GLOBALISATION, INSTABILITY AND ECONOMIC INSECURITY

by

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Abstract
This paper documents and analyses the volatility of economic growth in rich and poor countries. It concludes that whereas volatility has declined almost universally in advanced countries, the picture is more mixed for developing countries. The paper then concentrates on the case of India, where GDP volatility has declined over the past two decades. The evidence shows that the move away from agriculture has stabilised the economy. Increased financial depth and more favourable developments in terms of trade have had a similar effect. Finally, the paper discusses the relationship between economic instability and insecurity at a general level.

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1 Introduction

This paper is concerned with variations in economic growth rather than the average rate of growth. It is a subject not often studied particularly in relation to developing countries. Compared with hundreds of studies on the level of economic growth, there are very few studies at all on instability of economic growth in poor countries.

The present paper hopes to fill this gap to some extent by documenting and establishing some stylised facts about economic instability in rich and poor countries alike. The specific issues discussed are: Has economic instability increased or decreased over time in the two groups of countries? Are developed countries more stable than developing countries? These questions derive their significance from four different literatures.

Firstly, there is the literature on globalisation and on the outcomes of globalisation in terms of economic growth and economic instability. One important claim of the proponents of globalisation is that globalisation would lead to faster economic growth, although it may be more unstable than before (ILO, 2004, IMF Outlook, 1999). For the 1980s and in fact up to 1995, the average growth rate of the OECD economies during the post-globalisation period appears to have been comprehensively lower than during the golden age, i.e. almost every OECD country except Turkey had lower growth in the 1980 to 1995 period than in the period 1950-1973. It was also claimed (e.g. ILO, 2004) that most developing countries had recorded both lower growth and greater volatility in the 1980s and 1990s compared with before.

In the analysis below we will find that post-globalisation period growth performances have varied a great deal. In both rich and poor countries, there are clear gainers and losers. It is not the case of comprehensive failure or comprehensive success.

The second closely related literature concerns financial globalisation. Opinion is divided on how financial globalisation affects instability in rich and poor countries. The proponents argued that by providing liquidity, financial globalisation would help smooth the consumption paths of economies subject to various internal and external shocks. The opponents led by Joseph Stiglitz (see e.g. Stiglitz, 2000 and Easterly et al., 2001) suggested that in the case of developing countries there is widespread evidence that volatility has increased without necessarily leading to faster economic growth. A theoretical basis for this observation is provided for instance by information theory, and the

argument that a financial contract is rather different from a normal contract involving commodities or goods.

The third strand of literature that is relevant is the concern with social security for the poor. Because of the fear that globalisation might lead to higher economic instability, international financial institutions (IFIs) among others have recommended that safety nets should be set up for those who are left behind by globalisation to mitigate the effects of instability. How should the governments in societies deal with the poor subject to the loss of jobs and income as a result of economic instability? What kind of insurance arrangements would be feasible and appropriate? Even if economic instability is temporary, its effects on the poor can be long lasting. We will not touch upon these questions directly in this paper, but they are worth mentioning in the broader context.

The fourth strand of literature to which the analysis of instability is related to is the whole grand question of business cycle in economic analysis. Has the business cycle become obsolete or have we learned to tame it better than before, and what are the prognoses for the future? As we shall see below, many rich countries have enjoyed unprecedented stability. One question is whether it is likely to last. This question is important as it involves the question of how the large American current account and budget deficits will be brought under control without jeopardising world economic growth.

This paper is work-in-progress rather than a completed piece of research. Apart from establishing stylised facts on economic instability we will review some of the available hypotheses for explaining these facts. We will concentrate on the Indian case, where there has been a trend increase in GDP growth over the last two decades and the standard deviation of GDP growth has also declined over this period. We will present the results of time series analysis on the determinants of volatility in India. Finally, we also look at the relationship between economic instability and insecurity at a general level. In the end, we briefly also speculate about the consequences of a U.S. hard lending on the world economy, as a result of current international monetary imbalances.

Section 2 focuses on economic instability in advanced countries. Section 3 looks at the same in developing countries. Section 4 discusses possible determinants of instability. Section 5 describes changes in volatility in India, and section 6 presents some evidence from econometric analysis on the determinants of volatility in India. Section 7 explores the relationship between volatility and insecurity at a general level and section 8 concludes.

2 Economic volatility in advanced countries

Martin and Rowthorn (2004) have recently written about the changes in economic instability in advanced countries. They look at four economic regions – the US, the Euro area, the UK and Japan, and with the use of a small macroeconomic model attempt to explain the forces behind the noticeable drop in economic volatility. The authors divide the 50 year period into four periods: 1954-1973 being the "Golden age", 1974-1983 the turbulent decade of large oil price and other shocks, 1984-1993 the decade of disinflation and 1994-2003 the benign decade of clear moderation in business cycle activity. The measure used for volatility is standard deviation.[i]

The results from this study are show below in tables 1-3. Volatility of both inflation and GDP growth volatility in the world as a whole has declined somewhat in the last two decades; in the case of real GDP growth this has occurred mainly in the period 1994-2003, and in the case of inflation in the last two decades. The volatility of both GDP growth and inflation is lower in the period 1984-2004 than in 1954-1983 in nearly all the seven advanced countries. The frequency of severe recessions (table 3) has also dropped in some of these countries, and increased only in Japan.

Table 1 Standard deviations of annual real GDP growth

GDP growth volatility %	1954-1973	1974-1983	1984-1993	1994-2003
World	4,3	5,3	4,3	3,0
United States	2,5	2,8	1,9	1,2
Germany	2,4	2	1,9	1
France	1,2	1,4	1,6	1,2
Italy	1,5	2,7	1,4	0,9
United Kingdom	1,8	2,2	2,0	0,8
Japan	2,4	1,9	2,0	1,5

Source: Martin and Rowthorn (2004)

Table 2 Standard deviations of annual GDP price inflation

Inflation volatility %	1954-1973	1974-1983	1984-1993	1994-2003
United States	1,6	1,9	0,7	0,4
Germany	1,9	1,2	1,1	0,8
France	2,5	1,2	1,6	0,6
Italy	3,0	2,4	2,2	1,2
United Kingdom	2,4	6,0	1,7	0,7
Japan	2,7	5,4	1,0	0,9

Source: Martin and Rowthorn (2004)

Table 3 Frequency of severe recessions, percentage share

	1954-1973	1974-1983	1984-1993	1994-2003
United States	10	40	10	0
Germany	5	20	10	10
France	0	10	10	0
Italy	0	10	10	0
United Kingdom	0	40	10	0
Japan	0	10	0	20

Source: Martin and Rowthorn (2004)
Number of years when GDP growth is less or equal to 0% shown as a percentage share of number of years in period

3 Economic volatility in developing countries

This section looks at economic volatility in the developing world, on which there are few studies. It presents evidence of volatility of GDP growth and inflation over the years 1960-2004, and focuses on Asia, Latin America and Africa, with a special section dedicated to India. Volatility is measured as standard deviation.[ii] Middle Eastern and transition countries are excluded due to lack of time series data. The regional figures are based on all available countries as opposed to just those shown in the tables below.

When the two years immediately following the East Asian crisis are removed (last column in table), this is no longer the case. For most Asian countries consumer price volatility is highest in the period 1972-1981 and then falls, with the exceptions of Indonesia and the Philippines.

In South Asia, GDP volatility has declined clearly in India, Pakistan and Bangladesh in the past two decades. The variance of real GDP growth for the period 1982-2004 is significantly lower than for the period 1961-1981 at the 99% level for the South Asia aggregate. Despite the East Asian financial crisis of 1997, the variance is also significantly lower for the period 1982-2004 than 1961-1981 at the 99% level for the East Asia and Pacific aggregate. However, from the individual countries, volatility has declined considerably only in China in 1982-2004 and appears to have undergone a statistically significant increase in Malaysia, Thailand the Philippines.

