On the relation between Securities and Foreign Exchange Markets, Evidence from the US, UK, Germany, South Africa and Turkey

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Abstract

Purpose – This research aims to shedding more light on the relationship between securities markets and exchange rates in order to give stakeholders further understanding of interlinking dynamics. Investors hold assets and debt and can lose a lot of their investment when exchange rates of the relevant markets lose value. Enterprises are affected by their import/export foreign exchange exposure and finally, politicians can put in detriment their economies, when their policies are ill-conceived

Research Design – Based on past theory and literature on the fundamentals approach to exchange rate determination but enhanced to provide stronger results, an empirical analysis is in the form of a linear regression model is developed and tested. In addition to this, argumentation concerning control variables has been uniquely developed for this paper.

Findings – The paper finds significant relationships in specific situations but not enough to disprove the null hypotheses stating that a relationship does not exist between securities (stock and bond markets) and exchange rates. Some of the main findings are that significance exists in the stock and exchange rate markets in the UK, and bond and exchange rates markets in Germany. For South Africa and Turkey, no significance was found leading to the conclusion that a more customized model ought to be built per country along the extent of current research.

Implications – An understanding is brought forth that a customized mindset and approach be used when thinking about exchange rate movements per country being analysed.

Keywords – Exchange Rates, Stock Prices, Government Bonds, Empirical Research, Thesis

Contents

PART I – Introduction

Grasping the effects of exchange rate (foreign exchange) determinants has filled notable parts of the conversation regarding international financial research. The purchasing power of a country's medium of exchange directly influences many parts of its society, from household to corporate decisions. Another area of important influence is global capital flow patterns (Evans, 2011). Recently, research has shown that traditional variables such as those used to analyze the exchange rate, remain effective only in the long term. Factors such as securities markets however, that influence the increased trade in foreign exchnage markets due to increased cross border securities trade, have started to become more relevant and in some cases more important than the traditional determinants (Vitale, 2007). An analysis of the medium term (quarterly) will be conducted in the following to address the question of whether securites markets have a significant effect on the exchange rate when put in a framework including traditional determinant variables (details of which can be found in the Theoretical Framework). The short term is not considered due to the inavailability of data.

McPherson (2006) explains that the link between foreign exchange markets (markets for the trading of national currencies) and securities markets are significant across many fields. If the investment diversification in international portfolios is to be successful, then securities and foreign exchange markets ought not to show high alignment in correlation. Bringing further understanding to the relationship between securities markets like stocks and government bonds, and foreign exchange markets would have ramifications for decision makers such as investors, business leaders and governments in terms of predictability and bilateral trade. Abhyankara , Sarnob and Valente (2006) find that foreign exchange predictability significantly influences the economic value for stakeholders on securities markets based on a fundamentals analysis. Additionally, it can help actors on financial markets deal with risk on the medium to long term (Abhyankara, Sarno, & Valente, 2006). Public debt also strongly affects exchange rates because it is an indicator of the general direction of interest rates and expectations, and private bonds are then affected by said interest rates (Hashimzade & Thornton, 2013). Due to the latter, only government bond yields are taken into consideration, leaving private bonds out of the picture as they will be represented by the general interest rate. The research question composed for the purpose of bringing further understanding and therethrough applicable implications for decision makers is:

Are stock and government bond markets significant in affecting bilateral exchange rates?"

Hypotheses that will help answer the research question are motivated and introduced in the Theoretical Framework.

Social Relevance

One example of ramifications for decision makers is their ability to correctly address fluctuations in the exchange rate that have real business or investment implications in their countries. Thomson Reuters (2018) writes, *Emerging market equities eased 0.1 percent as the dollar recovered. Dollar strength has driven selling in emerging market stocks this year, putting pressure on emerging economies with large dollar-denominated debt piles.* [1] This example highlights the responsibility of governments of emerging markets to address their exchange rate because a weakening toward the greenback can have implications for the countries' financial assets in terms of international demand for these assets. If these exchange rates fall in value and a selloff abounds then a further deprecation can lead to problems of debt settlements denominated in a stronger foreign currency, which then becomes more expensive.

This paper aims to target both developed as well as developing countries in order to keep a wide and globally representative scope all the while addressing the differences in the different types of markets. This scope also offers a sub-research-question:

Do the developed and developing worlds' exchange rates behave in the same manner?

Developed market economies have instruments allowing them to avoid the uncertainty of exchange rates which emerging (and free floating such as Turkey and South Africa) markets have not optimized yet. A mechanism of sort would be the hording and use of foreign currencies and gold when needed as well as independent central banks. It will therefore be interesting to see the effects of stock market fluctuations on the Turkey and South Africa. Only countries with a free-floating exchange rate regime have been selected for this research, as countries with pegged or managed float currencies might not portray the correct relationship between the stock market and exchange market. Capital flow controls, a common characteristic of pegged or dirty float economies, could distort the multifaceted relationships of foreign exchange and securities (Pan, Fok, & Liu, 2007).

Countries taken into account will be, the United States, the United Kingdom, Germany, Turkey and South Africa. These countries have been chosen in line with the aim of global representativeness of this study. To reach this aim the spectrum of countries include the world's biggest economy and the most important currencies when it comes to reserves. International Monetary Fund (IMF) data shows that the Dollar, the Pound Sterling and the Euro make up 87.39% of reserve currencies with the dollar making up approximately 62.7% (International Monetary Fund, 2018). This comes in addition to the inclusion of developing markets (Turkey and South Africa) into the spectrum. The importance of reserves derives from the fact that countries with substantial currency reserves find more international

[1] Global Markets-Bond yields rise worldwide on BoJ easing talk, stocks slip, Thomson Reuters
The full reference to this article can be found in the bibliography.

trust in their policies and are able to hedge the risk of a depreciation of their own domestic currency by buying it with the foreign reserve currency. This increase in demand for their domestic currency then leads to an appreciation thereof. The Dollar's value represents American assets which make up part of the world's most powerful economy and thus assures a safe and stable way to manage the value of a domestic currency. The greenback's dominance is also the reason why all currencies studied will be in comparison to the US Dollar.

The social relevance in once sentence, therefore, would be that a greater understanding of exchange rates and securities markets would allow governments to hone policy and, investors and business leaders to anticipate and make decisions about their portfolios and exposures.

Scientific Relevance

The main theoretical idea is that security markets are an integral part of determining the pricing of foreign exchange currencies. Lyons (2001) explains the missing part in the common academic knowledge as being the understanding of the increased influence that securities markets have on exchange rates. The rise in the influence of securities are mentioned but at the detriment of what? Lyons (2001) explains that in the past macroeconomic variables were more representative but that the effect of securities trading and the stock market has begun to dwarf the effects of such traditional determinants (more on these traditional values will be discussed in the literature review). The theory that has sourced the idea for this paper is the same that Lyons discusses in his book; *The Microstructure Approach to Exchange Rates*. However, microstructure factors such as order flows will not be analysed, and focus will rather be put on the movements in exchange rates caused by fluctuations in the stock and government bond markets while controlling for macroeconomic variables, the reasoning of this model and theoretical background are provided in the methodology section.

Thus, it can be derived that the scientific relevance of this paper to be the addition of evidence to the prevailing theories that security markets do have a significant influence on exchange rates. Furthermore, to bridge the fundamentals approach toward the microstructure of exchange rates theory in the future research section. Even though analysis of foreign exchange markets has been accelerating since the 1970s, ill recognition of the intricacies surrounding foreign exchange movements is to blame for the fact that the research does not come to a consensus about the existence or direction of securities' influence on exchange rates. Further complication through the inability of the data in weighing the legitimacy attributed to previous studies. The scientific aim and relevance of this paper is thus to add to the expanding research with respect to exchange rate determination and contribute to the maturity of this field with the inclusion of certain global securities markets in the framework.

