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### Interest Rate Dynamics: An Examination of Mainstream and Keynesian Empirical Studies

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## **ABSTRACT**

This paper critically reviews both mainstream and Keynesian empirical studies of interest rate dynamics. It assesses the key findings of a selected number of these studies, surveying the debates between the mainstream and the Keynesian schools. It also explores the debates on interest rate dynamics within the Post Keynesian school of thought. Lastly, the paper identifies the critical questions relevant for future empirical research.

**KEYWORDS:** Interest Rate Dynamics; Empirical Modeling of Interest Rates; Mainstream Economics; Keynesian Economics

**JEL CLASSIFICATIONS:** E43; E50; E58; E60; G10; G12

## **SECTION I: INTRODUCTION**

The topic of interest rate dynamics is important in macroeconomics and finance. However, mainstream (neoclassical) economists and Keynesian economists have different perspectives on interest rates. What does the empirical research on interest rates reveal? What are the key issues for empirical research on interest rate dynamics going forward? This paper will address these questions.

Considerable differences exist between the mainstream and the Keynesian economists' views on interest rate dynamics. Whereas mainstream economists rely on the loanable funds theory, Keynesian economists view the central bank as playing a pivotal role in setting interest rates.

The paper is structured as follows. Section II provides a brief overview of the theoretical perspectives of mainstream and Keynesian economists on interest rate dynamics. Section III reports the findings from selected mainstream empirical studies. Section IV narrates the findings from selected Keynesian empirical studies. Section V identifies the key issues for future empirical research on interest rate dynamics. Section VI concludes.

## **SECTION II: THE THEORETICAL PERSPECTIVES ON INTEREST RATE DYNAMICS**

The mainstream view of interest rates is based on the loanable funds theory of interest rates, which holds that the interest rate is the price of funds and that the interest rate depends on the demand for and supply of loanable funds. This theory manifests in various fundamental texts of “classical” economics, such as Marshall (1890), Cassel (1903), Hicks ([1939] 2001), Taussig (1918), and von Mises (1963). However, Fisher ([1907] 1997a, [1943] 1997b) provides the best and the most-capable exposition of the loanable funds theory. For Fisher ([1943] 1997b, 3), a positive interest rate indicates a society’s “preference for a dollar of present [income] over a future income.”

The contemporary mainstream view is based on rational expectations, where the central bank’s policy rate follows some variant of the Taylor Rule, and the long-term interest rate depends on

the expected path of future short-term interest rates and perhaps a term premium. Under rational expectations, the current short-term interest rate's influence over the long-term interest rate is limited. Mainstream economists also argue that higher ratios of government debt and deficit to GDP can lead to a higher long-term interest rate, as government borrowing has a crowding-out effect.

In contrast to the mainstream view, Keynes maintained that the interest rate is based not only on human psychology and preferences, but also on social conventions. He highlights the role of uncertainty and liquidity preference in interest rate dynamics. Keynes (1930, 315) held that “[t]he influence of the short-term rate of interest on the long-term rate is much greater than anyone ... would have expected.” He reiterated that “[t]here is no reason to doubt the ability of a Central Bank to make its short-term rate of interest effective in the market” (1930, 363). In a modern capitalist economy, Keynes (1930, [1936] 2007) argued that the central bank's policy rate sets the risk-free short-term interest rate. This, in turn, influences the long-term interest rate on Treasury bonds and the shape of the Treasury yield curve. To give an empirical basis to his claim about interest rate dynamics, Keynes relied on: (1) Riefler's (1930) empirical research on financial markets in the United States in the 1920s and (2) his own observations of the behavior of financial markets in the United Kingdom during the same period.

Keynes maintained that, in a world of uncertainty, investors are forced to rely primarily on current conditions to form their view of the long term. In his view, the current short-term interest rate is the most important driver of the long-term interest rate. Kregel (2011) has provided a befitting summary of Keynes's thinking on interest rates and financial markets.