This evidence suggests that volatility has declined over the last two decades in South Asia and less so, but also in the East Asia region as a whole. Among the latter country group, volatility has clearly declined for China, but whether this is the case for the other countries is not clear; it is more so the case for inflation than GDP growth. There has been a statistically significant fall in inflation in most of the Asian countries shown here. Thus, the evidence does not suggest

that there would have been a marked increase in economic instability in the last two decades, when these countries were opening up their economies, and the volatility induced by the East Asian crisis appears to have been short-lived.

Table 4 Asia: Real GDP growth (%)

		1960-1971	1972-1981	1982-1991	1992-2004	1992-2004*	Ratio-test p-value
South Asia	St. Dev	2,6	3,6	1,8	1,3		0,001***
	Mean	4,0	3,6	5,2	5,7		
India	St. Dev	3,2	4,4	2,4	1,5		0,001***
	Mean	3,9	3,5	5,3	6,1		
Bangladesh	St. Dev	4,9	6,7	1,2	0,5		0,000***
	Mean	3,2	2,0	3,7	5,0		
Sri Lanka	St. Dev	1,9	2,2	1,5	2,1		0,38
	Mean	4,3	4,9	4,1	4,8		
Nepal	St. Dev	3,1	3,1	3,5	2,1		0,29
	Mean	2,2	3,1	4,6	4,3		
Pakistan	St. Dev	3,0	2,8	1,1	1,9		0,03**
	Mean	6,6	5,5	6,0	3,9		
East Asia & Pacific	St. Dev	7,4	2,0	1,5	2,5	1,7	0,000***
	Mean	4,9	6,5	7,7	7,9	8,6	
China	St. Dev	14,2	3,8	3,6	2,3	2,3	0,000***
	Mean	4,9	6,1	9,8	9,7	10,1	
Hong Kong, China	St. Dev	4,3	5,0	4,3	3,8	3,8	0,3
	Mean	5,3	4,0	3,1	3,8	3,8	
Korea, Rep.	St. Dev	3,6	3,8	1,7	4,2	2,0	0,44
	Mean	8,3	7,1	9,1	5,5	6,2	
Singapore	St. Dev	5,1	2,6	3,9	4,4	4,2	0,47
	Mean	10,1	8,7	7,1	6,3	6,9	
Thailand	St. Dev	2,0	2,6	3,2	5,4	3,2	0,000***
	Mean	7,9	7,0	8,2	4,5	5,8	
Philippines	St. Dev	1,0	1,8	5,0	2,1	1,8	0,000***
	Mean	5,0	5,7	1,4	3,7	4,1	
Malaysia	St. Dev	1,4	3,1	3,7	4,9	3,0	0,01**
	Mean	6,4	8,0	6,3	6,1	7,4	
Indonesia	St. Dev	4,1	1,2	2,6	5,6	1,6	0,11
	Mean	4,4	8,0	6,5	4,1	5,9	

* excludes years 1998 and 1999 for East Asia and Pacific countries
Data source: World Bank, World Development Indicators (WDI), September 2005, ESDS International, (MIMAS) University of Manchester. Title and ownership of the data remain with the World Bank.
Ratio test is a one-sided F-test for whether the variance is significantly different for the 1982-2004 period than for 1960-1981.
***, **, * = significant at the 99 and 95 and 90% levels respectively

Table 5 Asia: Consumer price inflation (%)

		1960-1971	1972-1981	1982-1991	1992-2004	Ratio-test p-value
India	**St. Dev**	**4,7**	**9,5**	**2,4**	**3,4**	0.000***
	Mean	6,1	9,2	9,0	7,1	
Bangladesh	**St. Dev**			**1,6**	**2,5**	
	Mean			7,2	4,7	
Sri Lanka	**St. Dev**	**2,5**	**7,5**	**5,4**	**3,2**	0,03**
	Mean	2,9	10,4	11,8	9,4	
Nepal	**St. Dev**	**7,4**	**6,2**	**4,4**	**4,2**	
	Mean	5,5	9,1	10,6	6,9	
Pakistan	**St. Dev**	**2,6**	**7,6**	**2,4**	**3,7**	0,000***
	Mean	3,6	13,1	7,0	7,5	
China	**St. Dev**			**7,8**	**8,4**	
	Mean			10,2	6,0	
Hong Kong, China	**St. Dev**			**2,9**	**5,5**	
	Mean			1,7	3,8	
Korea, Rep.	**St. Dev**	**2,2**	**7,8**	**2,7**	**1,8**	0,000***
	Mean	12,7	17,3	5,2	4,3	
Singapore	**St. Dev**	**1,1**	**7,8**	**1,7**	**1,1**	0,000***
	Mean	1,2	7,4	1,8	1,3	
Thailand	**St. Dev**	**2,5**	**6,8**	**1,8**	**2,4**	0,000***
	Mean	2,1	11,2	3,7	3,6	
Philippines	**St. Dev**	**6,2**	**8,3**	**13,4**	**2,0**	0,2
	Mean	7,1	14,1	14,2	6,3	
Malaysia	**St. Dev**	**1,6**	**4,6**	**1,8**	**1,3**	0,000***
	Mean	1,0	6,8	2,7	2,8	
Indonesia	**St. Dev**	**325,5**	**10,5**	**2,2**	**14,3**	0,000***
	Mean	191,8	18,3	8,3	12,9	

Data source: World Development Indicators, see table 4 above
Ratio test is a one-sided F-test for whether the variance is significantly different for the 1982-2004 period than for 1960-1981.
***, **, * = significant at the 99 and 95 and 90% levels respectively

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Table 6 Latin America: Real GDP growth (%)

		1960-1971	1972-1981	1982-1991	1992-2004	Ratio-test p-value
Latin America &	**St. Dev**	**1,8**	**2,2**	**2,4**	**2,2**	0,79
Caribbean	Mean	5,4	5,1	1,6	2,8	
Mexico	**St. Dev**	**2,5**	**2,2**	**3,0**	**3,5**	0,07*
	Mean	6,5	7,2	1,5	2,9	
Argentina	**St. Dev**	**5,0**	**5,1**	**6,7**	**6,7**	0,11
	Mean	4,2	1,9	0,5	2,8	
Brazil	**St. Dev**	**3,7**	**5,2**	**4,2**	**2,1**	0,07*
	Mean	6,7	6,9	2,2	2,7	
Chile	**St. Dev**	**2,9**	**6,6**	**6,4**	**3,6**	0,47
	Mean	4,6	2,7	4,3	5,5	
Colombia	**St. Dev**	**1,4**	**2,1**	**1,7**	**2,6**	0,11
	Mean	5,3	5,2	3,6	2,7	
Ecuador	**St. Dev**	**2,6**	**3,9**	**3,4**	**3,1**	0,37
	Mean	4,5	6,7	2,3	2,4	
Bolivia	**St. Dev**	**5,5**	**3,2**	**3,6**	**1,5**	0,02**
	Mean	3,0	3,5	0,7	3,3	
Peru	**St. Dev**	**2,4**	**2,9**	**8,0**	**3,9**	0,000***
	Mean	5,2	4,0	-1,0	4,0	
Paraguay	**St. Dev**	**2,2**	**2,8**	**3,4**	**2,0**	0,12
	Mean	4,4	9,2	2,2	1,8	
Uruguay	St. Dev	**2,5**	**2,7**	**6,3**	**6,1**	0,000***
	Mean	1,3	3,2	0,4	2,1	

Data source: World Development Indicators, see table 4 above

Ratio test is a one-sided F-test for whether the variance is significantly different for the 1982-2004 period than for 1960-1981.