In the following sections, the theoretical framework as well as methodology will be outlined. This study aims to address the research question through an empirical model that will highlight the relationship of the aforementioned economic phenomena. Quarterly data will be analysed using an empirical linear regression. These will lead to the findings which have come to prove certain points from both strands of the research, certain stating that a relationship does, and countering this, stating that a relationship does not exist. At the end it is found that a customized model seems to be necessary for every country at the current extent of research being discussed. The conclusion discusses the results which cannot seem to prove a significant relationship throughout all markets, but the study does find significance in specific situations.

PART II – Theoretical Framework

Based on the relevance and the fact that research has begun to accelerate in foreign exchange determination due to traditional macroeconomics seemingly being not completely representative (Lyons, 2001), this section presents hypotheses to be studied. The hypotheses concern the relationships between the exchange rate and stock markets, stock market volatilities, bond markets and bond market volatilities. The main driving factor for the traditional research becoming obsolete is that the foreign exchange market is continuing to grow due to the rapid growth in derivatives products (Sarno & Taylor, 2003).

The underlying theory studied to answer the research question is the theory of exchange rate economics. The theory is based on the fundamentals model which differs from the technical and microstructure models in the sense that it does not take into account modelling based on past information, and does not use order flow data or predictive values, respectively (Lace, Macerinskiene, & Balciunas, 2015). Traditionally, papers studying this theory analyse the determination of exchange rate dynamics using macroeconomic variables at medium and long-term intervals. Under the traditional approach, these fundamentals are price levels, income differences, productivity and balance of trade. These models are based on either UIP (uncovered interest rate parity) and/or PPP (purchasing power parity) and use the dynamics of money supply and demand as a basis (Taylor & Manzur, 2013). UIP is a condition that corrects for arbitrage in these markets but does not always hold (Sarno & Taylor, 2003). PPP theory states that the exchange rate is equal to the ratio of two countries' purchasing power (Sarno & Taylor, 2003). This paper builds on such old theories that derive from the classic exchange rate researchers such as Mundell (architect of the portfolio balance approach).

A literature review will follow the hypotheses and its purpose is twofold. Firstly, a brief history that shows the evolution of theory will be provided giving proof for the above statements. Secondly, the econometric model that this paper employs will find its motivation in the evolution of the theory to this day. Below, this paper theoretically introduces the hypotheses concerning the securities in the research question.

Hypotheses

The hypotheses aim to provide the relationships between securities and foreign exchange rates to address this change in scientific research concerning exchange rate determination. The hypotheses' foundational theories and their evolution over time can be found in the literature review.

Stock prices and their fluctuations have an influence on foreign exchange rates. This is where the incorporation financial theory into the theoretical framework takes place. Portfolio balance theory states that foreign exchange rates, like most tradable products, are determined by market mechanisms (Sarno & Taylor, 2003). In an economy performing well, stocks of the companies being traded would be in higher demand, thus increasing the demand for domestic currency and thereby, increasing the currency's price (the foreign exchange rate). The opposite is true in terms of economic crises. These are is incorporated into the methodology of research through the addition of a crisis dummy variable (more on this below). Due to the herding behaviour of investors such movements in money demand are exacerbated when the market starts behaving in more drastic movements both positively and negatively (Gavin, 1998). In the event of a selloff, investors will opt for foreign securities and thus the demand for foreign currencies increases, resulting in a depreciatory effect for the domestic currency.

Abdalla and Murinde (1997) study exchange and stock markets in Pakistan, India, S. Korea and the Philippines to look into the relationships of these variables in countries were there exist (at the time) attempts to set up stock market mechanisms resembling that of modern economies while pushing the countries toward free float. They find that there exists a relationship between stock prices and exchange rates in all countries but the Philippines.

Although they state that there exists a bidirectional relationship between stock indices and exchange rates, the evidence found is weak. This is based on the idea that as, for example, the dollar exchange rate rises, profits fall and thus do stock prices. With increasing globalization and global commerce/trade, exchange rates have increasingly been affecting profits. Evans states that a country's FOREIGN EXCHANGE rate may carry implications on the price efficiency of firms internationally (Evans, 2011). This idea comes about as exchange rates affect competitiveness through the cost of products and services. In case the US Dollar appreciates against the Euro, Euro Zone firms would sell more goods

to the US, make more profit and through their increased profitability, their value would also increase. In other words, their stock market price would increase in proportion as companies are valued through multiples of earnings indicators such as EBIT (earnings before interest and taxes) or EBITDA (earnings before, interest, taxes, depreciation and amortization). Coming back to our example, the opposite scenario would take place were the US Dollar to depreciate against the Euro. Euro Zone countries would then become less competitive; Japanese cars may then be preferred to German cars, for example. In the case of imports, this again works the same way but in opposite directions. These changes affect not only the buying/selling of goods or services for the economy but also increase transaction risk; payables and receivables in foreign currencies are affected (Dornbusch & Fischer, 1980). From a reversed point of view, a dip in the stock market would cause an outflow of money (drop in the demand for local currency) alongside a decrease in the interest rate devaluing the local currency further.

The equation Abdalla and Murinde use to present the above is, $R_{it} = \beta_{oi} + \beta_{1i}R_{St} + \beta_{2i}R_{mt} + \varepsilon_{it}$ (1) [2]. Equation (1) feeds into the model for exchange rate determination. The equation given by the paper for this is, $D_{st} = \alpha + \beta DRS_t + cD_{it} + \varepsilon_i$ (2)[3].

Abdalla and Murinde (1997) predict the existence of a negative relationship between the domestic currency and the stock market index. Along with the latter equations, the paper brings forth the empirical modelling of theoretical assumptions. The assumptions are that the regime being analysed is under a floating exchange rate system and that there are both downward and upward forces impacting the dependent variable. As an appreciation of the currency reduces the competitiveness of firms, there is a downward force on stock markets whereas a depreciation has the opposite effect. Thus, other factors are included into the linear relationship so as to break the simplicity and equilibrium of this model. The resulting formula using Germany, Japan and the US as examples is:

$$E_{ug} = \alpha_0 + \alpha_1 E_{u_j} - a_2 R_{gu} + a_3 R_{ju} + \alpha_4 S_g + a_5 S_j + \alpha_6 S_u + \alpha_7 A_g + \alpha_8 A_J + a_9 A_u + \alpha_{10}\left(A_g - A_g^{g(0)}\right) - \alpha_{11} CCAS^g \quad (3)$$ [4]

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[2] $R_{it}\,(Rate\ of\ return\ of\ common\ stocks) = \beta_{oi}(constant\ term) + \beta_{1i}R_{St}$ (rate of change of the trade weighted exchange rate) + $\beta_{2i}R_{mt}$(exchange rate exposure of domestic stocks) $+ \varepsilon_{it}\,(error\ term)$

[3] $D_{st}(change\ in\ the\ real\ exchange\ rate) = \alpha\ (constant) + \beta DRS_t$(volatility of stock price) + $cD_{it}(interest\ rate\ differential) + \varepsilon_i(error\ term)$

