Working Paper No. 834

Does Keynesian Theory Explain Indian Government Bond Yields?*

by

Tanweer Akram†
Voya Investment Management

Anupam Das‡
Mount Royal University

March 2015

* The authors thank Sariah Seaborn, Anuranjan Sharma, and the participants of the Voya Investment Management Fixed Income Research Workshop for their valuable comments and suggestions. The authors' institutional affiliations are provided solely for the purpose of identification; the views expressed are solely those of the authors, and the standard disclaimer applies. In the interest of full disclosure, Voya IM invests in a wide range of securities, including Indian government bonds.
† Corresponding author: Tanweer Akram, Voya Investment Management, 5780 Powers Ferry Road NW, Suite 300, Atlanta, GA 30327. Phone: (770) 690-4806. Fax: (770) 690-5406. E-mail: tanweer.akram@voya.com
‡ Anupam Das, Mount Royal University, Department of Policy Studies, 4825 Mount Royal Gate, SW Calgary, Alberta T3E 6K6, Canada. Phone: (403) 440-6535. Fax: (403) 440-6815. E-mail: adas@mtroyal.ca

Levy Economics Institute
P.O. Box 5000
Annandale-on-Hudson, NY 12504-5000
http://www.levyinstitute.org

ISSN 1547-366X

Abstract

John Maynard Keynes held that the central bank's actions determine long-term interest rates through short-term interest rates and various monetary policy measures. His conjectures about the determinants of long-term interest rates were made in the context of advanced capitalist economies, and were based on his views on ontological uncertainty and the formation of investors' expectations. Are these conjectures valid in emerging markets, such as India? This paper empirically investigates the determinants of changes in Indian government bonds' nominal yields. Changes in short-term interest rates, after controlling for other crucial variables such as changes in the rates of inflation and economic activity, take a lead role in driving changes in the nominal yields of Indian government bonds. This vindicates Keynes's theories, and suggests that his views on long-term interest rates are also applicable to emerging markets. Higher fiscal deficits do not appear to raise government bond yields in India. It is further argued that Keynes's conjectures about investors' outlooks, views, and expectations are fairly robust in a world of ontological uncertainty.

Keywords: Government Bond Yields; India; Emerging Markets

JEL Classifications: E43, E50, E60, O16

SECTION I: INTRODUCTION

John Maynard Keynes maintained that the central bank's actions are the primary drivers of long-term interest rates. He argued that the central bank sets the short-term interest rates, which in turn influence long-term interest rates. Keynes held that short-term realizations drive the investor's long-term expectations because the investor tends to extrapolate the present and the past in developing his view of the long-term outlook. The investor's view of the future is based on his knowledge of current conditions rather than mathematical expectations of an ontologically uncertain future in which probabilities of unknown outcomes cannot be meaningfully assigned. Instead, Keynes observed that the investor takes his cue about long-term interest rates from current conditions and the near-term outlook. As a result, short-term interest rates and changes in short-term interest rates are respectively the crucial determinants of the long-term interest rates and the changes in the long-term interest rates.

Keynes's arguments about the main driver of long-term interest rates were developed in the context of advanced capitalist economies. This paper assesses whether Keynes's conjecture is warranted in India, an emerging market. In particular, this paper examines whether changes in short-term interest rates drive changes in Indian government bonds' nominal yields and evaluates whether Keynes's conjectures on the relationship between short-term interest rates and long-term government bonds' nominal yields hold in India. It also examines whether fiscal deficits raise long-term interest rates in India. This paper uses the two step feasible and efficient Generalized Method of Moments (GMM) technique to econometrically model the relationship between the changes of short-term and long-term interest rates. Numerous models, based on an interpretation of Keynes's view of interest rates and financial markets, are calibrated to estimate the effects of short-term interest rates on long-term government bond yields, after controlling appropriate variables, using monthly and quarterly economic and financial market data from a variety of sources.

Section II describes Keynes's view on the drivers of long-term interest rates in a world of ontological uncertainty. Section III provides a brief background on Indian government securities and the Indian government bond market. Section IV provides a simple model of long-term interest rates and changes in long-term interest rates in light of Keynes's views. Section V describes the data and the econometric method deployed here. Section VI reports the results from several calibrated models of changes in long-term Indian government bonds' (IGBs') nominal yields. Section VII concludes.

SECTION II: KEYNES'S VIEW OF THE DRIVERS OF LONG-TERM INTEREST RATES

The close relationship between short-term interest rates, which are principally driven by the central bank's monetary policy, and long-term interest rates was well understood by Keynes (1930) in his *Treatise* (Kregel 2011). Keynes held that since the central bank controls the policy rates, the primary influence of monetary policy is on short-term interest rates. However, he observed that, "experience shows that, as a rule, the influence of the short-term rate of interest on the long-term rate is much greater than anyone … would have expected. … [T]here are some sound reasons, based on the technical character of the market, why it is not unnatural that this should be so" (Keynes 1930, p.353, cited in Kregel 2011, p.3). He cited the analysis of Winfried Riefler (1930) which drew on various Federal Reserve statistical studies on the relationship between short-term interest rates and long-term interest rates in the United States and their changes between 1919 and 1938. Riefler discerned that not only are long-term interest rates influenced by short-term interest rates, but also that changes in long-term interest rates are mainly driven by changes in short-term interest rates (Kregel 2011).

Keynes (1930, pp. 357–358) claimed that it is generally profitable to borrow on a short-term basis and lend on a long-term basis when long-term interest rates are higher than short-term interest rates, as long as the value of long-term securities does not decline in the span of their tenor. He also believed that the investor is reluctant to "miss the bus." When short-term interest rates are high, short-term securities appear extremely attractive to the investor due to their safety and liquidity, but when short-term interest rates are low, the investor is willing to shift to long-term securities in order to ensure income, which causes long-term bond yields to sell off. This quest for yields and herding are crucial factors that keep long-term interest rates mostly aligned with short-term interest rates.

Keynes believed that the investor is usually affected by current conditions, which color their outlook for the future. It is short-term realizations that drive the investor's long-term expectations. Keynes (1930, pp.359–362, cited in Kregel 2011, p.4) attributed this to several factors. Firstly, he recognized that the investor is, "oversensitive … to the near future, about which we may think that we know a little" because "in truth, we know almost nothing about the more remote future." Even for the most well informed investor, "the ignorance … about the more remote future is much greater than his knowledge" about current conditions and the near future. Hence, the investor is influenced by what is, "certain, or almost for certain about the recent past and the near future" and he is, "forced to seek a clue mainly here to trends further ahead." Secondly, Keynes sensed that, "the vast majority of those who are concerned with the buying and selling of securities know almost nothing whatever about what they are doing." As a result, the investor does not have a base for "valid judgment" and thus he is prone to, "the prey of hopes and fears easily aroused by transient events and as easily dispelled." Thirdly, Keynes discerned that the investor is susceptible to "mob psychology" which implies that, "as long as a crowd can be relied on to act in a certain way, even if it be misguided, it will be to the advantage of the better-informed professional to act in the same way — a short period ahead."

Keynes develops the notion of ontological uncertainty and the influence of short-term realization on the state of long-term expectations in *The General Theory* (Kregel 2011 and Veneroso 2014). The long-term economic and investment outlook is quite uncertain and often based on limited knowledge and information, according to Keynes (2007 [1936], p.149):

> The outstanding fact is the extreme precariousness of the basis of knowledge on which our estimates of prospective yield have to be made. Our knowledge of the factors which will govern the yield of an investment some years hence is usually very slight and often negligible. If we speak frankly, we have to admit that our basis of knowledge for estimating the yield ten years hence of a railway, a copper mine, a textile factory, the goodwill of a patent medicine, an Atlantic liner, a building in the City of London amounts to little and sometimes to nothing; or even five years hence.

The ontological uncertainty that affects investors' economic and investment outlook also colors their outlook for both short-term and long-term interest rates. Keynes (2007 [1936], pp.152-153) maintained that the near-term views affect the long-term economic and investment outlooks. The investor believes the distant future will be fairly similar to current conditions and the near future. Moreover, changes in current economic and financial conditions and changes in investors' near term views affect changes in the investor's long-term outlook:

> For if there exist organized investment markets and if we can rely on the maintenance of the convention, an investor can legitimately encourage himself with the idea that the only risk he runs is that of a genuine change in the news *over the near future*, as to the likelihood of which he can attempt to form his own judgment, and which is unlikely to be very large. For, assuming that the convention holds good, it is only these changes which can affect the value of his investment, and he need not lose his sleep merely because he has not any notion what his investment will be worth ten years hence. Thus investment becomes reasonably 'safe' for the individual investor over short periods, and

> hence over a succession of short periods however many, if he can fairly rely on there being no breakdown in the convention and on his therefore having an opportunity to revise his judgment and change his investment, before there has been time for much to happen. [Keynes 2007 (1936), pp.152-153] (emphasis is in the original).

Keynes argued that investors generally tend to extrapolate current trends in developing their long-term outlook, and thus changes in their assessment of current conditions and trends lead to reassessments of the future:

> It would be foolish, in forming our expectations, to attach great weight to matters which are very uncertain. It is reasonable, therefore, to be guided to a considerable degree by the facts about which we feel somewhat confident, even though they may be less decisively relevant to the issue than other facts about which our knowledge is vague and scanty. For this reason the facts of the existing situation enter, in a sense disproportionately, into the formation of our long-term expectations; our usual practice being to take the existing situation and to project it into the future, modified only to the extent that we have more or less definite reasons for expecting a change. (Keynes 2007 [1936], p.148).

He argued that this is particularly true in liquid markets, where the investor manages other people's money:

> As a result of the gradual increase in the proportion of the equity in the community's aggregate capital investment which is owned by persons who do not manage and have no special knowledge of the circumstances, either actual or prospective, of the business in question, the element of real knowledge in the valuation of investments by those who own them or contemplate purchasing them has seriously declined. (Keynes 2007 [1936], p.153).

While Keynes's observations pertain to investors in the equity market, they are equally applicable to fixed-income investors in the market for government securities, which also tends to be deep, thick and fairly liquid.

Keynes recognized that investors are subject to waves of optimism and pessimism. Market valuation can swing markedly due to changing fashions and herd instinct among investors. Hence, animal spirits and mass psychology, fads and fashion, rather than rational calculation, often provide the basis for speculative investments:

> A conventional valuation which is established as the outcome of the mass psychology of a large number of ignorant individuals is liable to change violently as the result of a sudden fluctuation of opinion due to factors which do not really make much difference to the prospective yield; since there will be no strong roots of conviction to hold it steady. In abnormal times in particular, when the hypothesis of an indefinite continuance of the existing state of affairs is less plausible than usual even though there are no express rounds to anticipate a definite change, the market will be subject to waves of

optimistic and pessimistic sentiment, which are unreasoning and yet in a sense legitimate where no solid basis exists for a reasonable calculation. (Keynes 2007 [1936], p.154).

Keynes famously compared the financial markets to beauty contests, sponsored by English tabloids, in which the public participates to choose not the prettiest face, but rather select the one everyone else chooses as the prettiest. He wrote:

> It is not a case of choosing those [faces] that, to the best of one's judgment, are really the prettiest, nor even those that average opinion genuinely thinks the prettiest. We have reached the third degree where we devote our intelligences to anticipating what average opinion expects the average opinion to be. And there are some, I believe, who practice the fourth, fifth and higher degrees. (Keynes 2007 [1936], p. 156).

Keynes realized the weak and flimsy basis of the formation of the investor's expectations, rather than the calibration of "mathematical expectation." He makes it clear that, "by very uncertain I do not mean the same thing as 'very improbable,'" (Keynes 2007 [1936], p.148) because there is little reason at all to maintain that there is a reasonable ground for even attempting to use mathematical expectation in formulating the investor's long-term economic outlook:

> The state of long-term expectation is often steady, and, even when it is not, the other factors exert their compensating effects. We are merely reminding ourselves that human decisions affecting the future, whether personal or political or economic, cannot depend on strict mathematical expectation, since the basis for making such calculations does not exist; and that it is our innate urge to activity which makes the wheels go round, our rational selves choosing between the alternatives as best we are able, calculating where we can, but often falling back for our motive on whim or sentiment or chance. (Keynes 2007 [1936], pp.162-163).

Keynes accepted that investors often rely on tactic conventions,

> [T]hus investment becomes reasonably "safe" for the individual investor over short periods, and hence over a succession of short periods however many, if he can fairly rely on there being no breakdown in the convention and on his therefore having an opportunity to revise his judgment and change his investment, before there has been time for much to happen. Investments which are "fixed" for the community are thus made "liquid" for the individual. (Keynes 2007 [1936], p.153).

He holds that market processes and institutional forces compel the typical investor to follow the conventions of the day:

> Finally it is the long-term investor, he who most promotes the public interest, who will in practice come in for most criticism, wherever investment funds are managed by committees or boards or banks. For it is in the essence of his behavior that he should be eccentric, unconventional and rash in the eyes of average opinion. If he is successful, that will only confirm the general belief in his rashness; and if in the short run he is

> unsuccessful, which is very likely, he will not receive much mercy. Worldly wisdom teaches that it is better for reputation to fail conventionally than to succeed unconventionally. (Keynes 2007 [1936], pp.157-158).

Human nature and the quest for ensuring demonstrably solid returns and beating the benchmark every quarter more than overwhelms any attempt to consider long-term fundamentals:

> Moreover, life is not long enough; — human nature desires quick results, there is a peculiar zest in making money quickly, and remoter gains are discounted by the average man at a very high rate. The game of professional investment is intolerably boring and over-exacting to anyone who is entirely exempt from the gambling instinct; whilst he who has it must pay to this propensity the appropriate toll. Furthermore, an investor who proposes to ignore near-term market fluctuations needs greater resources for safety and must not operate on so large a scale, if at all, with borrowed money — a further reason for the higher return from the pastime to a given stock of intelligence and resources. Finally it is the long-term investor, he who most promotes the public interest, who will in practice come in for most criticism, wherever investment funds are managed by committees or boards or banks. (Keynes 2007 [1936], p.157).

Keynes's (1930, pp.235–362, and 2007 [1936], pp.147–164) view on long-term interest rates was based on: his involvement in financial matters, both as an advisor to the government and as a private investor in securities, his astute observations on contemporary financial markets and his reading of the history of financial markets and financial speculations, his view of ontological uncertainty in the real world and the limits of statistical inference about the future based on past and present observations, and his interpretation of the empirical research of Riefler (1930).

The ontological uncertainty about the future and the effect of short-term realization on long-term expectations can keep long-term interest rates largely in harmony with short-term interest rates, whereas those factors that can cause fluctuations in short-term interest rates also drive investors' long-term outlook, and thus long-term interest rates, according to Keynes (1930, pp. 352-362, cited in Kregel 2011). On similar lines, it can be argued that those factors that affect the current rate of inflation generally also color investors' long-term inflation expectations, and the drivers that shift the current rate of economic growth also impel investors' expected rate of economic growth in the future.

Keynes's view on the investor's expectations is at odds with the "Lucasian" notion of rational expectations in standard economic theory, but it is not inconsistent with Kenneth Arrow's understanding of economic rationality of actually existing agents in a complex, adaptive, and self-organizing economy. In his seminal work on social choice theory, Arrow had remarked: "The concept of rationality … is at the heart of modern economic analysis, and it cannot be denied that it has great intuitive appear; but closer analysis reveals difficulties" (Arrow 1951, p.19). In a later work he has stated that "rationality is not a property of the individual alone, although it is usually presented that way. Rather it gathers not only its force but also its very meaning from the social context in which it is embedded" (Arrow 1986, p.S385). After pointing out that "many — in fact, most — markets do not exist," Arrow (1986) holds that (1) "when a market does not exist, there is a gap in the information relevant to an individual's decision, and it must be filled by some kind of conjecture" (S393); (2) rationality assumption imposes, "extremely severe strains on information-gathering and computing abilities. Behavior of this kind is incompatible with the limits of the human being, even augmented with artificial aids" (S397); (3) the complexity of the computation requirements of the rational expectations hypothesis, "require not only extensive first-order knowledge but also common knowledge, since prediction of the future depend on other individual's prediction of the future. In addition to the information requirements, it must be observed that the computation of fixed points is intrinsically more complex than optimizing" (S394); (4) "we can have situations where social truth is essentially a matter of convention, not of underlying realities" (S396); and (5) "[n]ot only is it possible to devise complete models of the economy on hypotheses other than rationality, but in fact virtually every practical theory of macroeconomics is partly so based" (S386). In addition, he notes that "the role of speculators and the volume of resources expended on informational service seem to require a subjective belief, at least, that buying and selling are based on changes in information" (S397). Arrow (1994) clearly recognizes that, (i) "individual behavior is always mediated by social relations"; (ii) "social variables, not attached to particular individuals, are essential in studying the economy or any other social system"; and (iii) "knowledge and technical information have an irremovable social component, of increasing importance over time." These nuanced perspectives on rationality lend credence to Keynes's views of the nature of long-term expectations of the investor.

The literature on bounded rationality (Simon 1957, 1978, and 1984) and the barriers to rationality (Foley 1998), as well as the findings of behavioral economics (Schwartz 1998), imply that informational and computational capabilities and limitations determine the scope of the investor's long-term expectations. It strengthens Keynes's claims that the investor's view of the future is often based on his understanding of past and present conditions rather than mathematical expectations of an ontologically uncertain future. If the future is characterized as ontologically uncertain, then it is doubtful that probabilities could even be reasonably attributed to unknown events.

Following Keynes's insights, the relationships between short-term and long term interest rates have been studied for developed countries (see, for example, Akram and Das 2014a). It will be intriguing to examine if the same relationship holds for emerging countries. The next section presents a discussion on Indian government securities and the Indian government bond (IGB) market.

SECTION III: INDIAN GOVERNMENT SECURITIES AND THE INDIAN GOVERNMENT BOND MARKET

The Reserve Bank of India (2014) provides an overview of Indian government securities and the market for IGBs. The description of these securities and the market for IGBs given below draws on this document. The Government of India issues both short-term securities and long-term securities. It issues short-term securities in two forms: Treasury bills and cash management bills. The Treasury bills are issued in three types of tenors: 91 days, 182 days, and 364 days. These are zero coupon securities that do not pay interest. However, they are issued at a discount to their face value, but can be redeemed at face value upon maturity. The cash management bills are similar to Treasury bills in this respect, but are issued with maturities below 91 days. The Government of India also issues a wide range of dated long-term securities. These carry either fixed or floating coupons which are paid at face value at fixed time periods. The tenor of such dated securities can be up to 30 years. The Indian authorities issue many different types of dated securities, including fixed rate bonds, floating rate bonds, zero coupon bonds, inflation-linked bonds, and bonds with call/put options.

The Reserve Bank of India (RBI) conducts auctions in which Indian government securities are issued. The auctions occur on an electronic platform, known as the Negotiated Dealing System (NDS). Various entities, which are members of the NDS, participate in such auctions, including commercial banks, primary dealers, insurance companies, provident funds, and other financial institutions. Entities that are not members of the NDS can also participate through primary dealers. The authorities can use either yield-based or price-based auction. The rates of interest on Indian government securities are determined through a market-based price discovery process. The Public Debt Office of the RBI is the registry and central depository of government securities in India. The major financial institutions are required to hold the securities in electronic form. The major holders of IGBs are large (domestic) Indian financial institutions, but smaller entities, such as cooperative banks and provident funds also hold IGBs. Foreign institutional investors can also hold Indian government securities up to a limit, based on a preset quota. Government regulations mandate various types of domestic financial institutions to allocate a certain portion of their assets in IGBs and other approved high-quality assets. Nevertheless, there is an active and lively secondary market in government securities in India. The Clearing Corporation of India Limited (CCIL) acts as the central counterparty for trading in Indian government securities. The settlement cycles for Treasury bonds and Treasury securities are respectively T+1 and T+2 in the primary market. In the secondary market, government securities are settled on a T+1 basis, although in repo transactions, investors can settle the first leg of the transaction on either a T+0 basis or T+1 basis. Chakrabarti (2010) gives a more detailed account of the market for IGBs and discusses recent developments and policy initiatives.