***, **, * = significant at the 99 and 95 and 90% levels respectively

Table 7 Latin America: Consumer price inflation (%)

		1960-1971	1972-1981	1982-1991	1992-2004	Ratio-test p-value
Mexico	**St. Dev**	**1,5**	**7,7**	**39,3**	**10,5**	0,000***
	Mean	3,0	19,1	68,6	14,2	
Argentina	**St. Dev**	**8,8**	**118,2**	**1038,3**	**9,5**	0,02**
	Mean	22,7	148,6	793,7	6,6	
Brazil	**St. Dev**			**902,1**	**760,5**	
	Mean			647,0	392,0	
Chile	**St. Dev**	**11,7**	**177,5**	**5,9**	**4,4**	0,000***
	Mean	26,5	174,8	20,7	6,4	
Colombia	**St. Dev**	**8,7**	**5,5**	**4,6**	**7,6**	0,19
	Mean	11,3	23,1	24,0	15,3	
Ecuador	**St. Dev**	**1,6**	**4,3**	**18,2**	**24,4**	0,000***
	Mean	4,3	6,2	2,1	2,3	
Bolivia	**St. Dev**	**5,9**	**3,0**	**3,5**	**1,4**	0,000***
	Mean	2,7	3,3	0,5	3,2	
Peru	**St. Dev**	**4,58**	**24,7**	**2413,1**	**21,8**	0,000***
	Mean	9,1	38,8	1257,0	15,4	
Paraguay	**St. Dev**	**5,2**	**8,2**	**8,9**	**4,5**	0,48
	Mean	3,5	14,2	22,8	12,0	
Uruguay	St. Dev	**36,6**	**18,9**	**26,5**	**21,0**	0,41
	Mean	45,7	65,0	69,3	25,1	

Data source: World Development Indicators, see table 4 above
Ratio test is a one-sided F-test for whether the variance is significantly different for the 1982-2004 period than for 1960-1981.
***, **, * = significant at the 99 and 95 and 90% levels respectively

The picture for Latin America is different from that for Asia. The variance of real GDP growth for the period 1982-2004 is not significantly different than for the period 1961-1981 at the 95% level for the Latin America aggregate. This viewed together with the changes in standard deviations for individual countries suggests that GDP volatility may not have declined or changed much in Latin America over the last two decades compared with earlier years. There has been a statistically significant increase in volatility in Peru and Uruguay. The volatility of inflation is extreme at times, and significantly higher in several countries in the latter decades. Inflation volatility is clearly lower in the latter decades only in the case of Chile. There were several major crises in Latin America in the last decade, and these are evidently reflected in the inflation volatility figures.

The variance of real GDP growth for the period 1982-2004 is not significantly different than for the period 1961-1981 at the 95% level for the Sub-Saharan Africa aggregate. However, standard deviation of GDP growth does appear to

have fallen in some individual countries such as Ghana, Cote d'Ivoire, Nigeria and Botswana. It has also declined in the case of Middle East and North Africa. On the other hand, the volatility of consumer price inflation has not fallen in Africa, and in some cases there has been a statistically significant increase (Nigeria, Cameroon, Zimbabwe).

Table 8 Africa: Real GDP Growth (%)

		1960-1971	1972-1981	1982-1991	1992-2004	Ratio-test
						p-value
Middle East &	St. Dev		5,5	3,3	1,1	0,001***
North Africa	Mean		3,8	3,7	3,8	
Algeria	St. Dev	14,9	7,4	3,0	2,5	0,000***
	Mean	3,1	7,8	2,4	2,9	
Egypt	St. Dev	3,1	4,7	2,6	1,0	0,000***
	Mean	5,3	6,7	5,2	4,4	
Sub-Saharan Africa	St. Dev	1,95	1,88	1,47	1,69	0,15
	Mean	5,1	3,2	1,7	2,9	
South Africa	St. Dev	1,7	2,2	2,4	1,7	0,42
	Mean	5,8	3,5	0,9	2,5	
Cote d'Ivoire	St. Dev	5,9	6,5	2,6	3,6	0,001***
	Mean	8,9	4,9	0,4	1,5	
Ghana	St. Dev	3,5	6,0	4,9	0,6	0,02**
	Mean	3,2	-0,4	3,2	4,4	
Nigeria	St. Dev	12,0	7,7	5,7	2,6	0,000***
	Mean	5,9	2,2	3,1	3,1	
Zimbabwe	St. Dev	6,6	6,8	3,1	6,5	0,17
	Mean	6,7	3,7	3,8	-0,2	
Cameroon	St. Dev	4,6	8,5	6,4	3,3	0,04**
	Mean	2,3	8,1	1,5	2,8	
Botswana	St. Dev	6,5	5,8	4,0	1,5	0,03**
	Mean	10,2	13,6	10,8	4,9	

Data source: World Development Indicators, see table 4 above
Ratio test is a one-sided F-test for whether the variance is significantly different for the 1982-2004 period than for 1960-1981.
***, **, * = significant at the 99 and 95 and 90% levels respectively

The tables 10-12 below show the percentage of years within the specified time periods when real GDP growth has been less than 0.5%. This is used to capture frequency of recessions. This has fallen clearly in South Asia over the last two decades, but not in East Asia. On the other hand, in Latin America and Sub Saharan Africa, recessions appear to have become more frequent in the 1982-2004 period. There may be a variety of reasons, but what emerges is that globalisation has been accompanied with a varying record of economic volatility in the world as a whole.

Table 9 Africa: Consumer Price Inflation (%)

		1960-1971	1972-1981	1982-1991	1992-2004	Ratio-test p-value
Algeria	**St. Dev**	**2,8**	**4,3**	**6,2**	**12,1**	0,01**
	Mean	4,6	9,7	10,9	11,9	
Egypt	**St. Dev**	**5,0**	**4,9**	**3,4**	**4,7**	0,28
	Mean	3,2	10,2	17,9	7,1	
South Africa	**St. Dev**	**1,3**	**2,4**	**2,1**	**2,9**	0,38
	Mean	3,0	11,6	14,7	7,5	
Cote d'Ivoire	**St. Dev**	**3,9**	**6,9**	**3,4**	**7,0**	0,11
	Mean	3,5	13,3	4,5	5,6	
Ghana	**St. Dev**	**10,5**	**38,5**	**31,6**	**14,3**	0,02**
	Mean	8,4	54,2	37,1	25,6	
Nigeria	**St. Dev**	**6,6**	**9,3**	**18,0**	**22,8**	0,000***
	Mean	5,4	15,9	19,9	27,2	
Zimbabwe	**St. Dev**	**1,0**	**4,8**	**5,8**	**36,1**	0,03**
	Mean	2,1	8,6	15,0	47,1	
Cameroon	**St. Dev**	**3,6**	**3,2**	**6,5**	**10,4**	0,02**
	Mean	2,9	11,3	7,2	5,4	
Botswana	**St. Dev**		**2,3**	**1,4**	**2,9**	0,5
	Mean		2,3	1,4	2,9	

Data source: World Development Indicators, see table 4 above
Ratio test is a one-sided F-test for whether the variance is significantly different for the 1982-2004 period than for 1960-1981.
***, **, * = significant at the 99 and 95 and 90% levels respectively