[4] E_{ug}(US − Germany exchange rate)
$= \alpha_0$(constant) $+ \alpha_1 E_{u_j}$(US − Japan exchange rate) $- a_2 R_{gu}$US − (Germany interest rate differential)
$+ a_3 R_{ju}$ (US − Japan interest rate differential) $+ \alpha_4 S_g$(German stock index) $+ a_5 S_j$(Japanese stock index)
$+ \alpha_6 S_u$(US stock index) $+ \alpha_7 A_g$(German bond value) $+ \alpha_8 A_J$(apanese bond value) $+ a_9 A_u$(US bond value)
$+ \alpha_{10}\left(A_g - A_g^{g(0)}\right)$ (German government debt excluding German bond value)
$- \alpha_{11} CCAS^g$ (German current account surplus)

Government bonds, government debt and the current account surplus/deficit are added for the above-mentioned purpose of less simplicity in the model and breaking of the equilibrium due to the upward and downward forces that would otherwise have a cancelling out effect. Empirical studies along this model find mixed results from no relationship to negative or positive relationships thus the hypotheses which are motivated by Abdalla and Murinde's paper are left open in the sense of the positive or negative direction pertaining to the magnitude of the influence (betas). As the direction of the relationship is much debated, the hypothesis is not restricted in terms thereof. The above is the foundation of the hypotheses concerning both the stock and government bond markets. Small additions follow each hypothesis in order to lead to the next.

Although a large amount of literature supports the idea suggesting a relationship exists between securities and exchange rates, another strand exists that finds no significant relationship between the variables. As it is important to provide an antithesis, Bartov and Bodnar (1994) find that there exists no significant relationship of exchange rates with stocks and bonds while He and Ng (1997) conclude only one quarter of the Japanese multinationals faced risk of significant foreign exchange exposure. Since there exist different strands of the discussion, the hypotheses must be tested in order to find more evidence on the theories that declare the existence of a significant relationship. A discussion on the direction of the effects of the variables should follow a model which has proven to show significance in most instances. In addition to this, there is more evidence for these relationships under discussion for developed countries than for developing countries, this will also provide interesting insight.

The above argumentation by Abdalla and Murinde bring us to the hypotheses concerning both stock and bond markets.

H01: There is no relationship between stock market prices and exchange rates of a specific country.

HA1: There is a relationship between the stock market prices and exchange rates of a specific country.

In addition to studying the price level, the risk associated with stocks is also said to have an important effect on exchange rates. Stock price volatility is assumed to affect exchange rates positively (negatively) as volatility decreases (increases) (Agrawal, Srivastav, & Srivastava, 2010). Apart from this distinction of the direction of the force, stock price volatility and exchange rate dynamics associated with it work in the same way as described above for the stock price level. Dr. Agrawal et. al. (2010) study the relationship between stock market volatility (stock market risk) and exchange rate movements for the Indian stock market and the rupee-USD exchange rate. Stock market volatility is defined by them as the change in stock prices from one period to another and is therefore also incorporated in this manner. Their study is conducted to research the new situation brought about by the floating of the Indian rupee leading to the currency's increased exposure to financial markets. They conclude that there exists a

unidirectional effect of Indian stock market volatility on exchange rates with an increase leading to a decline in the exchange rate. This will be analysed on different markets and thus, hypothesis 2 is developed:

H02: There is no relationship between the stock market price fluctuations/movements and exchange rates of a specific country.

HA2: There is a relationship between the stock market price fluctuations/movements and exchange rates of a specific country.

In order to further motivate the inclusion of bond yields into this equation, the findings of Stapleton and Subrahmanyam (1981) are taken into account. They state that the yields on international bonds seem to have a bi-directional influence with foreign exchange risk and sovereign risk. To come to this finding, they build a model in a single period framework to determine the behaviour of the relationship that is shared between the two variables in a world where the PPP holds. The policy followed by monetary authorities is also modelled in and seems to be a driving factor (Stapleton & Subrahmanyam, 1981). Due to the limited scope of this paper, policy is not included in the determinants.

Gadanecz, Miyajima & Shu argue, in a paper about exchange rate risk having influence on bond yields that shocks could be channelled from bond markets to FOREIGN EXCHANGE markets. For them this is a reverse causality, which this paper explores. This is because exchange currencies, with greater liquidity, hold hedging power that protects against extreme market volatility in the price for bonds (Gadanecz, Miyajima, & Shu, 2014). This provides more evidence for the argument of a relationship between the variables. Based on the findings outlined above, hypothesis 3 is developed:

H03: There is no relationship between the government bond yields and exchange rates of a specific country.

HA3: There is a relationship between the government bond yields and exchange rates of a specific country.

A rather unstudied part of this topic is the effect of bond yield volatility on exchange rates. This paper argues that as stocks are assets and their price volatility does affect exchange rates so must government bond yield volatilities. There is no literature to motivative this assumption thus the 4th hypothesis will be a unique addition to the scientific theory on exchange rates. It is known that there exists a relationship with said volatility as the dependent variable and exchange rates as one of the independent variables. Muharam (2013) proves this statement and motivates this reasoning further as he finds a relationship between the latter mentioned variables in Indonesian government bonds. The results of this hypothesis will be novel and thus might be of interest to the scientific community to start a discussion in this sub-topic. In an attempt to address this gap, hypothesis 4 has been developed:

H04: There is no relationship between the government bond yield fluctuations and exchange rates of a country.

HA4: there is a relationship between the government bond yield fluctuations and exchange rates of a specific country.

Literature Review & Recent History of Exchange Rates

The theoretical literature review is provided below to give an explanation and development of the theories which lay the foundation for the above relationship brought forward by Abdalla and Murinde. Therefore, also the foundation of theory leading to the hypotheses.

Most of the recent strand of exchange rate economics today finds its roots in the asset market approach, more specifically the monetary approach leading to the portfolio balance approach.

The determination of exchange rates that derive from asset market theory portray the independent variables as economic fundamentals. Significant fundamental variables usually include income, money and inflation. Before formulation of theories alongside the liberalisation and floating of exchange rates, there was the Bretton Woods system. This system was set up during a conference of the same name in 1944 by allied nations to erect the new economic world order after the devastation of the second world war. During this era, rates were basically pegged with central parities of currencies belonging to the signatories of this agreement varying by at most 1%. Due to strict capital controls and non-convertibility of most currencies this system was sustainable (Frenkel, 1976).

With the move away from fixed to floating rates, in 1973 during the Nixon presidency, the traditional flows view became obsolete. The flows view formulated the determination of exchange rates in relation to the current account balance which, due to the absence of capital flows is simplified to the balance of payments. The exchange rate is therefore the relative price of countries' outputs according to this view. The asset market approach which is more dynamic, developed after 1973, on the other, hand views foreign exchange rates as the relative price of national assets. With the assumption that movement of equity is totally liberated, the exchange rate adjusts instantly to supply and demand forces of national assets (Branson, 1983).