In most mainstream interest rate models, the long-term interest rate is based on the current short-term rate interest, future short-term interest rates, and a term premium. In the empirical implementation of mainstream models, the fiscal deficit ratio or the government debt ratio is usually given a prominent place. In contrast, in Keynesian interest rate models, the current short-term interest rate is the most important determinant. In the empirical implementation of Keynesian models, the emphasis is given to the current short-term interest rate. At the same time, variables such as inflation, the growth of industrial production, and other factors are also included.

### SECTION III: THE FINDINGS FROM MAINSTREAM EMPIRICAL STUDIES

Table 1 below summarizes the findings from several papers based on some empirical implementation of mainstream interest rate models. While some studies do include the current short-term interest rate as an important driver of long-term interest rates, the focus of the mainstream models is on the ratios of government fiscal deficit and government debt to GDP. Almost invariably, mainstream empirical economists conclude that a higher fiscal deficit ratio or government debt ratio is associated with a higher long-term interest rate. Moreover, mainstream empirical studies also often claim that private fixed investment is crowded out by a higher long-term interest rate, particularly if a higher fiscal deficit or government debt ratio leads to higher market interest rates. Elmendorf and Mankiw's (1998) survey of the theoretical literature from the mainstream perspective and Blanchard's (1984) models are noteworthy, while Reinhart and Rogoff (2009) epitomize the fear that a persistent and elevated fiscal deficit ratio or government debt ratio will lead to a higher interest rate that will result in crowding out of private investment and slower economic growth. Moreover, they warn that a government debt ratio above some critical threshold can cause a financial crisis and, eventually, debt default.

A striking feature of the mainstream economic analysis of interest rate dynamics is the failure to assess the monetary regime and other institutional features that pertain to the economy in question. It is pertinent to ask whether a country has monetary sovereignty or not, whether the government debt is issued in local currency or in foreign currency, whether the currency is pegged or is freely floating, and what the institutional capacities of the state are. The failure to analyze the underlying institutions and institutional practices, which is rampant in the studies mentioned in Table 1 below, can lead to fundamental errors regarding interest rate dynamics. For instance, authors of several empirical studies of Japanese government bond yields had claimed that low bond yields in Japan are unsustainable and that Japan would face a fiscal and financial crisis. Yet a decade has passed, and the Bank of Japan (BOJ) has been able to keep long-term government bond yields low. Currently, the BOJ may be prepared to relax its yield curve control if inflation stays above its target on a sustained basis.

Another critical failure of the mainstream studies of interest rate dynamics is the failure to understand sectoral balances and especially that the savings of the non-government sector are possible if and only if the government sector is engaged in dissaving. That is, for a given

currency, the dissaving of the government sector is necessarily equal to the combined savings of the domestic private sector and the external (foreign) sector.