Table 10 Asia: Frequency of recessions, percentage share of years

	1961-1971	1972-1981	1982-1991	1992-2004
South Asia	9	20	0	0
India	18	20	0	0
Bangladesh	27	20	0	0
Sri Lanka	0	10	0	8
Nepal	27	20	10	8
Pakistan	9	0	0	0
East Asia & Pacific	27	0	0	0
China	36	10	0	0
Hong Kong, China	0	10	10	15
Korea, Rep.	0	10	0	8
Singapore	9	0	10	15
Thailand	0	0	0	15
Philippines	0	0	30	15
Malaysia	0	0	10	15
Indonesia	9	0	0	8

Number of years when GDP growth is less than 0.5% shown as a percentage share of number of years in period

Table 11 Latin America: Frequency of recessions, percentage share of years

	1961-1971	1972-1981	1982-1991	1992-2004
Latin America & Caribbean	0	10	30	31
Mexico	0	0	30	15
Argentina	27	40	50	38
Brazil	0	10	30	15
Chile	9	30	20	8
Colombia	0	0	0	8
Ecuador	9	0	30	15
Bolivia	18	30	50	8
Peru	9	20	50	23
Paraguay	0	0	30	31
Uruguay	36	20	40	38

Number of years when GDP growth is less than 0.5% shown as a percentage share of number of years in period

Table 12 Africa: Frequency of recessions, percentage share of years

	1961-1971	1972-1981	1982-1991	1992-2004
Middle East & North Africa	0	30	20	0
Algeria	36	0	40	15
Egypt	0	0	0	0
Sub-Saharan Africa	0	0	10	15
South Africa	0	10	60	8
Cote d'Ivoire	9	10	60	54
Ghana	18	60	20	0
Nigeria	36	30	40	8
Zimbabwe	9	40	10	46
Cameroon	9	20	50	23
Botswana	0	0	0	0

Number of years when GDP growth is less than 0.5% shown as a percentage share of number of years in period

4 Explaining volatility

A few possible determinants of the changes in volatility in both advanced and industrial countries are discussed below.

Martin and Rowthorn (2004) find that the rise and fall in GDP growth over the entire period coincides with rises and falls in inflation. They attribute the decline in growth volatility from the 1970s to improved monetary policy and changes in inflation behaviour. Inflation became less persistent, less responsive to output, and less volatile, and monetary policy improved as interest rates became more responsive to changes in inflation. Improvements in monetary policy have in turn led to a decline in the volatility of economic shocks. However, they conclude that for stability to continue sound counter-inflation policies as well as absence of extreme geopolitical and natural disasters are

required, as such would induce volatility. Stock and Watson (2003) carry out a detailed study on the US and conclude that the decline in volatility is attributable to a combination of improved policy, "good luck" in productivity and commodity price shocks and other unknown forms of good luck.

In a cross-sectional analysis, Easterly et al. (2001) also find that economic volatility (captures as volatility of inflation, GDP growth, real wage, fiscal balance, private sector credit, money growth, inflation and terms of trade) is higher in non-OECD than OECD countries. Their regression results reveal that the volatility of GDP growth cannot be attributed to wage rigidities. Private capital flows or their volatility are not very relevant either, but they do find that financial depth (captured as private sector credit/GDP or stock market capitalization/GDP) reduces volatility up to a point, and economic openness tends to increase it. They also find some positive correlation between terms of trade volatility and output volatility, although this is not tested econometrically. Their analysis provides us with a set of hypotheses to be tested for the Indian case (section 6).

5 Economic volatility in India

India emerges as one of the developing countries where economic volatility has declined over the period 1980-2004. Table 13 shows standard deviations for Indian GDP growth over the last five decades. The evidence confirms that there has been a fairly considerable decline in GDP growth volatility in the period 1980-2004 compared with the period 1960-1979. The variance of real GDP growth for the period 1980-2004 is significantly lower than for the period 1951-1979 at the 99% level.

Table 13 Growth of real GDP by sector (%)

	1951-1959	1960-1969	1970-1979	1980-1989	1990-2004	Ratio	Ratio test, p-value
GDP							
St. dev.	**2,6**	**3,7**	**4,2**	**2,3**	**1,8**	**1,8**	0,001***
Mean	3,6	4,0	2,9	5,8	5,8	**0,6**	0,003***
Coeff. of var.	0,7	0,9	1,4	0,4	0,3		
Agriculture							
St. dev.	**4,6**	**7,2**	**8,1**	**6,1**	**4,7**	**1,3**	0,08*
Mean	2,7	2,5	1,3	4,4	2,7	**0,6**	0,2
Coeff. of var.	1,7	2,9	6,4	1,4	1,7		
Industry							
St. dev.	**1,4**	**3,3**	**3,7**	**2,6**	**3,5**	**0,9**	0,6
Mean	5,8	6,2	4,4	7,4	6,0	**0,8**	0,07*
Coeff. of var.	0,2	0,5	0,8	0,4	0,6		
Services							
St. dev.	**2,0**	**1,3**	**2,0**	**1,2**	**1,8**	**1,1**	0,3
Mean	4,3	5,2	4,1	6,4	7,4	**0,6**	0,000***
Coeff. of var.	0,5	0,2	0,5	0,2	0,2		
***, * significant at the 99% and 90% percent levels respectively							

Data source: Reserve Bank of India (RBI), Database on Indian Economy, 2005. Ratio = ratio between periods 1951-1979 and 1980-2004, Ratio = ratio between periods 1967-1977 and 1978-2004, Ratio test is an F/t-test for whether the variance is significantly lower or mean significantly higher between these two periods. Coeff. of var. refers to the ratio of standard deviation to the mean.

The volatility decrease is not as clear if one looks at the three components of GDP: agriculture, industry and services. Volatility in agricultural GDP has declined since the 1980s from that in 1960-1979, and the decline is significant at the 90 percent level, but no noticeable decline has occurred in the case of industry or services.

A wealth of literature tries to identify the break points in the GDP growth rate for the Indian economy. It is fairly generally agreed that the turning point in Indian growth rate occurred in the year 1980. However, some claim that there have also been other earlier or later breaks. A simple one tailed t-test for differences in means between the periods 1951-1979 and 1980-2004 reveals that there was a statistically significant increase in the growth rate for aggregate GDP (see table 13 above). There has been a statistically significant increase in the service sector and industry growth rates. The composition of GDP has changed remarkably over the time period. The share of agriculture in GDP has fallen from 58% in 1950 to 21% in 2004, and the share of services has risen from 32% to 58%.

Using sequential F-tests for statistical significance for the all years between 1951 and 2001, Wallack (2003) confirms that the aggregate annual GDP growth rate increased significantly and permanently in the year 1980. She also finds a

significant break in the GNP growth series in the year 1987. By examining the separate components of GDP, Wallack (2003) finds statistically significant additional break dates in the year 1992 for trade, transport and communication and in 1974 for finance, insurance, real estate and business. She suggests that these breaks in different sectors can be linked roughly to policy changes in the areas, such as the trade liberalisation and reforms in the telecommunications sector and growth of the IT sector in 1992, and a period of extremely low interest rates in 1974. She associates the break in the overall growth rate in 1980 to an investment boom.

Using a similar method to identify break points (Chow test), Virmani (2004) also locates the change in overall growth on the year 1980. While Wallack appears to find some evidence that there might be another break in the year 1993, Virmani finds that taking into account the 1980 break and variation in rainfall, there are no additional breaks in GDP growth. He thus concludes that the reforms of the early 1990s did not mark a beginning of a new phase – the phase that began in 1980 is still going on. Sarkar (2004) also finds no change in trend behaviour of real GDP since 1991 in comparison with the earlier period. A simple F-test of our figures in table 13 reveals that the variance of GDP growth is not statistically different in 1990-2004 from that in 1980-1989.