The Reserve Bank of India (2009 and 2014) and Yanamandra (2014) outline the RBI's monetary policy, whereas the Government of India (various years) discusses the public debt management and issuance of government securities in India. The RBI uses the repo rate as its policy rate in the middle of interest rate corridor. The RBI, the country's central bank, engages in open market operations by buying and selling government securities in order to adjust its policy rates and provide liquidity and reserves to the nation's banking system. The RBI uses a Liquidity Adjustment Facility (LAF) on a daily basis with the scheduled banks and primary dealers to extend liquidity on an overnight basis against IGBs and other designated securities as collateral through repo and reserve repo auction operations. In recent years, the RBI has instituted a Marginal Standing Facility (MSF) from which scheduled commercial banks can borrow overnight at 100 basis points above the repo rate. Since 2004, the RBI instituted a Market Stabilization Scheme (MSS) to provide liquidity on a long-term basis. The RBI provides access to liquidity through overnight repos, fixed term repos and variable term repos. It has adopted the Consumer Price Index (CPI) as the main indicator of inflation for conducting monetary policy. The RBI operates on a bi-monthly policy cycle, but reserves the right to change the policy rate in between scheduled meeting dates. Indian banks are required to hold IGBs, gold and cash in order to maintain the Statutory Liquidity Ratio (SLR), a share of net demand and time liabilities, which the RBI sets, even though it is no longer a crucial instrument of monetary policy in India.

Figure 1 traces the evolution of 2-year, 5-year and 10-year IGBs' nominal yields. Short-term interest rates in India track the RBI's policy rates as shown in Figure 2 below. Inflation generally exerts upward pressure on government bonds' nominal yields. Figure 3 shows the coevolution of CPI inflation and IGBs' nominal yields in India. Though the general relation between inflation and nominal bond yields appears to hold, this figure suggests the following: (1) CPI inflation in India is quite volatile; (2) there are times when CPI inflation is higher than IGBs' nominal yields, but sometimes IGB's nominal yields are higher than CPI inflation; (3) the relationship between CPI inflation and IGBs' nominal bond yields is not so tight; and (4) the leads and lags between CPI inflation and IGBs' nominal yields appear to vary over time.

Figure 1 The Evolution of Indian Government Bonds' (IGBs) Nominal Yields

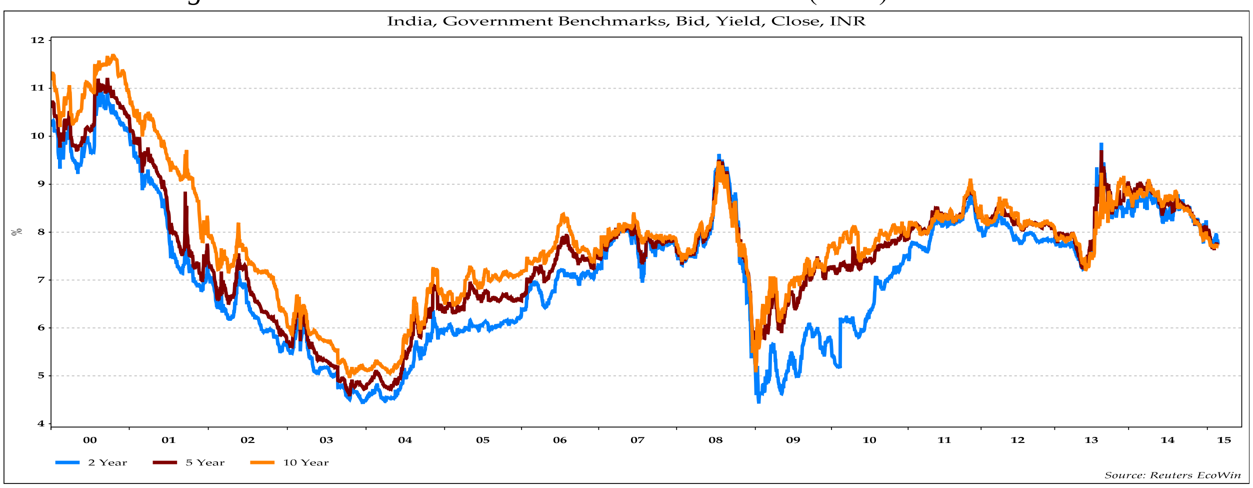


Figure 2 Short-term Interest Rates, as Measured by 3-month Treasury Bills' Rates, Track the Reserve Bank of India's Policy Rates

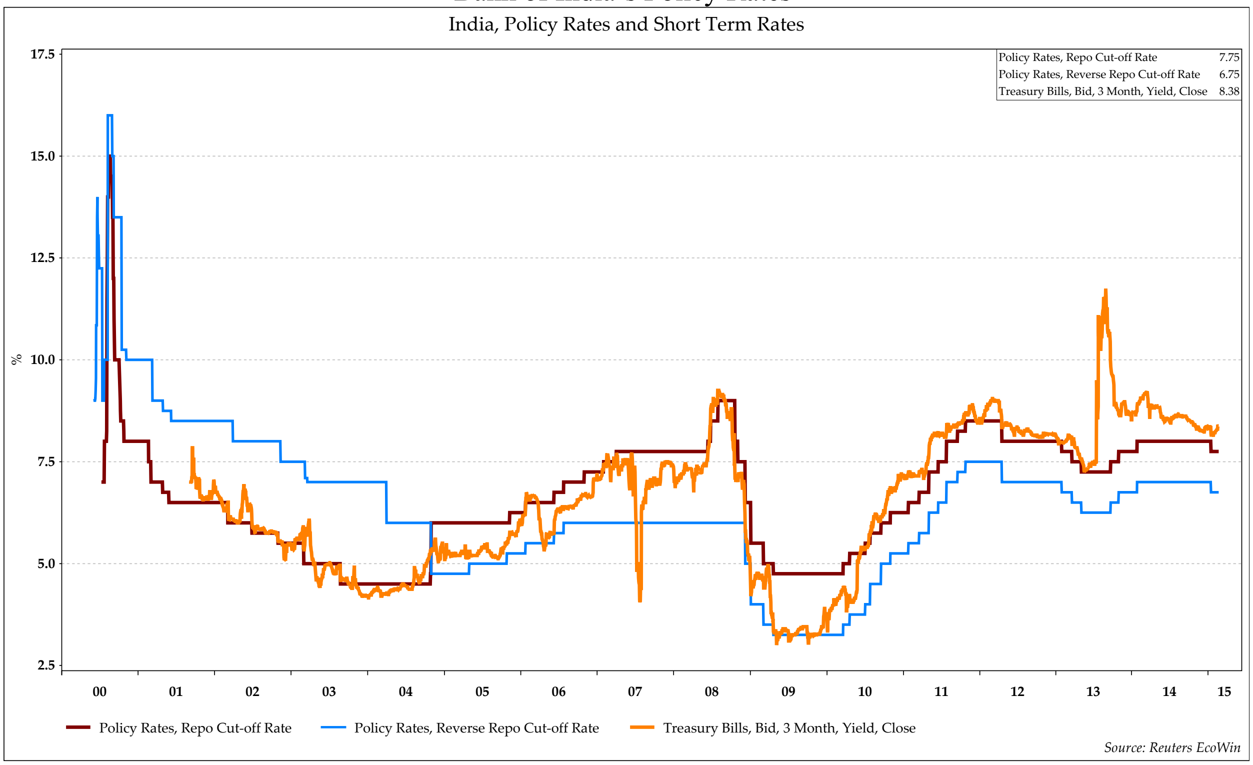
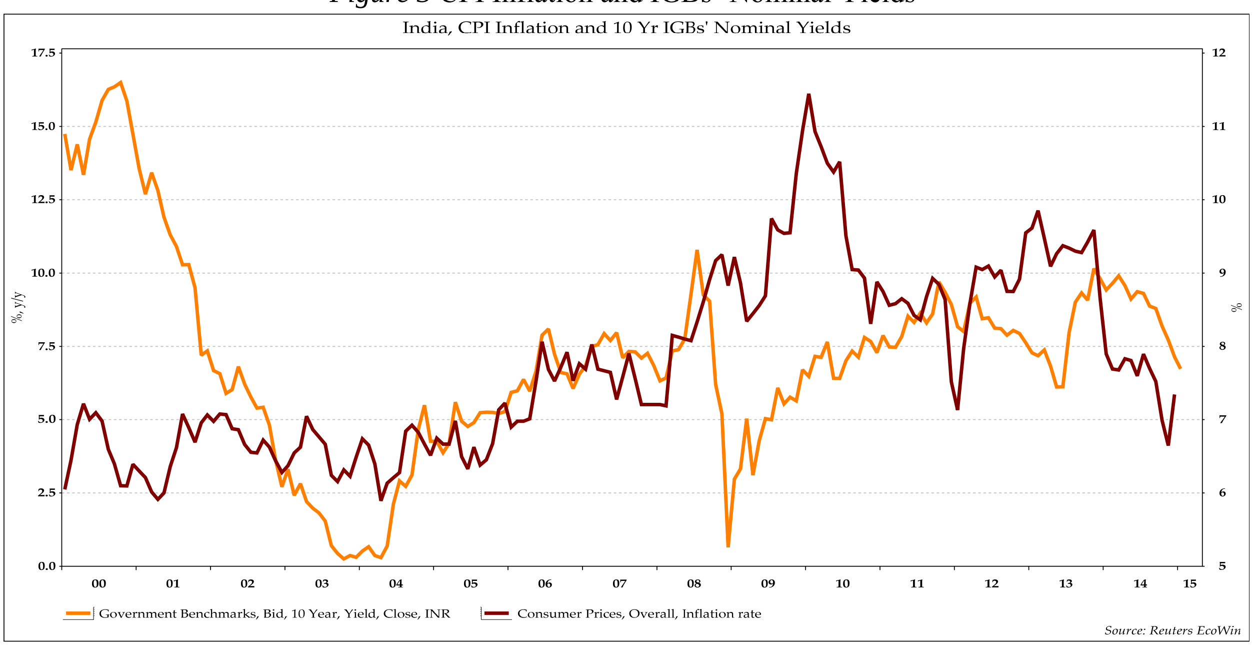


Figure 3 CPI Inflation and IGBs' Nominal Yields



India has monetary sovereignty, which gives the Government of India the ability to meet its debt obligations. It meets all the criteria for monetary sovereignty, as articulated in Wray (2003 and 2012) and Tymoigne (2013). The Government of India (1) sets the rupee as the country's unit of account, (2) issues liabilities solely in rupees, that is, its own currency, (3) acts as the legitimate monopoly issuer of unconvertible final means of payment denominated solely in rupees, and (4) exercises the authority to tax individuals, firms and other institutions domiciled in the union of India and accepts only rupees in payments of the taxes and levies that it imposes. Monetary sovereignty entails that the denomination of central government debt is in its own currency. Monetary sovereignty is crucial because it gives the Government of India and the RBI the operational capability to contain and control IGBs' nominal yields. The RBI exercises monetary authority and is the issuer of the nation's currency. It acts as the banker to the Government of India and maintains the banking account of all scheduled banks. The RBI is responsible for the central government's monetary, exchange, and banking transactions, and the management of the central government's public debt. As a banker to the nation's banks, the RBI is tasked to ensure the smooth and seamless operation of interbank obligations and the efficient transfer of funds within the banking system. The RBI enables banks to maintain their reserve accounts to meet their statutory reserve requirements and maintain adequate transaction balances for the banking system to function properly. It is the regulator of the banking system, and the regulator and supervisor of the payment and settlement system. It is responsible for maintaining financial stability. It also acts as a lender of last resort to the nation's banks. The RBI's multifaceted role gives it the operational ability to exert downward (upward) pressure on IGBs' nominal yields by allowing it to keep short-term interest rates low (high) and to use other tools of monetary policy.

In countries with sovereign currencies, such as India, long-term interest rates are strongly associated with short-term interest rates and the changes in long-term interest rates are also fairly tightly correlated with changes in short-term interest rates (see Appendix A). Thus, long-term interest rates generally stay low (high) when short-term interest rates are low (high), and long-term interest rates rise (decline) when short-term interest rates rise (fall). Moreover, when observed inflation and inflationary expectations are low (high), both short-term interest rates and long-term interest rates tend to stay low (high). Long-term interest rates are also driven by persistence, implying that long-term interest rates tend to stay low once they become low and stay high once they turn high.

The figures below, in the form of scatterplots, show the relation between IGBs' nominal yields and the Indian Treasury bills' rates. Figure 4a shows the tight correlation between the nominal yields of two-year IGBs and the rate of three-month Indian Treasury bills, while the following figure (4b) shows the tight correlation between the percentage point changes, year over year, in the yields of two-year IGBs and the percentage point changes, during the same period, in three-month Indian Treasury bills' rates. Appendix A provides numerous scatterplots that show the strong relationship between short-term interest rates and various long-term interest rates and their changes.

Figure 4a The Yields of 2-year Indian Government Bonds and 3-month Indian Treasury Bill Rates

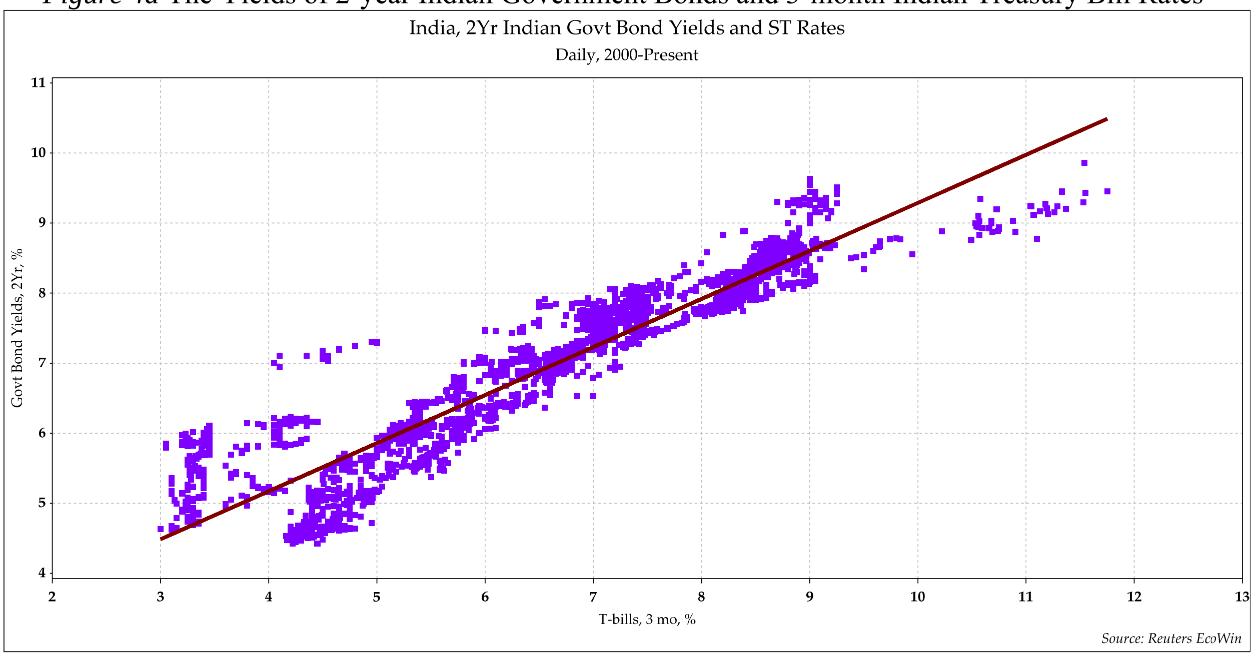
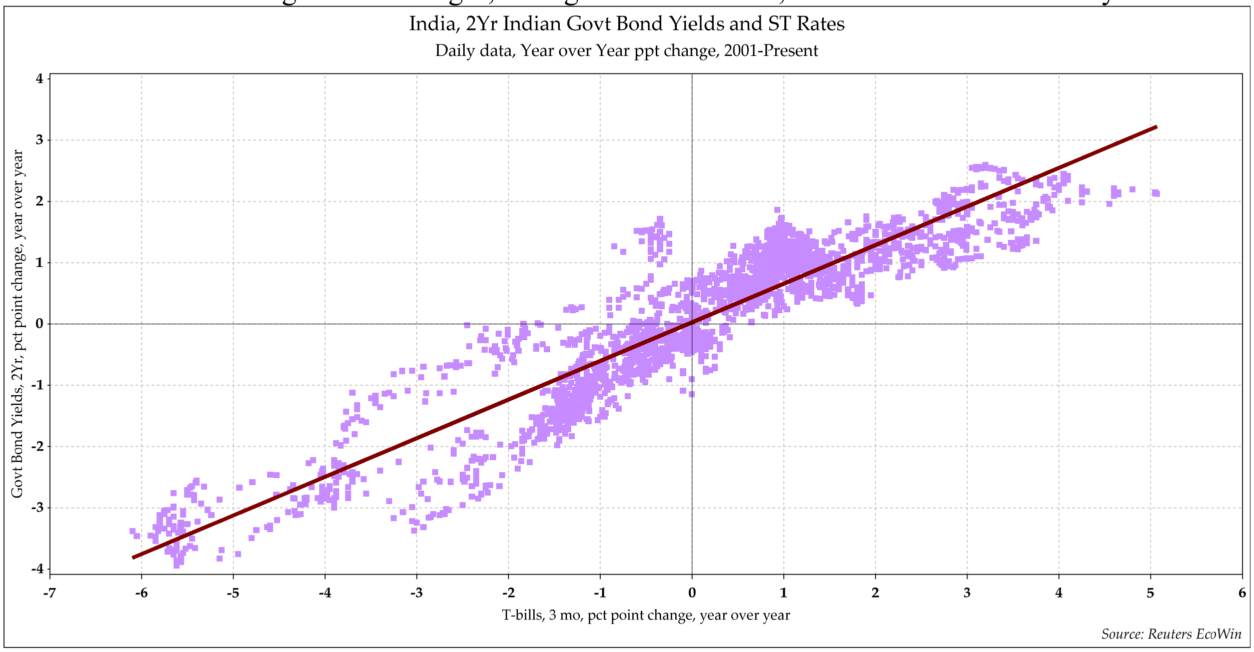


Figure 4b The Percentage Point Changes, Year over Year, in the Yields of 2-year Indian Government Bonds and the Percentage Point Changes, during the Same Period, in 3-month Indian Treasury Bill Rates



SECTION IV: A SIMPLE MODEL OF LONG-TERM INTEREST RATES

In light of Keynes's views, a simple model of long-term interest rates and changes in the long-term interest rate is developed here, following Akram and Das (2014a and 2014b).

The long-term government bonds' nominal yield can be understood as a function of short-term interest rates and forward interest rates. The yield of a long-term (LT) bond, r_{LT}, depends on the short-term (ST) interest rate, r_{ST} and an appropriate forward interest rate, $f_{ST,LT-ST}$:

$$(1 + r_{LT})^{LT} = (1 + r_{ST})^{ST}(1 + f_{ST,LT-ST})^{LT-ST} \qquad (4.1)$$

A long-term bond and long-term interest rate are here defined in relative terms, such that a long-term bond is of longer maturity than a short-term bond, that is, $LT - ST > 0$. The standard market practice is to define short-term interest rate as yields of bills and securities with maturity of 12 months or less and long-term interest rates as yields of bonds with maturity higher than 12 months.