**Table 1: Summary of Selected Mainstream Studies of Interest Rate Dynamics**

Studies	Country/ Region	Summary
Cebula (2014)	US	Examines the effect of the federal government deficit on the <i>real</i> interest rate yield on 3-year and 7-year Treasury securities. Claims that the federal budget deficit ratio exercised a positive and statistically significant impact on the ex-post real interest rate yields after allowing for quantitative easing and other factors.
Elmendorf and Mankiw (1998)	Survey of the literature	Surveys the mainstream literature on government debt and government deficit. Maintains that an increase in government deficit and debt crowds out private investment and increases the long-term interest rate.
Gruber and Kamin (2012)	OECD	Uses panel data and finds that a country's fiscal position affects its long-term government bond yields. The marginal effect of the projected deterioration of fiscal positions adds about 60 basis points to US bond yields by 2015, while the effects on other G-7 countries' bond yields are smaller.
Hoshi and Ito (2013, 2014)	Japan	Argues that Japan's fiscal situation is unsustainable and that fiscal crisis is a certainty. Expresses skepticism that the Bank of Japan could keep Japanese government bond yields low.
Jaramillo and Weber (2013)	Emerging Markets	Studies the effect of fiscal variables on government bond yields in emerging markets. Reports that—whereas in normal times fiscal variables do not appear to have any discerned effect—in turbulent times, they do as investors pay attention to fiscal variables in such circumstances.
Lam and Tokuoka (2013)	Japan	Argues that Japanese government bond yields (JGBs) have remained low and stable because of steady inflows from the household and corporate sectors, high domestic ownership of JGBs, and safe-haven flows during the European debt crisis. Fears that the bond yields will rise sharply due to the elevated government debt ratio.
Kumar and Baldacci (2010)	A panel of 31 advanced and emerging market economies	Claims that a higher government deficit ratio or government debt ratio raises the long-term interest rate. However, the precise magnitude depends on initial fiscal, institutional, and other structural conditions, as well as global financial markets. Argues that large fiscal deficits and public debts are likely to increase government bond yields in many advanced economies over the medium term.
Martinez, Tercenoa, and Teruelb (2013)	7 Latin American countries	Finds that inflation, term of trade, and the ratios of external debt and international reserves to nominal GDP have noticeable effects on Emerging Market Bond Index (EMBIG) spreads. The global financial crisis had a marked impact on bond spreads.
Min, Lee, Na, Park, and Nam (2003)	11 Emerging markets	Argues that liquidity and solvency variables are the main drivers of emerging market bond spreads, but also that US interest rates and macroeconomic fundamentals play an

Studies	Country/ Region	Summary
		important role. Finds that for Latin American countries, there is a negative yield–maturity relationship.
Paccagnini (2016)	US	Studies the effect of the macroeconomic determinants of the term structure of interest rates during the Great Moderation period.
Perovic (2015)	10 Central and Eastern European countries	Reports that higher debt and deficit ratios lead to higher government debt ratios. Moreover, the critical threshold above which fiscal variables have effects on bond yield is lower for Central and Eastern European countries than in advanced economies.
Poghosyan (2014)	22 advanced countries	Uses cointegration to distinguish between long-run and short-run determinants of government bond yields. Claims that, in the long run, government bond yields increase by about 2 basis points in response to a 1 percentage point increase in the government-debt-to-GDP ratio and by approximately 45 basis points in response to a 1 percentage point increase in the potential growth rate.
Tokuoka (2012)	Japan	Uses an overlapping-generations model to argue that the lack of fiscal consolidation would eventually increase interest rates in Japan due to a higher government debt ratio.

#### SECTION IV: THE FINDINGS FROM KEYNESIAN EMPIRICAL STUDIES

Several empirical studies support the Keynesian perspective on interest rate dynamics. Table 2 summarizes selected Keynesian studies on interest rate dynamics. Lavoie’s (2014, 186–88, 232–34) book includes a detailed overview of empirical research that examines interest rates from a Keynesian vantage point. Empirical research in the Keynesian tradition shows the close connection between the short-term interest rate and the long-term interest rate. However, there are debates among Keynesian scholars. Most studies evince that the short-term interest rate is the primary driver of the long-term interest rate, while other studies show that the long-term interest rate influences the short-term interest rate. Few studies report that there is a bidirectional causality between the short-term interest rate and the long-term interest rate. There is also debate amongst Keynesian economists about (1) the relationship between long-term government bond yields and market interest rates, and (2) whether the current short-term interest rate affects market interest rates.

Table 2 summarizes the findings of some key empirical research from the Keynesian perspective. Several Keynesian economists have explored Granger causality between the short-term interest rate and the long-term interest rate, both in terms of linear and nonlinear causality. However, it

should be noted that Granger causality does not reveal anything about causes, but instead about temporal precedence. Thus, the findings from this strand of Keynesian empirical literature should be interpreted with caution.