The evidence broadly confirms that the GDP growth rate increased in 1980, and the volatility of growth fell. The change in volatility can be seen in the figures 1 and 2. Figure 2 shows the 5-year moving average and standard deviation of the real GDP growth series. It reveals that there is a significant decline in volatility and an increase in the average growth rate in year 1980 (in the figure 2 the decline is located at year 1984 as it shows the standard deviation and mean over the past 5 years).

Figure 1 Real GDP Growth
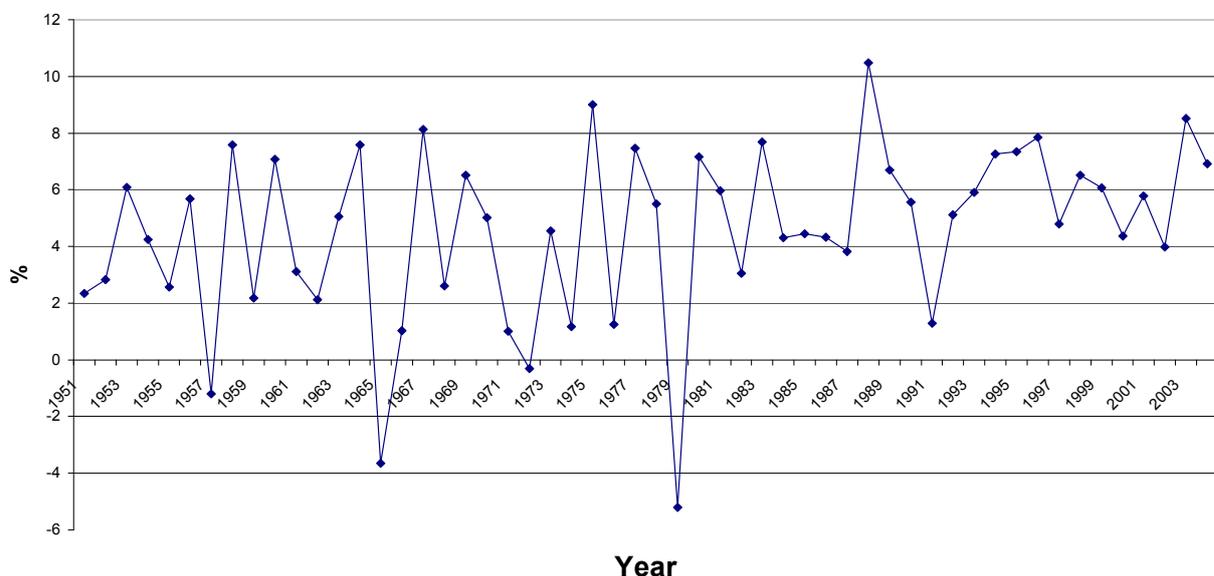
Figure 2 "Moving" 5-year real GDP growth rates
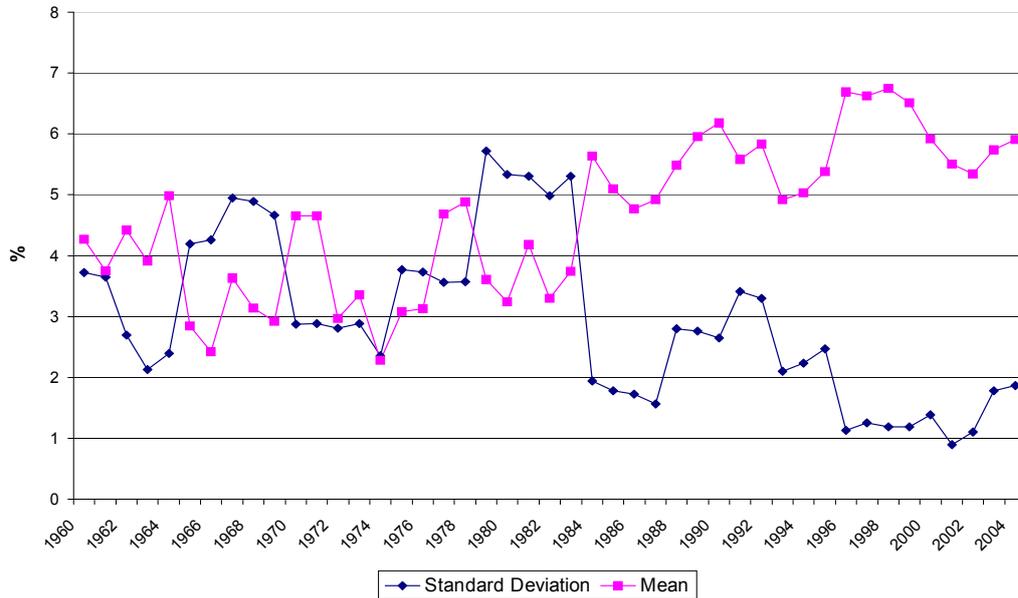
Data source: Reserve Bank of India (RBI), Database on Indian Economy, 2005

In addition to GDP volatility, the volatility of inflation has also declined overt the decades in India, as can be seen from table 14 below, which shows the standard deviation and mean of agricultural worker CPI (CPIAL). The standard deviation of CPIAL for the period 1978-2004 (5.1) is significantly lower than for the period 1967-1977 (14.1) at the 99% level. However, the difference in average inflation between the two periods is not statistically significant. Figure 3 below shows a 5-year moving average/standard deviation for inflation, and the decline in volatility can be situated approximately around the year 1977.

Table 14 Consumer Price Inflation (CPIAL, Agricultural labourer), %

	1967-1977	1978-1988	1989-1996	1997-2004	Ratio	Ratio test p-value
St. dev.	14,1	5,3	5,3	3,6	2,7	0,000***
Mean	6,3	7,5	10,0	4,3	0,9	0,6

*** significant at the 99% level

Data source: Reserve Bank of India (RBI), Database on Indian Economy. Ratio = ratio between periods 1967-1977 and 1978-2004, Ratio test is an F/t-test for whether the variance is significantly lower or mean significantly higher between these two periods.

Figure 3 "Moving" 5-year inflation rate for agricultural labourers (CPIAL), %
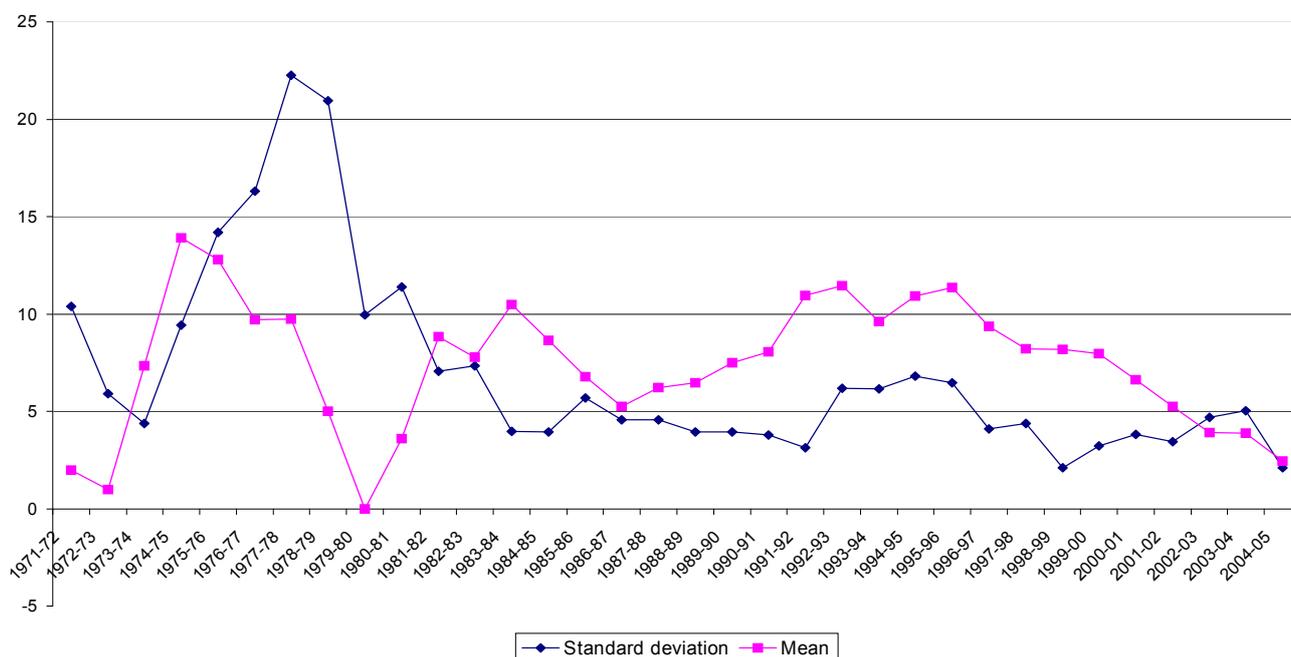
Data source: Reserve Bank of India (RBI), Database on Indian Economy, 2005