The long-term rate, r_{LT}, is a function of the short-term interest rate, r_{ST}, and an appropriate forward interest rate, $f_{ST,LT-ST}$. That is,

$$r_{LT} = F^1\left(r_{ST}, f_{ST,LT-ST}\right) \tag{4.2}$$

The forward rate, $f_{ST,LT-ST}$, depends on the future short-term interest rate, r_F, and the term premium, z.

$$f_{ST,LT-ST} = F^2(r_F, z)$$

However, the future short-term interest rate and the term premium are determined by the expected rate of inflation, π^E, and the expected rate of economic activity, g^E. Hence, $F^2(r_F, z) = F^3(\pi^E, g^E)$

However, if one holds that near-term views almost always affect investors' long-term economic and investment outlooks, the current rate of inflation, π, and the current rate of economic activity, g, would respectively influence the investor's expected rate of inflation and the expected rate of economic activity. That is, $\pi^E = F^4(\pi)$ and $g^E = F^5(g)$. Hence,

$$f_{ST,LT-ST} = F^2(r_F, z) = F^3(\pi^E, g^E) = F^3\left(F^4(\pi), F^5(g)\right) \tag{4.3}$$

The forward rate is a function of the current rate of inflation and the current rate of economic activity, under the "Keynesian" assumption that the near-term view is almost always the key determinant. As a result, the long-term interest rate, r_{LT}, is a function of the short-term interest rate, r_{ST}, the current rate of inflation, π and the current rate of economic activity, g.

$$r_{LT} = F^1\left(r_{ST}, F^3\left(F^4(\pi), F^5(g)\right)\right) = F^6(r_{ST}, \pi, g) \tag{4.4}$$

For monthly data, month-over-month changes are defined as follows: $\Delta[X] = X(t) - X(t-1)$
For monthly data, year-over-year changes are defined as follows: $\Omega[\mathrm{X}] = X(t) - X(t-12)$
For quarterly data, quarter-over-quarter changes are defined as follows: $\Lambda[X] = X(t) - X(t-1)$
For quarterly data, year-over-year changes are defined as follow: $\Pi[X] = X(t) - X(t-4)$

Changes in long-term interest rates are functions of changes in short-term interest rates, the rates of inflation, and the rates of economic activity. These functions are expressed as follows:

$$\Delta r_{LT} = F^{7}(\Delta r_{ST}, \Delta\pi, \Delta g) \quad (4.5)$$

$$\Omega r_{LT} = F^{8}(\Omega r_{ST}, \Omega\pi, \Omega\, g) \quad (4.6)$$

$$\Lambda r_{LT} = F^{9}(\Lambda r_{ST}, \Lambda\pi, \Lambda\, g) \quad (4.7)$$

$$\Pi r_{LT} = F^{10}(\Pi r_{ST}, \Pi\pi, \Pi\, g) \quad (4.8)$$

Functions (4.5), (4.6), (4.7), and (4.8) are respectively operationalized as follows:

$$r_{LT} = A_0 + A_1 r_{ST} + A_2\pi + A_3 g \quad (4.9)$$

$$\Delta r_{LT} = B_0 + B_1\Delta r_{ST} + B_2\Delta\pi + B_3\Delta g \quad (4.10)$$

$$\Omega r_{LT} = C_0 + C_1\Omega r_{ST} + C_2\Omega\pi + C_3\Omega g \quad (4.11)$$

$$\Lambda r_{LT} = D_0 + D_1\Lambda r_{ST} + D_2\Lambda\pi + D_3\Lambda g \quad (4.12)$$

$$\Pi r_{LT} = E_0 + E_1\Pi r_{ST} + E_2\Pi\pi + E_3\Pi g \quad (4.13)$$

Equations (4.9), (4.10), (4.11), (4.12), and (4.13) provide a Keynesian framework for estimating several behavioral models relating the effects of short-term interest rates and a variety of control variables on IGBs' nominal yields. These models are based on an interpretation of Keynes's views on the nature of long-term expectations.

SECTION V: DATA AND METHODOLOGY

Time series data on interest rates, various indices of inflation, industrial production and general government finance are used here for the econometric models. Interest rate data cover policy rates, such as the bank rate, repo cut-off rate, reserve repo cut-off rate, and cash reserve ratio; short-term interest rates, such as nominal yields on Indian Treasury bills of 3-month and 6-month maturities; and long-term IGBs' nominal yields, such as yields on IGBs of 2-year, 3-year, 4-year, 5-year, 6-year, 7-year, 8-year, 9-year, 10-year, and 15-year maturities. Inflation data cover headline inflation, that is, Consumer Price Index (CPI) for all items, measured as a percentage change year over year, as well as total Wholesale Price (WSP) inflation, measured similarly. Industrial production data is the index of industrial activity, also measured as a percentage change year over year. Government finance data covers general government net lending/borrowing (fiscal balance), measured as a percentage of nominal Gross Domestic Product (nGDP).

Table 1 below summarizes the variables and the data used in the models. The first column provides the variable labels. Quarterly variables are indicated by the suffix of Q. The second column provides the variable description and the date range for the data. The third column gives the original frequency and indicates if it has also been converted to a lower frequency. The fourth column lists both the primary sources and the secondary sources. The final column lists Thomson Reuters EcoWin's, that is, the data provider's mnemonic code for the time series of the variables.

Table 1 Summary of the Data and the Variables

Variable Labels	Data Description, Date Range	Frequency	Sources	Thomson Reuters EcoWin Mnemonic Code
Policy Rates				
PRATE; PRATE_Q	Policy rates, bank rate, %; Jan 2000 – Sep 2014; 1Q2000 – 3Q2014	Daily; converted to Monthly	Reuters; Thomson Reuters EcoWin	ew:inr14400
REPO; REPO_Q	Repo cut-off rate, %; Jul 2000 – Sep 2014; 3Q2000 – 3Q2014	Daily; converted to Monthly	Reuters; Thomson Reuters EcoWin	ew:inr14420
REVREPO; REVREPO_Q	Reverse repo cut-off rate, %; Jun 2000 – Sep 2014; 3Q2000 – 3Q2014	Daily; converted to Monthly	Reuters; Thomson Reuters EcoWin	ew:inr14425
RESVRATIO; RESVRATIO_Q	Cash reserve ratio, %; Jan 2000 – Sep 2014;	Daily; converted to	Reuters; Thomson	ew:inr1440510

Variable Labels	Data Description, Date Range	Frequency	Sources	Thomson Reuters EcoWin Mnemonic Code
	1Q2000 – 3Q2014	Monthly	Reuters EcoWin	
Indian Treasury Bills' Rates				
TB3M; TB3M_Q	Treasury bills, bid, 3 month, % yield; Sep 2001 – Sep 2014; 3Q2001 – 4Q2014	Daily; converted to Monthly; converted to Quarterly	Reuters; Thomson Reuters EcoWin	ew:inr14200
TB6M; TB6M_Q	Treasury bills, bid, 6 month, % yield; Sep 2001 – Sep 2014; 3Q2001 – 4Q2014	Daily; converted to Monthly; converted to Quarterly	Reuters; Thomson Reuters Ecowin	ew:inr14210
Indian Government Bonds' Yields				
IGB2YR; IGB2YR_Q	Government bond, bid, 2 year, % yield, close; Jan 2000 – Sep 2014; 1Q2000 – 4Q2014	Daily; converted to Monthly; converted to Quarterly	Reuters; Thomson Reuters Ecowin	ew:inr14110
IGB3YR; IGB3YR_Q	Government bonds, bid, 3 year, % yield, close; Mar 2002 – Sep 2014; 2Q2002 – 4Q2014	Daily; converted to Monthly; converted to Quarterly;	Reuters; Thomson Reuters Ecowin	ew:inr14113
IGB4YR; IGB4YR _Q	Government bonds, bid, 4 Year, % yield, close; Mar 2002 – Sep 2014; 2Q2002 – 4Q2014	Daily; converted to Monthly; converted to Quarterly	Reuters; Thomson Reuters Ecowin	ew:inr14114
IGB5YR; IGB5YR_Q	Government Bonds, bid, 5 year, % yield, close; Jan 2000 – Sep 2014; 1Q2000 – 4Q2014	Daily; converted to Monthly; converted to Quarterly	Reuters; Thomson Reuters Ecowin	ew:inr14120
IGB6YR; IGB5YR_Q	Government bonds, bid, 6 year, % yield, close; Mar 2002 – Sep 2014; 2Q2002 – 4Q2014	Daily; converted to Monthly; converted to Quarterly	Reuters; Thomson Reuters Ecowin	ew:inr14116
IGB7YR; IGB7YR_Q	Government bonds, bid, 7 year, % yield, close; Mar 2002 – Sep 2014; 2Q2002 – 4Q2014	Daily; converted to Monthly; converted to Quarterly	Reuters; Thomson Reuters Ecowin	ew:inr14117
IGB8YR; IGB8YR_Q	Government bonds, bid, 8 year, % yield, close; Mar 2002 – Sep 2014; 2Q2002 – 4Q2014	Daily; converted to Monthly; converted to Quarterly	Reuters; Thomson Reuters Ecowin	ew:inr14118

Variable Labels	Data Description, Date Range	Frequency	Sources	Thomson Reuters EcoWin Mnemonic Code
IGB9YR; IGB9YR_Q	Government bonds, bid, 9 year, % yield, close; Mar 2002 – Sep 2014; 2Q2002 – 4Q2014	Daily; converted to Monthly; converted to Quarterly	Reuters; Thomson Reuters Ecowin	ew:inr14119
IGB10YR; IGB10YR_Q	Government bonds, bid, 10 year, %, yield, close; Jan 2000 – Sep 2014; 1Q2000 – 4Q2014	Daily; converted to Monthly; converted to Quarterly	Reuters; Thomson Reuters Ecowin	ew:inr14130
IGB15YR; IGB15YR_Q	Government bonds, bid, 15 year, % yield, close; Mar 2002 – Sep 2014; 2Q2002 – 4Q2014	Daily; converted to Monthly; converted to Quarterly	Reuters; Thomson Reuters Ecowin	ew:inr14135
Inflation				
CPIYOY; CPIYOY_Q	Consumer price index, % change, y/y; Jan 2000 – Aug 2014; 1Q2000 – 3Q2014	Monthly; converted to Quarterly	Labour Bureau, Government of India; Thomson Reuters EcoWin	ew:inr11001
WSPIYOY; WSPIYOY_Q	Wholesale prices, % change, y/y; Apr 2005 – Aug 2014; 2Q2005 – 3Q2014	Monthly; converted to Quarterly	Office of the Economic Adviser to the Government of India; Thomson Reuters EcoWin	ew:inr11007rty
Economic Activity				
IPYOY; IPYOY_Q	Industrial production, % change, y/y; Apr 2006 – Aug 2014; 2Q2006 – 3Q2014	Monthly; converted to Quarterly	Central Statistical Organisation, India; Thomson Reuters EcoWin	ew:inr02005rty
Government Finance				
FBALANCE_Q	Government net lending, annualized rate, seasonally adjusted, % of nominal GDP; 1Q2001 – 3Q2014	Quarterly	OECD Economic Outlook	oe:ind_nlgqq

In this paper, three sets of equations are estimated in order to identify the determinants of changes in long-term Indian government bonds' nominal yields. The monthly equations do not control for, or incorporate a fiscal balance variable, but the quarterly equations do control for fiscal balances. The three sets of equations show year-over-year changes for monthly data as indicated by Ω[.] and year-over-year changes for quarterly by Π[.]. The quarterly variables are suffixed by _Q.

In the first set of equations, changes in long-term government bonds' nominal yields (IGB) of various maturities are determined only by changes in short-term interest rates (TB) of various maturities. The quarterly equation includes fiscal balance (FISCAL).

$$\Omega[\mathrm{IGB}] \;=\; \beta_0 \;+ \beta_1(\Omega[\mathrm{TB}]) \qquad (5.1)$$

$$\Pi[\mathrm{IGB\_Q}] \;=\; \beta_2 \;+ \beta_3(\Pi[\mathrm{TB\_Q}]) \;+\; \beta_3(\Pi[\mathrm{FISCAL\_Q}]) \qquad (5.2)$$

In the second set of equations, changes in long-term government bonds' nominal yields (IGB) are determined by both changes in short-term interest rates (TB) and changes in inflation (INFLATIONYOY). The quarterly equation includes fiscal balance (FISCAL).

$$\Omega[\mathrm{IGB}] \;=\; \delta_0 \;+ \delta_1(\Omega[\mathrm{TB}]) + \delta_2(\Omega[\mathrm{INFLATIONYOY}]) \qquad (5.3)$$

$$\Pi[\mathrm{IGB\_Q}] \;=\; \delta_3 \;+ \delta_4(\Pi[\mathrm{TB\_Q}]) + \delta_5(\Pi[\mathrm{INFLATIONYOY\_Q}]) + \;\delta_6(\Pi[\mathrm{FISCAL\_Q}]) \qquad (5.4)$$

Finally, in the third set of equations, changes in long-term government bonds' nominal yield (IGB) are determined by changes in short-term interest rates (TB), changes in inflation (INFLATIONYOY) and changes in the growth of economic activity (GROWTH). The quarterly equations again include fiscal balance (FISCAL).

$$\Omega[\mathrm{IGB}] \;=\; \varphi_0 \;+ \varphi_1(\Omega[\mathrm{TB}]) + \varphi_2(\Omega[\mathrm{INFLATIONYOY}]) + \varphi_3(\Omega[\mathrm{GROWTH}]) \qquad (5.5)$$

$$\Pi[\mathrm{IGB\_Q}] = \varphi_4 + \varphi_5(\Pi[\mathrm{TB\_Q}]) + \varphi_6(\Pi[\mathrm{INFLATIONYOY\_Q}]) + \varphi_7(\Pi[\mathrm{GROWTH\_Q}]) + \varphi_8\Pi[\mathrm{FISCAL\_Q}]) \qquad (5.6)$$

In the above sets of equations, the following variables are used in econometric estimations:

IGB = {IGB2YR, IGB3YR, IGB4YR, IGB5YR, IGB6YR, IGB7YR, IGB8YR, IGB9YR, IGB10YR, IGB15YR; IGB2YR_Q, IGB3YR_Q, IGB4YR_Q, IGB5YR_Q, IGB6YR_Q, IGB7YR_Q, IGB8YR_Q, IGB9YR_Q, IGB10YR_Q, IGB15YR_Q}

TB = {TB3M, TB6M; TB3M_Q, TB6M_Q}

INFLATIONYOY = {CPIYOY, WSPIYOY; CPIYOY_Q, WSPIYOY_Q}

GROWTH = {IPYOY; IPYOY_Q}

FISCAL = {FBALANCE_Q}

Time series variables with large T are often characterized by unit root processes, that is, variables are integrated of order one, I(1). The most commonly used test to check for stationarity is the augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979 and 1981). The Phillips-Perron (PP) Test (Phillips and Perron, 1988) is a modified version of the Dickey-Fuller (DF) test. It proposes a *t*-statistics corrected for both autocorrelation and heteroskedasticity. Both these tests are applied and the results are presented in tables 2 and 3. Results in Table 2 show that the year-over-year percentage point changes of all the monthly variables are stationary. Results in Table 3 show that the year-over-year percentage point changes of almost all of the quarterly variables used in the econometrics models are also stationary.

Table 2 Unit Root Tests for Monthly Variables, Percentage Point Change, Year over Year

Variable	**Augmented Dickey-Fuller (ADF)**	**Phillips-Perron (PP)**
Ω[IGB2YR]	-2.86***	-2.53**
Ω[IGB3YR]	-3.26***	-2.71***
Ω[IGB4YR]	-3.66***	-2.71***
Ω[IGB5YR]	-2.99***	-2.54**
Ω[IGB6YR]	-3.69***	-2.79***
Ω[IGB7YR]	-3.59***	-2.82***
Ω[IGB8YR]	-3.51***	-2.88***
Ω[IGB9YR]	-3.44***	-2.90***
Ω[IGB10YR]	-2.66***	-2.43**
Ω[IGB15YR]	-3.66***	-3.13***
Ω[TBILL3MO]	-2.93***	-2.62***
Ω[TBILL6MO]	-2.95***	-2.57**
Ω[CPIYOY]	-2.08**	-3.41***
Ω[IPYOY]	-4.77***	-4.13***

Notes: *** and ** indicate statistical significance at the 1% and 5% level respectively. Null hypothesis of both ADF and PP tests is that the series contains unit root.

Table 3 Unit Root Tests for Quarterly Variables, Percentage Point Change, Year Over Year

Variable	Augmented Dickey-Fuller (ADF)	Phillips-Perron (PP)
Π[IGB2YR]	-3.01***	-2.50**
Π[IGB5YR]	-2.37**	-2.37**
Π[IGB10YR]	-2.07**	-2.27**
Π[IGB15YR]	-2.60**	-3.09***
Π[TBILL3MO]	-2.30**	-2.87***
Π[CPIYOY]	-1.21	-3.11***
Π[WSPIYOY]	-6.73***	-1.79*
Π[IPYOY]	-2.82***	-2.66***

Notes: *** and ** indicate statistical significance at the 1% and 5% level respectively. Null hypothesis of both ADF and PP tests is that the series contains unit root.

Given the variables are stationary, the standard ordinary least square (OLS) technique is first used to examine the relationship between long-term government yields, short-term interest rates, and other important variables. The OLS results are presented in tables B1–B10 in Appendix B. These results support the hypothesis that percentage point changes to short-term interest rates, year over year, are the key drivers of changes in IGB's nominal yields during the same period. While the OLS method provides some benchmark results, it should be noted that there may be the presence of endogeneity between long-term government bond yields, short-term interest rates, and the rate of inflation. The relationships between these variables may not necessarily show a one-way causal chain (Akram and Das 2014a and 2014b). Hence, estimating the equations using the standard least square (LS) procedures may result in inconsistent estimates of relevant coefficients (Greene 2003, p.221). Therefore, an instrumental variable (IV) approach is appropriate here. To accommodate the problem of endogeneity, the two-step feasible and efficient Generalized Method of Moments (GMM) technique is used. This approach not only provides consistent estimates over other instrument variables techniques, but it is considered to be appropriate in the presence of endogeneity (Baum *et al* 2003). Moreover, the technique used in the econometric estimation also accommodates the problems of arbitrary heteroskedasticity and autocorrelation. While using instrumental techniques, it is crucial to identify valid instruments that are correlated with endogenous regressors but are uncorrelated to the error term. First and second period lags of changes of short-term interest rates and changes in the rate of inflation are used as instruments in relevant equations. Finally, the Hansen (1982) test of over-identifying restrictions is used to check for the exogeneity of instruments.

SECTION VI: EMPIRICAL RESULTS

Different behavioral models, based on the simple Keynesian model of long-term interest rates are estimated here to calibrate the effects of short-term interest rates and other control variables on long-term IGBs' nominal yields using the available data.

GMM estimation results are presented in tables 4–13. The monthly results are in tables 4–13, while the quarterly results are in tables 14–21. For the monthly models equations 6.1, 6.2, and 6.3 use the change in the three-month Treasury bills' rate as the change in short-term interest rates, while equations 6.4, 6.5, and 6.6 use the change in the six-month Treasury bills' rate as the change in short-term interest rates. In equations 6.1 and 6.4 the change in short-term interest rates is the only explanatory variable, while in equations 6.2 and 6.5 the change in short-term interest rates and the change in inflation are the explanatory variables. Equations 6.3 and 6.6 have the change in short-term interest rates, the change in inflation, and the change in the growth of industrial production as the three explanatory variables. The quarterly models always include the change in fiscal balance as an explanatory variable. Equation 6.7 includes the change in the three-month Treasury bills' rate and the change in fiscal balance as explanatory variables. Equation 6.8 includes the change in the three-month Treasury bills' rate, the change in inflation, and the change in fiscal balance as explanatory variables, while Equation 6.9 includes the change in three-month Treasury bills' rate, the change in inflation, the change in the growth of industrial production, and the change in fiscal balance as explanatory variables.