Recently, Akram and Mamun (2023a, 2023b, 2023c, 2023d, 2023e, forthcoming a, forthcoming b) have investigated whether Keynes’s claim that the short-term interest rate influences the long-term interest rate extends to interest rate swap yields denominated in currencies of advanced countries and emerging market currencies. They have found that the short-term interest rate generally exerts a decisive influence on long-term swap yields, not just on the front end of the swap yield curve but also in the middle and back end of the curve.

**Table 2: Summary of Selected Keynesian Empirical Studies of Interest Rate Dynamics**

Studies	Country or Region	Summary
Akram and Das (2014)	Japan	Reports that the current short-term interest rate has a statistically significant and positive effect on Japanese government bond (JGB) yields, after controlling for other factors.
Akram and Das (2016)	India	Argues that changes in the short-term interest rate take a lead role in driving the changes in Indian government bond yields after controlling for inflation and economic activity.
Akram and Das (2017)	Eurozone	Applies a pooled-mean-group (PMG) technique of cointegration to examine the major drivers of nominal yields of long-term government bonds in a set of eurozone countries. In addition, applies the autoregressive distributive lag (ARDL) approach in country-specific regressions to establish that the short-term interest rate is the most important determinant of the long-term government bond yield.
Akram and Das (2019)	India	Finds that the short-term interest rate is the main driver of the long-term interest rate in the long-run in India, after controlling for macroeconomic variables.
Akram and Das (2020)	Australia	Reveals using estimated models that the short-term interest rate is the main driver of Australian government bond yields. Shows that the effect of the budget balance ratio on government bond yields is small, though statistically significant. However, the debt ratio has no statistically discernible effect on government bond yields.
Akram and Li (2017)	US	Shows that the short-term interest rate is the most important driver of the long-term interest rate, while controlling for various macroeconomic variables. Reports that a higher government debt ratio has a negative effect on the long-term interest rate, particularly in the long run. However, they also note that, on a short-run basis, a higher government debt ratio has a positive effect on the long-term interest rate.
Akram and Li (2020a)	US	Uses monthly data to examine the behavior of US Treasury yields. Finds that the short-term interest rate is the most important factor in explaining US Treasury yields. At the same time, core inflation and the growth of industrial production also influence long-term interest rates.



<b>Studies</b>	<b>Country or Region</b>	<b>Summary</b>
Akram and Li (2020b)	Japan	Uses a vector correction approach to model JGB yields. A low short-term interest rate is mainly responsible for low JGB yields. Elevated government debt and fiscal deficit ratios do not exert upward pressure on JGB yields.
Akram and Li (forthcoming)	Japan	Uses daily data to examine the dynamics of long-term interest rates. Models long-term JGB yields based on the short-term interest rate on Treasury bills, the equity index, the Japanese yen exchange rate, and the commodity price index. The findings reinforce the view that the central bank influences the long-term government bond yield through its control of the short-term interest rate.
Akram and Li (2020d)	UK	Shows that the short-term interest rate has a crucial influence on the yields of UK gilts, even after controlling for various factors, such as core inflation, the growth of industrial production, and other factors. Also, reports that a higher government debt ratio does not lead to higher yields on gilts.
Atesogulu (2003–4)	US	Finds that there is a positive cointegration relationship between the federal funds rate and the prime rate in the US during two subperiods. Results from the first sample period reveal a two-way causality between the federal funds rate and the prime rate. In contrast, the results from the second sample period indicate that causality runs from the federal funds rate to the prime rate.
Atesogulu (2005)	US	Uses vector-error correction (VEC) models and cointegration to examine the relationship between the fed funds target rate and long-term interest rates. Finds there is a cointegration relationship with a unidirectional causality from the federal funds rate to the long-term interest rate. However, changes in the federal funds rate do not have much of an effect on the long-term interest rate in the short run, raising questions about monetary policy's effectiveness in the short run.
Chakroborty (2016)	India	Explores the relationship between various macroeconomic factors and interest rates in India. Findings support the Keynesian perspective on interest rate dynamics for India.
Cook (2008)	US	Examines the pass-through from the federal funds rate to the 30-year fixed mortgage rate in the US. Reports that there is substantial pass-through.
Das and Akram (2020)	Canada	Analyzes the relationship between the short-term interest rate and the long-term government bond yield in Canada, after controlling for other important financial variables, using high-frequency daily data from 1990 to 2018. Finds that the short-term interest rate is a key driver of government bond yields of different maturity tenors in the long run. While there is a positive association between the long-term bond yield and the Canadian federal government's net debt-to-GDP ratio, the effect, as obtained by the estimated magnitude, is modest.
Deleidi and Levero (2021)	US	Uses a structural VAR model to examine the causal relationship between the short-term effective federal funds rate and long-term interest rates, namely, the 10-year Treasury note yield and Moody's Aaa corporate bond yield. Finds a bidirectional relationship when a 10-year Treasury yield is considered as the long-term rate, but finds a unidirectional relationship that goes from short- to long-term interest rates when the Aaa corporate bond yield is considered as the long-term rate. Claims that the results imply the Federal Reserve can permanently affect long-term interest rates through setting the short-term policy rate.

