDP growth rate, as suggested by Lal (2005). The data on birth rates have been a little different compared to the other proxies, where there have been data once each decade. Birth rates in 1951 do not exist, but more frequent data from 1961 to 2001 could be found. Given more observations in this set up, the results should be more conclusive than other measures. Birth rates in India have declined as seen in *Figure 9.6.1* and should accordingly suggest that the parameter, social beliefs, has decreased. However, birth rates could be correlated with the sex ratio, without meaning that social beliefs have weakened. Since the woman's primary task in life is to give birth to a boy, if the woman through abortions can decide which child to keep and not to keep in order to fulfill her main goal in life, the number of birth rates would go down without the social beliefs being weakened.

Figure 9.6.1: Number of births divided by total number of women in percentage in India from year 1961 to 2001



Source: Demographic yearbook, various years.

9.7 Marriage rate

Since marriage is one of the most important rituals in Hinduism it would have been of interest to know what the statistics on divorces in India during the observed time period looked like but there is no such data available. Lal (2005, p.319) claims that the mean age of marriage in India has increased. Critique on the continuance of child marriages in India is however harsh and the author of *Child Marriage in India*, Jaya Sagade, expresses that “there’s a sense that it won’t be possible to uproot such an entrenched custom” to The New York Times in 2005 (Gentleman, 2005). Marrying at an older age implies that the rituals of Hindu women have increased from being primarily the marriage and the birth giving to a boy. Since the ritual of marriage is of greatest importance in Hinduism we will argue that the measure, part of females under fifteen years old that is married, correlates with social beliefs and can be used as a proxy.

Table 9.7.1: Results from running an OLS regression with **measurement error model** of $GDPgrowth_{it} = \beta_0 + \delta_0 event_t + \beta_1 India_i + \delta_1 India_i * event_t + marriage_{rate}_{it} + u_{it}$, controlled for heteroskedasticity.

	GDP growth rate
event	-1,249* (0,702)
India	-0,813 (2,107)
India*event	<i>dropped</i>
marriage_{rate}	-26,764 (25,231)
constant	5,254*** (0,427)

