Is external debt an effective way of bringing economic reforms?

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10 September 2008

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Research Paper by:

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Abstract

This paper investigates the adverse effects of external debt on economic performance. In order to cater the issue of errors in mathematical model developed to analyze the correlation, this paper deals by performing a hypothetical analysis on economic growth within a country at different levels of external debt. The analysis is done on all sectors at the same time to ensure maximum accuracy. The paper concludes that debt itself is not an effective way of helping underdeveloped countries. This study adds in finding effective means which will allow underdeveloped countries to get a foothold on the development ladder of economy.

1.   Introduction

Poverty is one of the most severe problems of the world. It is regarded as the root cause of many other major problems the world is facing e.g. crime and corruption. It is therefore the primary concern of developed countries to some how eliminate or reduce poverty to some extent to make this world a better place to live. In order to do so it is pertinent that the economy of third world countries be given economic/financial support to boost their economic growth. Foreign aid and debt is one such support given to third world countries so that they can improve the performance of their economy which will result in reduction of poverty in the same. Consensus in economics and political discussions was for a long time that this was a fair and efficient way of helping developing countries, despite early criticism that foreign aid and debt could have such adverse economic and political consequences as to negate any beneficial effects [Cline, 1995 and Cohen, 1993]. The international community continues to rely on foreign aid and debt as its primary means of advancing development in the Third World. Existing economic research nevertheless gives only limited reason to believe that these worthy goals can be reached through simply disbursing more debt to developing countries [Geske Dijkstra and Niels Hermes, 2001]. As suggested by [Maureen, 2001] external debt does not necessarily means that it will improve the economy or on the other extreme, as explained by [Rajan, Subramanian, 2005], if debt is not properly used for development, will in fact cause long term damage to the economy.

[Moss, Chiang, 2003] in their studies highlighted that the relationship between external debt and economic growth can become complicated for several reasons. First, there is a direct relation between the stock of debt and debt servicing which was also highlighted by [Clements et al, 2003].Then the large debt service requirements dry up foreign exchange and capital, because they are transferred to principal and interest payments. Which in turn reduces the budget available for development expenditures. Thirdly the debt servicing not only affects the development expenditures by the government but the private sectors investment is also impacted by it. As a result each sector in the economy faces a decline in this scenario. The private sector reluctance in case of high external debt was also highlighted by [Barro, 1990 and Kneller *et al*, 1999] in their study. They suggested that private investor are reluctant because they believe if the government raises more debt then there is a probability that it will tax away the return on their investment in order to service the debt in the future. It is also pertinent that in order to service the

debt it will increase the cost of capital to generate more revenue and meet its expense. Another important thing to mention is that when the debtor countries are unable to meet their debt service obligations promptly, the debtor countries will face bad credit status and find it difficult to borrow. As a result, debtor countries will pay high rate to obtain new credit [Agénor, 2002]. It is worth mentioning that increased precautionary savings caused by higher uncertainty about future income may further reduce growth. In the situation of high external debt the economy also benefits partially from an increase in output or exports because a fraction of the increase is used to service the debt and accrues to creditors [Savvides, 1992]. Finally to obtain more foreign exchange to meet debt obligations, many debtor countries reduce imports and trade, this causes poor trade performance [Geiger, 1990]

All the discussion above theoretically suggests that growth of economy is impacted by the level of external debt. What we have done in this paper is that we have performed a hypothetical analysis to find out the correlation between external debt and economic growth. Instead of performing analysis on the overall growth of economy, we have performed our analysis on growth of each and every sector of economy. In this way the correlation between them is better elaborated. The result of the analysis gives us basis to ascertain authenticity of all the theories previously explained. The analysis is performed on economic data of Pakistan for the period from 1990 to 2005-6. This era is highlighted with many rises and falls of Pakistan economy which gives more ground to perform the analysis and find the correlation. In the next section we have briefly discussed the economic and political happenings of this period in Pakistan so that an idea can be developed about the situation of economy in this period.

The remainder of the paper is as follows: the section 3 briefly reviews the theoretical and empirical literature on the debt growth nexus, section 4 presents the data, section 5 presents the analysis and section 6 concludes based on the results of the analysis. Appendix 'A' presents all the figures and appendix 'B' tables of dataset used and developed for the analysis.

2.   Background Facts and Figures

Pakistan economy has witnessed an economic turmoil from the time it came into being. The worst situation faced by the country was in the era of 1990 to 1999. But the reforms right after these crises are extraordinary and shows that Pakistan has fought back strongly on economic

grounds. This is the reason why we have selected the era from 1990 to 2005-6, so that we can analyze the relation with great variance in the data. All the data given here is taken from Federal Bureau of Statistics (Government of Pakistan), Finance Division (Government of Pakistan) and Federal Research Division, Library of Congress.

In 1990, elected government of Pakistan at that time inherited an economy in deep fiscal crisis. External debt and liabilities (ED&L) of the country stood at $20.56 billion. The ED&L to forex earnings ratio was 257%. The fiscal deficit was as large as 8.5 per cent of the Gross national product (GNP). In addition, the decline of remittances and widening trade deficit had worsened the balance of payments position. Pakistan approached IMF for the structural adjustment facility and accepted the target of reducing the fiscal deficit to 4.8 per cent by 1990-91. However, the deficit continued and reached a new peak of 8.7 per cent in 1990-91 despite the disbursement of $900 million by the IMF.

When Pakistan exploded the nuclear bomb in 1998, its trade and balance of payments were in disarray. Workers' remittances have stagnated around the $1 billion mark and the current account deficit was $2.5 billion. As the Western countries imposed sanctions on Pakistan and the IMF cut off its assistance, the crises in the balance of payments deepened. In 1999 ED&L increased to $38.96 billion. The percentage increase in ED&L from 1990 to 1999 was 90%. At the same time Foreign Exchange Earnings increased by just $4 billion. As a result ED&L to Forex earnings ratio increased to 335%.

The military government that seized power in 1999 tried to grapple with the worsening economic situation. U.S assistance has played a key role in moving Pakistan's economy from the brink of collapse to setting record high levels of foreign reserves and exports, dramatically lowering levels of solid debt[1]. During this reform period ED&L has decreased by $2.5 billion in 7 years. ED&L as % of GDP which was 64% in 1999 decreased to 28.3% in 2005-6. And ED&L to Forex earnings ratio which was 335% in 1999 decreased to 128% in 2005-6. The previous discussion shows that there is significant contrast in the performance of economy off these two eras which also relates to the level of external debt and liabilities.