<b>Studies</b>	<b>Country or Region</b>	<b>Summary</b>
Gabrisch (2021)	US	Uses GARCH-in-mean models to examine government bond yields in six leading financial markets. Shows there is a tight connection between the short-term interest rate and the long-term interest rate.
Kim (2020)	Euro zone	Examines the spread between eurozone bond yields and German government bond yields. First, a positive relationship exists between the spreads and the debt-to-GDP ratio during the European sovereign debt crisis and before the global financial crisis in which conventional monetary policy prevailed, reflecting negative market sentiments on default risk and market discipline. Second, there is a negative long-run relationship between spreads and the debt-to-GDP ratio under unconventional monetary policy. Argues that the findings show that default risk diminished after the ECB's nonstandard measures.
Kim (2021)	Multi-country	Analyzes the effects of government debt and deficits on long-term interest rates in 17 advanced economies over the period 1973–2016, finding that there is a market penalty for countries without monetary sovereignty, resulting in higher interest rates than in countries with monetary sovereignty.
Li and Su (2021)	Multi-country	Applies a rolling-window strategy to examine the dynamic linear and nonlinear Granger causality relationships between short- and long-term interest rates over time. Finds that in the US, the long-term interest rate Granger causes the short-term interest rate, either linearly or nonlinearly; in most of the subsamples, the short-term interest rate does not linearly or nonlinearly Granger cause the long-term interest rate. However, in the UK and Japan, there are bidirectional Granger causality relationships between short- and long-term interest rates.
Payne (2006–7)	US	Finds that the fixed mortgage rate and the federal funds rate are cointegrated. Claims that there is unidirectional causality from the federal funds rate to the fixed mortgage rate. However, the most common Granger causality direction between short- and long-term interest rates is a bidirectional one.
Rahimi (2014)	Canada, US	Examines both linear and nonlinear Granger causality tests between short- and long-term interest rates in Canada and the US, finding that there is usually bidirectional causality. However, in more recent periods, the federal funds rate (in the US) and the overnight rate (in Canada) Granger cause other interest rates significantly.
Rahimi, Lavoie, and Chu (2016)	Canada, US	Examines the causal relationship between the short-term and long-term interest rates in the US and Canada. Reports that the most common Granger causality direction between short-term and long-term interest rates is bidirectional. Claims that nonlinear Granger causality can be found where no linear causality has been uncovered. Shows that during recent business cycles, the federal funds rate (in the US) and the overnight rate (in Canada) still Granger cause long-term interest rates significantly.
Rahimi, Chu, and Lavoie (2017)	US	Applies a window strategy to detect the linear and nonlinear Granger causality relationships between the federal funds rate and the 10-year Treasury note yield during different time horizons. They report that during nearly all time periods, there is a significant two-way Granger causality relationship between these two interest rates.
Simoski (2019)	Multi-country (Brazil,	Uses VEC models to investigate the long-term determinants of government bonds' nominal yields in three Latin American countries (i.e., Brazil, Colombia, and Mexico). The estimated models indicate

