A First Cut Estimate of the Equity Risk Premium in India

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Abstract

We estimate the equity risk premium in India using data for the last 25 years. We address the shortcomings of existing indices by constructing our own total return index for the 1980s and early 1990s. We use our estimates of the extent of financial repression during this period to construct a series of the risk free rate in India going back to the early 1980s. We find that the equity risk premium is about 8¾% on a geometric mean basis and about 12½% on an arithmetic mean basis. There is no significant difference between the pre reform and post reform period: the premium has declined marginally on a geometric mean basis and has risen slightly on an arithmetic mean basis. The reason for this divergence between the sub period behaviour of the two means is the increase in the annualized standard deviation of stock market returns from less than 20% in the pre reform period to about 25% in the post reform period. The higher standard deviation depresses the geometric mean in the post reform period.

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1 Introduction

The equity risk premium is the expected excess of the aggregate return in the stock market over the risk free rate. This is a critical quantity in the Capital Asset Pricing Model which states that the excess of the expected return on any stock over the risk free rate is equal to the equity risk premium times the riskiness of the stock as measured by its beta. The equity risk premium is therefore important in asset pricing. Since the expected return on any stock also represents the cost of equity capital for the company, the equity risk premium plays an important role in corporate finance as well.

Till recently, we did not have a sufficiently long period of usable stock market history in India to estimate the equity risk premium. Now however, we have about 25 years of usable stock market history which gets us to the point where usable estimates can be constructed.

There are still two difficulties in estimating the equity risk premium in India:

1. For the 1980s and early 1990s, we do not have a comprehensive stock market index in India that reflects the total return (including dividends).

2. During the 1980s and early 1990s, interest rates in India were repressed. This makes it necessary to use some estimates of the risk free rate for the period.

This paper makes an attempt to address these two difficulties and construct a first cut estimate of the equity risk premium in India.

2   Sample Period

Because of the high volatility of the stock market, the equity risk premium can be estimated only with a very long period of data. Though the Indian capital market is the oldest in Asia with a 130 year history, more than half of this was the period when India was a British colony. Even of the post independence period, more than half was a period in which India was a highly controlled and planned economy with intense financial repression. Though it is commonly thought that economic reforms in India began in 1991, the key changes in the real economy took place around 1980. As Rodrick and Subramaniam (2004) correctly point out, it is around 1980 that India began to break out of the planned economy and move onto a higher growth path. Therefore, the stock market returns in India since around 1980 do represent the returns in the modern growth phase of the Indian economy. Thus we do have a quarter century years of usable stock market history.

The Bombay Stock Exchange has published an electronic database of stock prices in India for the period 1981-2001. From around the mid 1990s, many databases of stock prices and related information is readily available. We therefore use the period from 1981-2005 to estimate the equity risk premium in India.

3   Stock Market Index

The most popular stock market index in India (the BSE Sensex) does go back to 1979. This is a market value weighted index but has several serious problems:

1. The index was first compiled in 1986 and was calculated back to 1979 using an unchanged composition for this period. This introduces a serious self selection bias in the index returns. The index stocks were chosen in 1986 out of the the stocks with the largest market capitalization at that time. In the process of achieving this large market capitalization, these stocks would likely have produced high returns in the preceding few years. This would cause an upward bias in the index returns from 1979-1986.

2. For about a decade (till August 1996), the index underwent no significant revision. This meant that by the early 1990s, the index was increasingly unrepresentative of the Indian stock market.

3. The Sensex is a price index and not a total return index. It is only from the mid 1990s that a total return version of this index has become available. The price index clearly understates the return in the stock market. During the nine years from 1997-2005, the annual returns on the total return index has exceeded that of the price index by over 2% annually.

One could hope that the upward self selection bias of the index would tend to negate the downward bias caused by the omission of dividends during the 1980s and early 1990s. Convenient as this hypothesis would be, it would be desirable to have an independent estimate of the true total return in the Indian market during this period.

Construction of a proper stock market index going back to 1981 is a formidable task as much of the data is not available in machine readable form. It is our intention to attempt this task in due course, but this would obviously be a time consuming and difficult endeavour.

In the meantime however, we have constructed a total return index using the available machine readable data. The index that we have constructed is an equally weighted index of the most liquid stocks.

1. In each calendar year, we determine the stocks that have traded on at least 95% of the trading days of that year. These become the index stocks for the next calendar year. We use these stocks for the index next year rather than the same year to

   a) ensure that the index is actually an investible portfolio since its composition is known at the beginning of the year, and

   b) avoid a self selection bias arising from liquidity being correlated with returns.

2. We deal with corporate actions like bonus and rights by selling the stock cum benefits and buying it back next day when it goes ex benefits.

3. We use the same methodology on ex dividend dates to capture the dividends and make it a total return index.

4. Standard outlier removal methods were used to provide protection against data errors.

After its inception, the Sensex underwent its first major revision in August 1996 when half of the stocks in the index were replaced. From around this date we regard the Sensex as a reasonably representative index. Therefore, we use our equally weighted index from 1981 to 1996 and chain it into the Sensex total return index at the beginning of 1997. During the period 1981 to 1996, the annual compound return on the equally weighted index exceeds that on the Sensex price index by about 0.15%. This would imply that the omission of the dividend yield has on balance roughly compensated for the self selection bias of the index.