N 55

robust standard errors in parentheses

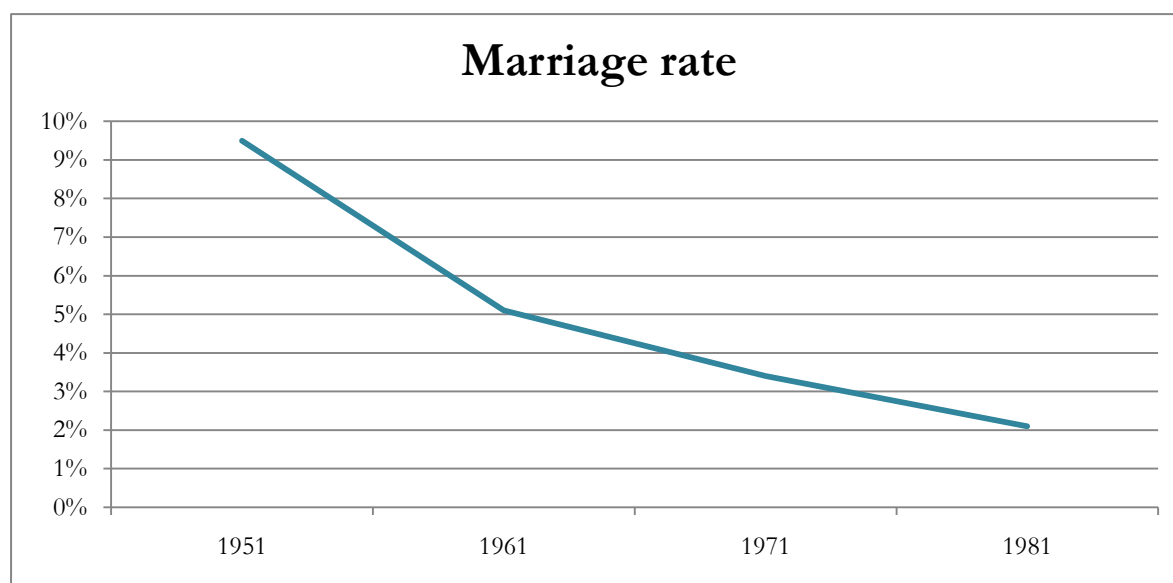
* p<0.10

** p<0.05

*** p<0.01

The number of married women under fifteen years old should have a strong correlation with the social beliefs in India. As mentioned above, marriage and giving birth to a boy are the main (and only) rituals considered important for a woman. The preferable age for a woman to get married according to Hinduism is before reaching the age of puberty (Mullatti, 1995). The data that could be found for India was four observations as seen in *Figure 9.7.1* from 1951 to 1981 on married women under the age of 15. This can also be seen in Appendix 13.1. Given the few number of observations this is considered to be a poor measure, however it reflects a very important side of how attitudes and social beliefs have changed in India. Child marriage has become much less frequent, as it can be seen in *Figure 9.7.1*, comparing the numbers from 1951 and 1981. Given this reduction, there still does not exist a correlation between the proxy and the GDP growth rate, but it can be due to few numbers of observations. There is however a clear downward sloping trend. The reason behind the reduction of this rate is the most important one. If the rate of child marriages has gone down because of peer pressure from the world, this would not indicate a reduction in social beliefs. If this is the case, what undermine the Hindu equilibrium was not the fourth parameter; social beliefs.

Figure 9.7.1: Number of married women under the age of 15 divided by total number of women under the age of 15 in percentage in India from year 1951 to 1981



Source: Demographic Yearbook, various years.

9.8 Conclusions of the analysis of hypothesis 3

After this analysis of the hypothesis: *The unequal parameters between the countries have had an impact on the economic growth in India* we can conclude that none of the variables used as proxies for social beliefs have had an impact on GDP growth rate on generally accepted significance levels. Therefore the third hypothesis does not hold. However five of the six variables used as proxies suggest that the parameter, social attitudes and beliefs, has decreased but we would not go as far as claiming that it has disappeared.

10. Conclusions

The first three of Lal's parameters, uncertain labor supply, political instability and climatic uncertainty have decreased with respect to the quantifications that have been done during the analysis. These parameters can all have had a positive impact on GDP growth rate in India but not significantly higher than in Pakistan since we have drawn the conclusion in the analysis of the first hypothesis that the circumstances for these parameters are equal. The fourth parameter concerning social attitudes and beliefs has shown to be unequal between India and Pakistan. The variables used as proxies for this parameter have given different results. All of the proxies except for sex ratio have indicated a decrease in the parameter but we have been unable to argue that it

has disappeared. We cannot find any support that the potential decrease of the fourth parameter has had an impact on GDP growth rate in India.

In light of the quantifications that have been done for the comparison of the circumstances in India and Pakistan, the quality of the data that has been used and how the proxies has been determined; it is difficult to find evidence that the increase in GDP growth rate in India has been due to the decrease of Deepak Lal's underlying parameters. Instead the process of reforms in 1991 has shown evidence of having an impact on GDP growth rate in India. It seems reasonable since India's GDP growth rate has been higher than Pakistan's and similar reforms have not taken place in Pakistan during the analyzed time period. We therefore conclude that the reason for an undermining of the Hindu equilibrium has its origin in the process of reforms in 1991.

11. Further research

We are most aware of that this degree project is far from perfect and to conclude with certainty whether Lal's thesis holds or not further research is required. Since our analysis indicates that it is the process of reforms in 1991 rather than a decrease in Lal's parameters that have undermined the Hindu equilibrium, a qualitative evaluation of Lal's thesis would be of interest. Quantitatively, an analysis based on additional observations (probably possible with access to Indiatat) would give more precise results to draw conclusions from. And finally, since India is a geographically and demographically large country it is reasonable to believe that the change in Lal's parameters vary on a regional level and therefore a regional based analysis would be interesting to study.