Table 4 GMM Estimations for Ω[IGB2YR]

	Eq. 6.1	Eq. 6.2	Eq. 6.3	Eq. 6.4	Eq. 6.5	Eq. 6.6
Constant	0.040 (0.42)	0.013 (0.15)	0.078 (1.52)	0.026 (0.36)	0.003 (0.05)	0.056 (1.35)
Ω[TB3M]	0.638*** (13.28)	0.676*** (16.77)	0.590*** (16.22)	-	-	-
Ω[TB6M]	-	-	-	0.701*** (15.19)	0.739*** (21.05)	0.650*** (18.72)
Ω[CPIYOY]	-	0.045 (1.35)	-0.017 (-1.26)	-	0.041 (1.53)	-0.007 (-0.58)
Ω[IPYOY]	-	-	0.033*** (4.76)	-	-	0.023*** (3.49)
Hansen *J*	0.30	0.58	2.39	0.46	0.80	2.46
Obs.	143	142	88	143	142	88
Time Period	Nov 2002-Sep 2014	Nov 2002-Aug 2014	Apr 2007-Aug 2014	Nov 2002-Sep 2014	Nov 2002-Aug 2014	Apr 2007-Aug 2014

***Notes**:* 1) *z*-Statistics are in parentheses. 2) *** implies the significance levels at 1%. 3) Instruments used: Eq. 5.1: first and second lags of Ω[TB3M]; Eqs. 5.2 and 5.3: first and second lags of Ω[TB3M] and Ω[CPIYOY]; Eq. 5.4: first and second lags of Ω[TB6M]; Eqs. 5.5 and 5.6: first and second lags of Ω[TB6M] and Ω[CPIYOY].

Table 5 GMM Estimations for Ω[IGB3YR]

	Eq. 6.1	Eq. 6.2	Eq. 6.3	Eq. 6.4	Eq. 6.5	Eq. 6.6
Constant	0.070 (0.66)	0.057 (0.61)	0.071 (1.16)	0.050 (0.56)	0.034 (0.43)	0.054 (0.96)
Ω[TB3M]	0.524*** (9.23)	0.557*** (11.88)	0.462*** (13.60)	-	-	-
Ω[TB6M]	-	-	-	0.585*** (10.20)	0.615*** (13.87)	0.512*** (15.89)
Ω[CPIYOY]	-	0.057 (1.40)	-0.005 (-0.22)	-	0.060* (1.66)	0.005 (0.24)
Ω[IPYOY]	-	-	0.027*** (3.46)	-	-	0.020*** (2.77)
Hansen *J*	0.85	0.97	2.37	1.05	1.10	2.41
Obs.	139	138	88	139	138	88
Time Period	Apr 2003-Sep 2014	Apr 2003-Aug 2014	Apr 2007-Aug 2014	Apr 2003-Sep 2014	Apr 2003-Aug 2014	Apr 2007-Aug 2014

***Notes**:* 1) *z*-Statistics are in parentheses. 2) *** and ** imply the significance levels at 1% and 5% respectively. 3) Instruments used: Eq. 5.1: first and second lags of Ω[TB3M]; Eqs. 5.2 and 5.3: first and second lags of both Ω[TB3M] and Ω[CPIYOY]; Eq. 5.4: first and second lags of Ω[TB6M]; Eqs. 5.5 and 5.6: first and second lags of both Ω[TB6M] and Ω[CPIYOY].

Table 6 GMM Estimations for Ω[IGB4YR]

	Eq. 6.1	Eq. 6.2	Eq. 6.3	Eq. 6.4	Eq. 6.5	Eq. 6.6
Constant	0.068	0.059	0.062	0.049	0.035	0.041
	(0.57)	(0.57)	(0.77)	(0.46)	(0.39)	(0.49)
Ω[TB3M]	0.482***	0.516***	0.399***	-	-	-
	(8.07)	(10.43)	(12.05)			
Ω[TB6M]	-	-	-	0.542***	0.574***	0.440***
				(8.71)	(11.65)	(12.79)
Ω[CPIYOY]	-	0.069	0.004	-	0.073*	0.013
		(1.52)	(0.15)		(1.72)	(0.48)
Ω[IPYOY]	-	-	0.024***	-	-	0.018**
			(2.74)			(2.17)
Hansen *J*	1.10	1.21	2.81	1.32	1.36	3.40
Obs.	139	138	88	139	138	88
Time Period	Apr 2003-Sep 2014	Apr 2003-Aug 2014	Apr 2007-Aug 2014	Apr 2003-Sep 2014	Apr 2003-Aug 2014	Apr 2007-Aug 2014

***Notes**:* 1) *z*-Statistics are in parentheses. 2) ***, ** and * imply the significance levels at 1%, 5% and 10% respectively. 3) Instruments used: Eq. 5.1: first and second lags of Ω[TB3M]; Eqs. 5.2 and 5.3: first and second lags of Ω[TB3M]and Ω[CPIYOY]; Eq. 5.4: first and second lags of Ω[TB6M]; Eqs. 5.5 and 5. 6: first and second lags of Ω[TB6M] and Ω[CPIYOY].

Table 7 GMM Estimations for Ω[IGB5YR]

	Eq. 6.1	Eq. 6.2	Eq. 6.3	Eq. 6.4	Eq. 6.5	Eq. 6.6
Constant	0.032	0.050	0.040	0.017	0.032	0.029
	(0.24)	(0.44)	(0.40)	(0.14)	(0.32)	(0.42)
Ω[TB3M]	0.457***	0.489***	0.337***	-	-	-
	(7.36)	(8.75)	(7.84)			
Ω[TB6M]	-	-	-	0.515***	0.545***	0.371***
				(7.90)	(9.65)	(8.29)
Ω[CPIYOY]	-	0.074	-0.003	-	0.078*	0.006
		(1.52)	(-0.10)		(1.69)	(0.22)
Ω[IPYOY]	-	-	0.023**	-	-	0.023***
			(2.33)			(2.89)
Hansen *J*	1.09	1.41	3.97	1.25	1.55	7.45**
Obs.	143	142	88	143	142	88
Time Period	Nov 2002-Sep 2014	Nov 2002-Aug 2014	Apr 2007-Aug 2014	Nov 2002-Sep 2014	Nov 2002-Aug 2014	Apr 2007-Aug 2014

***Notes**:* 1) *z*-Statistics are in parentheses. 2) ***, ** and * imply the significance levels at 1%, 5% and 10% respectively. 3) Instruments used: Eq. 5.1: first and second lags of Ω[TB3M]; Eqs. 5.2 and 5.3: first and second lags of Ω[TB3M] and Ω[CPIYOY]; Eq. 5.4: first and second lags of Ω[TB6M]; Eqs. 5.5 and 5.6: first and second lags of Ω[TB6M] and Ω[CPIYOY].

Table 8 GMM Estimations for Ω[IGB6YR]

	Eq. 6.1	Eq. 6.2	Eq. 6.3	Eq. 6.4	Eq. 6.5	Eq. 6.6
Constant	0.069 (0.51)	0.077 (0.69)	0.086 (0.81)	0.051 (0.41)	0.057 (0.57)	0.078 (0.78)
Ω[TB3M]	0.423*** (6.81)	0.456*** (7.91)	0.299*** (7.01)	-	-	-
Ω[TB6M]	-	-	-	0.480*** (7.25)	0.512*** (8.56)	0.331*** (7.93)
Ω[CPIYOY]	-	0.062 (1.25)	-0.001 (-0.02)	-	0.066 (1.38)	0.007 (0.24)
Ω[IPYOY]	-	-	0.023** (2.47)	-	-	0.019** (2.12)
Hansen *J* **Obs.**	1.08 139	1.23 138	2.98 88	1.22 139	1.34 138	2.84 88
Time Period	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014

Notes: 1) *z*-Statistics are in parentheses. 2) *** and ** imply the significance levels at 1% and 5% respectively. 3) Instruments used: Eq. 5.1: first and second lags of Ω[TB3M]; Eqs. 5.2 and 5.3: first and second lags of Ω[TB3M] and Ω[CPIYOY]; Eq. 5.4: first and second lags of Ω[TB6M]; Eqs. 5.5 and 5.6: first and second lags of Ω[TB6M] and Ω[CPIYOY].

Table 9 GMM Estimations for Ω[IGB7YR]

	Eq. 6.1	Eq. 6.2	Eq. 6.3	Eq. 6.4	Eq. 6.5	Eq. 6.6
Constant	0.056 (0.41)	0.052 (0.47)	0.066 (0.63)	0.039 (0.30)	0.033 (0.32)	0.060 (0.62)
Ω[TB3M]	0.407*** (6.72)	0.444*** (7.95)	0.297*** (7.69)	-	-	-
Ω[TB6M]	-	-	-	0.462*** (7.07)	0.478*** (8.47)	0.327*** (8.62)
Ω[CPIYOY]	-	0.067 (1.40)	0.002 (0.08)	-	0.071 (1.52)	0.009 (0.28)
Ω[IPYOY]	-	-	0.017** (2.03)	-	-	0.014 (1.64)
Hansen *J* **Obs.**	0.84 139	0.93 138	2.72 88	0.98 139	1.03 138	2.66 88
Time Period	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014

***Notes**:* 1) *z*-Statistics are in parentheses. 2) *** and ** imply the significance levels at 1% and 5% respectively. 3) Instruments used: Eq. 5.1: first and second lags of Ω[TB3M]; Eqs. 5.2 and 5.3: first and second lags of Ω[TB3M] and Ω[CPIYOY]; Eq. 5.4: first and second lags of Ω[TB6M]; Eqs. 5.5 and 5.6: first and second lags of Ω[TB6M] and Ω[CPIYOY].

Table 10 GMM Estimations for Ω[IGB8YR]

	Eq. 6.1	**Eq. 6.2**	**Eq. 6.3**	**Eq. 6.4**	**Eq. 6.5**	**Eq. 6.6**
Constant	0.053 (0.36)	0.097 (0.81)	0.117 (1.08)	0.036 (0.26)	0.079 (0.72)	0.108 (1.05)
Ω[TB3M]	0.399*** (6.56)	0.430*** (7.27)	0.242*** (5.90)	-	-	-
Ω[TB6M]	-	-	-	0.455*** (6.99)	0.485*** (7.95)	0.272*** (6.53)
Ω[CPIYOY]	-	0.055 (1.04)	-0.008 (-0.27)	-	0.060 (1.17)	-0.003 (-0.09)
Ω[IPYOY]	-	-	0.028*** (2.80)	-	-	0.025** (2.50)
Hansen *J*	1.62	1.76	2.58	1.31	1.89	2.55
Obs.	139	138	88	139	138	88
Time Period	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014

Notes: 1) *z*-Statistics are in parentheses. 2) *** and ** imply the significance levels at 1% and 5% respectively. 3) Instruments used: Eq. 5.1: first and second lags of Ω[TB3M]; Eqs. 5.2 and 5.3: first and second lags of Ω[TB3M] and Ω[CPIYOY]; Eq.5. 4: first and second lags of Ω[TB6M]; Eqs. 5.5 and 5.6: first and second lags of Ω[TB6M] and Ω[CPIYOY].

Table 11 GMM Estimations for Ω[IGB9YR]

	Eq. 6.1	**Eq. 6.2**	**Eq. 6.3**	**Eq. 6.4**	**Eq. 6.5**	**Eq. 6.6**
Constant	0.041 (0.27)	0.082 (0.68)	0.087 (0.72)	0.024 (0.17)	0.063 (0.57)	0.086 (0.75)
Ω[TB3M]	0.382*** (5.89)	0.411*** (6.92)	0.247*** (5.75)	-	-	-
Ω[TB6M]	-	-	-	0.437*** (6.31)	0.465*** (7.59)	0.274*** (6.20)
Ω[CPIYOY]	-	0.071 (1.29)	0.008 (0.23)	-	0.076 (1.41)	0.013 (0.37)
Ω[IPYOY]	-	-	0.024** (2.39)	-	-	0.021** (2.13)
Hansen *J*	1.02	1.39	3.17	1.01	1.49	2.95
Obs.	139	138	88	139	138	88
Time Period	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014

Notes: 1) *z*-Statistics are in parentheses. 2) *** and ** imply the significance levels at 1% and 5% respectively. 3) Instruments used: Eq. 5.1: first and second lags of Ω[TB3M]; Eqs. 5.2 and 5.3: first and second lags of Ω[TB3M] and Ω[CPIYOY]; Eq. 5.4: first and second lags of Ω[TB6M]; Eqs. 5.5 and 5.6: first and second lags of Ω[TB6M] and Ω[CPIYOY].

Table 12 GMM Estimations for Ω[IGB10YR]

	Eq. 6.1	**Eq. 6.2**	**Eq. 6.3**	**Eq. 6.4**	**Eq. 6.5**	**Eq. 6.6**
Constant	-0.016	0.006	0.047	-0.030	-0.006	0.040
	(-0.10)	(0.05)	(0.41)	(-0.19)	(-0.05)	(0.37)
Ω[TB3M]	0.397***	0.436***	0.270***	-	-	-
	(6.07)	(7.29)	(6.66)			
Ω[TB6M]	-	-	-	0.453***	0.489***	0.300***
				(6.49)	(8.03)	(7.38)
Ω[CPIYOY]	-	0.076	0.010	-	0.079	0.016
		(1.42)	(0.31)		(1.52)	(0.49)
Ω[IPYOY]	-	-	0.029**	-	-	0.025**
			(2.47)			(2.18)
Hansen *J*	0.59	0.92	2.43	0.65	1.00	2.37
Obs.	143	142	88	143	142	88
Time Period	Nov 2002-Sep 2014	Nov 2002-Aug 2014	Apr 2007-Aug 2014	Nov 2002-Sep 2014	Nov 2002-Aug 2014	Apr 2007-Aug 2014

Notes: 1) *z*-Statistics are in parentheses. 2) *** implies the significance levels at 1%. 3) Instruments used: Eq. 5.1: first and second lags of Ω[TB3M]; Eqs. 5.2 and 5.3: first and second lags of Ω[TB3M] and Ω[CPIYOY]; Eq. 5.4: first and second lags of Ω[TB6M]; Eqs. 5.5 and 5.6: first and second lags of Ω[TB6M] and Ω[CPIYOY].

Table 13 GMM Estimations for Ω[IGB15YR]

	Eq. 6.1	**Eq. 6.2**	**Eq. 6.3**	**Eq. 6.4**	**Eq. 6.5**	**Eq. 6.6**
Constant	0.035	0.055	0.063	0.020	0.036	0.055
	(0.25)	(0.49)	(0.56)	(0.15)	(0.33)	(0.51)
Ω[TB3M]	0.341***	0.377***	0.209***	-	-	-
	(5.29)	(6.21)	(4.99)			
Ω[TB6M]	-	-	-	0.391***	0.428***	0.236***
				(5.72)	(6.78)	(5.56)
Ω[CPIYOY]	-	0.067	-0.000	-	0.071	0.006
		(1.25)	(-0.00)		(1.35)	(0.16)
Ω[IPYOY]	-	-	0.021**	-	-	0.019*
			(2.12)			(1.86)
Hansen *J*	1.24	1.44	2.55	1.34	1.53	2.59
Obs.	139	138	88	139	138	88
Time Period	Apr 2003-Sep 2014	Apr 2003-Aug 2014	Apr 2007-Aug 2014	Apr 2003-Sep 2014	Apr 2003-Aug 2014	Apr 2007-Aug 2014

***Notes**:* 1) *z*-Statistics are in parentheses. 2) ***, ** and * imply the significance levels at 1%, 5% and 10% respectively. 3) Instruments used: Eq. 5.1: first and second lags of Ω[TB3M]; Eqs. 5.2 and 5.3: first and second lags of Ω[TB3M] and Ω[CPIYOY]; Eq. 5.4: first and second lags of Ω[TB6M]; Eqs. 5.5 and 5.6: first and second lags of Ω[TB6M] and Ω[CPIYOY].

Table 14 GMM Estimations for Π[IGB2YR_Q]

	Eq. 6.7	Eq. 6.8	Eq. 6.9
Constant	0.031	0.100**	0.081*
	(0.35)	(2.33)	(1.71)
Π[TB3M_Q]	0.603***	0.526***	0.526***
	(7.87)	(14.23)	(11.74)
Π[FBALANCE_Q]	0.122***	0.183***	0.149**
	(2.87)	(4.38)	(1.97)
Π[WSPIYOY_Q]	-	0.004	0.007
		(0.10)	(0.30)
Π[IPYOY]	-	-	0.003
			(0.16)
Hansen *J*	0.93	1.20	1.46
Obs.	47	32	30
Time Period	1Q2003 -3Q2014	4Q2006 - 3Q2014	2Q2007 – 3Q2014

Notes: 1) *z*-Statistics are in parentheses. 2) ***, ** and * imply the significance levels at 1%, 5% and 10% respectively. 3) Instruments used: Eq. 5.7: first and second lags of Π[TB3M] and Π[FB]; Eqs. 5.8 and 5.9: first and second lags of Π[TB3M], Π[FB] and Π[WSPIYOY].

Table 15 GMM Estimations for Π[IGB5YR_Q]

	Eq. 6.7	Eq. 6.8	Eq. 6.9
Constant	0.064	0.181***	0.132**
	(0.56)	(3.78)	(2.28)
Π[TB3M_Q]	0.361***	0.183***	0.143**
	(3.56)	(5.17)	(2.20)
Π[FB]	0.123**	0.158***	0.253***
	(2.59)	(4.31)	(2.68)
Π[WSPIYOY]	-	0.043	0.043
		(1.31)	(1.41)
Π[IPYOY]	-	-	-0.030
			(-1.16)
Hansen *J*	1.16	1.33	1.67
Obs.	47	32	30
Time Period	1Q2003 -3Q2014	4Q2006- 3Q2014	2Q2007- 3Q2014

Notes: 1) *z*-Statistics are in parentheses. 2) *** and ** imply the significance levels at 1% and 5% respectively. 3) Instruments used: Eq. 5.7: first and second lags of Π[TB3M] and Π[FB]; Eqs. 5.8 and 5.9: first and second lags of Π[TB3M], Π[FB] and Π[WSPIYOY].

Table 16 GMM Estimations for Π[IGB10YR_Q]

	Eq. 6.7	Eq. 6.8	Eq. 6.9
Constant	0.024	0.156***	0.127**
	(0.19)	(3.22)	(2.00)
Π[TB3M_Q]	0.308**	0.087**	0.037
	(3.56)	(2.16)	(0.56)
Π[FB_Q]	0.132**	0.181***	0.308***
	(2.17)	(4.48)	(3.24)
Π[WSPIYOY_Q]	-	0.057*	0.064**
		(1.75)	(2.14)
Π[IPYOY_Q]	-	-	-0.041
			(-1.62)
Hansen *J*	1.68	1.64	1.69
Obs.	47	32	30
Time Period	1Q2003 - 3Q2014	4Q2006 – 3Q2014	2Q2007- 3Q2014

Notes: 1) *z*-Statistics are in parentheses. 2) ***and ** imply the significance levels at 1% and 5% respectively. 3) Instruments used: Eq. 5.7: first and second lags of Π[TB3M] and Π[FB]; Eqs. 5.8 and 5.9: first and second lags of Π[TB3M], Π[FB] and Π[WSPIYOY].

Table 17 GMM Estimations for Π[IGB15YR_Q]

	Eq. 6.7	Eq. 6.8	Eq. 6.9
Constant	0.108	0.152***	0.114
	(1.09)	(2.84)	(2.00)
Π[TB3M_Q]	0.214*	0.056**	-0.042
	(1.88)	(2.58)	(-0.59)
Π[FBALANCE_Q]	0.109**	0.135***	0.325***
	(2.29)	(6.27)	(3.31)
Π[WSPIYOY_Q]	-	0.046***	0.071**
		(2.73)	(2.37)
Π[IPYOY_Q]	-	-	-0.064**
			(-2.26)
Hansen *J*	1.16	2.13	1.27
Obs.	47	32	30
Time Period	1Q2003 – 3Q2014	4Q2006Q4-2014Q3	2Q2007 – 3Q2014

Notes: 1) *z*-Statistics are in parentheses. 2) ***, ** and * imply the significance levels at 1%, 5% and 10% respectively. 3) Instruments used: Eq. 5.7: first and second lags of Π[TB3M] and Π[FB]; Eqs. 5.8 and 5.9: first and second lags of Π[TB3M], Π[FB] and Π[WSPIYOY].