6 Explaining volatility in India

6.1 Hypotheses

There are a number of specific hypotheses concerning the reduced volatility of the Indian economy, which have important policy implications, and therefore deserve systematic examination. The econometric analysis in this section tests the following hypotheses:

- An elementary hypothesis is the change in the structure of the economy from agriculture to manufacturing and services. To what extent is the reduced volatility due to the structural changes in the economy? To capture this change, the econometric analysis uses the share of agriculture per GDP as an explanatory variable.
- The role of international private capital flows. Do such flows raise or reduce volatility?
- It has been argued by leading policy makers that the government's ability to manage the economy has improved. A strong form of this hypothesis is that there has been a trend reduction in the volatility of GDP growth because of greater knowledge of the economy by policy makers and their ability to anticipate how to cope with economic shocks. Inflation and

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budget deficit as a share of GDP are used to reflect the government's policy choices.

- Another hypothesis concerns the impact of trade openness on volatility. It is argued perhaps somewhat counter-intuitively that this should not lead to greater, but to lower volatility.
- The role of financial sector development and financial liberalisation has been emphasised by some economists as an important determinant of volatility.
- The role of shocks, such as changes in terms of trade will also be considered.
- Finally, the rate of GDP growth itself may matter for volatility. Is higher growth associated with more volatility?

To sum up, in the context of a multivariate analysis, volatility could be regarded as being influenced by openness, financial development, management by the government, shocks, and the structure of the economy. These hypotheses will be investigated in the next section by means of time series analysis. Policy implications for India on how to maintain stability or reduce volatility will be derived from the results of the analysis.

6.2 Measuring volatility

In the above analysis, volatility of GDP growth over decades is measured using the standard deviation. However, for the purposes of econometric time series analysis, an annual measure is required.

The GDP growth series was not found to adhere to an ARCH or GARCH processes, which are a few standard volatility processes. We decided to opt for a measure based on a two step forecast error of GDP growth[iii]. A similar measure to ours has been used by Servén (1998) to capture uncertainty of various variables in a study of the effects of economic uncertainty on investment in developing countries.

The precise volatility measure used in this paper is based on the recursive estimation of the following equation

(1) $y_t = \alpha + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \gamma t + \varepsilon_t$

where y_t is real GDP growth and t represents time. This was carried for all years for which GDP data was available (1950-2004), so that the sample size increases by year.[iv] The volatility measure is the three-year mean absolute value of the forecast error of equation (1). A three-year mean is used as the changes in

the forecast error itself can be judged to be artificially large, and a better fit in the regression model is found by using a mean.

However, the analysis was also repeated using a simple three-year moving standard deviation of GDP growth as an alternative volatility measure. This measure is not very different from the forecast error based one (see figure 4 below), but is not as theoretically appealing as the forecast error, the purpose of which is to reflect unexpected changes in growth, which are the essence of economic uncertainty and volatility. However, for general purposes, the standard deviation is a decent approximation. The two measures are shown together with GDP growth in figure 4 below.

Figure 4 GDP growth and alternative volatility measures
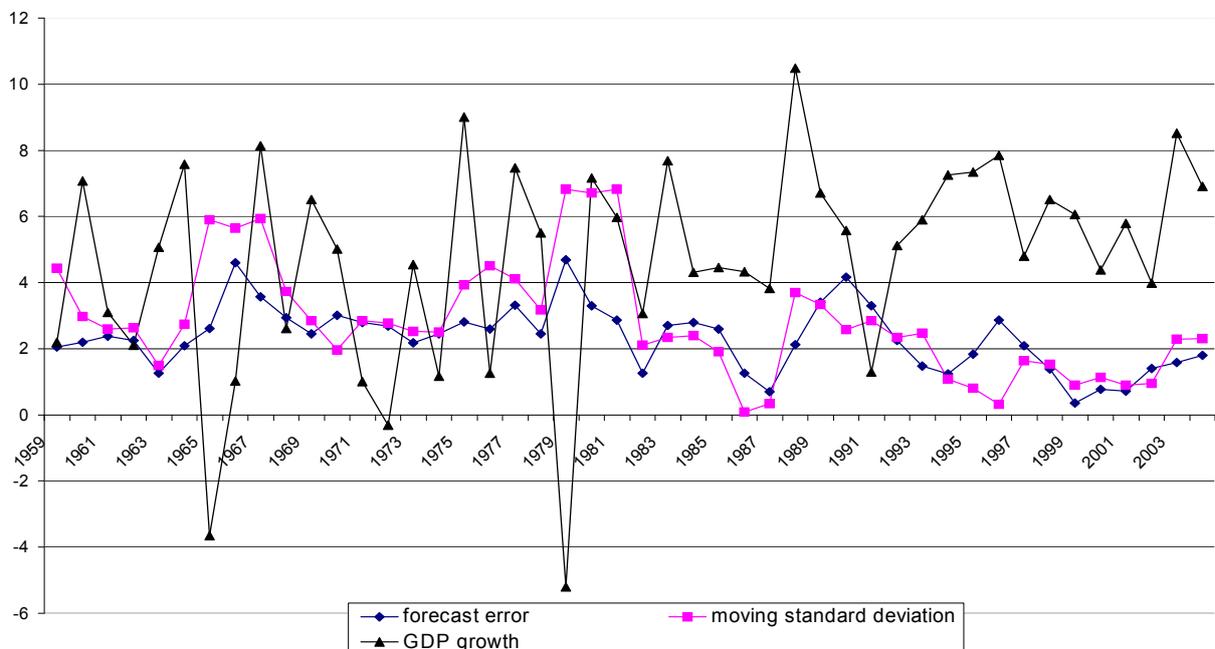
6.3 Data

The variables used to test the hypotheses presented in section 6.1 are shown in table 15 below.

Table 15 Data

VARIABLE	SOURCE
Real GDP growth (%) AGR/GDP: Share of agriculture in GDP (%) CPI: Consumer price inflation for agricultural workers (CPIAL) (%) TOT: Terms of trade, percentage change.	Reserve Bank of India (RBI), Database on Indian Economy, 2005.
FD/GDP: Gross fiscal deficit as a share of GDP (%)	Reserve Bank of India, Handbook of Statistics on Indian Economy, 2005.
Trade (Imports + Exports) as a share of GDP (%) PC/GDP: Private sector credit as a share of GDP (%) PCF/GDP: Private capital flows as a share of GDP (%)	World Development Indicators, World Bank, September 2005.