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13. Appendices

Appendix 13.1: Data used for the regressions

year	growth rate	country	railway rate	sex ratio	hindu rate	birth rate	urban rate	marriage rate	education rate
1951	2,33	i		0,947	0,8495		0,173	0,0949152	
1952	2,84	i	0,0615629						0,0773825
1953	6,09	i	-0,0336197						
1954	4,24	i	0,0548241						0,0840531
1955	2,56	i	-0,0757791						
1956	5,69	i	0,2043281						0,0922209
1957	-1,21	i	0,1199365						
1958	7,59	i	-0,0864829						0,0953244
1959	2,19	i	0,2525172						0,1002456
1960	7,08	i	0,0510442			0,399			0,1070857
1961	3,1	i	0,0608143	0,941	0,8348	0,42	0,1799	0,0505676	0,1130032
1962	2,12	i	0,0584935						0,1211521
1963	5,06	i	0,099895						0,1463887
1964	7,58	i	0,0995297						0,134386
1965	-3,65	i	0,1182375						
1966	1,02	i	0,0968169						0,1502067
1967	8,14	i	0,1036013				0,1929		
1968	2,61	i	0,0869456				0,1935		0,1632088
1969	6,52	i	-0,0835456				0,1953		0,1726866
1970	5,01	i	0,0756305				0,1976		0,1666827
1971	1,01	i	0,0683564	0,929	0,8273		0,1991	0,0336421	
1972	-0,32	i	0,0034984				0,2017		0,156957
1973	4,55	i	0,338136				0,2034		
1974	1,16	i	0,1031935				0,2059		0,1558729
1975	9,00	i	0,1802088			0,352	0,208		
1976	1,25	i					0,2102		
1977	7,47	i					0,2124		0,1591275
1978	5,5	i					0,2145		0,1610059
1979	-5,2	i					0,2167		0,1575259
1980	7,17	i					0,2189		
1981	5,97	i	0,1522746	0,933	0,8263		0,2331	0,0209655	0,1578567
1982	3,06	i	0,180073						
1983	7,68	i							
1984	4,31	i							0,1712455
1985	4,45	i					0,25		0,1754911
1986	4,33	i					0,254		0,1776316
1987	3,83	i				0,32	0,2582		
1988	10,47	i	0,1307712				0,2626		0,1827674
1989	6,7	i	0,1063693			0,313	0,2671		0,1850681
1990	5,57	i	0,1453377				0,2717		
1991	1,3	i	0,1280581	0,927	0,82	0,299	0,2572		

1992	5,12	i	0,1107505				0,2598		
1993	5,9	i					0,2627		0,1980267
1994	7,25	i					0,2638		0,2004801
1995	7,34	i	0,11926			0,283	0,2638		0,1991734
1996	7,84	i	0,0935596				0,2678		0,1999997
1997	4,76	i	0,13172				0,2699		0,1998331
1998	6,57	i	0,1989029				0,272		
1999	6,37	i		0,933	0,8062	0,252	0,2741		
2000	3,84	i					0,2763		
2001	6,14	i					0,2778		0,1971989
1951	-1,8	p	0	0	0	0	0	0	0
1952	1,72	p	0	0	0	0	0	0	0
1953	10,22	p	0	0	0	0	0	0	0
1954	2,03	p	0	0	0	0	0	0	0
1955	3,53	p	0	0	0	0	0	0	0
1956	2,98	p	0	0	0	0	0	0	0
1957	2,54	p	0	0	0	0	0	0	0
1958	5,47	p	0	0	0	0	0	0	0
1959	0,88	p	0	0	0	0	0	0	0
1960	4,89	p	0	0	0	0	0	0	0
1961	6,01	p	0	0	0	0	0	0	0
1962	7,19	p	0	0	0	0	0	0	0
1963	6,48	p	0	0	0	0	0	0	0
1964	9,38	p	0	0	0	0	0	0	0
1965	7,56	p	0	0	0	0	0	0	0
1966	3,08	p	0	0	0	0	0	0	0
1967	6,79	p	0	0	0	0	0	0	0
1968	6,49	p	0	0	0	0	0	0	0
1969	9,79	p	0	0	0	0	0	0	0
1970	1,23	p	0	0	0	0	0	0	0
1971	2,32	p	0	0	0	0	0	0	0
1972	6,8	p	0	0	0	0	0	0	0
1973	7,45	p	0	0	0	0	0	0	0
1974	3,88	p	0	0	0	0	0	0	0
1975	3,25	p	0	0	0	0	0	0	0
1976	2,84	p	0	0	0	0	0	0	0
1977	7,73	p	0	0	0	0	0	0	0
1978	5,53	p	0	0	0	0	0	0	0
1979	7,33	p	0	0	0	0	0	0	0
1980	6,4	p	0	0	0	0	0	0	0
1981	7,56	p	0	0	0	0	0	0	0
1982	6,79	p	0	0	0	0	0	0	0
1983	3,97	p	0	0	0	0	0	0	0
1984	8,71	p	0	0	0	0	0	0	0
1985	6,36	p	0	0	0	0	0	0	0
1986	5,81	p	0	0	0	0	0	0	0

1987	6,44	p	0	0	0	0	0	0	0
1988	4,67	p	0	0	0	0	0	0	0
1989	4,44	p	0	0	0	0	0	0	0
1990	5,42	p	0	0	0	0	0	0	0
1991	7,57	p	0	0	0	0	0	0	0
1992	2,1	p	0	0	0	0	0	0	0
1993	4,37	p	0	0	0	0	0	0	0
1994	5,06	p	0	0	0	0	0	0	0
1995	6,6	p	0	0	0	0	0	0	0
1996	1,7	p	0	0	0	0	0	0	0
1997	3,49	p	0	0	0	0	0	0	0
1998	4,18	p	0	0	0	0	0	0	0
1999	3,91	p	0	0	0	0	0	0	0
2000	1,96	p	0	0	0	0	0	0	0
2001	3,11	p	0	0	0	0	0	0	0

Source: Sivasubramonian (2004); Government of Pakistan: Federal Bureau of Statistics (2010); United Nations Demographic Yearbook (various years); Stateman's Yearbook (various years).