3.   Theoretical and Empirical Literature

In order to carry out the subject study, we first established a hypothesis and then performed the hypothetical analysis to come to a conclusion. In this section we have briefed about the hypothesis and its mechanics. We also briefed about the different phenomena related to debt i.e

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[1]Us assistance after the 9/11 has come in many forms. It started with the uplifting of sanctions imposed on Pakistan in response to the nuclear blast, rescheduling of debt, provision of foreign aids, extension of foreign trade along with USA and other European countries.

debt overhanging, crowding out effect and macroeconomic uncertainty.

3.1   Hypothetical Analysis

3.1.1   Introduction

Statistics often involve a comparison of two values when one or both values are associated with some uncertainty. Statistical inference consists of two components, estimation and hypothesis testing. Estimation can be carried out on the basis of sample values from a large population. Estimation involves the use of summary statistics, including the sample mean and standard deviation. In contrast, hypothesis testing enables one to quantify the degree of uncertainty in sampling variation, which may account for the results that deviate from the hypothesized values in a particular study. The procedure that we have used is the Chi Square test of independence[2]. This test is used to find out whether two populations or variables are related or independent to each other with respect to some characteristic.

3.1.2   Procedure

A general procedure is that of calculating the probability of observing the difference between two values if they really are not different. This probability is called the P value, and this condition is called the null hypothesis (H0). On the basis of the P value and whether it is low enough, one can conclude that H0 is not true and that there really is a difference. This act of conclusion is in some ways a "leap of faith," which is why it is known as statistical significance.

There are five major steps necessary for conducting a statistical hypothesis test: (a) formulate the null (H0) and alternative (Ha) hypotheses, (b) compute the critical value for the given conditions, (c) calculate the statistics for the subject data, (d) either reject or do not reject H0 decision based on the difference between the critical value and computed value (e) interpret the results.

3.2   Debt Overhang

The term "debt overhang" indicates a situation in which a debt is so large that any earnings generated by new investment projects are entirely appropriated by existing debt holders, and hence even projects with a positive net present value cannot reduce the debt or result in the slowing of economic growth which was also highlighted by [Krugman, 1988 and Sachs, 1989]. As sovereign governments service their debt by taxing firms and households, high levels of debt

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[2]Chi square test is a nonparametric hypothesis test. Nonparametric statistical procedures test hypotheses that do not require normal distribution or variance assumptions about the populations from which the samples were drawn and are designed for ordinal or nominal data

imply an increase in the economic sector's expected future tax burden. Debt overhang characterizes a situation in which this future debt burden is perceived to be so high that it acts as a disincentive to current investment [Serven, 1996]. Investors think that the proceeds of any new project will be taxed away to service the pre-existing debt. A weaker version requires only uncertainty by investors as to whether the government will expropriate the return on their investment, or even uncertainty on the part of lenders to investors who may not be sure whether their claims will take precedence over or be superseded by the government's taxing power. Lower levels of current investment, in turn, lead to lower growth and, for a given tax rate, lower government revenues, lower ability to pay, and lower expected value of the debt. Countries that suffer from debt overhang will have no net resource flows because, by definition, any new loan that might be issued would be worth less than its nominal value, and no new creditor will be willing to lend when a loss is certain.

3.3   Crowding out effect

In economics, crowding out theoretically occurs when the government expands its borrowing to finance increased expenditure or tax reduction, crowding out private sector investment by way of higher interest rates [Chowdhury, Hansen, and Clements et al, 2003]. If increased borrowing leads to higher interest rates by creating a greater demand for money and loanable funds and hence a higher "price", the private sector, which is sensitive to interest rates will likely reduce investment due to a lower rate of return. This is the investment that is crowded out [Dornbusch, 1989]. The weakening of fixed investment and other interest-sensitive expenditure counteracts to varying extents the expansionary effect of government deficits. More importantly, a fall in fixed investment by business can hurt long-term economic growth of the supply side, i.e., the growth of potential output.

However, this crowding-out effect is moderated by the fact that government spending expands the market for private-sector products through the multiplier and thus stimulates – or "crowds in" – fixed investment (via the "accelerator effect"). This accelerator effect is most important when business suffers from unused industrial capacity, i.e., during a serious recession or a depression.

Crowding out can, in principle, be avoided if the deficit is financed by simply printing money, but this carries concerns of accelerating inflation. Crowding out of another sort may occur due to the prevalence of floating exchange rates. Government borrowing leads to higher interest rates, which attract inflows of money on the capital account from foreign financial markets into the domestic currency (i.e., into assets denominated in that currency). Under floating exchange rates, that leads to appreciation of the exchange rate and thus the "crowding out" of domestic exports

(which become more expensive to those using foreign currency). This counteracts the demand-promoting effects of government deficits.

Crowding out is most serious when an economy is already at potential output or full employment. Then the government's expansionary fiscal policy encourages increased prices, which lead to an increased demand for money. This in turn leads to higher interest rates and crowds out interest-sensitive spending. At potential output, businesses are in no need of markets, so that there is no room for an accelerator effect. More directly, if the economy stays at full employment gross domestic product, any increase in government purchases shifts resources away from the private sector. This phenomenon is sometimes called "real" crowding out.

The negative effects on long-term economic growth that occur when private fixed investment are crowded out can be moderated if the government uses its deficit to finance productive investment in education, basic research, and the like. The situation is made worse, of course, if the government wastes borrowed money.

3.5 Macroeconomic uncertainty

The poor may also be affected negatively by increased macroeconomic uncertainty and volatility due to high indebtedness [Breen, Garcia-Peñalosa, 1999]. Increased precautionary savings caused by higher uncertainty about future income may increase poverty due to reduced growth. In addition, credit market effects, i.e. higher incidence of credit rationing or increased risk premium and borrowing rates for private firms may affect negatively the poor via fallen labor demand [Agénor, 2002]. Higher levels of external debt may also increase the propensity of debt crisis [Cohen, 1997]. While a financial crisis in itself may impact negatively on the poor [Baldacci, de Mello, Inchauste, 2002], debt crisis may additionally affect the income of the poor in the longer-run via asymmetric effects, i.e. poverty is less reduced in subsequent expansions than increased during contractions. Firstly expectations may be more pessimistic during phases of crisis than optimistic in booming times. Secondly, credits may be rationed to firms due to a higher perceived risk of default in recessions. This effect may not completely offset during expansions. Thirdly, inadequate insurance and credit mechanisms for poorer households may prevent the ability to smooth consumption with possible negative effects. Finally, unskilled workers may lose their jobs first in recessions if firms "hoard" their skilled labor force due to higher turnover costs. During expansions companies may increase fixed investment if complementarity between skilled labor and physical capital is high, leading to persistent unskilled unemployment [Agénor, 2002].