Table 18 GMM Estimations for Π[IGB2YR]

	Eq. 6.7	Eq. 6.8	Eq. 6.9
Constant	0.031	-0.020	0.176***
	(0.35)	(-0.27)	(2.74)
Π[TB3M_Q]	0.603***	0.675***	0.525***
	(7.87)	(10.64)	(16.99)
Π[FBALANCE_Q]	0.122***	0.094**	-0.196
	(2.87)	(2.25)	(-1.25)
Π[CPIYOY_Q]	-	0.068*	-0.109*
		(1.77)	(-1.73)
Π[IPYOY_Q]	-	-	0.102**
			(2.15)
Hansen *J*	0.93	1.93	2.12
Obs.	47	47	30
Time Period	1Q2003 - 3Q2014Q3	1Q2003-3Q2014	2Q2007 – 3Q2014

Notes: 1) *z*-Statistics are in parentheses. 2) ***, ** and * imply the significance levels at 1%, 5% and 10% respectively. 3) Instruments used: Eq. 5.7: first and second lags of Π[TB3M] and Π[FB]; Eqs. 5.8 and 5.9: first and second lags of Π[TB3M], Π[FB] and Π[CPIYOY].

Table 19 GMM Estimations for Π[IGB5YR_Q]

	Eq. 6.7	Eq. 6.8	Eq. 6.9
Constant	0.064	0.062	0.192***
	(0.56)	(0.88)	(4.51)
Π[TB3M_Q]	0.361***	0.459***	0.245***
	(3.56)	(6.08)	(10.99)
Π[FBALANCE_Q]	0.123**	0.074***	-0.072
	(2.59)	(2.63)	(-0.68)
Π[CPIYOY_Q]	-	0.095***	-0.042
		(3.72)	(-1.08)
Π[IPYOY_Q]	-	-	0.067**
			(1.98)
Hansen *J*	1.16	2.13	2.25
Obs.	47	47	30
Timer Period	1Q2003-3Q2014	1Q2003-3Q2014	2Q2007-3Q2014

Notes: 1) *z*-Statistics are in parentheses. 2) *** and ** imply the significance levels at 1% and 5% respectively. 3) Instruments used: Eq. 5.7: first and second lags of Π[TB3M] and Π[FB]; Eqs. 5.8 and 5.9: first and second lags of Π[TB3M], Π[FB] and Π[CPIYOY].

Table 20 GMM Estimations for Π[IGB10YR_Q]

	Eq. 6.7	**Eq. 6.8**	**Eq. 6.9**
Constant	0.024	0.018	0.182***
	(0.19)	(0.27)	(2.86)
Π[TB3M_Q]	0.308**	0.384***	0.191***
	(3.56)	(3.49)	(9.03)
Π[FBALANCE_Q]	0.132**	0.182**	-0.065
	(2.17)	(2.45)	(-0.63)
Π[CPIYOY_Q]	-	0.109***	-0.024
		(3.50)	(-0.56)
Π[IPYOY_Q]	-	-	0.069**
			(2.04)
Hansen *J*	1.68	3.21	2.49
Obs.	47	47	30
Time Period	1Q2003 – 3Q2014	1Q2003Q1-3Q2014	2Q2007- 3Q2014

Notes: 1) *z*-Statistics are in parentheses. 2) ***and ** imply the significance levels at 1% and 5% respectively. 3) Instruments used: Eq. 5.7: first and second lags of Π[TB3M] and Π[FB]; Eqs. 5.8 and 5.9: first and second lags of Π[TB3M], Π[FB] and Π[CPIYOY].

Table 21 GMM Estimations for Π[IGB15YR_Q]

	Eq. 6.7	**Eq. 6.8**	**Eq. 6.9**
Constant	0.108	0.043	0.115
	(1.09)	(0.53)	(1.56)
Π[TB3M_Q]	0.214*	0.341***	0.153***
	(1.88)	(3.91)	(5.67)
Π[FBALANCE_Q]	0.109**	0.065***	0.080
	(2.29)	(3.17)	(0.86)
Π[CPIYOY_Q]	-	0.095***	0.038
		(3.45)	(0.89)
Π[IPYOY_Q]	-	-	0.009
			(0.30)
Hansen *J*	1.16	2.82	2.35
Obs.	47	47	30
Time Period	1Q2003 -3Q2014	1Q2003 - 3Q2014	2Q2007 - 3Q2014

Notes*:* 1) *z*-Statistics are in parentheses. 2) ***, ** and * imply the significance levels at 1%, 5% and 10% respectively. 3) Instruments used: Eq. 5.7: first and second lags of Π[TB3M] and Π[FB]; Eqs. 5.8 and 5.9: first and second lags of Π[TB3M], Π[FB] and Π[WSPIYOY].

Hansen criteria are met for almost all equations. This means the null hypothesis that the instrument variables are uncorrelated with the error terms and are exogenous is not rejected. This corroborates the validity of the instruments used in the models. The coefficients of short-term interest rates, proxied by changes in rates in T-bills of 3-month and 6-month tenors, are always found to be positive and statistically significant at the 1% level. The magnitude of the coefficient of this variable becomes smaller as the tenors of the government bond rise. These results suggest that the nominal yields of long-term IGBs are strongly influenced by short-term interest rates. The coefficient for the year-over-year changes in inflation is not significant. The coefficient of the change in the growth of industrial production is significant. This variable is mostly significant at least at the 5% level, whenever it is included in the equation. The size of this variable lies approximately between 0.02 to 0.03. This implies that changes in the nominal yields of long-term IGBs are fairly sensitive to changes in the growth of industrial production, but are insensitive to changes in inflation. The GMM results of the monthly models reinforce the benchmark findings of the OLS estimations.

The results from the quarterly models show that the coefficients of the change in fiscal balance are either positive and statistically significant in equations 6.7 and 6.8, or in Equation 6.9, positive and significant when the change in wholesale price inflation is used as a control, and/or negative when the change in consumer price inflation is used as a control. The findings imply that fiscal deficits do not raise IGBs' nominal yields. These results are contrary to the conventional wisdom of mainstream literature (such as Baldacci and Kumar 2010, Gruber and Kamin 2012, Lam and Tokuoka 2011, Poghosyan 2012, and Tokuoka 2012) which maintains that, other things held constant, the deterioration of fiscal balance (that is, higher fiscal deficits) generally raises government bonds' nominal yields. But the results obtained here are consistent with the view that higher (lower) government spending leads to increased (decreases) reserve positions, which could cause government bonds' nominal yields to decline (rise), unless the central bank actively undertakes defensive actions to offset the downward (upward) effects of increased (decreased) government spending on interest rates.

SECTION VII: CONCLUSION

The findings of this paper suggest that Keynes's conjectures about the determinants of long-term interest rates are valid in emerging markets, such as India. In particular, it shows that changes in the long-term IGBs' nominal yields are associated with changes in short-term interest rates, the rates of inflation, and the rates of growth as represented by industrial production. Monetary sovereignty gives the Reserve Bank of India (RBI) the ability to control short-term interest rates and the Government of India the operational ability to service its sovereign debt issued in Indian rupees, the national currency. Changes in short-term interest rates are the main drivers of changes in long-term IGBs' nominal yields, while changes in the rates of inflation and the rates of growth also affect government bond yields. Higher fiscal deficits do not exert upward pressure on IGBs' nominal yields. Keynesian conjectures that short-term interest rates rule the roost, after controlling for a host of relevant variables, appears to hold not just in advanced countries, such as Japan (Akram and Das 2014a and 2014b, and Akram 2014), but also in emerging economies, such as India. The empirical findings of this paper, in conjunction with the understanding of modern tax-driven money (Wray 2003 and 2012; Tcherneva 2011), recent developments in mainstream monetary theory (Sims 2013a and 2013b; Woodford 2001) and the analysis of actual operations of central banking (Bindseil 2004 and Fullwiler 2008), lend further credence to Keynes's insightful conjectures about the drivers of long-term interest rates in the real world, characterized by ontological uncertainty, and suggests that his views hold, not only in advanced countries, but also in emerging economies like India.

References

Akram, T. (2014). "The Economics of Japan's Stagnation," *Business Economics* **49**(3): 156-175.

Akram, T. and Das, A. (2014a). "Understanding the Low Yields of the Long-Term Japanese Sovereign Debt," *Journal of Economic Issues* **48**(2): 331-340.

Akram, T. and Das, A. (2014b). "The Determinants of Long-Term Japanese Government Bonds' Low Nominal Yields," Levy Economics Institute Working Paper No. 818 (October). http://www.levyinstitute.org/pubs/wp_818.pdf

Arrow, K.J. (1951). *Social Choice and Individual Values*. New York, NY: Wiley.

_____ (1986). "Rationality of Self and Others in an Economic System," *The Journal of Business* **59**(4): (October) S385-S399.

_____ (1994). "Methodological Individualism and Social Knowledge," *American Economic Review*, **84**(2): (May) 1–9

Baldacci, E. and Kumar, M. (2010). "Fiscal Deficits, Public Debt, and Sovereign Bond Yields," IMF Working Paper 10/184. http://www.imf.org/external/pubs/ft/wp/2010/wp10184.pdf (accessed May 29, 2014).

Baum, C.F., Schaffer, M.E., and Stillman, S. (2003). "Instrumental Variables and GMM: Estimation and Testing," *The Stata Journal* **3**(1): 1-31.

Bindseil, U. (2004). *Monetary Policy Implementation: Theory, Past, and Present*. Oxford and New York: Oxford University Press.

Chakrabarti, R. (2010). "Bond Markets" in Rajesh Chakrabarti and Sankar De, (edited). *Capital Markets in India*. New Delhi, India: Response Books.

Dickey, D.A.; and Fuller, W.A. (1979). "Distribution of the Estimators for Autoregressive Time Series with a Unit Root," *Journal of the American Statistical Association* **74**(366): (June) 427-431.

Dickey, D.A. and Fuller, W.A. (1981). "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root," *Econometrica* **49**(4): (July) 1057-1072.

Foley, D.K. (1998). "Introduction" in Peter S. Albin's *Barriers and Bounds to Rationality*. Princeton, NJ: Princeton University Press.

Fullwiler, S. (2008). "Modern Central Bank Operations: The General Principles," http://ssrn.com/abstract=1658232 (accessed May 29, 2014).

Government of India, various years. *Public Debt Management Report*. New Delhi, India: Ministry of Finance, Government of India. http://www.finmin.nic.in/reports/Public_Debt_Management.asp

Greene, W.H. (2003). *Econometric Analysis*, Fifth edition. Upper Saddle River, NJ: Prentice Hall.

Gruber, J.W., and Kamin, S.B. (2012). "Fiscal Positions and Government Bond Yields in OECD Countries," *Journal of Money, Credit, and Banking* **44**(8): 1563-1587.

Hansen, L.P. (1982). "Large Sample Properties of Generalized Method of Moments Estimators," *Econometrica* **50**(4): 1029-1054.

Keynes, J.M. (1930). *A Treatise on Money, Vol. II: The Applied Theory of Money*. London, U.K.: Macmillan.

_____ (2007 [1936]). *The General Theory of Employment, Interest, and Money*. New York, NY: Palgrave Macmillan.

Kregel, J. (2011). "Was Keynes' Monetary Policy *À Outrance* in the Treatise, A Forerunner of ZIRP and QE? Did He Change his Mind in the *General Theory*?", Levy Economics Institute, Policy Note, No. 4. http://www.levyinstitute.org/pubs/pn_11_04.pdf (accessed May 29, 2014).

Lam, R.W. and Tokuoka, K. (2011). "Assessing the Risks to the Japanese Government Bond (JGB) Market," IMF Working Paper 11/292. http://www.imf.org/external/pubs/ft/wp/2011/wp11292.pdf (accessed May 29, 2014).

Phillips, Peter C.B. and Perron, P. (1988). "Testing for a Unit Root in Time Series Regression," *Biometrika* **75**(2): (June) 335-346.

Poghosyan, T. (2012). "Long-Run and Short-Run Determinants of Sovereign Bond Yields in Advanced Economies," IMF Working Paper 12/271. http://www.imf.org/external/pubs/ft/wp/2012/wp12271.pdf (accessed May 29, 2014).

Riefler, W.W. (1930). *Money Rates and Money Markets in the United States*. New York and London: Harper & Brothers.

Reserve Bank of India (2009). *Fiscal Monetary Coordination: Report on Currency and Finance 2009 -12*. Mumbai, India: Reserve Bank of India.

Reserve Bank of India (2014). "Government Securities Market in India — A Primer." http://rbi.org.in/scripts/FAQView.aspx?Id=79

Reserve Bank of India (2014b). Reserve Bank of India Annual Report. Mumbai, India: Reserve Bank of India.

Schwartz, H. (1998). *Rationality Gone Awry? Decision Marking Inconsistent with Economic and Financial Theory*. West Port, CT: Praeger.

Simon, H.A. (1957). *Models of Man: Social and Rational*. New York: Wiley.

_____ (1978). "Rationality as Process and as Product of Thought," *American Economic Review* **68**(2): (May) 1-16.

_____ (1984). "On the Behavioral and Rational Foundations of Economic Dynamics," *Journal of Economic Behavior and Organization* **5**(1): (March) 35-55.

Sims, C. (2013a). "Paper Money," American Economic Association Presidential Lecture, http://sims.princeton.edu/yftp/PaperMoney/PaperMoneySlides.pdf (accessed Mar 23, 2013).

_____ (2013b). "Paper Money," *American Economic Review* **103**(2): (April) 563-584.

Tcherneva, P.R. (2011). "Bernanke's Paradox: Can He Reconcile His Position on the Federal Budget with His Recent Charge to Prevent Deflation?" *Journal of Post Keynesian Economics* **33**(3): (April) 411-434.

Tokuoka, K. (2012). "Intergenerational Implications of Fiscal Consolidation in Japan," IMF Working Paper No. 12/197. http://www.imf.org/external/pubs/ft/wp/2012/wp12197.pdf (accessed May 29, 2014).

Thomson Reuters EcoWin, various years. Thomson Reuters EcoWin, subscription service (accessed October 1, 2014).

Tymoigne, E. (2013). "Public Debt and Monetary Sovereignty in the US: Myths and Realities," presented at the Allied Social Science Associations' annual meeting, January 4-6.

Veneroso, F. (2014). "Bubble Valuation? Do We Have a Stock Market Bubble Again?" presented at the 23rd Annual Hyman P. Minsky Conference, April 9-10.

Woodford, M. (2001). "Fiscal Requirements for Price Stability," *Journal of Money, Credit and Banking* 33(3): (August) 669-728.

Wray, L.R. (2003). *Understanding Modern Money: The Key to Full Employment and Price Stability*. Cheltenham, UK; Northampton, MA: Edward Elgar.

_____ (2012). *Modern Money Theory: A Primer on Macroeconomics for Sovereign Monetary Systems*. New York, NY: Palgrave Macmillan.

Yanamandra, S. (2014). "Minsky, Monetary Policy and Mint Street: Challenges for the Art of Monetary Policymaking in Emerging Economies," Levy Economics Institute Working Paper No. 820 (November). http://www.levyinstitute.org/pubs/wp_820.pdf

APPENDIX A: SCATTER PLOTS OF THE RELATIONSHIP BETWEEN 3-MONTH INDIAN TREASURY BILLS' RATES AND IGBS' NOMINAL YIELDS

The successive scatter plots, figures A1a and A1b, figures A2a and A2b, figures A3a and A3b, figures A4a and A4b, figures A5a and A5b, figures A6a and A6b, figures A7a and A7b, figures A8a and A8b, figures A9a and A9b, and figures A10a and A10b, respectively, depict the following: (1) the relationship between the IGBs' nominal yields respectively of 3-year, 4-year, 5-year, 6-year, 7-year, 8-year, 9-year, 10-year, and 15-year maturities, and the three-month Indian Treasury bills' rates; and (2) the relationship between the percentage point changes, year over year, in the nominal yields of IGBs of the above tenors and the percentage point changes, during the same period, in the three-month Indian Treasury bills' rates.

Figure A1a The Yields of 3-year Indian Government Bonds and 3-month Indian Treasury Bill Rates

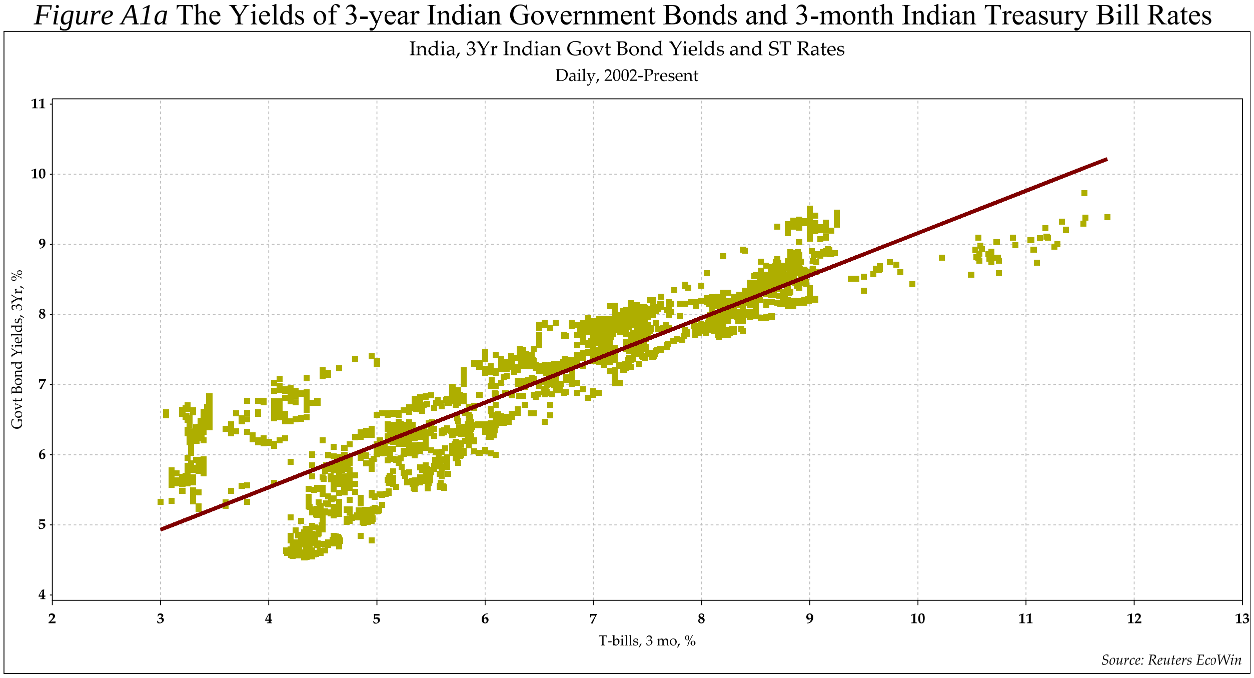


Figure A1b The Percentage Point Changes, Year over Year, in the Yields of 3-year Indian Government Bonds and the Percentage Point Changes, during the Same Period, in 3-month Indian Treasury Bill Rates