Before continuing, figure 1 provides a visual representation of the branches of research are given to provide clarity on the distinctions:

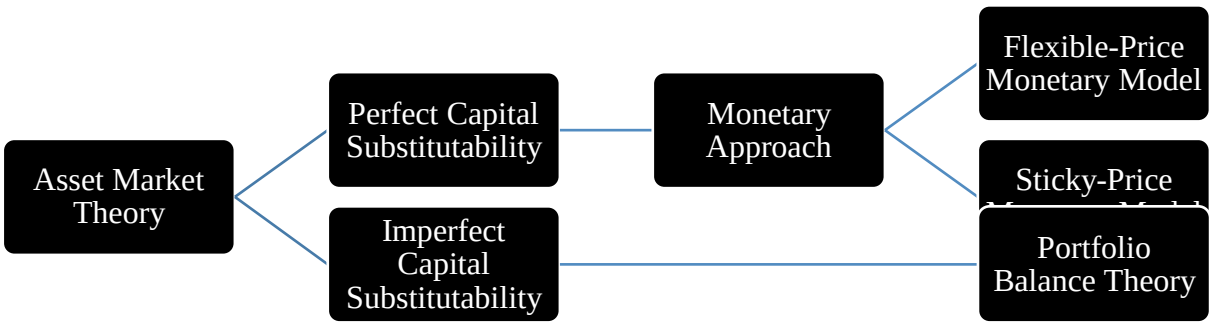

Figure 1: A theory tree of exchange rate determination models

The then newly developed asset market approach was split into two different branches based on (im)perfect capital substitutability, which was assumed to be in perfect form as long as foreign and domestic assets (for example bonds) were seen as the same, portrayed in one specie. The monetary approach implies perfect capital substitutability whereas the portfolio balance approach (Mundell Flemming model) implies imperfect capital substitutability. This substitutability is based on capital mobility, perfect being the ease of mobility given changes in the market and imperfect being the difficulty of said mobility. An example of a change provided by the independent macroeconomy would be interest rates (Dornbusch R. , 1978). It is important to note that Dornbusch (1978) uses the model to which this literature review is working towards.

The reason the theory is dubbed the asset market approach is because perfect capital substitutability leads the way to assuming that home and external bonds are equal and thus are seen as an asset. The monetary approach reduces the investors' portfolios consisting of money and bonds to 3 markets, namely domestic currency, foreign currency and international bonds (Sarno & Taylor, 2003). Continuing, Walras' Law states that in equilibrium of money markets, bonds markets are also in equilibrium. This, according to Walras' law, is because the interest rate adjusts and thus the supply and demand of bonds come to equilibrium. This equilibrium then renders the international bonds market obsolete and only the domestic and foreign currencies remain. This is the reason this approach is dubbed the monetary approach.

On the other hand, the portfolio balance approach incorporates risk through interest rates that foreign and domestic assets earn. Changes in the composition of investors' portfolios is only possible then given the change of rates of return earned on the assets as well as their risk represented by the interest rate. The portfolio composition thus depends on the risk/earnings ratio of foreign assets as those are the ones seen as risky. Homo-economicus, being risk averse in this model world, prefers most of his investment to be in domestic assets from the offset. The monetary approach then splits into yet another two branches. The first branch is defined by the flexibility of goods prices and the assumption that PPP (purchasing power parity) holds at all times. These two conditions result in the equilibrium of goods markets and are represented by the branch of flexible price models. When said prices are sticky, the goods market is not always in equilibrium and PPP only holds in the long-run. The latter branch is made up of sticky-price models. The importance of this dichotomy is seen in various characteristics of exchange rates and interest rates (Frenkel, On Exchange Rates, 1993). It is important to mention that Frenkel (1993) finds that the model being worked to in this literature review does not hold.

Delving deeper into the monetary model it is evident that although there exists a wide variety of model formulations, there are *commonalities* among all of them.

- The first one is the *PPP (purchasing power parity)* (Frenkel, 1976). The PPP is the parity state of the FOREIGN EXCHANGE rate. The purchasing power parity condition can be interpreted so as to define the equilibrium of the exchange rate as the ratio of domestic over foreign price levels of a certain good. In log form it can be written as, $s_t = p_t - p_t^*$ (4), s being the spot rate, p the home and p* the abroad price degree.
- The next commonality is that the monetary approach revolves around *money market equilibrium*. Factors influencing the specie demand and supply are foreign and domestic price levels, income and the annual price of money. This is illustrated as, $m_t^d - p_t = ky_t - \lambda i_t$ (5), m being the (log of) demand for money, y being the (log of) national income and i being the interest rate. In equilibrium, the money demand function equals the money supply function: $m_t^d = m_t^s$ (6) (Frenkel, On Exchange Rates, 1993).
- The *UPI (Uncovered Interest Rate Parity)* is also seen across all these models. Given that bonds globally are a perfect substitute, their expected return rates will be the same when shown in the same currency. This is because arbitrage immediately taking effect in this market! Through this, variation in rates of return for foreign and domestic interest rates is equal to the anticipated depreciation in the home currency. This relationship is portrayed as, $i_t - i_t^* = E(s_{t+1}) - s_t$(7): the interest rate differential between the domestic and foreign country equals the anticipated exchange rate shift from period t to period t+1. Taking the PPP and the money market equilibrium conditions, it is derived that money, national income and interest rates are the main determinants of exchange rates. It is expected that an increase in foreign money supply, interest rates and a decrease in the domestic real income will lead to an appreciation of the domestic exchange rate. The formula for this relationship is, $s_t = \boldsymbol{m}_t - ky_t - \lambda(i_t - i_t^*)$ (8)[5]: (m and y in the previous formula being the difference in domestic and foreign values for each) (Frenkel, On Exchange Rates, 1993).
- *The final part* leading to the equilibrium spot exchange rate is derived by substituting the UPI condition into the last formula. The resulting condition is, $s_t = \boldsymbol{m}_t - ky_t - \lambda(E(s_{t+1}) - s_t)$ (9). This equation implies that the spot exchange rate is affected by news (which affects interest rates as it is an indicator of future return and risk of assets) and changes in the fundamentals m and y (Frenkel, On Exchange Rates, 1993).

[5] s_t $(spot\ exchange\ rate) = \boldsymbol{m}_t$ $(money\ supply) - ky_t$ $(income) - \lambda(i_t - i_t^*)$ (interest rate differential between domestic and foreign)

This flexible-price monetary model does have its shortcomings, however. Volatility of exchange rates exceed the fundamental monetary variable and PPP is violated. To try to address the shortcomings, sticky-price monetary models and the portfolio balance approach were further examined. In the sticky price model, UPI holds always whereas PPP holds only in the long-run. This was a very close representation of flexible price models. Short-run fixed price models represent a world in which prices are sticky and therefore cannot move. An increase in the money supply leads to a decrease in the interest rate to facilitate market clearing leading to UIP implying an expected decrease in the exchange rate, s (an appreciation). The expectation of the market is then an exaggeration and thus a depreciation occurs larger than it should. In the short-run sticky price model, an overshoot in the equilibrium exchange rate is thus observed (Dornbusch R. , 1978).

The portfolio balance model has assumed the existence of a single global bond market due to the perfect substitutability condition. This was seen as unreasonable by later researchers as economic agents perceiving the foreign and domestic bond markets as separate assets would lead to exchange rates not being solely determined by the availability of money. Empirical testing of this model is achievable through the inclusion of variables representing the supply of domestic and foreign assets/bonds (Backus, 1984). These variables are F_t (domestic bonds) and F_t^* (foreign bonds). Their inclusion to equation 9 leads to the empirical model that is the theoretical foundation of the empirical model constructed by Abdalla and Murinde (1997). The empirical model is a built up by the literature by bringing the theories of both the monetary and portfolio balance approaches together, resulting in a holistic formulation of the relationship of the exchange rate and fundamental values.

$$s_t = \alpha + \beta_0 (m_t - m_t^*) + \beta_1 (y_t - y_t^*) + \beta_2 (i_t - i_t^*) + \beta_3 (F_t - F_t^*) + \varepsilon_t \quad (10)$$

The above model is set as the empirical testing framework used by most of the papers brought forth in this literature review by which exchange rates are affected by money, national income, interest rates and domestic and foreign assets (stocks and bonds). The model is slightly augmented to include certain control variables that have an effect on GDP (national income), interest rates and money (currency). Money supply is controlled for by the variable inflation in this study. This is due to the fact that money supply on a quarterly basis is very hard to define, let alone the lack of data for it. This decision is motivated by the fact that, all else held equal, an increase in money supply causes inflation (an increase thereof) (Cripps, 1977).