4   Data

To be able to test all the propositions given above, we employ data from different sources. Our focus of study is the era of economic growth of Pakistan from 1990 to 2005-6. This era is of particular interest for economists. With great variations in the level of external debt and economic growth of the country, it gives an important basis to develop the model and perform the analysis with accuracy. All the data given here is taken from Federal Bureau of Statistics (Government of Pakistan), Finance Division (Government of Pakistan) and Federal Research Division, Library of Congress. Table 1 at appendix 'B' gives the GDP of economic sectors of Pakistan from 1990 to 2005-6. While table 2 gives the external debt and liabilities from 1990 to 2005-6 of Pakistan.

5.   The Analysis

To perform the hypothesis test we have used $\chi 2$ (Chi Square) technique. Stepwise analysis is given as follows.

5.1   State Null and Alternative Hypothesis:

In this step we made the assumption that external debt and economic growth is independent of each other. This is called null hypothesis and is stated as follow:

Ho: Economic growth of different sectors within an economy is independent of level of external debt and liabilities.

After stating the null hypothesis we state the alternative hypothesis:

Ha: Economic growth of different sectors within an economy is dependent of level of external debt and liabilities.

5.2 Determine Significance level:

We have tested our hypothesis for 95% confidence interval. For 95% confidence interval significance level is equal to 5%[3].i.e:

$$Significance\ level = \alpha = 100\% - 95\%$$

$$\alpha = 5\%$$

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[3]The test can also be conducted for significance level greater than 5% i.e α =10%, 15%. But this makes the confidence interval smaller i.e confidence interval decreases to 90% and 85% respectively.

5.3 Critical values:

The critical value is obtained through consulting the $\chi 2$ table and determining the value of $\chi 2$ against α and degree of freedom (*df*).

Where
$$df = (r\text{-}1) \; x \; (c\text{-}1)$$
$$r = no. \; of \; rows$$
$$c = no. \; of \; columns$$

For the case in hand, r is equal to 10 and c is equal to 15. Therefore:

$$df = (10\text{-}1) \; x \; (15\text{-}1)$$
$$df = 9 \; x \; 14$$
$$df = 126$$

Therefore, for our study the critical value is 158.962[4]. The critical values, acceptance region and rejection region are illustrated in figure 1 at appendix 'A'.

5.4   Compute value of $\chi 2$:

In order to perform the analysis first we have developed a table that presents GDP of all the sectors of economy at different levels of external debt and liabilities. Therefore we have taken the GDP of all the sectors in different years from table 1 and external debt and liabilities in the same year from table 2 and presented them in table 3 at appendix 'B'.

5.5   Calculate the Expected Growth:

Table 3 at appendix 'B' gives the observed GDP at different levels of external debt. For our analysis we have to calculate the expected GDP at different levels of external debt. To calculate the expected GDP of a sector at any level of external debt, we multiplied the sum of GDPs of all the sectors in a particular column with the sum of the GDPs in a particular row and divided with the total sum of GDP of all sectors. Mathematically we can represent the equation as follows:

$$E_{(i,j)} = \sum_{i=1}^{r} GDP_{(i,\,j)} X \sum_{j=1}^{c} GDP_{(i,\,j)} / \sum_{i=1}^{c} (\text{sum of } Row)$$

Or,

$$E_{(i,j)} = \sum_{i=1}^{r} GDP_{(i,\,j)} X \sum_{i=1}^{c} GDP_{(i,\,j)} / \sum_{i=1}^{r} (\text{sum of } Column)$$

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[4]Critical values can be calculated by looking at the Chi Square table or it can also be found out through scripts in which we input the variables and the script generates the distribution graph incorporating critical values. One such script can be found here: http://www.fourmilab.ch/rpkp/experiments/analysis/chiCalc.html

Where *"i"* represents the row number (economic sector) and *"j"* represents the column number (level of debt). While *"r"* represents the total number of rows and *"c"* represents the total number of columns.

For example expected GDP for major crops at EDL level of $ 22.899 billion is calculated as follows is as follows:

$$E_{(1,1)} = \sum_{i=1}^{15} GDP_{(i,10)} X \sum_{i=1}^{10} GDP_{(15,\,j)} / \sum_{i=1}^{c} (\text{sum of } Row)$$

$$E_{(1,1)} = 84.9 \; X \; 33.3/676.8 = 4.38$$

In the same way expected growth for each cell is calculated[5]. Table 4 at appendix 'B' shows the expected growth for all the sectors at every level of external debt. In each cell the top value represents the observed GDP and bottom value represents the expected GDP of the particular sector.

5.6   Calculate difference of expected and observed growth

The difference between observed and expected growth of sectors is calculated by subtracting the expected growth calculated in previous step from the observed (given) growth of the corresponding row and column. i.e:

$$Difference = d_{(i,j)} = O_{(i,j)} - E_{(i,j)}$$

For example the difference between observed and expected growth for major crops at external debt level of $ 22.899 billions is as follows:

$$d_{(1,1)} = -0.1 - 4.177$$
$$d_{(1,1)} = -4.277$$

In the same way we calculated the difference of observed and expected growth of each column. Table 5 at appendix 'B' gives the difference of growth of all columns.

5.7   Calculation of $\chi 2$

After the difference of observed and expected growth has been calculated for each cell, we now calculated the value of $\chi 2$ for each cell. $\chi 2$ is calculated by the following formula:

$$\chi 2 = \sum_{i=1,\,j=1}^{r,c} \{(O_{(i,\,j)} - E_{(i,\,j)})^2\} / E_{(i,\,j)}$$

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[5]The tables are generated through excel sheet. In the simplest way the expected GDP for first cell is calculated by multiplying the sum of first column with sum of first row and dividing with sum of all cells.