Studies	Country or Region	Summary
	Colombia, Mexico)	that the short-term interest rates are the main drivers of long-term government bond yields for each of the three countries. Finds that higher government debt and deficit ratios do not exert upward pressures on the Brazilian government bond yield. However, for the model estimates for Colombia and Mexico, the results are in concordance with the conventional view, even though the government finance variables do not have a statistically significant effect on government bond yields.
Vinod, Chakraborty, and Karun (2014)	India	Finds that monetary policy, expected inflation, and volatility in capital flows drive long-term interest rates in India. Moreover, the fiscal deficit does not have a significant effect on the long-term interest rate.

## SECTION V: KEY ISSUES FOR EMPIRICAL RESEARCH

The loanable funds theory, which is the basis of the mainstream view of interest rates, dominates the empirical research on interest rate dynamics, even though Keynesian empirical research on interest rate dynamics has revealed some important aspects of government bond markets.

Keynesian empirical models could also provide a plausible, and possibly better, explanation of the empirical patterns in interest rate dynamics. The mainstream views, however, inform and influence policymakers and central banks.

There is no dialogue between practitioners of mainstream and Keynesian economics—Keynesians cite mainstream economists all the time, but mainstream economists do not cite the research conducted by Keynesian economists. Even when Keynesian researchers publish their research in mainstream journals, it is not discussed by mainstream economists. Mainstream economists do not read Keynes or Post Keynesians, and widely used interest rate models in quantitative finance do not tap into Keynes’s insights. Although there is no dialogue between mainstream economists and Keynesian economists on interest rates, it would be useful to have an exchange of ideas.

There are good ongoing debates and discussions among Keynesians, as issues are not settled. Indeed, many research issues remain outstanding, which means that there are many topics for further research and empirical inquiry. Further research with more and better data and different empirical modeling techniques will be helpful. Most empirical research on interest rate dynamics has used monthly and quarterly data. It would be worthwhile to use daily and higher-frequency

data, particularly for advanced countries. While there are papers on several emerging markets, such as Mexico, Brazil, India, and China, more research on emerging-market countries, particularly frontier emerging markets and developing countries in Asia, Africa, and Latin America, would be valuable.

Most Post-Keynesian studies have used time-series data, though a few have used panel data. Some additional insights could be obtained by using multi-country panel data in modeling interest rate dynamics. More research on long-term market interest rates, not just government bond yields, would be relevant for policymakers and practitioners.

In the future, an important arena for progress in interest rate research is the closer integration of empirics and theory. Empirical research on interest rate dynamics needs to be based on sound theoretical models. Likewise, theories on interest rates should be connected to the patterns observed and discerned in the empirical research.

## **SECTION VI: CONCLUSION**

This paper has reviewed a selection of mainstream and Keynesian empirical research. The mainstream empirical research is based on the loanable funds theory and ties a higher (lower) fiscal deficit or government debt ratio to higher (lower) government bond yields. The Keynesian empirical research is based on Keynes's view that the central bank's policy rate influences the long-term government bond yield through its effect on the short-term interest rate. There are debates among Keynesian economists regarding interest rate dynamics. Although the findings of empirical research inspired by the Keynesian perspective illuminate interest rate dynamics, the mainstream perspective continues to dominate policy discussion. While the dominance of the mainstream perspective is lamentable, the Keynesian perspective can be enhanced further with better data and more empirical research. Mainstream economists will continue to ignore Keynesian research for the foreseeable future, even if the findings of such research have some merit and/or are published in mainstream journals. However, Keynesian economists still need to conduct further empirical research to carry on the torch of Keynesianism despite being neglected and ignored by the mainstream practitioners of the profession.

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