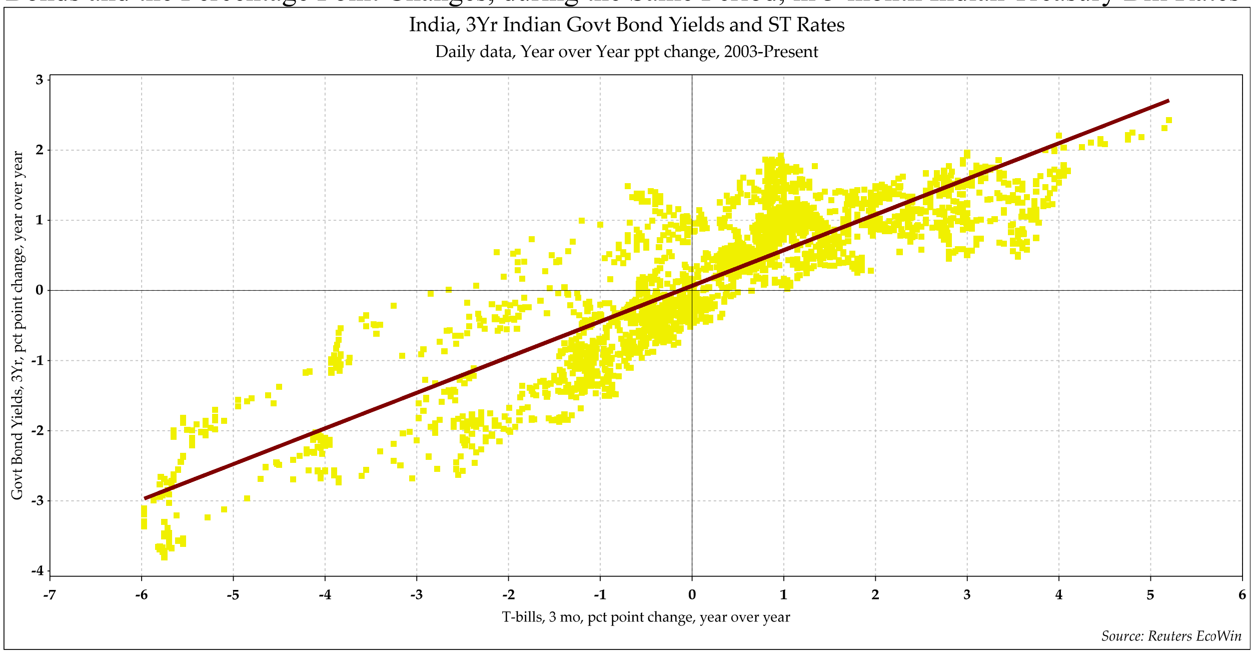


Figure A2a The Yields of 4-year Indian Government Bonds and 3-month Indian Treasury Bill Rates

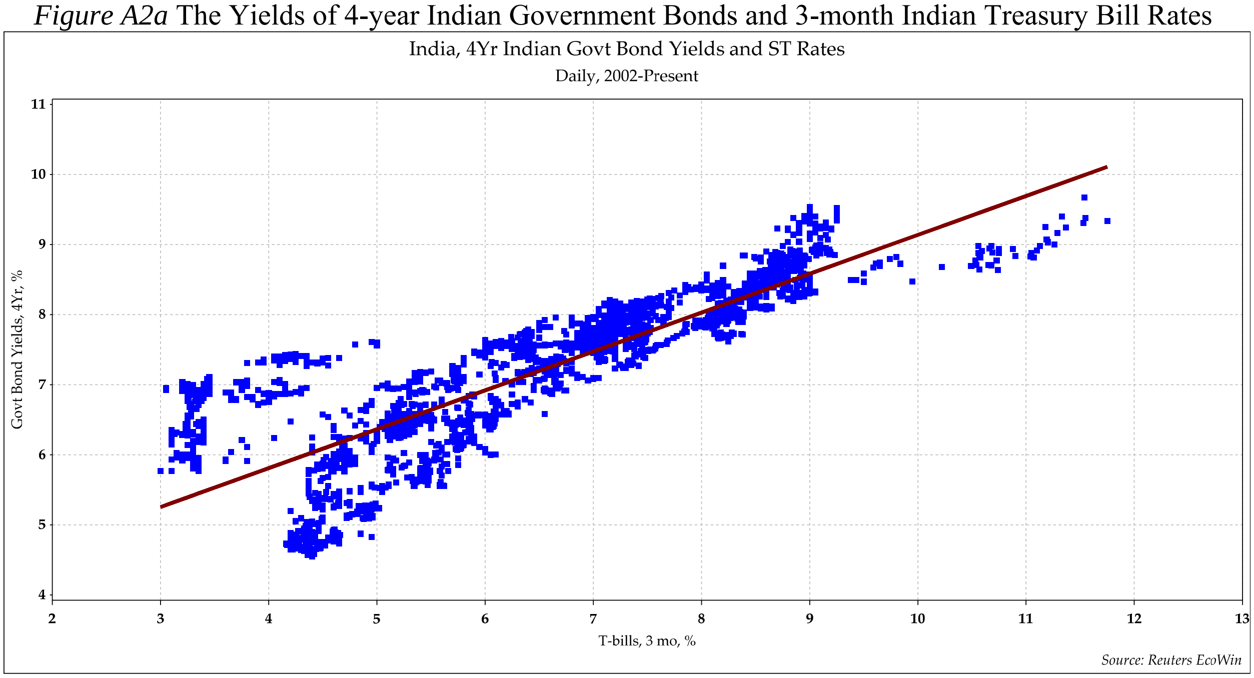


Figure A2b The Percentage Point Changes, Year over Year, in the Yields of 4-year Indian Government Bonds and the Percentage Point Changes, during the Same Period, in 3-month Indian Treasury Bill Rates

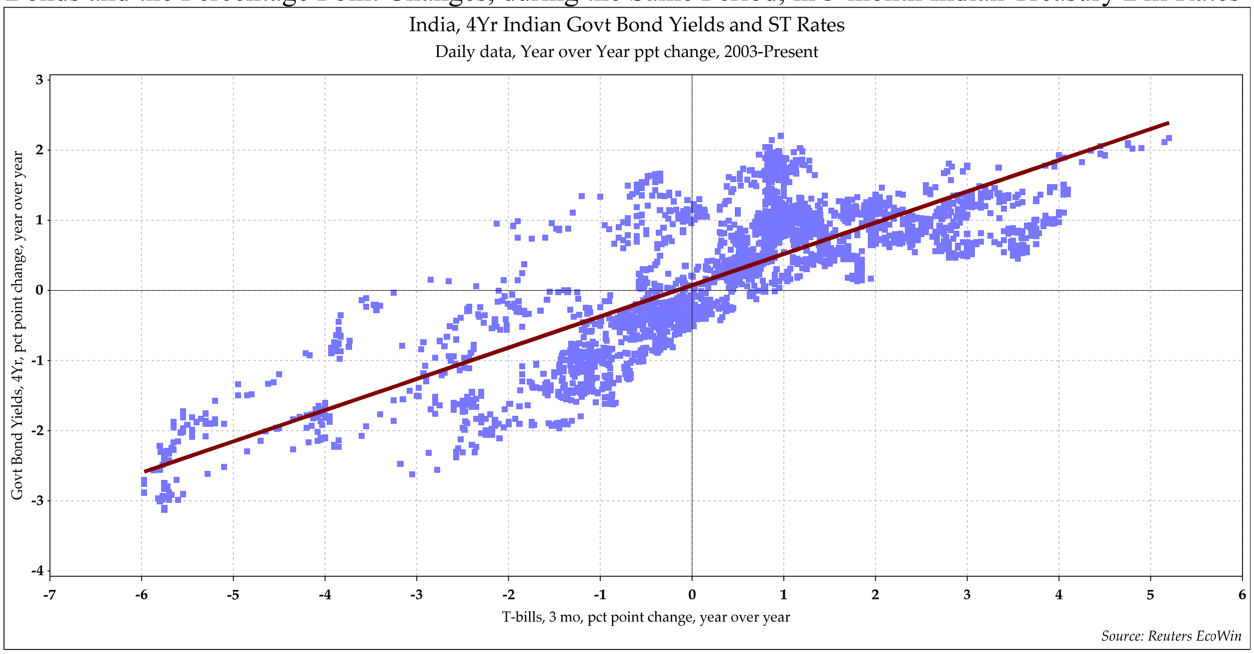


Figure A3a The Yields of 5-year Indian Government Bonds and 3-month Indian Treasury Bill Rates

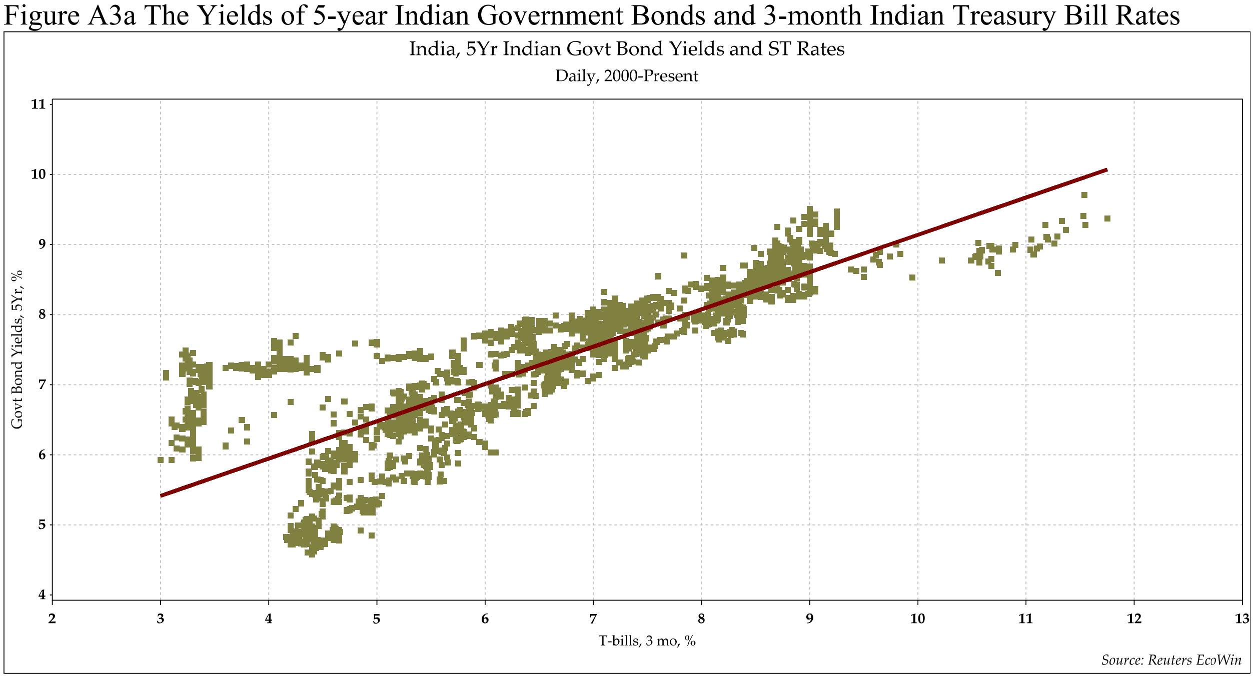


Figure A3b The Percentage Point Changes, Year over Year, in the Yields Of 5-year Indian Government Bonds and the Percentage Point Changes, during the Same Period, in 3-month Indian Treasury Bill Rates

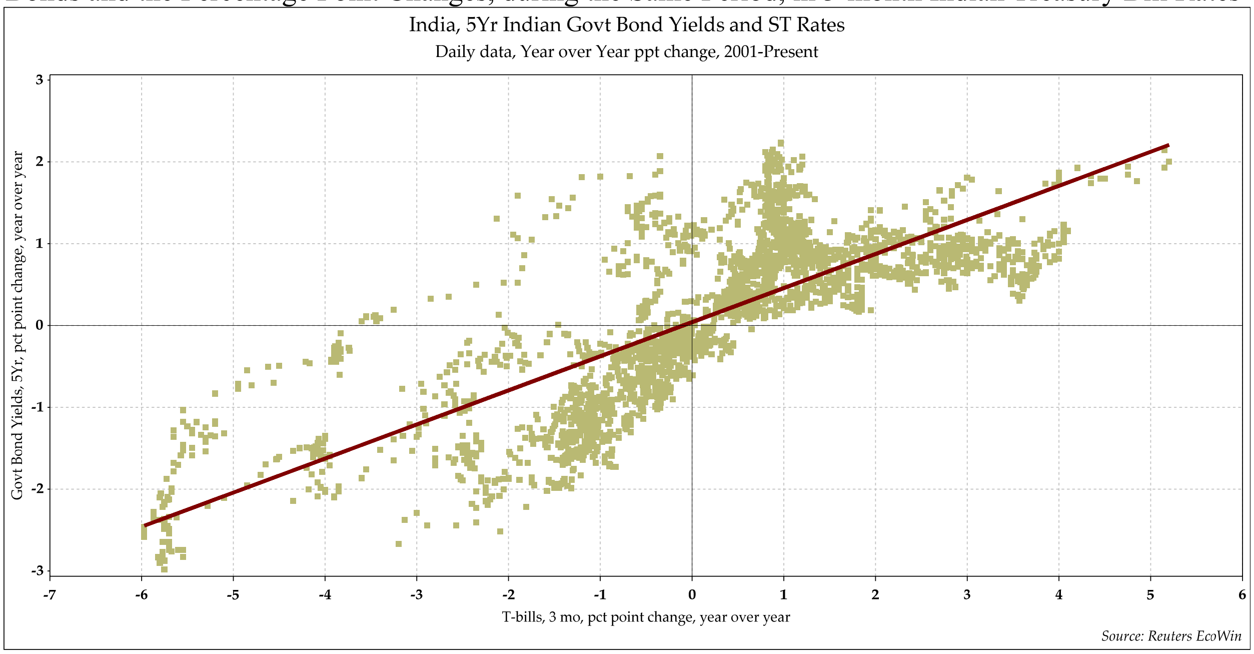
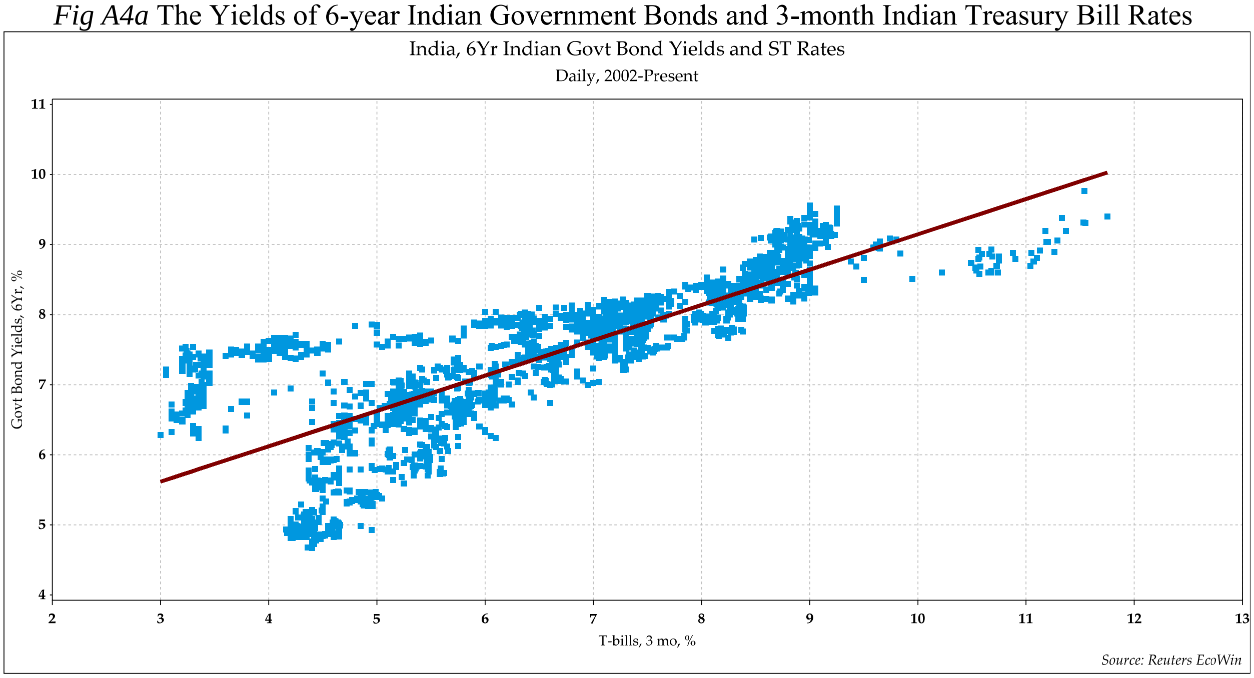


Fig A4a The Yields of 6-year Indian Government Bonds and 3-month Indian Treasury Bill Rates



\

Figure A4b The Percentage Point Changes, Year over Year, in the Yields of 6-year Indian Government Bonds and the Percentage Point Changes, during the Same Period, in 3-month Indian Treasury Bill Rates

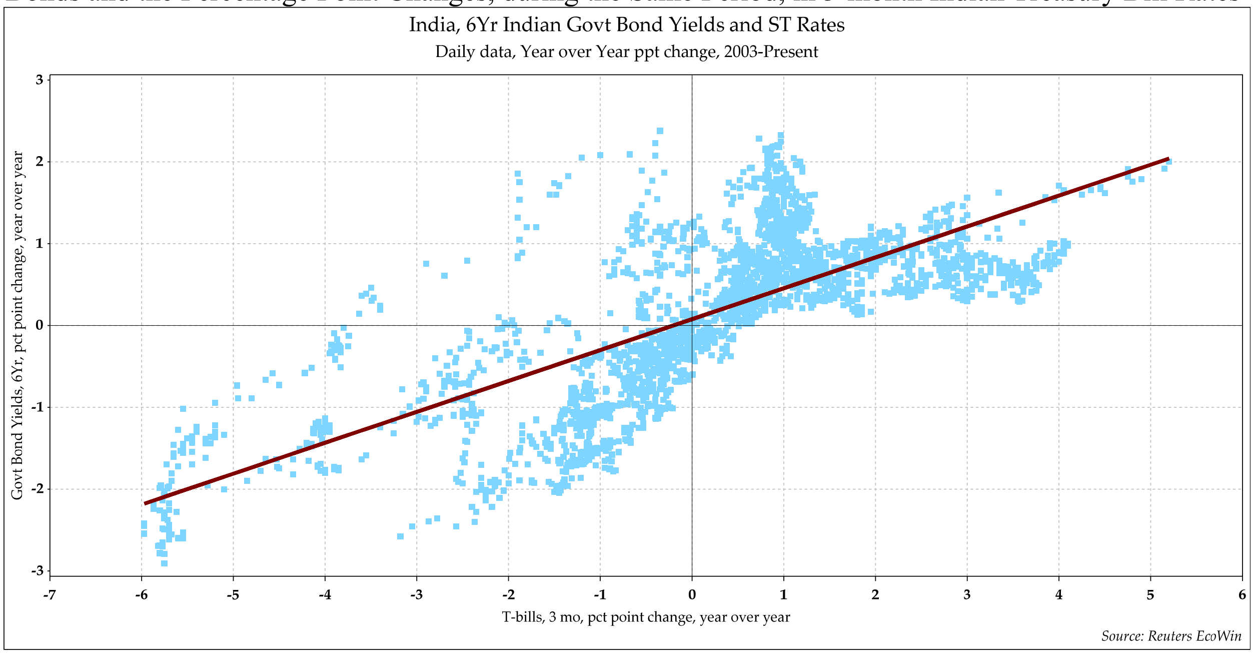


Figure A5a The Yields of 7-year Indian Government Bonds and 3-month Indian Treasury Bill Rates