Or,

$$\chi 2 = \sum_{i=1, j=1}^{r,c} \{(d_{(i,j)})^{\wedge}2\} / E_{(i,j)}$$

Where $d_{(i,j)}$ is difference between observed and expected growth. The above formula can be further elaborate:

$$\chi 2 = \{(d_{(1,1)})^{\wedge}2\} / E_{(1,1)} + \{(d_{(2,1)})^{\wedge}2\} / E_{(2,1)} + \{(d_{(3,1)})^{\wedge}2\} / E_{(3,1)} + \dots \{(d_{(15,10)})^{\wedge}2\} / E_{(15,10)}$$

$$\chi 2 = \{(0.1\text{-}4.17)^{\wedge 2}\}/4.17 + \{(5.2\text{-}1.1)^{\wedge 2}\}/1.1 + \{(6.1\text{-}4.53)^{\wedge 2}\}/4.53 + \dots \{(5.4\text{-}9.14\}^{\wedge 2}\}/9.14$$

Table 6 at appendix 'B' shows the calculation of $\chi 2$ in the tabular form:

Value of $\chi 2$ of our hypothesis is the sum of all the cells of table 6 i.e:

$$\chi 2 = \sum_{i=1, j=1}^{r,c} \chi 2_{(i,j)} = 2981.22$$

5.8   Evaluate if $\chi 2$ lies in rejection region:

We have already calculated the critical value for 95% confidence interval and degree of freedom equal to 126. The value calculated is 158.962. The same is represented in figure 1. The region between origin and critical value is called the acceptance region. While any region beyond this limit is called the rejection region. The value of $\chi 2$ we calculated in previous step for the subject hypothesis is 2981.i.e it lays in the rejection region. The same can be seen in figure 2 at appendix 'A'.

5.9   Result of the analysis:

If the value of $\chi 2$ we have calculated lies in acceptance region then we accept the null hypothesis (H_0). But if the value of $\chi 2$ lies in rejection region then we reject the null hypothesis (H_0) and accept the alternate (Ha) hypothesis. As evident from figure 2 at appendix 'A' the value of X^2 falls in the rejection region therefore, we reject Null Hypothesis and accept the alternate hypothesis. The conclusion of the hypothesis testing can be stated as:

"At 5% significance level the given data does not provide sufficient evidence to conclude that the growth of economic sectors is independent of level of eternal debt and liabilities. In other

words with 95% confidence interval we can state that there exists a correlation between growth of economic sectors and the level of external debt and liabilities of an economy".

6. Concluding Remarks

This paper underlines the great relevance that high external debts have on economic performance. By testing the null hypothesis stating that performance of economy is independent of the level of external debt we conclude that at 5 % significance level the evidence doesn't suggest so i.e: performance of economy depends on the level of external debt. The analysis justifies the poor economic performance of Pakistan at the high level of external debt and a better economic performance at lower level of external debt. This analysis confirms to the theoretical concept of economy which suggests a strong relation between these two. Although the cause of the low growth due to the external debt may not be reflected in this paper but it underlines the great relevance that debt issues have in Low-Income countries and investigate the adverse effect that a large indebtedness has on the rate of economic growth. Hence in the light of the analysis we can say that giving debt to countries is likely to fail the target of helping the world's poorest countries to have a foothold on the development ladder. Therefore debt relief, instead, could be a way to start a new path of economic growth, because it reduce debt overhang, crowding out and uncertainty and it could also foster the development of sound institutions and the implementation of growth and market oriented policies, that are the main determinant of economic growth. In order to further proceed with the study, the analysis that we have adopted here can also be used in order to find the correlation of Socio-Economic indicators e.g. poverty, unemployment, inflation, literacy, crime etc with the growth of the economy. Having found the strong correlation of growth with external debt, we can either correlate these Socio-Economic indicators indirectly with debt or can perform the analysis directly between these indicators and debt.

References

Agénor, Pierre, 2002, Macroeconomic Adjustment and the Poor: Analytical Issues
and Cross-Country Evidence. Washington DC: The World Bank.

Agenor, Pierre, 2005, The Economics of Adjustment and Growth, Harvard University Press, Cambridge, Mass.

Aggarwal, Vinod K, 1996, Debt Games. Strategic interaction in international debt rescheduling, Cambridge University Press.

Ajayi, S. Ibi, 1996, An analysis of external debt and Capital Flight in the Heavily Indebted Poor Countries of Sub-Saharan Africa, in: Iqbal, Zubair/ Kanbur, Ravi (ed.), External finance for low income countries. Washington DC: International Monetary Fund.

Anderson, T. W., and C. Hsiao, 1981, Estimation of dynamic models with error components, Journal of American Statistical Association, Vol. 76, No. 375, pp. 598606.

Arellano, Manuel, and Stephen R. Bond, 1991, Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, Review of Economic Studies, Vol. 58, pp. 277-297.

Asiedu, Elizabeth, 2003, Debt relief and institutional reform: a focus on Heavily Indebted Poor Countries, The Quarterly Review of Economics and Finance Vo. 43, pp. 614626.

Baldacci, Emanuelle, de Mello, Luiz, Inchauste, Gabriele, 2002, Financial Crisis, Poverty, and Income Distribution, Working Paper 04/2002. Washington DC: International Monetary Fund.

Barro, R.J, 1990, Government Spending in a simple Model of Endogenous Growth, Journal of political economy, 98 (2): 103-25.

Basu, Kanshik, 1997, Analytical development economics. The less developed economy revisited, MIT Press.

Birdsall, Nancy, and Brian Deese, 2002, Beyond HIPC: Secure Sustainable Debt Relief for Poor Countries, Center for Global Development Working Paper, No. 44.

Blundell, Richard, and Stephen Bond, 1997, Initial conditions and moment restrictions in dynamic panel data models, Journal of Econometrics, Vol. 87, pp. 115-143.

Blundell, Richard, Stephen Bond, and Frank Windmeijer, 2000, Estimation in Dynamic Panel Data Models: Improving on the Performance of the Standard GMM Estimators, The Institute of Fiscal Studies Working Paper, No. 00/12.

Bond, Stephen, Anke Hoeffler, and Jonathan Temple, 2001, GMM Estimation of Empirical Growth Models, mimeo, September 2001.

Bond, Stephen, Asli Leblebicioglu, and Fabio Schiantarelli, 2004, Capital Accumulation and Growth: A New Look at the Empirical Evidence, Boston College Working Paper in Economics, No. 591.