Appendix 13,2: Do-file used for performing the regressions in STATA

```
*Opening the document with all collected data
cd "C:\Documents and Settings\Ezgi\Mina dokument\Uppsatskurs
659\Regression"
insheet using "final data.csv", delimiter (";")

*creating a dummy for the country variable
tab country, gen(i)
rename i1 country2
drop i2

*creating the eventdate
gen event=.
replace event=0 if year<=1990
replace event=1 if year>=1991

*creating the interaction term that gives us the differences-in-difference
term
generate evco=event*country2

save regression, replace

*regression 1
reg growthrate event, r

*regression 2
reg growthrate event country2 evco, r

*regression 3 with railwayrate as the social beliefs proxy nr 1
clear
use regression
*dropping missing values
drop if railwayrate==.
reg growthrate event country2 evco, r

*regression 4 with education as the socialbeliefs proxy nr 2
```

```

clear
use regression
*dropping missing values
drop if educationrate==.
reg growthrate event country2 evco educationrate, r

*regression 5 with sexratio as the socialbeliefs proxy nr 3
clear
use regression
*dropping missing values
drop if sexratio==.
reg growthrate event country2 evco sexratio, r

*regression 6 with hindurate as the socialbeliefs proxy nr 4
clear
use regression
*dropping missing values
drop if hindurate==.
reg growthrate event country2 evco hindurate, r

*regression 7 with birthrate as the socialbeliefs proxy nr 5
clear
use regression
*dropping missing values
drop if birthrate==.
reg growthrate event country2 evco birthrate, r

*regression 8 with marriagerate as the socialbeliefs proxy nr 7
clear
use regression
*dropping missing values
drop if marriagerate==.
reg growthrate event country2 evco marriagerate, r

```

Appendix 13.3: Agriculture, value added to GDP (%)

year	India	Pakistan
1962	40,07	43,33
1967	44,92	38,69
1972	40,63	34,47
1977	37,42	32,33
1982	33,17	31,56
1987	29,44	26,25
1992	28,99	26,35
1997	26,12	26,7
2002	20,87	23,35

Source: Food and Agriculture Organization of the United Nations (2010).

Appendix 13.4: Increase in economically active population

India		Pakistan	
1961-1971	-0,025109289	1961-1972	0,548382042
1971-1981	0,439048248	1972-1982	0,412462403
1981-1991	0,237435406	1982-1992	0,24287838
1991-2001	0,286273511	1992-2002	0,299767246

Source: International Labour Organization (2010b).

Appendix 13.5: Unemployed of total population in India from 1969 to 2000

Year	Unemployed (thousands)	Population (thousands)	Unemployment ratio
1969	3204000	526986000	0,61%
1970	3726000	539080000	0,69%
1971	4602000	547949809	0,84%
1972	5928000	563530000	1,05%
1973	7714000	575890000	1,34%
1974	8378000	588300000	1,42%
1975	8918000	600760000	1,48%
1976	9563000	613270000	1,56%
1977	10513000	625820000	1,68%
1978	11837000	638390000	1,85%
1979	13794000	650980000	2,12%
1980	15317000	663600000	2,31%
1981	16854000	685184692	2,46%
1982	18646000	705000000	2,64%
1983	20802000	720000000	2,89%
1984	23034000	736000000	3,13%
1985	24861000	750859000	3,31%
1986	28261000	766135000	3,69%
1987	30542000	781374000	3,91%
1988	30050000	796596000	3,77%
1989	32776000	811817000	4,04%
1990	34632000	827050000	4,19%
1991	36300000	844324222	4,30%
1992	36758000	869845000	4,23%
1993	36276000	887603000	4,09%
1994	36692000	905508000	4,05%
1995	36742000	923541000	3,98%
1996	37430000	941681000	3,97%
1997	39140000	959908000	4,08%
1998	40090000	978199000	4,10%
1999	40371000	996531000	4,05%
2000	41344000	1014877000	4,07%

Source: International Labour Organization (2010c).