PART III – Methodology

The dependent variables are the USD exchange rates of the countries discussed. They will be regressed against the stock market and bond yield variables while controlling for the previously mentioned macroeconomic variables that also have significant influence. The results of the regression analysis will show whether and under which conditions stock markets and bond yields affect the exchange rate. The hypotheses will then be answered based on all four of the regressions performed. This way the research will also be able to make comments concerning developed and emerging market economies. This includes the case of South Africa and shows how these variables affect a well-known commodity currency.

Commodity currencies are those which are heavily influenced by the price fluctuations of goods that are a major export for the country in question. It is expected that stocks and bonds will not have a significant effect on this currency as trade flows of commodities have a greater impact (Cashin, Cespedes, & Sahay, 2004). The reason that this analysis is carried out over 5 different countries is, as previously mentioned in the introduction, to have a broad-spectrum approach/provide global representativeness. The time series variables have been formulated into equations similar to the final equation in the theoretical framework for the regression and are shown below. *Note: all exchange rates are given as USD / respective currency unit.*

The regression equations that will be used in answering the hypotheses provided in the Theoretical Framework section are provided below. Notes have been given for alterations in the equations concerning South Africa and Turkey. Hypothesis 1 and 2 are represented by stock market indices of the respective countries and their volatilities, respectively. Hypothesis 2 and 3 are represented by Government Bond Yield data and the volatility of this variable, respectively. *Note: for the explanation of abbreviations, please see the appendix.*

The regression equation below (equation 3) is the basis for the following measures alongside equation 10. What differs between the models motivated by the equation and the equation itself is that the variables being discussed are not put in terms of differences (negative signs for the direction of the variables is put into equation 3 as the theory predicts them to move in this direction). This is done so as to be able to observe the effect each variable has on the exchange rate in an isolated manner. The model below should therefore be interpreted to a larger extent as the motivation to use a linear regression model in the analysis of exchange rates as previous research by exchange-rate-theory-heavyweights have done.

Equation 10 finds its roots in the theories that led to the formulation of the empirical model referenced in this article as equation 3. Through the addition of some control variables in the data section to increase the statistical power of the ensuing regression results, this paper has brought together past and recent empirics alongside interdependencies of variables needing to be controlled for as discussed in the Data section, to build the following model.

Equation (3) drives from the literature review and was built as of the 1970s and is the result of the asset market theory on exchange rates:

$$s_t = \alpha + \beta_0 (m_t - m_t^*) + \beta_1 (y_t - y_t^*) + \beta_2 (i_t - i_t^*) + \beta_3 (F_t - F_t^*) + \varepsilon_t$$

↓

Equation (10) derives from the hypotheses' motivation and was built in 1997 by Abdalla and Murinde in an attempt to further explain the movements of the exchange rate through the fundamentals approach developed by asset market theory. Equation 10 differs from equation 3 in that it also brings the current account surplus and specifically defines securities as government bonds and stocks:

$$E_{ug} = \alpha_0 + \alpha_1 E_{u_j} - a_2 R_{gu} + a_3 R_{ju} + \alpha_4 S_g + a_5 S_j + \alpha_6 S_u + \alpha_7 A_g + \alpha_8 A_J + a_9 A_u + \alpha_{10}\left(A_g - A_g^{g(0)}\right) - \alpha_{11} CCAS^g$$

↓

Finally, Equation (11) was built in 2018 for this paper and brings together the fundamentals approach and asset market theory, with theory concerning the control variables. The significance of including control variables such as unemployment, foreign direct investment, the crisis dummy and the oil price can be found in the data section under the respective variables:

$$E = \alpha + \beta_1 EVol + \beta_2\, 2\, GPDD + \beta_3 GDPcapD + \beta_4 GDPF + \beta_5 GDPcapF + \beta_6 CD + \beta_7 UD + \beta_8 UF + \beta_9 CABD + \beta_{10} CABF + \beta_{11} IRD + \beta_{12} IRF + \beta_{13} IPD + \beta_{14} IPF + \beta_{15} FDID + \beta_{16} FDIF + \beta_{17} OP + \beta_{18} SID + \beta_{19} SIF + B\beta_{20} SIVolD + \beta_{21} SIVolF + \beta_{22} GBYD + \beta_{23} GBYF + \beta_{24} GBYVolD + \beta_{25} GBYVolF + \beta_{26} CPID + \beta_{27} CPIF + \varepsilon$$

Key to Empirical Formula

E	Exchange Rate	**UF**	Unemployment Rate Foreign	**SID**	Stock Index Domestic
Alpha	Constant term	**CABD**	Current Account Balance Domestic	**SIF**	Stock Index Foreign
Betas	Effect Magnitude	**CABF**	Current Account Balance Foreign	**SIVolD**	Stock Index Volatility Domestic
Evol	Exchange Rate Volatility	**IRD**	Interest Rate Domestic	**SIVolF**	Stock Index Volatility Foreign
GDPD	Gross Domestic Product, Domestic	**IRF**	Interest Rate Foreign	**GBYD**	Government Bond Yield Domestic
GDPF	Gross Domestic Product, Foreign	**IPD**	Industrial Production Domestic	**GBYF**	Government Bond Yield Foreign
GDPcapD	Gross Domestic Product per capita, Domestic	**IPF**	Industrial Production Foreign	**GBYVolD**	Government Bond Yield Volatility Domestic
GDPcapF	Gross Domestic Product per capita, Foreign	**FDID**	Foreign Direct Investment Domestic	**GBYVolF**	Government Bond Yield Volatility Foreign
CD	Crisis Dummy	**FDIF**	Foreign Direct Investment Foreign	**CPID**	Consumer Price Index Domestic
UD	Unemployment Rate Domestic	**OP**	Oil Price	**CPIF**	Consumer Price Index Foreign

The following regression equations are the representation of the above for the specific countries being studied in this paper and will be carried out using the STATA statistical program.

1) Regression Equation for UK:

$$USUK = \alpha + \beta_1\ USUKV + \beta_2\ 2\ GPDUS + \beta_3\ GDPcapUS + \beta_4\ GDPUK + \beta_5\ GDPcapUK + \beta_6\ CD + \beta_7\ UUS + \beta_8\ UUK + \beta_9\ CABUS + \beta_{10}CABUK + \beta_{11}IRUS + \beta_{12}IRUK + \beta_{13}IPUS + \beta_{14}IPUK + \beta_{15}FDIUS + \beta_{16}FDIUK + \beta_{17}OP + \beta_{18}SP500 + \beta_{19}FTSE100 + B\beta_{20}SP500Vol + \beta_{21}FTSE100V + \beta_{22}GBYUS + \beta_{23}GBYUK + \beta_{24}GBYUSV + \beta_{25}GBYUKV + \beta_{26}CPIUS + \beta_{27}CPIUK + \varepsilon$$