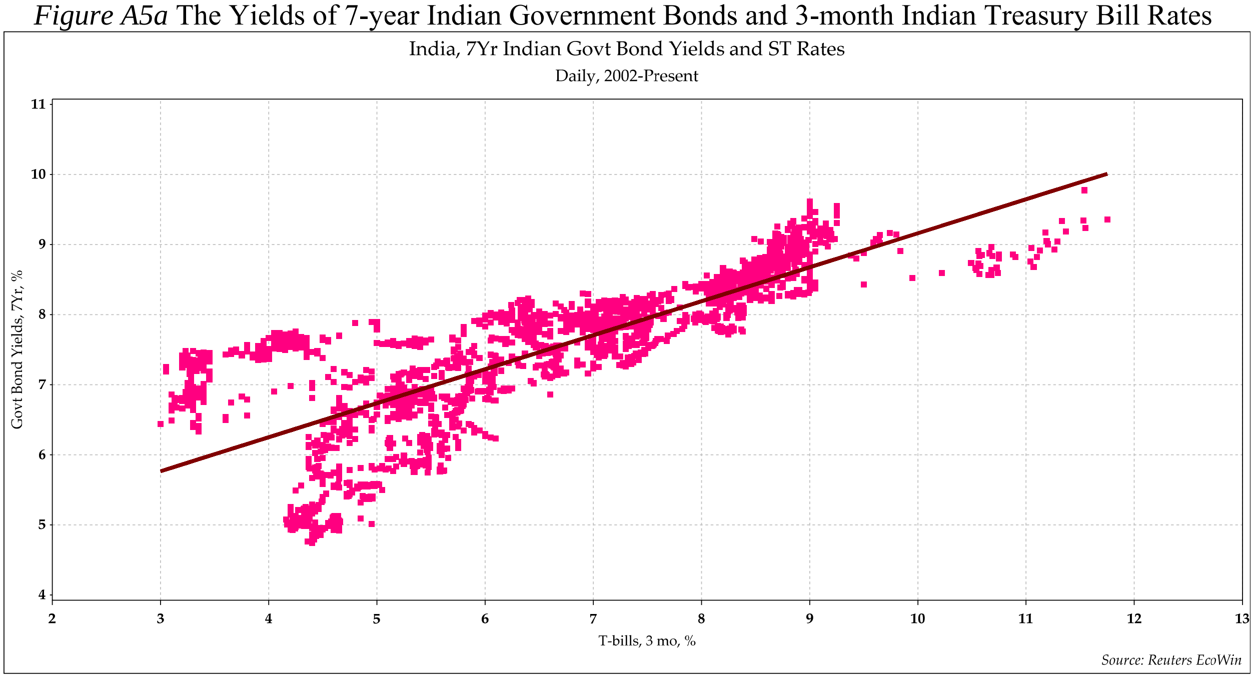


Figure A5b The Percentage Point Changes, Year over Year, in the Yields of 7 Year Indian Government Bonds and The Percentage Point Changes, during the Same Period, in 3-month Indian Treasury Bill Rates

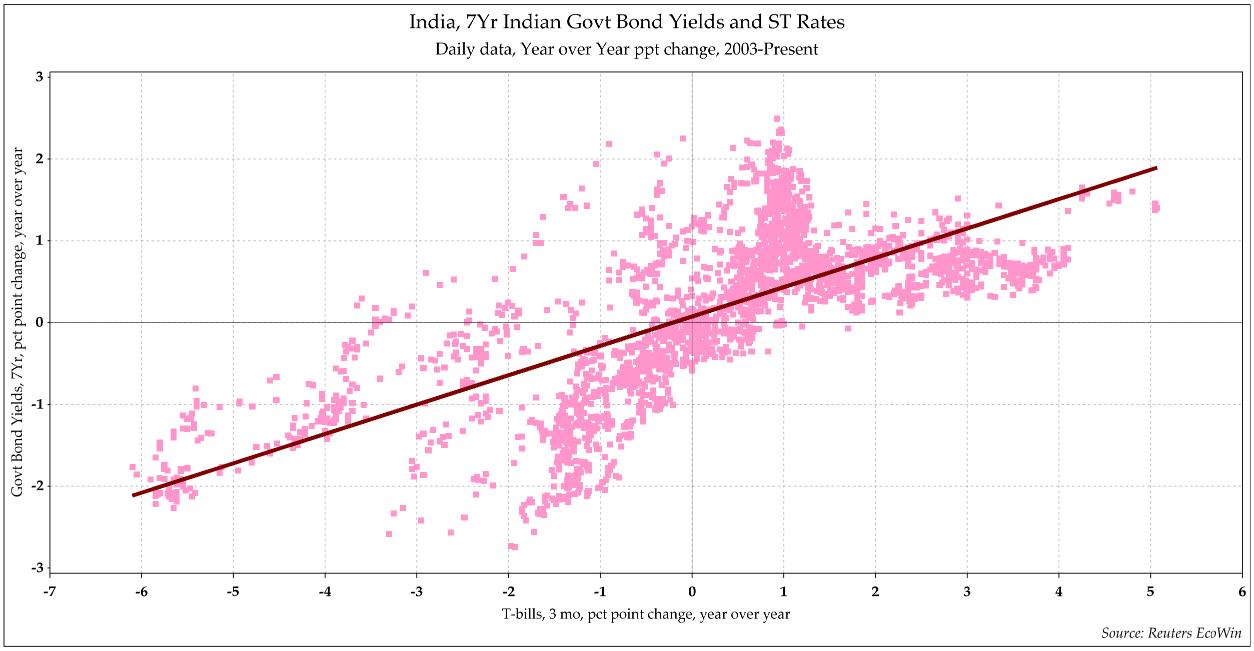


Figure A6a The Yields of 8-year Indian Government Bonds and 3-month Indian Treasury Bill Rates

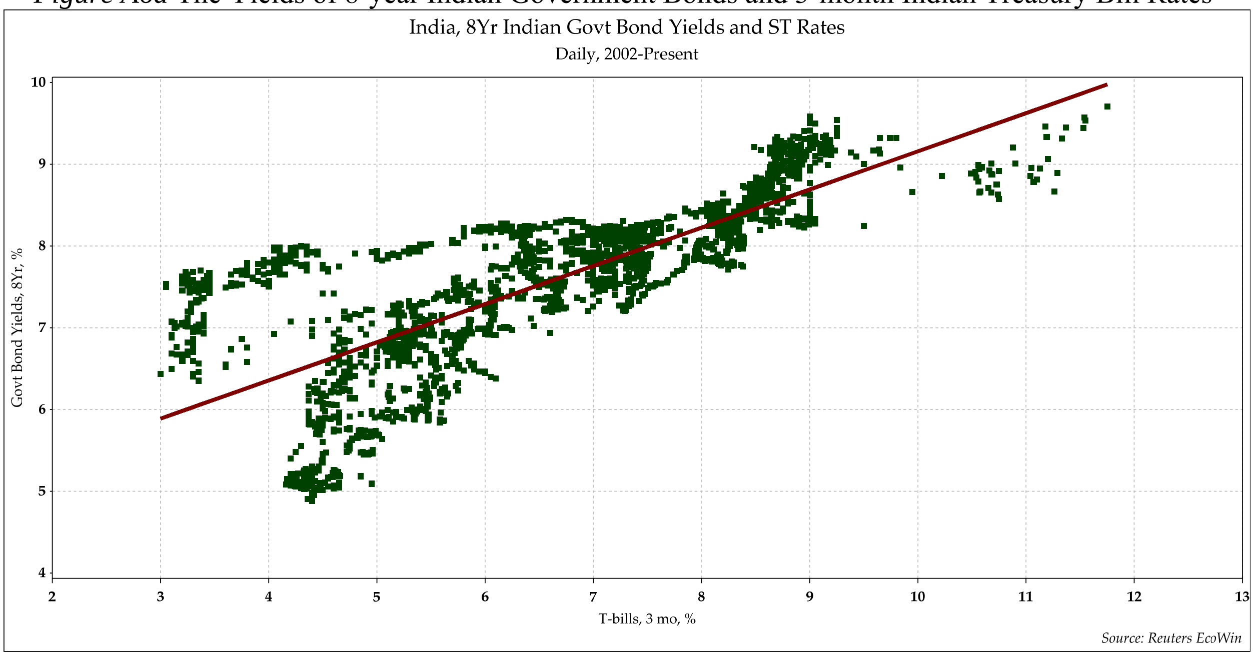


Figure A6b The Percentage Point Changes, Year over Year, in the Yields of 8-year Indian Government Bonds and the Percentage Point Changes, during the Same Period, in 3-month Indian Treasury Bill Rates

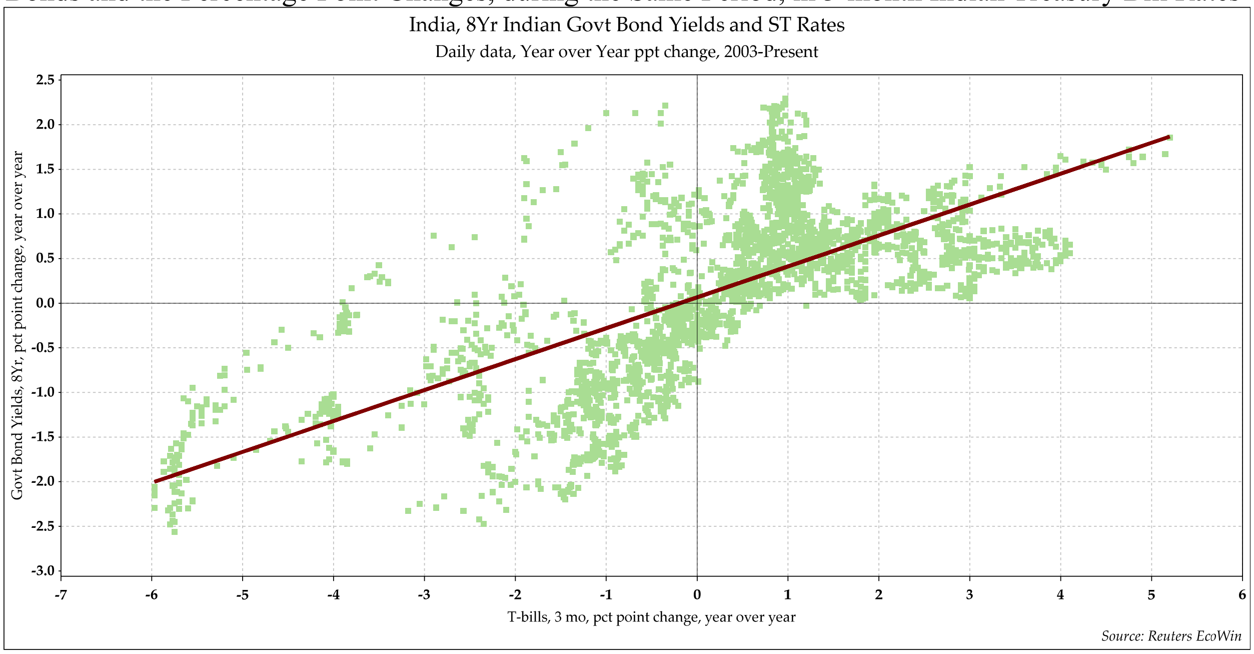


Figure A7a The Yields of 9-year Indian Government Bonds and 3-month Indian Treasury Bill Rates

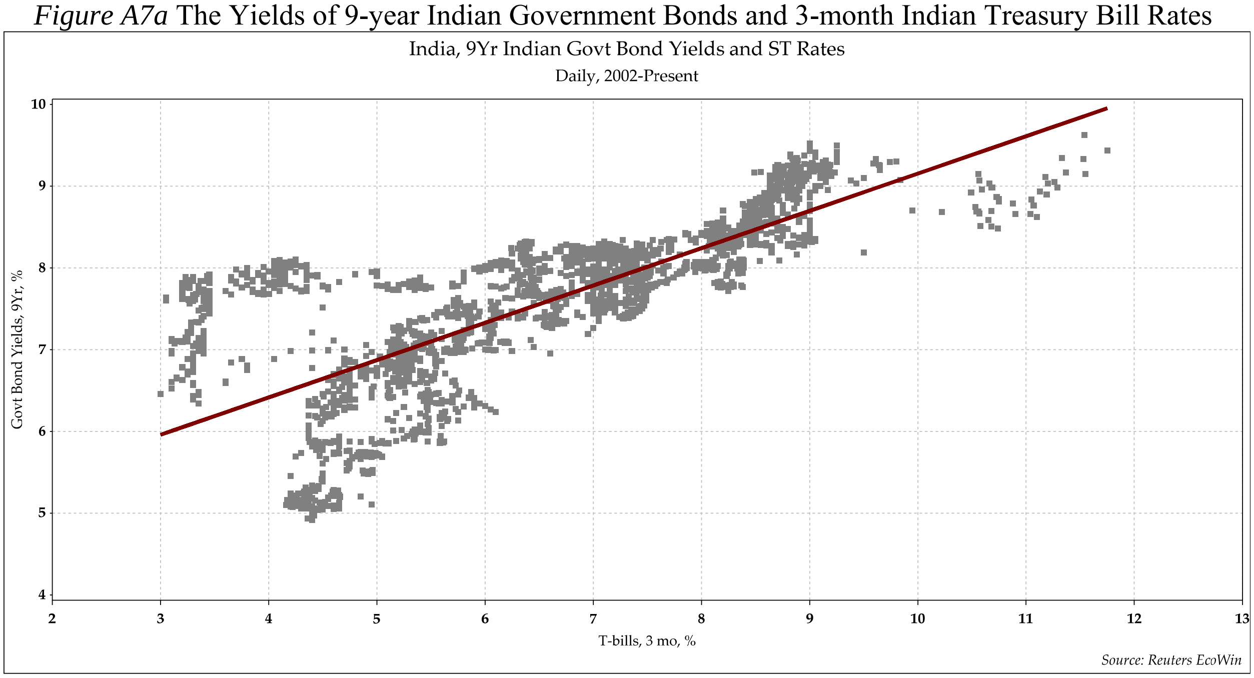


Figure A7b The Percentage Point Changes, Year over Year, in the Yields of 9-year Indian Government Bonds and the Percentage Point Changes, during the Same Period, in 3-month Indian Treasury Bill Rates

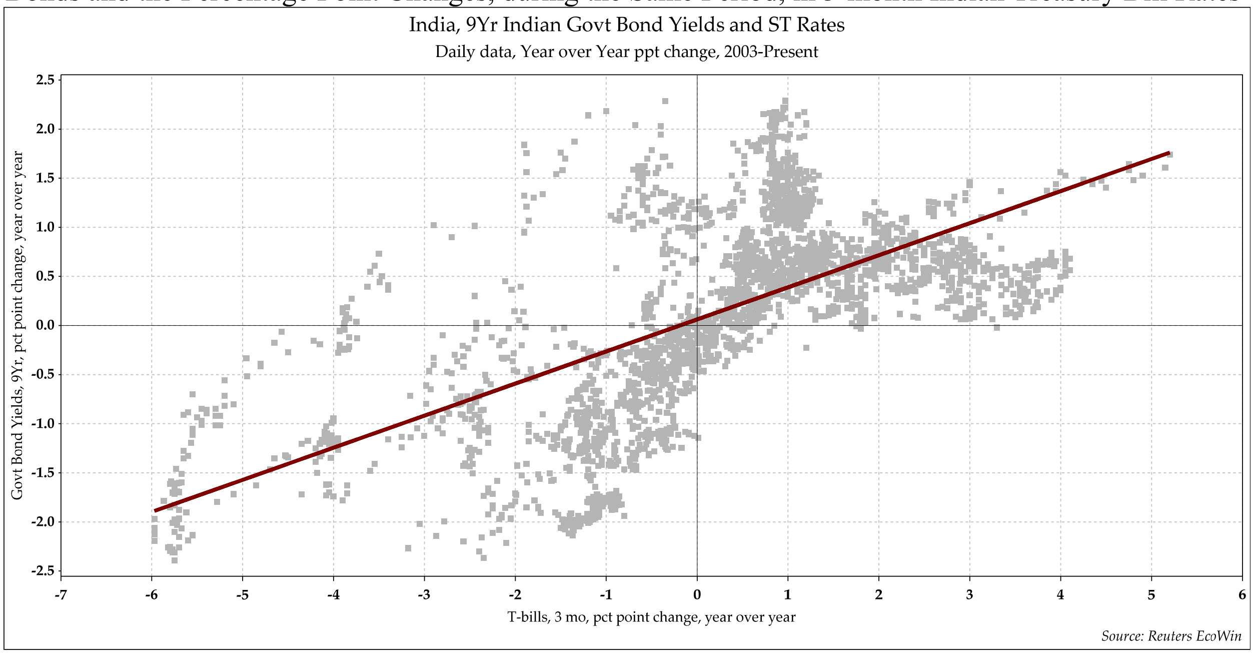


Figure A8a The Yields of 10-year Indian Government Bonds and 3-month Indian Treasury Bill Rates

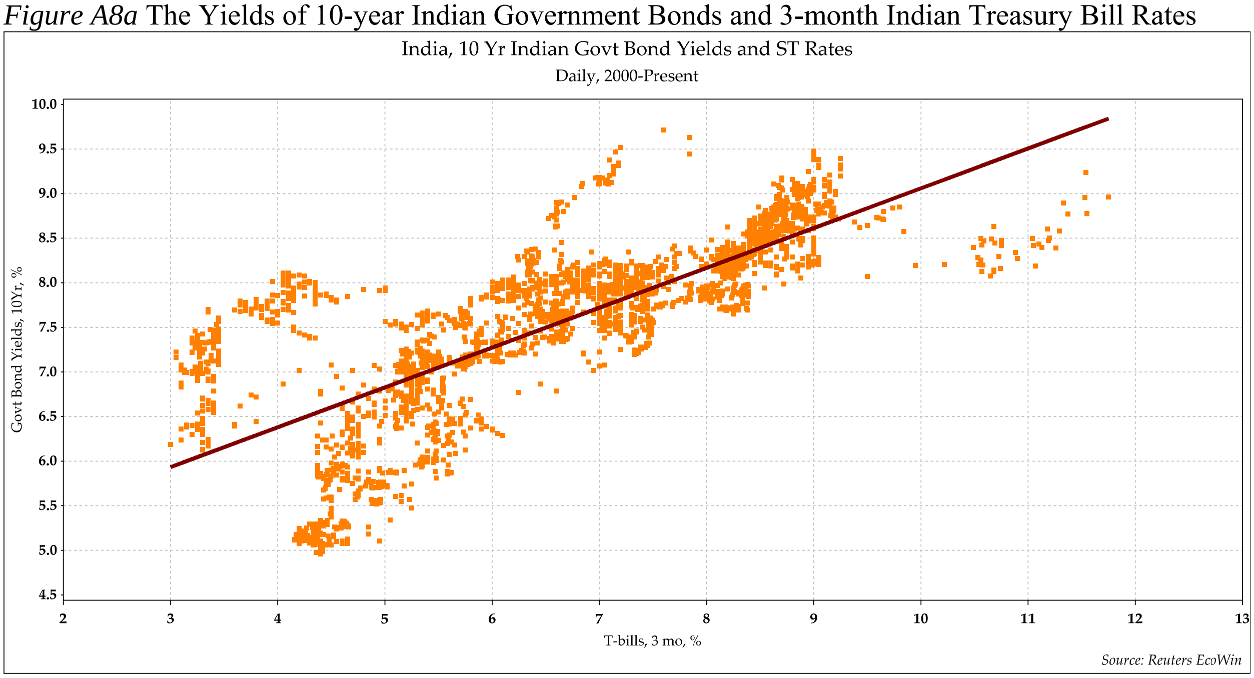


Figure A8b The Percentage Point Changes, Year over Year, in the Yields of 10-year Indian Government Bonds and the Percentage Point Changes, during the Same Period, in 3-month Indian Treasury Bill Rates