4 Risk free interest rate

Interest rates in India were administered till the early 1990s. Varma (2002) estimates that the repression of interest rates amounted to about 3%. There are three different methods of estimating the extent of financial repression:

1. Varma (2002) estimates financial repression by comparing the call market rate with the one year bank deposit rate pre and post deregulation. While the deposit rate exceeded the call rate by 1.5% post deregulation, it was below the call rate by 1.5% pre deregulation. This gives the estimate of 3% for the extent of financial repression. We believe that this is the best of the three different estimates of financial repression.

2. The second method is to compare the real interest rate pre and post deregulation. Prior to deregulation, the average real deposit rate is close to zero. Post

deregulation the average is above 2%. This gives 2% as an estimate of the degree for financial repression. This is a serious under estimate for several reasons. There are two structural reasons why the neutral real interest has fallen substantially. First, average inflation has fallen from about 9% in the 1980s and 1990s to 4.5% during the 2000s. The resulting decline in the inflation risk premium would lead to a fall in the equilibrium real interest rate would have declined. Second, the neutral real interest has fallen due to fact that the opening up of the economy to domestic competition and foreign trade has reduced pricing power of the producers. Apart from the structural factors, there is also a cyclical factor at work. For both domestic and global reasons, monetary policy has been highly accommodative in recent years. This means that the real interest rate has been well below the neutral rate. Our best estimate is that structural factors contribute 0.5% and the cyclical factors another 0.50% to the underestimate of the financial repression using real interest rates. Adjusted for this underestimate, therefore, this methodology also leads to an estimate similar to that obtained using the methodology of Varma (2002).

3. The third estimate is based on a comparison of Indian and US interest rates after adjusting for currency depreciation. Prior to 1991, the Indian rupee was kept at artificially high levels by stringent exchange controls. One of the first elements of economic reforms in 1991 was a steep devaluation of the currency which could be regarded as unanticipated. We therefore look at the average annual depreciation of about 8.5% of the Indian rupee against the US dollar between 1981 and 1990. This period which excludes the steep devaluation of 1991 was characterized by a more or less predictable crawling peg. It is plausible to argue that the realized currency depreciation during this period was very close to the anticipated depreciation. It would then be plausible to approximate the ex ante interest rate parity by the ex post interest rate parity. During the period under consideration the average one year constant maturity US Treasury interest rate was only 0.25% below the average one year bank deposit rate in India. This implies that the Indian deposit rate was about 8% below what is required by interest rate parity. If one adds to this a currency risk premium that would normally attach to an emerging market currency the gap becomes even larger – probably close to 10%. Only a small part

of this could plausibly be regarded as due to interest rate repression; the bulk of it would simply be a violation of interest rate parity resulting from exchange rate repression and stringent exchange controls. We believe that this method does not lead to any usable measure of financial repression.

Taking all these factors into consideration, we estimate the risk free rate in the 1980s as well as in 1991 and 1992 as three percentage points above the one year bank deposit rate. From 1995 onwards, we estimate the risk free rate as the yield on 364 day T Bills. During the transition period (1993 and 1994) we interpolate linearly between the two series.

5   Risk Premium

We now have everything that is needed to estimate the risk premium. All that is needed is to compute the average annual market return and subtract the average risk free rate from that. The average return can be computed using either geometric mean or the arithmetic mean. The geometric mean corresponds to the compound annual rate of return and used to be favoured in the past. In recent times, however, the arithmetic mean has gained ground as the favoured method (Brealey and Myers, 2003, page 156-157). The arithmetic mean depends strongly on the assumption that returns in successive years are independent while the geometric mean is more robust in the face of serial dependence.

We therefore compute the estimates of the risk premium using both these averaging methods. We also divide the sample period into the pre reform and post reform sub periods (using mid 1991 as the cut off date) and present the results for these two sub periods as well. The arithmetic mean of the market return has been obtained by computing the average daily return and annualizing this into an equivalent annual return.

Time Period	Geometric Mean			Arithmetic Mean		
	Risk Free Rate	Market Return	Risk Premium	Risk Free Rate	Market Return	Risk Premium
Pre mid 91	12.02%	20.98%	8.96%	12.02%	23.23%	11.21%
Post mid 91	9.47%	18.05%	8.58%	9.51%	22.96%	13.45%

	Geometric Mean			Arithmetic Mean		
Entire period	10.53%	19.27%	8.74%	10.56%	23.07%	12.51%

We find that the risk premium is about 8¾% on a geometric mean basis and about 12½% on an arithmetic mean basis. There is no significant difference between the pre reform and post reform period: the premium has declined marginally on a geometric mean basis and has risen slightly on an arithmetic mean basis. The reason for this divergence between the sub period behaviour of the two means is the increase in the   standard deviation of stock market returns from less than 20% annualized in the pre reform period to about 25% in the post reform period. The higher standard deviation depresses the geometric mean in the post reform period.

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