Breen, Richard, Garcia-Peñalosa, Cecilia, 1999, Income inequality and macroeconomic volatility: an empirical investigation. European University Institute, Oxford.

Bruno, Giovanni S.F., 2004, Approximating the Bias of the LSDV Estimator for Dynamic Unbalanced Panel Data Models, Bocconi University Working Paper EEA 2004-1

Burnside, Craig and David Dollar, 2000, Aid, Policies and Growth, American Economic Review, Vol. 90, No. 4, pp. 847-68, September 2000.

Chowdhury, Abdur R., 2004, External Debt, Growth and the HIPC Initiative: Is the Country Choice Too Narrow?, chapter 8 in Debt Relief for Poor Countries, ed. by Addison, Hansen and Tarp.

Claessens, Stjin, Detragiache, Enrica, Kanbur, Ravi, Wickham, Peter, 1996, Analytical aspects of debt problems, in: Iqbal, Zubair, Kanbur, Ravi (ed.), External finance for low-income countries. Washington DC: International Monetary Fund.

Claessens, Stijn, Diwan, Ishac, 1989, Liquidity, Debt Relief, and Conditionality, in: Husain, Ishrat, Diwan, Ishac (ed.), Dealing with the Debt Crisis: 213 – 225.

Clements, Benedict, Rina Bhattacharya, and Toan Q. Nguyen, 2004, External Debt, Public Investment, and Growth in Low-Income Countries, IMF Working Paper No. 03/249.

Cline, William, 1995, International Debt Reexamined, (Washington D.C: Institute for International Economics).

Cohen, Daniel, 1993, Low Investment and Large LCD Debt in the 1980's, The American Economic Review, Vol. 83, No. 3.

Cohen, Daniel, 1997, Growth and External Debt: A New Perspective on the African and Latin American Tragedies, Centre of Economic Policy Discussion Paper, No. 1753.

Cordella, Tito, Luca A. Ricci, and Marta Ruiz-Arranz, 2005, Deconstructing HIPCs' Debt Overhang, mimeo, International Monetary Fund, April 2005.

Davidson, Russel, and James G. MacKinnon, 2004, Econometric Theory and Methods, Oxford University Press, Oxford.

Davoodi, Hamid R., Tiongson, Erwin R., Asawanuchit, Sawitree S, 2003, How useful are benefit incidence analyses of public education and health spending? Working Paper 03/227. Washington DC: International Monetary Fund.

Dornbusch, 1989, Reducing Transfers from Debtor Countries, in Dornbusch, Aternative Solutions to developing-country debt problems.

Eastwood, Robert, Lipton, Michael, 2001, Pro-poor growth and pro-growth Poverty: Meaning, Evidence, and Policy Implications, in: Asian Development Review 19(1).

Elbadawi, Ibrahim A., Benno J. Ndulu, and Njuguna Ndung'u, 1999, Debt Overhang and Economic Growth in Sub-Saharan Africa, chapter 5 in External Finance for Low-Income Countries, ed. by Iqbal, Zubair, and Ravi Kanbur (Washington D.C: IMF Institute).

Erixon, Fredrik, 2005, Aid and Development: Will it Work This Time?, International Policy Network, June 2005.

Gallup, John Luke, Radelet, Steven, Warner, Andrew, 1999, Economic Growth and the Income of the Poor, CAER II Discussion Paper 36, Harvard Institute for International Development.

Ghei, Nita, Hinkle, Lawrence E, 1999, A note on nominal devaluation, inflation, and the real exchange ratte. In: Hinkle, Lawrence E., Montiel, Peter J., Exchange rate misalignment.

Geiger, L.T, 1990, Debt and economic development in Latin America, The Journal of Developing Areas, 24, pp.181-194.

Geske Dijkstra and Niels Hermes, 2001, The uncertainty of debt service payments and economic growth of highly indebted poor countries: Is there a case for debt relief? Faculty of Public Policy, Erasmus University Rotterdam.

Grün, Carola, Klasen, Stephan, 2001, Growth, income distribution and well-being in transition countries. Economics of Transition 9/2: 359 – 394.

Gugerty, Mary Kay, Timmer, Peter C, 1999, Growth, Inequality, and Poverty Alleviation: Implications for Development Assistance, CAER II Discussion Paper 50 December 1999, Harvard Institute for International Development, Cambridge, Mass.

Gupta, Sanjeev, Benedict Clements, Emanuele Baldacci, and Carlos Mulas-Granados, 2005, Fiscal policy, expenditure composition, and growth in low-income countries, Journal of International Money and Finance, Vol. 24, pp. 441-463.

Gunning, Jan W., and Richard Mash, 1998, Fiscal Implications of Debt and Debt Relief: Issues Paper. Mimeo.

Hansen, Henrik, 2004, The Impact of External Aid and External Debt on Growth and Investment. chapter 7 in Debt Relief for Poor Countries, ed. by Addison, Hansen and Tarp.

Hoeffler, Anke E., 2002, The augmented Solow model and the African growth debate, Oxford Bulletin of Economics and Statistics, Vol. 64, No. 2, pp. 135-158.

Imbs, Jean, and Romain Ranciere, 2005, The Overhang Hangover, World Bank Policy Research Working Paper, No. 3673, August 2005.

Judson, Ruth A., and Ann L. Owen, 1999, Estimating dynamic panel data models: a guide for macroeconomists, Economic Letters, No. 65, pp. 9-15.

Kakwani, Nanak, Pernia, Ernesto M, 2000, What is Pro-poor growth?, in: Asian Development Review 18(1): 1 – 16.

Kakwani, Nanak, Son, Hyun H., Khandker, Shahidur, 2003, Poverty equivalent growth rate: with applications to Korea and Thailand.

Kiviet, Jan F., 1995, On bias, inconsistency, and efficiency of various estimators in dynamic panel data models, Journal of Econometrics, Vol. 68, pp. 53-78.

Kneller, R., Bleaney, M.F. and Gemmell, 1999, Fiscal Policy and Growth: Evidence

from OECD countries, Journal of Public Economics, 74: 171-190.

Kraay, Aart, and Vikram Nehru, 2004, When Is External Debt Sustainable? World Bank Policy Research Working Paper, No. 3200.

Krugman, Paul, 1988, Financing vs. Forgiving a Debt Overhang, Journal of Development Economics, No. 29, pp. 253-268.