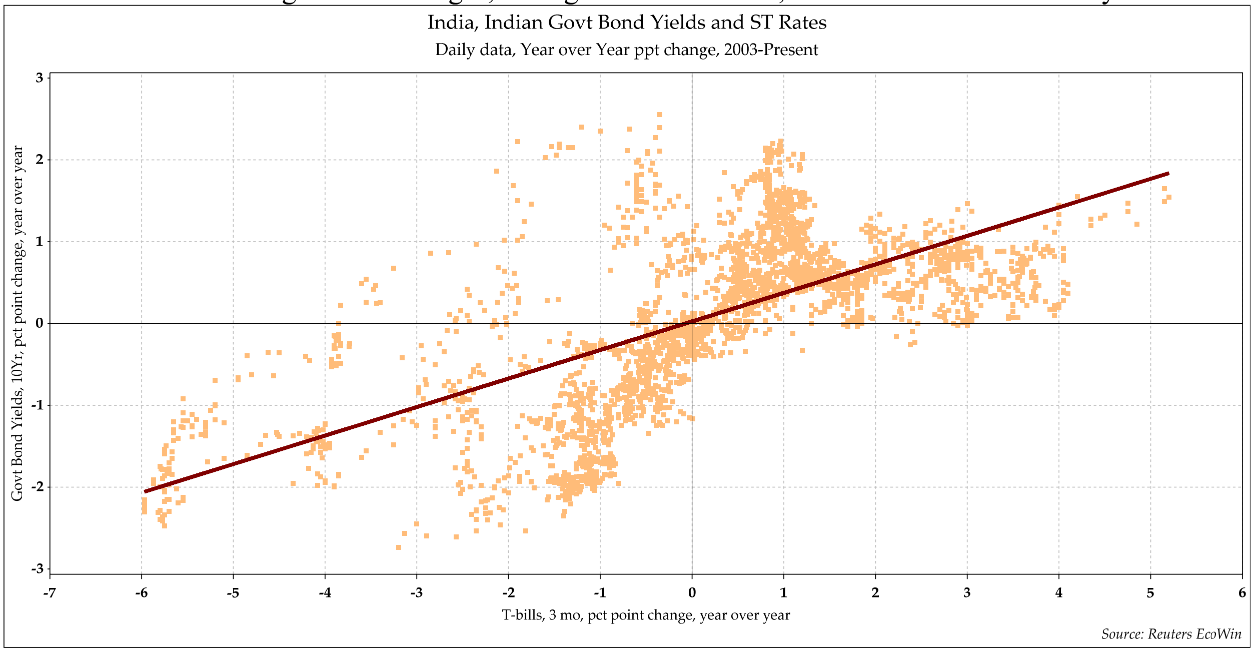


Figure A9a The Yields of 10-year Indian Government Bonds and 3-month Indian Treasury Bill Rates

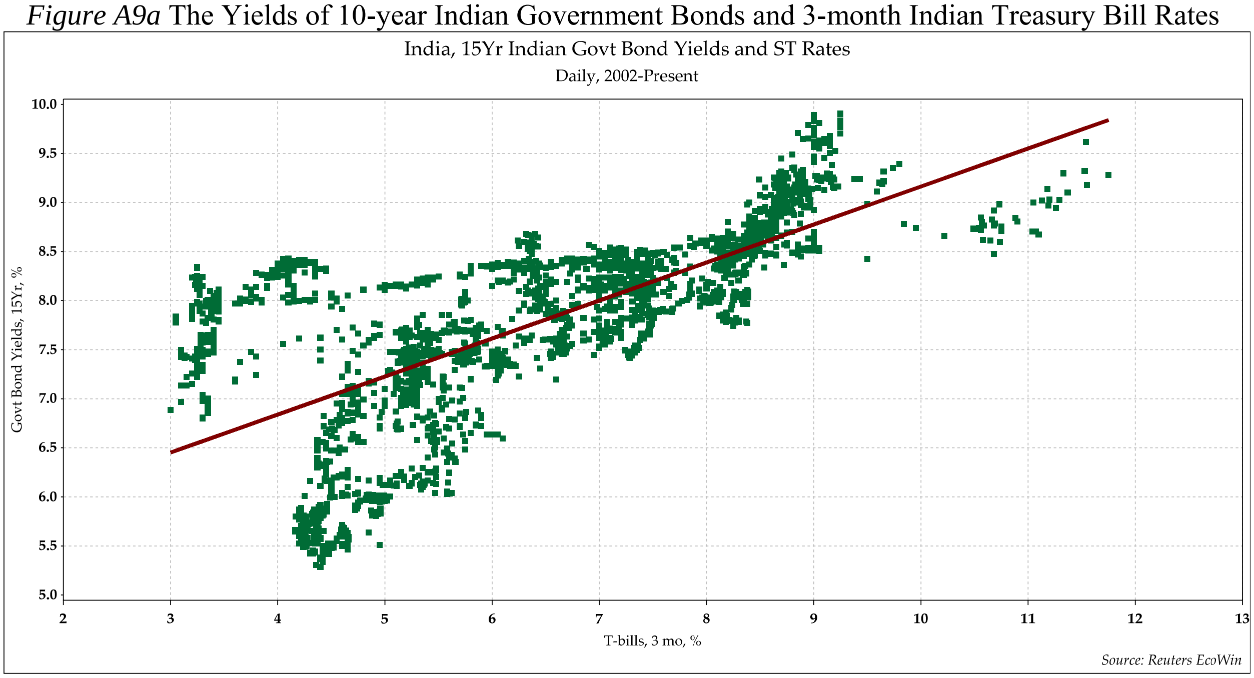
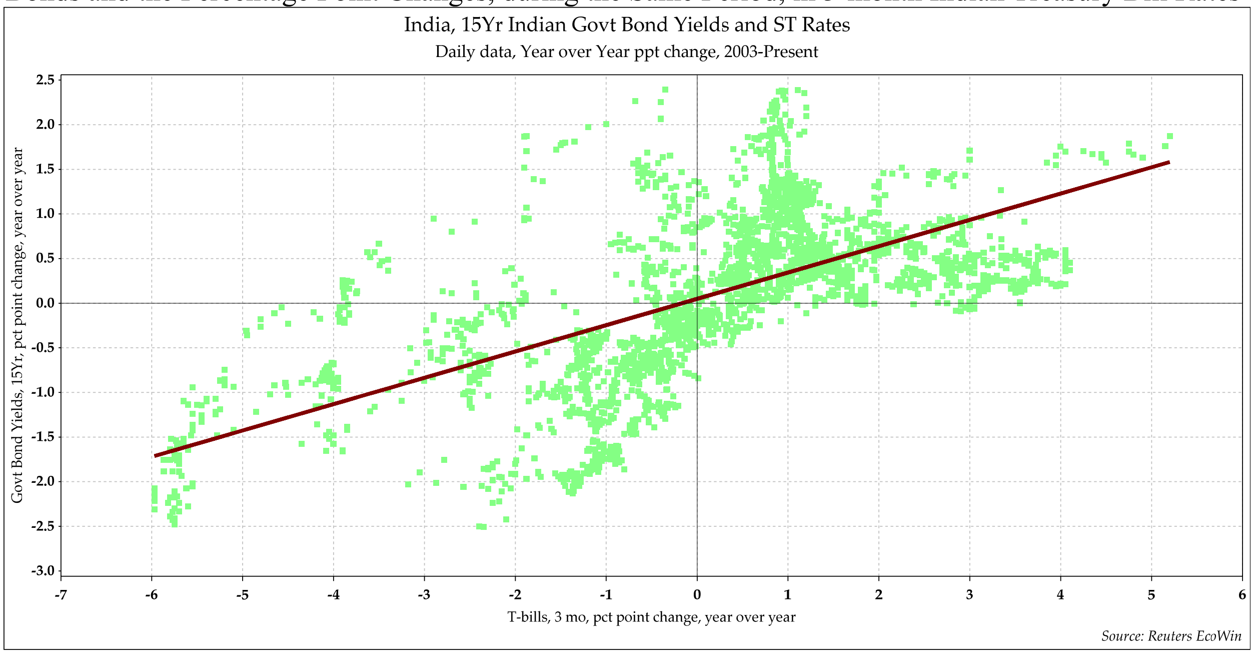


Figure A9b The Percentage Point Changes, Year over Year, in the Yields of 10-year Indian Government Bonds and the Percentage Point Changes, during the Same Period, in 3-month Indian Treasury Bill Rates



APPENDIX B: OLS REGRESSION RESULTS

The OLS regression results are presented in this appendix (see tables B1–B10). Equations B1, B2, and B3 use the change in three-month Treasury bills rate as the change in short-term interest rates, whereas equations B4, B5 and B6 use the change in six-month Treasury bills rate. Equations B1 and B2 use only the change in short-term interest rates as the sole explanatory variable. Equations B2 and B4 use two explanatory variables, namely, the change in short-term interest rates and the change in the rate of inflation. Equations B3 and B6 use three explanatory variables, namely, the change in short-term interest rates, the change in the rate of inflation, and the change in the year-over-year growth of industrial production. It is evident from the results that the coefficients of the changes in short-term interest rates are always positive and statistically significant at the 1% level. Year-over-year changes in the growth of industrial production are significant, but changes in the rate of inflation are not.

Table B1 OLS Estimations for Ω(GB2YR)

	Eq. B1	**Eq. B2**	**Eq. B3**	**Eq. B4**	**Eq. B5**	**Eq. B6**
Constant	0.026 (0.61)	0.005 (0.13)	0.057 (1.20)	0.017 (0.48)	-0.003 (-0.09)	0.038 (0.98)
Ω(TB3M)	0.637*** (24.37)	0.659** (23.61)	0.575*** (20.59)	-	-	-
Ω(TB6M)	-	-	-	0.696*** (30.65)	0.718*** (29.97)	0.639*** (25.45)
Ω(CPIYOY)	-	0.037** (2.02)	-0.010 (-0.68)	-	0.038** (2.57)	0.001 (0.12)
Ω(IPYOY)	-	-	0.035*** (6.03)	-	-	0.025*** (5.16)
***R*-Squared**	0.85	0.86	0.92	0.90	0.91	0.95
Obs.	145	144	88	145	144	88
Time Period	Sep 2002- Sep 2014	Sep 2002- Aug 2014	Apr 2007- Jul 2014	Sep 2002- Sep 2014	Sep 2002- Aug 2014	Apr 2007- Jul 2014

Notes: 1) *t*-Statistics are in parentheses. 2) *** and ** imply the significance levels at 1% and 5% respectively.

Table B2 OLS Estimations for Ω(GB3YR)

	Eq. B1	Eq. B2	Eq. B3	Eq. B4	Eq. B5	Eq. B6
Constant	0.717 (1.46)	0.040 (0.83)	0.071 (1.38)	0.059 (1.39)	0.027 (0.64)	0.055 (1.21)
Ω(TB3M)	0.507*** (17.80)	0.539*** (18.18)	0.453*** (14.32)	-	-	-
Ω(TB6M)	-	-	-	0.561*** (21.10)	0.595*** (21.87)	0.503*** (16.62)
Ω(CPIYOY)	-	0.055*** (2.88)	0.006 (0.40)	-	0.058*** (3.49)	0.015 (1.03)
Ω(IPYOY)	-	-	0.032*** (5.54)	-	-	0.025*** (4.66)
***R*-Squared**	0.74	0.76	0.87	0.80	0.82	0.90
Obs.	139	138	88	139	138	88
Time Period	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014

***Notes*:** 1) *t*-Statistics are in parentheses. 2) *** implies the significance level at 1%.

Table B3 OLS Estimations for Ω(GB4YR)

	Eq. B1	Eq. B2	Eq. B3	Eq. B4	Eq. B5	Eq. B6
Constant	0.086 (1.62)	0.005 (0.13)	0.078 (1.47)	0.074 (1.55)	0.034 (0.73)	0.064 (1.32)
Ω(TB3M)	0.443*** (16.41)	0.484*** (17.36)	0.390*** (13.98)	-	-	-
Ω(TB6M)	-	-	-	0.493*** (18.57)	0.537*** (19.91)	0.434*** (15.96)
Ω(CPIYOY)	-	0.073*** (3.46)	0.021 (1.19)	-	0.076*** (4.01)	0.029* (1.68)
Ω(IPYOY)	-	-	0.031*** (4.81)	-	-	0.024*** (4.06)
***R*-Squared**	0.64	0.68	0.82	0.71	0.74	0.84
Obs.	139	138	88	139	138	88
Time Period	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014

***Notes*:** 1) *t*-Statistics are in parentheses. 2) *** implies the significance levels at 1%.

Table B4 OLS Estimations for Ω(GB5YR)

	Eq. B1	Eq. B2	Eq. B3	Eq. B4	Eq. B5	Eq. B6
Constant	0.055 (0.98)	0.021 (0.38)	0.105* (1.80)	0.047 (0.92)	0.012 (0.24)	0.093 (1.69)
Ω(TB3M)	0.414*** (13.67)	0.456*** (14.50)	0.331*** (10.38)	-	-	-
Ω(TB6M)	-	-	-	0.462*** (15.07)	0.507*** (16.24)	0.370*** (11.56)
Ω(CPIYOY)	-	0.081*** (3.66)	0.013 (0.75)	-	0.084*** (4.13)	0.021 (1.16)
Ω(IPYOY)	-	-	0.033*** (4.71)	-	-	0.027*** (4.07)
***R*-Squared**	0.58	0.62	0.76	0.64	0.68	0.79
Obs.	145	144	88	145	144	88
Time Period	Sep 2002- Sep 2014	Sep 2002- Aug 2014	Apr 2007- Jul 2014	Sep 2002- Sep 2014	Sep 2002- Aug 2014	Apr 2007- Jul 2014

Notes: 1) *t*-Statistics are in parentheses. 2) *** implies the significance levels at 1%.

Table B5 OLS Estimations for Ω(GB6YR)

	Eq. B1	Eq. B2	Eq. B3	Eq. B4	Eq. B5	Eq. B6
Constant	0.099 (1.65)	0.061 (1.01)	0.124* (1.99)	0.088 (1.58)	0.049 (0.86)	0.113* (1.90)
Ω(TB3M)	0.373*** (12.47)	0.412*** (13.55)	0.302*** (9.93)	-	-	-
Ω(TB6M)	-	-	-	0.419*** (13.66)	0.462*** (15.05)	0.337*** (10.97)
Ω(CPIYOY)	-	0.071*** (3.05)	0.013 (0.62)	-	0.076*** (3.43)	0.019 (0.95)
Ω(IPYOY)	-	-	0.030*** (4.34)	-	-	0.025*** (3.71)
***R*-Squared**	0.51	0.55	0.70	0.57	0.61	0.72
Obs.	139	138	88	139	138	88
Time Period	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014

Notes: 1) *t*-Statistics are in parentheses. 2) *** implies the significance levels at 1%.

Table B6 OLS Estimations for Ω(GB7YR)

	Eq. B1	Eq. B2	Eq. B3	Eq. B4	Eq. B5	Eq. B6
Constant	0.087 (1.45)	0.049 (0.80)	0.110* (1.82)	0.076 (1.36)	0.037 (0.64)	0.100* (1.72)
Ω(TB3M)	0.362*** (12.62)	0.401*** (13.08)	0.288*** (10.34)	-	-	-
Ω(TB6M)	-	-	-	0.406*** (13.54)	0.449*** (14.21)	0.321*** (11.35)
Ω(CPIYOY)	-	0.070*** (3.05)	0.009 (0.47)	-	0.074*** (3.42)	0.015 (0.78)
Ω(IPYOY)	-	-	0.025*** (3.77)	-	-	0.020*** (3.13)
***R*-Squared** **Obs.**	0.49 139	0.53 138	0.68 88	0.55 139	0.59 138	0.70 88
Time Period	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014

Notes: 1) *t*-Statistics are in parentheses. 2) *** implies the significance levels at 1%.

Table B7 OLS Estimations for Ω(GB8YR)

	Eq. B1	Eq. B2	Eq. B3	Eq. B4	Eq. B5	Eq. B6
Constant	0.092 (1.50)	0.053 (0.83)	0.132** (2.07)	0.082 (1.41)	0.040 (0.68)	0.122* (1.99)
Ω(TB3M)	0.341*** (11.42)	0.383*** (12.40)	0.265*** (9.00)	-	-	-
Ω(TB6M)	-	-	-	0.385*** (12.22)	0.431*** (13.49)	0.296*** (9.84)
Ω(CPIYOY)	-	0.076*** (3.12)	0.014 (0.63)	-	0.080*** (3.47)	0.019 (0.90)
Ω(IPYOY)	-	-	0.030*** (4.54)	-	-	0.026*** (3.95)
***R*-Squared** **Obs.**	0.45 139	0.49 138	0.64 88	0.51 139	0.55 138	0.66 88
Time Period	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014

Notes: 1) *t*-Statistics are in parentheses. 2) *** implies the significance levels at 1%.

Table B8 OLS Estimations for Ω(GB9YR)

	Eq. B1	Eq. B2	Eq. B3	Eq. B4	Eq. B5	Eq. B6
Constant	0.089 (1.36)	0.044 (0.67)	0.133** (2.02)	0.078 (1.27)	0.031 (0.50)	0.123* (1.93)
Ω(TB3M)	0.322*** (10.13)	0.370*** (11.01)	0.246*** (7.83)	-	-	-
Ω(TB6M)	-	-	-	0.366*** (10.96)	0.418*** (12.05)	0.276*** (8.61)
Ω(CPIYOY)	-	0.087*** (3.39)	0.021 (1.01)	-	0.092*** (3.76)	0.028 (1.29)
Ω(IPYOY)	-	-	0.032*** (4.51)	-	-	0.028*** (4.00)
***R*-Squared** **Obs.**	0.40 139	0.45 138	0.60 88	0.46 139	0.52 138	0.62 88
Time Period	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014	Apr 2003- Sep 2014	Apr 2003- Aug 2014	Apr 2007- Aug 2014

Notes: 1) *t*-Statistics are in parentheses. 2) *** implies the significance levels at 1%.

Table B9 OLS Estimations for Ω(GB10YR)

	Eq. B1	Eq. B2	Eq. B3	Eq. B4	Eq. B5	Eq. B6
Constant	0.001 (0.01)	-0.042 (-0.64)	0.096 (1.48)	-0.007 (-0.12)	-0.052 (-0.83)	0.086 (1.38)
Ω(TB3M)	0.362*** (11.10)	0.414*** (11.68)	0.266*** (9.18)	-	-	-
Ω(TB6M)	-	-	-	0.410*** (11.89)	0.466*** (12.76)	0.298*** (10.10)
Ω(CPIYOY)	-	0.098*** (3.47)	0.021 (1.00)	-	0.102*** (3.83)	0.027 (1.29)
Ω(IPYOY)	-	-	0.038*** (4.86)	-	-	0.034*** (4.40)
***R*-Squared** **Obs.**	0.43 145	0.49 144	0.65 88	0.49 145	0.55 144	0.67 88
Time Period	Sep 2002- Sep 2014	Sep 2002- Aug 2014	Apr 2007- Jul 2014	Sep 2002- Sep 2014	Sep 2002- Aug 2014	Apr 2007- Jul 2014

Notes: 1) *t*-Statistics are in parentheses. 2) *** implies the significance levels at 1%.

Table B10 OLS Estimations for Ω(GB15YR)

	Eq. B1	**Eq. B2**	**Eq. B3**	**Eq. B4**	**Eq. B5**	**Eq. B6**
Constant	0.077	0.036	0.095	0.068	0.025	0.086
	(1.24)	(0.57)	(1.40)	(1.14)	(0.41)	(1.31)
Ω(TB3M)	0.288***	0.332***	0.228***	-	-	-
	(9.36)	(10.49)	(6.71)			
Ω(TB6M)	-	-	-	0.328***	0.375***	0.256***
				(10.16)	(11.43)	(7.25)
Ω(CPIYOY)	-	0.079***	0.024	-	0.083***	0.029
		(3.18)	(1.05)		(3.47)	(1.27)
Ω(IPYOY)	-	-	0.025***	-	-	0.021***
			(3.28)			(2.79)
***R*-Squared**	0.37	0.42	0.52	0.42	0.47	0.54
Obs.	139	138	88	139	138	88
Time Period	Apr 2003-Sep 2014	Apr 2003-Aug 2014	Apr 2007-Aug 2014	Apr 2003-Sep 2014	Apr 2003-Aug 2014	Apr 2007-Aug 2014

Notes: 1) *t*-Statistics are in parentheses. 2) *** implies the significance levels at 1%.