2) Regression Equation for Germany:

$$USDEU = \alpha + \beta_1\ USDEUV + \beta_2\ \ GPDUS + \beta_3\ GDPcapUS + \beta_4\ GDPDEU + \beta_5\ GDPcapDEU + \beta_6\ CD + \beta_7\ UUS + \beta_8\ UDEU + \beta_9\ CABUS + \beta_{10}CABDEU + \beta_{11}IRUS + \beta_{12}IRDEU + \beta_{13}IPUS + \beta_{14}IPDEU + \beta_{15}FDIUS + \beta_{16}FDIDEU + \beta_{17}OP + \beta_{18}SP500 + \beta_{19}DAX30 + \beta_{20}SP500Vol + \beta_{21}DAX30V + \beta_{22}GBYUS + \beta_{23}GBYDEU + \beta_{24}GBYUSV + \beta_{25}GBYDEUV + \beta_{26}CPIUS + \beta_{27}CPIGER + \varepsilon$$

3) Regression Equation for South Africa:

$$USSA = \alpha + \boldsymbol{\beta_1}\ USSAV + \boldsymbol{\beta_2}\ \ GPDUS + \boldsymbol{\beta_3}\ GDPcapUS + \boldsymbol{\beta_4}\ GDPSA + \boldsymbol{\beta_5}\ GDPcapSA + \boldsymbol{\beta_6}\ \ CD + \boldsymbol{\beta_7}\ CABUS + \boldsymbol{\beta_8}\ CABSA + \boldsymbol{\beta_9}\ IRUS + \boldsymbol{\beta_{10}}IRSA + \boldsymbol{\beta_{11}}IPUS + \boldsymbol{\beta_{12}}IPSA + \boldsymbol{\beta_{13}}OP + \boldsymbol{\beta_{14}}SP500 + \boldsymbol{\beta_{15}}JSEFTSE40 + \boldsymbol{\beta_{16}}SP500V + \boldsymbol{\beta_{17}}\ JSEFTSE40V + \boldsymbol{\beta_{18}}GBYUS + \boldsymbol{\beta_{19}}GBYSA + \boldsymbol{\beta_{20}}GBYUSV + \boldsymbol{\beta_{21}}GBYSAV + \beta_{26}CPIUS + \beta_{27}CPISA + \varepsilon$$

Note: For South Africa, Unemployment and Foreign Direct Investment have been removed due to a lack of data that would've caused a weakened the statistical power of the regression.

4) Regression Equation for Turkey:

$$USTUR = \alpha + \boldsymbol{\beta_1}\ USTURV + \boldsymbol{\beta_2}\ \ GPDUS + \boldsymbol{\beta_3}\ GDPTUR + \boldsymbol{\beta_4}\ \ CD + \boldsymbol{\beta_5}\ UUS + \boldsymbol{\beta_6}\ UTUR + \boldsymbol{\beta_7}\ CABUS + \boldsymbol{\beta_8}\ CABTUR + \boldsymbol{\beta_9}\ IRUS + \boldsymbol{\beta_{10}}IRTUR + \boldsymbol{\beta_{11}}IPUS + \boldsymbol{\beta_{12}}IPTUR + \boldsymbol{\beta_{13}}FDIUS + \boldsymbol{\beta_{14}}FDITUR + \boldsymbol{\beta_{15}}OP + \boldsymbol{\beta_{16}}SP500 + \boldsymbol{\beta_{17}}BIST100 + \boldsymbol{\beta_{18}}SP500Vol + \boldsymbol{\beta_{19}}BIST100V + \beta_{26}CPIUS + \beta_{27}CPITUR + \varepsilon$$

Note: For Turkey, Government Bond Yields and GDP per capita have been taken out due to lack of data, thus hypotheses 3 and 4 will not be tested for Turkey.

The time period under consideration for this thesis is 1980 to 2018 depending on the availability of data, except for Turkey which is analysed from roughly 2000 to 2018. The quarterly frequency is chosen as such due to the fact that more frequent data (monthly, weekly, …) is not available for some of the variables under consideration. This is the reason certain variables were excluded from the regressions concerning South Africa and Turkey; only annual data was available for those mentioned.

PART IV- Data

The data used in this research are macroeconomic variables, equity market indices and data on bond yields of respective countries. All these variables are derived from equation (3) and more are added with the help of equation (10). Those that are not in equations 3 or 10 are included as control variables whose significance is given below.

The macroeconomic variables and government bond yields are retrieved from publicly available databases such as Federal Reserve Economic Data (FRED) and the Organization for Economic Co-operation and Development (OECD). Stock prices are retrieved from Bloomberg. All data is analysed between 1980 and 2018, except for data concerning Turkey which is from 2000 to 2018. The reason for this is the huge devaluation that Turkey's currency faced during the 1970s onwards as well as the effect of economic sanctions imposed following the country's invasion of Northern Cyprus. The data before the revaluation of the lira is thus skewed by political factors and not representative on a solely economic basis. It is also important to mention that before the Euro, the Deutsche Mark was used in Germany, however, to avoid confusion, the Euro will always be used when talking about the German exchange rate.

Operationalizing Concepts and Data

The **real exchange rate** is the ratio of the foreign over the domestic price level. The foreign price level is in this case converted into the domestic currency by means of the current nominal rate. The **volatility of the exchange rate** is its change per unit of time (in this case quarterly). Data for the real exchange rates of all countries was obtained from (FRED)[6].

Variables of Interest for Hypotheses

Stock Market indices' prices (historical) are measurement tools to analyse a sector of the market. In this case the indices representing the biggest companies in the respective markets were chosen as these will have the greatest impact, due to their size, on the exchange rate. These are S&P500, FTSE100, BIST100, DAX30 and JSEFTSE40. These represent the top 500, 100, 100, 30 and 40 companies listed on the main indices of the US, UK, Turkey, Germany and South Africa, respectively. The indices

[6] US-Germany: https://fred.stlouisfed.org/series/CCUSSP01DEM650N
US-UK: https://fred.stlouisfed.org/series/USUKFOREIGN EXCHANGEUKM
US-Turkey: https://fred.stlouisfed.org/series/CCUSMA02TRM618N
US-South Africa: https://fred.stlouisfed.org/series/DEXSFUS

were selected as representative of the whole stock market in each country because the most important of the indices are said to be representative of the whole market. In case of the US, this is the S&P 500. Graham (1973) states that the S&P 500 had eclipsed the Dow Jones Industrial average as the accepted measure of the broad stock market. Data for all indices was obtained from Bloomberg Terminal.

Stock Market Volatility is the volatility of the above measure. Volatility to a certain extent represents risk, higher levels of volatility usually put a downward pressure on prices. The data for this measure is a derivation from **Stock Market indices' prices**. The percentage change from the previous quarter is calculated.

10 Year Government Bond Yields are returns to the investments made in that country's government debt obligation in the form of long term bonds. Data for the real exchange rates of all countries was obtained from FRED.[7]

10 Year Government Bond Yield Volatility is the volatility of the above and, as with stock prices, puts a downward pressure on prices when its value is high. The data for this measure is a derivation from **10 Year Government Bond Yields**. The percentage change from the previous quarter is calculated.