Maureen Were, 2001, The Impact of External Debt on Economic Growth and Private Investments in Kenya: An Empirical Assessment, A paper to be presented at the Wider Development Conference 17-18 August 2001, Helsinki.

Morisset, Jacques, 1990, Can Debt-Reduction Restore Economic Growth in Highly Indebted Countries?, in: Revue d'économie politique, 101(4): 639 – 666.

Nikbakht, Ehsan, 1984, Foreing loans and economic performance. The experience of the less developed countries, New York.

Moss, Todd J., and Hanley S. Chiang, 2003, The Other Costs of High Debt in Poor Countries: Growth, Policy Dynamics, and Institutions, Issue Paper on Debt Sustainability, Center for Global Development, Washington DC, August 2003.

Nkurunziza, Janvier D., and Robert H. Bates, 2003, Political Institutions and Economic Growth in Africa, CSAE Working Paper, No. 2003-03.

Pattillo, Catherine, Helene Poirson, and Luca Ricci, 2002, External Debt and Growth, IMF Working Paper, No. 02/69.

Rajan, Raghuram G., and Arvind Subramanian, 2005, What Undermines Aid's Impact on Growth? IMF Working Paper WP/05/126, International Monetary Fund, Washington, DC.

Roodman, David, 2003, XTABOND2: Stata module to extend xtabond dynamic panel data estimator, Statistical Software Components S435901, Boston College Department of Economics, revised 22 Apr 2005.

Sachs, Jeffrey D., 1989, The Debt Overhang of Developing Countries. In Debt, Stabilization and Development, by Calvo, Guillermo A., Ronald Findlay, Pentti Kouri, and Jorge Braga de Macedo, (Oxford: Basil Blackwell).

Savvides, A, 1992, Investment slowdown in developing countries during the 1980s: debt overhang or foreign capital inflows, Kyklos, 45 (3), pp. 363-378.

Serieux, John E, 2001, Debt of the poorest countries: Anatomy of a crisis kept on hold, in: Canadian Journal of Development Studies 22(2): 289 – 295.

Serven, Luis, 1996, Irreversibility, Uncertainty and Private Investment: Analytical Issues and Some Lessons for Africa, The World Bank, Mimeo, December 1996.

Temple, J. R. W, 1999, The New Growth Evidence, in: Journal of Economic Literature 37: 112 – 156.
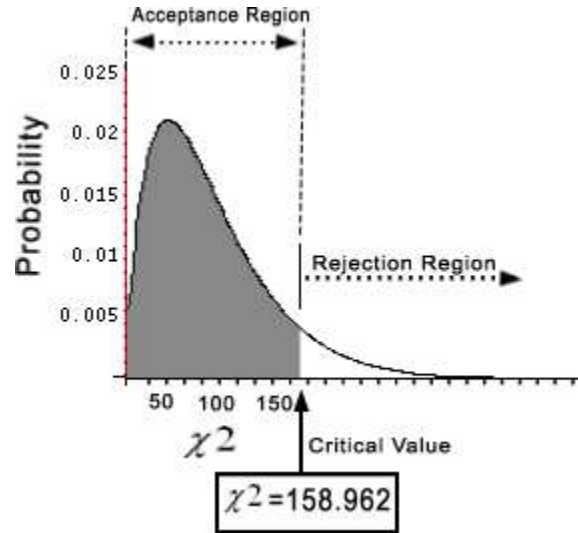
Appendix A: Figures

Figure 1: Critical Value for α=5% and DF=126

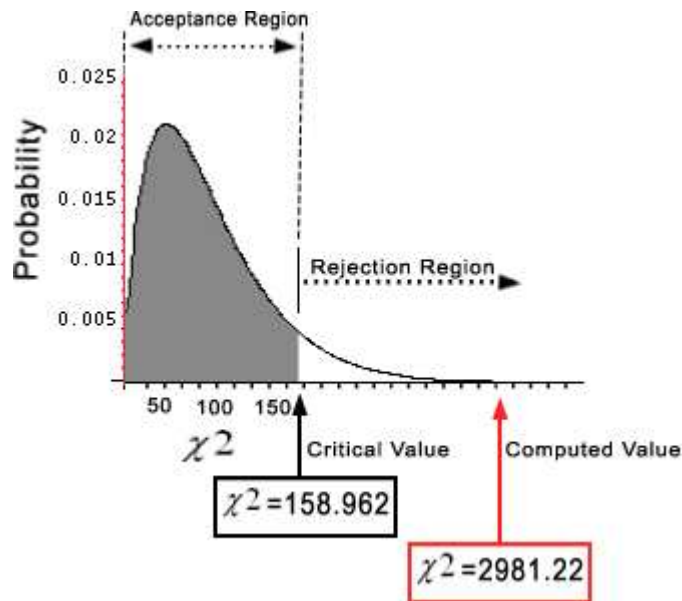Figure 2: X² Statistics for the hypothesis H₀

Appendix B: Tables

	Gross Domestic Product (GDP) (1990-2005-6)									
Year	1990	1995	1997	1999	2000	2001	2002	2003	2004	2005
Sector										
1. Agriculture										
i. Major Crops	-0.1	8.7	-4.3	0	15.4	-9.9	-2.5	6.8	1.9	17.3
ii. Minor Crops	5.2	6.9	0.9	4.2	-9.1	-3.2	-3.7	1.9	2.6	3.1
iii. Livestock	6.1	5.5	4.2	3.2	1.9	3.8	3.7	2.6	2.8	2.3
iv. Fishing	8.2	-7.3	4.8	0.6	9.7	-3	-12.3	3.4	2	2.1
v. Forestry	9.7	1.6	10.5	0	113	9.1	-4.4	11.1	-5.5	0.4
2. Industry										
i. Mining & Quarrying	4.7	-4.3	1.9	3.2	6.2	-1.7	7.3	16.1	3.8	5
ii. Manufacturing	8.4	-2.4	-0.1	4.1	1.5	9.3	4.5	6.9	14.1	12.5
iii. Construction	3.1	1	1.1	-4.9	5.2	0.5	1.6	4	-6.9	6.2
iv. Electricity and Gas Distribution	14.6	16.8	-2.9	17.4	-3	-13.7	-7	-11.7	21.1	2.1
3. Services										
i. Transport, Storage & Communication	6.5	4.1	3.8	5.1	3.6	5.3	1.2	4.3	5.5	5.6
ii. Wholesale and Retail Trade	3.5	4.6	0.7	3	1.9	4.5	2.8	6	8.1	12
iii. Finance and Insurance	0.5	6.3	11.5	18.9	-4.1	-15.1	17.2	-1.3	4.5	21.8
iv. Ownership of Dwellings	5.3	5.3	5.3	5.3	5.3	3.8	3.5	3.3	3.5	3.5
v. Public Administration & Defense	2.7	3.1	2.2	2.5	9.4	2.2	6.9	7.7	4.2	-0.8
vi. Community, S & P Services	6.5	6.5	6.5	6.5	6.5	5.6	7.9	6.2	5.2	5.4