Unfortunately, due to insufficient data on some of the variables, the analysis cannot be carried out from the year 1950 onwards. The period used in the analysis is 1970-2003. Due to the shortness of the period, econometric estimation cannot be done for two separate periods.

Table 16 Results of unit root tests

	ADF	trend, lags	PP	trend, lags	order
AGR/GDP	-4.9	yes, 1	-4.9	yes, 1	I(0)
CPI	-4.7	no, 1	-4.7	yes, 1	I(0)
GDP growth	-5.3	yes, 1	-7.8	yes, 1	I(0)
FD/GDP	-1.9	yes, 1	-2	yes, 1	I(1)
PCF/GDP	-3.4	yes, 1	-3.9	yes,1	I(1)
PC/GDP	-0.8	no, 1	-0.8	no, 1	I(1)
TOT	-4.9	no, 2	-5.2	no, 2	I(0)
Trade/GDP	-1.2	no, 1	-1.2	no, 1	I(1)
VOL (Volatility)	-5.2	yes, 2	-3.7	yes, 2	I(0)

All regressions include a constant. VOL = forecast error based measure
I(0) = stationary, I(1) = unit root

Before turning to the regression analysis, unit root tests were carried out for each variable. Both the Dickey-Fuller (or augmented version, ADF) and the Phillips-Perron (PP) tests were used. The results are shown in table 15 below, which also shows the number of lags and whether a trend was included in the test regression. The Phillips-Perron test was used as it allows for milder conditions concerning the distribution of errors (Enders, 1995).

Table 16 shows FD/GDP, trade/GDP, PC/GDP and PCF/GDP are found to be non-stationary and are differenced in the regressions. Additionally, AGR/GDP, GDP growth and the volatility measure are de-trended by removing the estimated time trend. The time series regression will then include only stationary variables and looks at short-run relationships.

6.4 Results

Table 17 below shows the results of the regression analysis, where the forecast error measure is used to capture volatility of GDP growth.[v] The results in the table correspond to the preferred model to which we arrived at using general-to-specific methodology. This particular specification passes all standard diagnostic tests.

There is no direct interpretation to the volatility measure used, so it is more of interest to concentrate on the statistical significance of the variables than the size of the coefficients.

Table 17 Time series regression 1972-2003
Dependent variable: Volatility (forecast error)

Variable	Coefficient	Std. Error	t-Statistic
VOL (-1)	0.42	0.14	2.91***
AGR/GDP (-2)	0.26	0.13	1.97*
GDP growth (-1)	0.08	0.04	1.90*
TOT (-1)	-0.03	0.01	-2.93***
D (Trade/GDP)	0.10	0.09	1.08
D (PC/GDP)	-0.16	0.08	-2.12**
R^2	0.50		
Adjusted R^2	0.40		
Diagnostic tests			
Normality (Jarque-Bera): 1.11(0.57)			
White heteroskedasticity (F-test): 0.94 (0.53)			
Serial correlation (Breusch-Godfrey): 0.91 (0.42)			

***, **, * = statistically significant at the 99, 95 and 90 percent levels respectively
D = difference

The results in table 17 show that volatility is persistent as it depends positively and significantly on previous volatility. However, this may be partly because the volatility measure is constructed by averaging three consecutive forecast errors. Volatility of growth is increased by a higher degree of agriculture/GDP (with two lags). The previous section already revealed that agricultural output is more volatile than output of other sectors. The results also show that higher growth (lagged) is associated with more volatility, although the model only captures short-run relationships. In the long run, this would not hold, as the previous

section shows. However, it is important to keep in mind that the volatility measure is functionally constructed from the growth series, and thus one should be cautious in interpreting the significance of this variable.

An increase in terms of trade lowers GDP volatility as does private sector credit/GDP, an indicator of financial depth. External influences such as trade or private capital flows are statistically insignificant, and thus cannot be said to have increases economic instability. This is also the case for inflation and the budget deficit.

Although trade/GDP is not statistically significant, it is included in the final model as it produces an improvement in fit (based on R^2 and Akaike information criteria). However, it must be acknowledged that if this variable is removed, only past volatility, terms of trade and GDP growth remain statistically significant (same coefficient signs).

As mentioned above, the regression analysis was repeated using a simple three-year moving standard deviation of GDP growth as a robustness check. The results are not shown, but are discussed briefly here. Using this volatility measure produces a worse regression fit, and thus the other measure might be preferred in addition to its theoretical appeal. But, this alternative model does reveal that the results are sensitive to the specification of volatility. In this model, only terms of trade changes and perhaps surprisingly in comparison with the previous model, trade/GDP are statistically significant. The former lowers volatility, whereas the latter increases it. This suggests a stronger role for external influences as the model in table 17. The signs of coefficients are the same as in table 17. Trade/GDP was not significant in the first model, but the sign of the coefficient was the same in both models.

The result on changes in terms of trade remains robust to all model specifications, and an improvement is found to lower volatility. This is a strong result and suggests that external shocks have played a role in the volatility of growth India. For various reasons mentioned above, we can argue that the model in table 17 is the preferred model for explaining volatility. Thus we could conclude that the share of agriculture in GDP and financial depth are likely to have influenced GDP volatility in India at least to some extent. Volatility declines as the share of agriculture falls or in other words as the economy undergoes a structural change, and when financial depth increases. Openness to trade may have increased volatility, but this is not a robust result.

It would be interesting to carry out a more detailed analysis, such as testing for non-linear relationships between growth and volatility or between financial depth and volatility or private capital flows and volatility to examine. However, due to the relative shortness of time series, it was decided to limit the analysis to a very basic model.

The analysis above is only able to capture short run relationships. Future work will look at the relationships between average GDP volatility, and variables such as GDP growth, the share of agriculture in GDP and various state-specific variables at the level of separate Indian states over a long time period.

7 Insecurity and economic volatility

The purpose of this section is to assess the developments in a few indicators of security or well-being in the countries described above. Lack of time series data prohibits a more detailed analysis, so the section focuses on developments in unemployment, poverty and income inequality for the periods for which data is available. The measurement of these indicators is not without problems, and even comparability between countries can be questionable, but the purpose here is to provide a
brief overview.

Tables 18-20 below show the average total unemployment rate for different countries for the period 1980-2000.[vi] It is questionable whether unemployment is a meaningful concept in low-income countries, and data was unavailable for African countries.

Table 18 Latin America: Average unemployment rate (% of total labour force)

	1980-1984	1985-1989	1990-1994	1995-2000
Argentina	3,9	5,7	8,4	15,9
Brazil	4,0	3,2	5,5	7,9
Chile	14,0	8,1	5,2	6,5
Colombia	10,1	11,4	8,9	13,6
Mexico		2,5	3,4	3,7
Peru		6,0	8,5	7,6
Paraguay	6,3	5,5	5,3	8,2
Uruguay		9,1	8,8	10,5
Venezuela	8,5	10,1	8,6	11,9

Source: World Development Indicators, see table 4 above

Over the 1980-2000 period, the previous section revealed that economic stability had not declined, and had perhaps even increased in some Latin American countries. Unemployment rates appear to have increased in many of

the countries over this period, and have fallen only in Chile, where economic volatility has declined in the 1990s in comparison with the 1980s.