Macroeconomic (Control) Variables

As **oil** is a major commodity and as the world heavily relies on it for its energy needs, fluctuation in oil prices can affect currencies and economies significantly. An example of when the importance of oil prices took effect is the energy crisis of the 1970s when OPEC decided to raise prices. This rate hike hit western inflation and exchange rates. The oil prices included in the regression is the Brent Crude index[8]. This variable is the only one which is slightly divergent from the fundamentals as the inclusion of oil prices is the inclusion of a specific good. It is however included as it is as significant as other macroeconomic fundamentals and its more influential in determining exchange rates than any other commodity. The price of oil is very interesting for many reasons both economic and political but in this paper, it is important to note that Fratzscher, Schneider and Robays find a strong negative correlation between oil prices and the US dollar as well as with asset prices. They mention that this may be explained by the financialization of the commodity in question. This means that it behaves more and more as other financial assets. Oil is thus included as a control variable for securities markets and a direct influencer of the exchange rate. Data for the real exchange rates of all countries was obtained from Federal Reserve Economic Data (FRED).

[7] US: https://fred.stlouisfed.org/series/IRLTLT01USM156N
Germany: https://fred.stlouisfed.org/series/IRLTLT01DEM156N
UK: https://fred.stlouisfed.org/series/IRLTLT01GBM156N
South Africa: https://fred.stlouisfed.org/series/IRLTLT01ZAM156N
[8] https://fred.stlouisfed.org/series/POILBREUSDM

GDP (the Gross Domestic Product) is the summed value of all goods and services that a country's economy yields over the period of an annum (Sarno & Taylor, 2003). GDP is an indicator of an economies health and in growth is will lead to the appreciation of the currency due to increased demand for a country's currency. **GDP per capita** is an indicator derived from the latter and is the total GDP of a country divided by the population of its citizens. It is a clearer measure of economic health. Data for the real exchange rates of all countries was obtained from FRED (Federal Reserve Economic Data)[9]. GDP can also be defined as national income as all the spending on goods and services within an economy is one counter party's income derived from those goods and services produced and provided. Equation 10 mentions domestic and foreign national income which will be represented in this paper's linear relationship by the GDP.

Foreign Direct Investment (FDI) is an investment of a controlling ownership nature in a domestic company by an entity based abroad. FDI has been included in this study's empirical model as it has been found to have a relationship with both stock prices (Anokye M. & Tweneboah, 2008) and exchange rates (Blonigen, 1997). This variable thus acts as a control variable strengthening the statistical power of the empirical model developed in this paper. Data for the real exchange rates of all countries was obtained from the OECD (Organisation for Economic Co-operation and Development) [10].

Industrial production is the output of the industrial segment of a country's economy (Sarno & Taylor, 2003). It is a measure of economic health. Industrial production has been included in empirical modelling due to its significant relationship with both the exchange rate and the at times securities such as stock prices and government bonds (Bahmani-Oskooee & Saha, 2015). It is therefore a control variable to increase the predicting power of the model used in this paper. Data for the real exchange rates of all countries was obtained from FRED[11].

The **unemployment rate** is the percentage of people who are unemployed but actively seeking employment in an economy in the period of an annum (Sarno & Taylor, 2003). It is also an indicator of economic health. This variable is included in the study as a control variable, the reason for this is twofold. Firstly, it has been found that the unemployment rate and exchange rate are significantly interdependent (Pentecost & Zarzosa Valdivia, 2014). Secondly, there is also a significant relationship

[9] US: https://fred.stlouisfed.org/series/GDP
UK: https://fred.stlouisfed.org/series/CLVMNACSCAB1GQUK
Germany: https://fred.stlouisfed.org/series/CPMNACSCAB1GQDE
Turkey: https://fred.stlouisfed.org/series/NAEXKP01TRQ652S
South Africa: https://fred.stlouisfed.org/series/NAEXKP01ZAQ661S
[10] https://data.oecd.org/
[11] US: https://fred.stlouisfed.org/series/IPB50001N
UK: https://fred.stlouisfed.org/series/GBRPROINDMISMEI
Germany: https://fred.stlouisfed.org/series/DEUPROINDMISMEI
Turkey: https://fred.stlouisfed.org/series/TURPROINDMISMEI

between unemployment rates and stock prices (Gonzalo & Abderrahim, 2014). Data for the real exchange rates of all countries was obtained from FRED [12].

Interest rates are prices charged on capital that has been lent and affect exchange rates through capital flows (Dornbusch & Fischer, 1980). Capital will flow from one country to another if the interest rate in the destination country is higher than the originating country. This outflow of capital will depreciate the currency of the destination country. Data for the real exchange rates of all countries was obtained from the OECD[13]. Equation (3) introduced interest rates as a determinant of the exchange rate with a prediction that domestic and foreign interest rates have a positive and negative relationship with the exchange rate, respectively.

The inflation rate of a country represents the gradual deprecation of its currency towards consumption (Sarno & Taylor, 2003). The inflation measure used here is CPI (consumer price index). The difference in exchange rates is a reflection of the difference in countries' inflation rates. A high (low) inflation rate will put a depreciatory (appreciatory) pressure on a country's currency. Data for the real exchange rates of all countries was obtained from the OECD [14]. Equation (10) includes money supply as a determinant but as this variable is very difficult to find data for it on a quarterly basis, it is represented by the variable, inflation. This is because the monetary theory of inflation states that inflation is caused directly on a 1 to 1 increase (decrease) with an increase (decrease) in the money supply).

International trade by means of exports and imports has a marked influence on the exchange rate. Countries with trade surpluses will be likely to have strong (and strengthening) exchange rates because their currency (in which their goods are purchased) is in greater demand in relative to the importing country. As realisable data for the balance of trade does not exist for every country, the Current Account (CA) Balance has been used as a replacement and, as some would argue, an improved addition as the CA incorporates net income from abroad and current transfer and this paper has discussed the importance of capital flows. Data for the real exchange rates of all countries was obtained from FRED. Equation (3) introduces the current account surplus/deficit as a determinant of the exchange rate. Previously, the balance of payments was also mentioned, the BoP makes up part of the current account thus is in this manner accounted for.

The Crisis Dummy is a dummy variable that has been set to 1 for every quarter there has been an economic crisis that affected most of the world being studied here and kept at 0 during times of stability. Crises affect economies by tightening money supplies and less availability of credit.

[12] US: https://fred.stlouisfed.org/series/M0892AUSM156SNBR
UK: https://fred.stlouisfed.org/series/UNRTUKA
Germany: https://fred.stlouisfed.org/series/LMUNRRTTDEQ156S
Turkey: https://fred.stlouisfed.org/series/LMUNRLTTTRM647S
[13] https://data.oecd.org/
[14] https://data.oecd.org/

PART V – Results, Interpretation and Discussion

In total 4 regressions have been carried out to test the hypotheses presented in the theoretical framework. They examine the relationship between historic stock prices and government bond yields, against the dependent variable exchange rates

To determine whether the variables in question have a significant effect on the dependent variables, the P-Values given by the regressions are observed. If the P-Value is lower that 5%, this means it lies within the 95% confidence interval and is thus significant in its effect on the dependent variable. If a variable is significant at a 99% confidence interval this will be stated, any P-Value above 0.05 is implies insignificance for the variable. There was no need to take the logarithm of the data observed as the data points are no abnormally distributed and based on averages to the quarters analysed, meaning outliers very unlikely.