Table 1: Real GDP of economic sectors of Pakistan from 1990 to 2005

	External Debt & Liabilities (ED&L) (1990 – 2005-6)									
Year	1990	1995	1997	1999	2000	2001	2002	2003	2004	2005
External Debt & Liabilities ($ billions)	22.9	37.2	42.4	38.9	37.9	37.1	36.5	35.5	35.2	35.8

Table 2: External Debt and Liabilities of Pakistan from 1990 to 2005

	GDP at different levels of ED&L										
Year	1990	1995	1997	1999	2000	2001	2002	2003	2004	2005	
External Debt & Liabilities($ billions)	22.9	37.2	42.4	38.9	37.9	37.1	36.5	35.5	35.2	35.8	
Sector											Total
1. Agriculture											
i. Major Crops	-0.1	8.7	-4.3	0	15.4	-9.9	-2.5	6.8	1.9	17.3	33.3
ii. Minor Crops	5.2	6.9	0.9	4.2	-9.1	-3.2	-3.7	1.9	2.6	3.1	8.8
iii. Livestock	6.1	5.5	4.2	3.2	1.9	3.8	3.7	2.6	2.8	2.3	36.1
iv. Fishing	8.2	-7.3	4.8	0.6	9.7	-3	-12.3	3.4	2	2.1	8.2
v. Forestry	9.7	1.6	10.5	0	113	9.1	-4.4	11.1	-5.5	0.4	145.5
2. Industry											
i. Mining & Quarrying	4.7	-4.3	1.9	3.2	6.2	-1.7	7.3	16.1	3.8	5	42.2
ii. Manufacturing	8.4	-2.4	-0.1	4.1	1.5	9.3	4.5	6.9	14.1	12.5	58.8
iii. Construction	3.1	1	1.1	-4.9	5.2	0.5	1.6	4	-6.9	6.2	10.9
iv. Electricity and Gas Distribution	14.6	16.8	-2.9	17.4	-3	-13.7	-7	-11.7	21.1	2.1	33.7
3. Services											
i. Transport, Storage and Communication	6.5	4.1	3.8	5.1	3.6	5.3	1.2	4.3	5.5	5.6	45

	1990	1995	1997	1999	2000	2001	2002	2003	2004	2005	Total
ii. Wholesale and Retail Trade	3.5	4.6	0.7	3	1.9	4.5	2.8	6	8.1	12	47.1
iii. Finance and Insurance	0.5	6.3	11.5	18.9	-4.1	-15.1	17.2	-1.3	4.5	21.8	60.2
iv. Ownership of Dwellings	5.3	5.3	5.3	5.3	5.3	3.8	3.5	3.3	3.5	3.5	44.1
v. Public Administration & Defense	2.7	3.1	2.2	2.5	9.4	2.2	6.9	7.7	4.2	-0.8	40.1
vi. Community, S & P Services	6.5	6.5	6.5	6.5	6.5	5.6	7.9	6.2	5.2	5.4	62.8
Total	84.9	56.4	46.1	69.1	163.4	-2.5	26.7	67.3	66.9	98.5	676.8

Table 3: Real GDP of economic sectors at different level of external debt and liabilities

	Observed (Oi) & Expected (Ei) GDP									
Year	1990	1995	1997	1999	2000	2001	2002	2003	2004	2005
External Debt & Liabilities ($ billions)	22.9	37.2	42.4	38.9	37.9	37.1	36.5	35.5	35.2	35.8
Sector										
1. Agriculture										
i. Major Crops	-0.1	8.7	-4.3	0	15.4	-9.9	-2.5	6.8	1.9	17.3
	4.177	2.775	2.268	3.4	8.04	-0.123	1.314	3.311	3.292	4.846
ii. Minor Crops	5.2	6.9	0.9	4.2	-9.1	-3.2	-3.7	1.9	2.6	3.1
	1.104	0.733	0.599	0.898	2.125	-0.033	0.347	0.875	0.87	1.281
iii. Livestock	6.1	5.5	4.2	3.2	1.9	3.8	3.7	2.6	2.8	2.3
	4.529	3.008	2.459	3.686	8.716	-0.133	1.424	3.59	3.568	5.254
iv. Fishing	8.2	-7.3	4.8	0.6	9.7	-3	-12.3	3.4	2	2.1
	1.029	0.683	0.559	0.837	1.98	-0.03	0.323	0.815	0.811	1.193
v. Forestry	9.7	1.6	10.5	0	113	9.1	-4.4	11.1	-5.5	0.4
v. Forestry	18.25	12.13	9.911	14.86	35.13	-0.537	5.74	14.47	14.38	21.18
2. Industry										
i. Mining & Quarrying	4.7	-4.3	1.9	3.2	6.2	-1.7	7.3	16.1	3.8	5
	5.294	3.517	2.874	4.309	10.19	-0.156	1.665	4.196	4.171	6.142
ii. Manufacturing	8.4	-2.4	-0.1	4.1	1.5	9.3	4.5	6.9	14.1	12.5
	7.376	4.9	4.005	6.003	14.2	-0.217	2.32	5.847	5.812	8.558
iii. Construction	3.1	1	1.1	-4.9	5.2	0.5	1.6	4	-6.9	6.2
	1.367	0.908	0.742	1.113	2.632	-0.04	0.43	1.084	1.077	1.586
iv. Electricity and Gas Distribution	14.6	16.8	-2.9	17.4	-3	-13.7	-7	-11.7	21.1	2.1
	4.227	2.808	2.295	3.441	8.136	-0.124	1.329	3.351	3.331	4.905
3. Services										
i. Transport, Storage and Communication	6.5	4.1	3.8	5.1	3.6	5.3	1.2	4.3	5.5	5.6
	5.645	3.75	3.065	4.594	10.86	-0.166	1.775	4.475	4.448	6.549
ii. Wholesale and Retail Trade	3.5	4.6	0.7	3	1.9	4.5	2.8	6	8.1	12
	5.908	3.925	3.208	4.809	11.37	-0.174	1.858	4.684	4.656	6.855
iii. Finance and Insurance	0.5	6.3	11.5	18.9	-4.1	-15.1	17.2	-1.3	4.5	21.8
	7.552	5.017	4.101	6.146	14.53	-0.222	2.375	5.986	5.951	8.761
iv. Ownership of Dwellings	5.3	5.3	5.3	5.3	5.3	3.8	3.5	3.3	3.5	3.5
	5.532	3.675	3.004	4.503	10.65	-0.163	1.74	4.385	4.359	6.418
v. Public Administration & Defense	2.7	3.1	2.2	2.5	9.4	2.2	6.9	7.7	4.2	-0.8
	5.03	3.342	2.731	4.094	9.681	-0.148	1.582	3.987	3.964	5.836
vi. Community, S & P Services	6.5	6.5	6.5	6.5	6.5	5.6	7.9	6.2	5.2	5.4
	7.878	5.233	4.278	6.412	15.16	-0.232	2.477	6.245	6.208	9.14
Total	84.9	56.4	46.1	69.1	163.4	-2.5	26.7	67.3	66.9	98.5