Table 19 Asia: Average unemployment rate (% of total labour force)

	1980-1984	1985-1989	1990-94	1995-2000
Bangladesh	1,8	1,2	1,9	2,5
China	3,2	2,1	2,5	3,0
Korea (Rep.)	4,4	3,2	2,5	4,0
Malaysia	5,8	7,2	3,9	2,9
Pakistan	3,7	3,3	5,0	5,8
Philippines	5,5	7,7	8,6	8,8
Singapore	2,9	4,2	2,3	3,4
Thailand	2,1	3,5	1,8	2,0

Source: World Development Indicators, see table 4 above

Table 20: Industrial countries: Average unemployment rate (% of total labour force)

	1960-1969	1970-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004
France			8,1	9,5	10,0	11,2	9,1
Germany			5,3	6,4	6,3	8,5	8,3
Italy			7,2	9,2	9,3	11,2	8,9
Japan	1,3	1,8	2,4	2,6	2,4	3,7	5,0
UK				10,2	9,8	7,2	5,1
US	4,8	6,4	8,3	6,2	6,6	4,9	4,8

Source: Organisation for Economic Development and Cooperation (OECD), Main Economic Indicators (MEI) 2005, ESDS International, (MIMAS) University of Manchester. Title and ownership of the data remain with OECD.

In Asia, the changes in unemployment rates over the last two decades vary by country, and cannot be clearly related to findings on economic volatility for these decades. In industrial countries, despite the stabilisation of the economy, with the exception of the UK, unemployment rates have not declined within 1980-2004. For the two countries with data from 1960 onwards – Japan and the US – unemployment has not fallen in the latter decade compared with the former. In Japan it has increased. Although probably imprecise, this evidence does suggest that the increase in economic stability in the industrial world may not have strengthened security, if measured as changes in unemployment.

There are other dimensions in the area of employment, relating to changes in the nature of employment contracts and impact of external pressures on wages that might provide deeper insights to changes in insecurity, but time series data is not available or easily obtained. The rest of this section examines briefly changes in income inequality and poverty.

Inequality and poverty are the other indicators we use to assess social developments. Measuring inequality is not straightforward. The most

comprehensive database on income inequality for a large number of countries, the income inequality WIID database of the World Institute for Development Economics Research (WIDER), includes a number of series per country constructed from different sources. To obtain some insights into possible changes in income inequality in some of the countries examined, this paper relies on existing work. The results for individual countries can be debated, as the evidence below does not utilise country-specific studies, but are there to provide a general picture.

Ravallion and Chen (1997) look at changes in income inequality and poverty over the time period 1981-1994 in 42 developing countries. The data is based on household surveys. They look at 64 spells for these countries, where one spell is defined as a period between two surveys conducted in a country. Even though data availability on income distribution for developing countries has improved in the time period they consider, there are still considerable deficiencies, especially in the case of Sub-Saharan Africa. For this reason spells that could be analysed for this region were identified only for four countries.

Ravallion and Chen conclude that inequality rose more often than fell only in the case of East Asia between 1981 and 1994. In Latin America it fell (10 out of 14 spells) more often than rose, and the same holds for South Asia, where inequality fell in 6 out of 10 spells. Their results suggest no clear link between inequality and economic instability in the regions examined in the previous sections. On the other hand, they find that poverty fell in 7 out of 9 spells in East Asia, where economic instability also declined. However, poverty fell in only 4 out of 10 spells in South Asia and rose in 6 out of 14 spells in Latin America and in 5 out of 7 spells in Sub-Saharan Africa.

Sala-i-Martin and Mohapatra (2002) use a more extended dataset to estimate income distributions for all G20 countries for the years 1970, 1980, 1990 and 1998. Their estimates on income distributions for these countries are used to produce table 21 below that compares changes in poverty and income distribution for the years 1970 and 1998. The table shows our interpretations of the authors' results on poverty and income inequality based on distribution graphs for each country and should be considered as approximations. If the change was not clearly significant, inequality and poverty were considered to have stayed "roughly the same".

The estimations of Sala-i-Martin and Mohapatra also show that the relationship between inequality and economic instability is ambiguous. Economic volatility was shown to have declined in China and USA, but income inequality appears to have risen in these cases. In Argentina, where economic volatility has

accelerated, both inequality and poverty appear to have increased. On the other hand, economic volatility has not changed much over the decades in South Africa, but both inequality and poverty have also risen. According to our interpretation, poverty appears to have declined everywhere except for South Africa, and Argentina (where economic stability has increased in the latter).

Table 21 Changes in inequality and poverty from 1970 to 1998

	Poverty	Inequality
Argentina	rose	rose
Brazil	fell	roughly same
Mexico	fell	fell
China	fell	rose
Korea	fell	roughly same
India	fell	roughly same
Indonesia	fell	fell
France	fell	roughly same
Germany	fell	roughly same
Italy	fell	fell
Japan	fell	fell
UK	fell	roughly same
USA	fell	rose
South Africa	rose	rose

These are authors' interpretations of the results of Sala-i-Martin and Mohapatra (2002)

The analysis reveals that the relationship between insecurity and instability is ambiguous and complex.

8 Concluding remarks on economic growth, instability and insecurity

This paper has revealed that the last two decades of increased globalisation have been met with a varying degree of economic volatility around the world. Whereas volatility has declined almost universally in the advanced countries, the picture is more mixed for developing countries. In Asia, and especially South Asia, volatility has declined, and the rate of growth has increased. However, in many Latin America countries volatility has risen, and the growth record is unimpressive. There has been little change in Africa.

Thus, concerning the link between economic growth and volatility, the evidence suggests that some volatility may always be associated with economic growth, and that we need to be cautious in making judgements about the level of volatility. The fears that globalisation would generate higher growth at the cost of economic stability, have not materialised in South Asia. On the other hand Latin America has suffered from excessive volatility accompanied with low rates of growth.

The paper also reveals that at a general level, the link between insecurity, captured by poverty, inequality and unemployment rates and volatility is unclear. It is not possible to conclude that stability would automatically generate improvements in security. In advanced countries, despite the fall in volatility, there has not been success in tackling unemployment.

The econometric evidence shows that in the case of India, short run volatility can be linked to external shocks (terms of trade), structural changes in economy, and financial depth. The move away from agriculture and an increase in financial depth are found to lower volatility. Terms of trade developments have also been more favourable, and contributed to a fall in GDO volatility.

In the end we return to the question raised in the introduction: has the business cycle been tamed, at least in the advanced countries by measures such as central bank independence? The answer to this question is likely to be negative, since there are currently huge monetary imbalances in the world economy, which can have important implications for global GDP volatility.

There is a large ongoing debate on whether these imbalances will result in a hard landing for the US economy. This question is beyond the scope of this paper, but many would agree that the possibility of a hard landing for the US cannot be ruled out. If such a hard landing were to occur, it could again have devastating consequences for the developing world, as did the hard landing of 1979-83. Even countries, such as India and China might not escape. In view of the greater financial integration that exists in the world today, a recession in advanced countries could lead to acute financial instability in developing countries, involving stock market crashes and banking crises. Although financial globalisation is by no means complete, it is more advanced than before, which poses serious hazards for developing countries.

Notes

[i] Much more sophisticated measures of volatility can be used but it turns out that simple standard deviation conveys the main stylised facts very well.

[ii] Using the coefficient of variation instead of standard deviation led to broadly similar results.

[iii] The measure based on a one step forecast error was also constructed. It did not differ remarkably from the other, but the two-step forecast error measure produced a better fit in the regression analysis.

[iv] The volatility measure is not very different if the years 1970-2004 are used instead as the sample for these regressions.

[v] The regressions are carried out with EViews software.

[vi] The data was not available in World Development Indicators for earlier years.

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