Table 4: Observed & Expected GDP at different levels of external debt

	Difference of Observed & Expected GDP $d = O_i - E_i$									
Year	1990	1995	1997	1999	2000	2001	2002	2003	2004	2005
External Debt & Liabilities ($ billions)	22.9	37.2	42.4	38.9	37.9	37.1	36.5	35.5	35.2	35.8
Sector										
1. Agriculture										
i. Major Crops	-4.277	5.925	-6.568	-3.4	7.36	-9.777	-3.814	3.489	-1.392	12.45
ii. Minor Crops	4.096	6.167	0.301	3.302	-11.22	-3.167	-4.047	1.025	1.73	1.819
iii. Livestock	1.571	2.492	1.741	-0.486	-6.816	3.933	2.276	-0.99	-0.768	-2.954
iv. Fishing	7.171	-7.983	4.241	-0.237	7.72	-2.97	-12.62	2.585	1.189	0.907
v. Forestry	-8.552	-10.53	0.589	-14.86	77.87	9.637	-10.14	-3.368	-19.88	-20.78
2. Industry										
i. Mining & Quarrying	-0.594	-7.817	-0.974	-1.109	-3.988	-1.544	5.635	11.9	-0.371	-1.142
ii. Manufacturing	1.024	-7.3	-4.105	-1.903	-12.7	9.517	2.18	1.053	8.288	3.942
iii. Construction	1.733	0.092	0.358	-6.013	2.568	0.54	1.17	2.916	-7.977	4.614
iv. Electricity and Gas Distribution	10.37	13.99	-5.195	13.96	-11.14	-13.58	-8.329	-15.05	17.77	-2.805
3. Services										
i. Transport, Storage and Communication	0.855	0.35	0.735	0.506	-7.264	5.466	-0.575	-0.175	1.052	-0.949
ii. Wholesale and Retail Trade	-2.408	0.675	-2.508	-1.809	-9.471	4.674	0.942	1.316	3.444	5.145
iii. Finance and Insurance	-7.052	1.283	7.399	12.75	-18.63	-14.88	14.83	-7.286	-1.451	13.04
iv. Ownership of Dwellings	-0.232	1.625	2.296	0.797	-5.347	3.963	1.76	-1.085	-0.859	-2.918
v. Public Administration & Defense	-2.33	-0.242	-0.531	-1.594	-0.281	2.348	5.318	3.713	0.236	-6.636
vi. Community, S & P Services	-1.378	1.267	2.222	0.088	-8.662	5.832	5.423	-0.045	-1.008	-3.74

Table 5: Differences of Observed & Expected growth of economic sectors

	Independent values of $\chi 2$ for all sectors									
Year	1990	1995	1997	1999	2000	2001	2002	2003	2004	2005
External Debt & Liabilities ($ billions)	22.9	37.2	42.4	38.9	37.9	37.1	36.5	35.5	35.2	35,834
Sector										
1. Agriculture										
i. Major Crops	4.38	12.65	19.02	3.40	6.74	-777.12	11.07	3.68	0.59	32.00
ii. Minor Crops	15.20	51.86	0.15	12.13	59.30	-308.65	47.18	1.20	3.44	2.58
iii. Livestock	0.55	2.06	1.23	0.06	5.33	-116.02	3.64	0.27	0.17	1.66
iv. Fishing	50.00	93.27	32.21	0.07	30.11	-291.16	492.60	8.19	1.75	0.69
v. Forestry	4.01	9.14	0.04	14.86	172.63	-172.82	17.91	0.78	27.49	20.38
2. Industry										
i. Mining & Quarrying	0.07	17.37	0.33	0.29	1.56	-15.30	19.07	33.77	0.03	0.21
ii. Manufacturing	0.14	10.88	4.21	0.60	11.35	-417.02	2.05	0.19	11.82	1.82
iii. Construction	2.20	0.01	0.17	32.49	2.51	-7.25	3.18	7.85	59.07	13.42
iv. Electricity and Gas Distribution	25.45	69.71	11.76	56.63	15.24	-1480.48	52.19	67.60	94.78	1.60
3. Services										
i. Transport, Storage and Communication	0.13	0.03	0.18	0.06	4.86	-179.76	0.19	0.01	0.25	0.14
ii. Wholesale and Retail Trade	0.98	0.12	1.96	0.68	7.89	-125.57	0.48	0.37	2.55	3.86
iii. Finance and Insurance	6.58	0.33	13.35	26.46	23.89	-995.39	92.54	8.87	0.35	19.40
iv. Ownership of Dwellings	0.01	0.72	1.76	0.14	2.69	-96.41	1.78	0.27	0.17	1.33
v. Public Administration & Defense	1.08	0.02	0.10	0.62	0.01	-37.22	17.88	3.46	0.01	7.55
vi. Community, S & P Services	0.24	0.31	1.15	0.00	4.95	-146.62	11.87	0.00	0.16	1.53

Table 6: Values of $\chi 2$ calculated for all economic sectors