Summary of results

Results of the regressions with as dependent variable the exchange rate

	(1)	(2)	(3)	(4)	
VARIABLES	US-UK	US-DEU	US-SA	US-TUR	
USUKV	0.655**				
	(0.298)				
GDPUS	-0.000	0.001***	0.010**	0.000	
	(0.000)	(0.000)	(0.004)	(0.000)	
GDPcapUS	-0.000	-0.000**	-0.003*		
	(0.000)	(0.000)	(0.001)		
GDPUK	0.000**				
	(0.000)				
GDPcapUK	-0.000*				
	(0.000)				
CD	-0.038	-0.028	0.311	-0.228**	
	(0.034)	(0.027)	(0.320)	(0.112)	
UUS	-0.043*	-0.030**		-0.006	
	(0.023)	(0.014)		(0.078)	
UUK	-0.024				
	(0.023)				
CABUS	-0.001	0.030*	0.350	-0.090	
	(0.030)	(0.017)	(0.386)	(0.076)	
CABUK	-0.039***				
	(0.013)				
IRUS	-0.243***	-0.098***	-0.025	0.037	
	(0.072)	(0.036)	(0.610)	(0.088)	
IRUK	0.178***				
	(0.061)				
IPUS	-0.003	-0.001	-0.182***	0.006	

	(0.010)	(0.006)	(0.066)	(0.023)
IPUK	-0.016*			
	(0.009)			
FDIUS	-0.000	-0.000***		0.000
	(0.000)	(0.000)		(0.000)
FDIUK	0.000			
	(0.000)			
OP	0.006***	0.004***	-0.017	0.000
	(0.002)	(0.001)	(0.012)	(0.004)
SP500	0.000	-0.000*	-0.001	-0.001**
	(0.000)	(0.000)	(0.002)	(0.001)
SP500V	0.131	0.073	-3.560	0.659
	(0.313)	(0.210)	(2.539)	(0.571)
FTSE100	-0.000			
	(0.000)			
FTSE100V	-0.023			
	(0.193)			
GBYUS	0.203**	0.006	0.675	
	(0.077)	(0.039)	(0.751)	
GBYUSV	-1.234***	-0.362	-1.139	
	(0.434)	(0.263)	(1.794)	
GBYUK	-0.109			
	(0.073)			
GBYUKV	0.767*			
	(0.427)			
CPIUK	0.000			
	(0.017)			
CPIUS	-0.008	0.015	-0.421**	-0.055
	(0.022)	(0.009)	(0.176)	(0.042)
USDEUV		0.421**		
		(0.173)		
GDPDEU		-0.001		
		(0.001)		
GDPcapDEU		0.000		
		(0.000)		
UDEU		-0.033**		
		(0.015)		
CABDEU		0.026***		
		(0.007)		
IRDEU		0.161***		
		(0.044)		
IPDEU		-0.005		
		(0.004)		
FDIDEU		-0.000		
		(0.000)		
DAX30		0.000		
		(0.000)		
DAX30V		-0.139*		
		(0.082)		
GBYDEU		-0.045		

		(0.048)			
GBYDEUV		0.645**			
		(0.277)			
CPIDEU		-0.017*			
		(0.009)			
USSAV			7.475***		
			(1.490)		
GDPSA			-0.000		
			(0.000)		
GDPcapSA			-0.017**		
			(0.008)		
CABSA			-0.095		
			(0.091)		
IRSA			-0.811		
			(0.981)		
IPSA			0.247***		
			(0.049)		
JSEFTSE40			0.000		
			(0.001)		
JSEFTSE40V			1.408		
			(1.041)		
GBYSA			0.964		
			(0.957)		
GBYSAV			-4.433		
			(8.798)		
CPISA			0.236***		
			(0.035)		
USTURV				0.560	
				(0.363)	
GDPTurkey				0.000	
				(0.000)	
UTUR				0.000	
				(0.000)	
CABTUR				0.011	
				(0.031)	
IRTUR				0.019	
				(0.015)	
IPTUR				-0.003	
				(0.010)	
FDITUR				-0.000	
				(0.000)	
BIST100				-0.000	
				(0.000)	
BIST100V				0.335	
				(0.247)	
CPITUR				0.008**	
				(0.004)	
Constant	12.388**	1.169***	19.742	-3.593	
	(5.757)	(0.390)	(15.687)	(3.197)	

Observations	120	135	73	55	
R-squared	0.727	0.898	0.957	0.848	
Robust standard errors in parentheses	***p<0.01, **p<0.05, * p<0.1				

Note: Abbreviations are in the appendix

1) US/UK Exchange Rate

In the regression concerning the United States Dollar and the Pound Sterling, the stock market variables have no significant effect for this exchange rate. This could be, as previously mentioned in the introduction, due to mature hedging mechanisms of developed economies that this relationship is nullified and thus H01 and H02 cannot be rejected.

Government bond yields for the UK also do not have a significant effect but notice that US government bonds have a significant effect. Historic prices are significant at a 95% confidence interval and their volatility is significant at a 99% confidence interval. Historic prices in this case move in the same direction with a 1 unit increase in the yield percentage translated to a 0.203 increase in the exchange rate. An increase in the yield represents a fall in the price of US government bonds meaning that the pound sterling can buy more of the good than before, thus an increase in the exchange rate seen in this regression fits theory being analysed. The volatility moves in the opposite direction, a one unit increase in the volatility measure is represented by a 1.234 decrease in the percentage of the exchange rate. This might be due to the fact that volatility represents risk and is thus significant at a higher level. This is to be expected according to theory, that risk would be a factor to negatively affect the exchange rate if the UK were to hold large amounts of US debt. However, H03 cannot be rejected because UK government bond yields have no significance meaning that government bond yields do not seem to have a significant effect on the exchange rate in all situations. H04 also cannot be rejected because UK government bond yield volatility has no significance which means that government bond yield volatility doesn't always have a significant effect on the exchange rate. The amount of debt owed to one another ought to be incorporated into the regression for future research as this could be because the US economy is much bigger and its obligations at a magnitude that reaches far beyond what it owes to the UK. Fluctuations of UK debt securities therefore seem to play no major role.

The regression has an R-Squared of 72.7% which, although not very high, is not too low either showing that most relevant variables have been included.

The implications of these findings for the UK-US exchange mechanisms will be related to the importance of predictability on the choice of securities outlined by Abhyankara , Sarnob and Valente (2006). Predictability of the exchange rate is important in terms of deriving economic value and the risk associated with securities in consideration. Most relationships within this example are insignificant. A stakeholder/decision maker could, however, derive economic value from the relationship between the US-UK exchange rate and both the US government bond value and US government bond volatility.

2) US/Germany Exchange Rate

In the regression concerning the United States Dollar and the Euro, with respect to the German economy, stock markets have no significant effect on the exchange rates. This could again be due to the fact that developed markets have hedging mechanisms that mitigate this relationship. Another reason could be that the German stock market is not big enough on its own to affect the Euro. In this case, future research should treat the European Union as a whole and incorporate other exchanges and indices such as those found in Euronext. Thus, H01 and H02 cannot be rejected.

US and German Government Bond Yields and US Government Bond Yield Volatility have no effect on the exchange rate. This may be due to the globally diversified nature of the US economy and the that of the EU that fluctuations have no major effect on one another. German Government Bond Yield Volatility does however have a significant effect, at a 95% confidence interval, with a percentage increase in this variable resulting in a 0.645 unit increase in the exchange rate. This represents a depreciation of the US dollar with respect to the German currency. An increase in risk in the European market that negatively affects payables to the US and thus endangers the US economy and therethrough its exchange rate might be the reason. H03 and H04 cannot be rejected as only the volatility of the German government bonds have a significant effect.

The R-Squared of this regression is 89.8, indicating a strong representation of data.

The implications of these findings for the German-US exchange mechanisms will be related to the importance of predictability on the choice of securities outlined by Abhyankara , Sarnob and Valente (2006). Predictability of the exchange rate is important in terms of deriving economic value and the risk associated with securities in consideration. Most relationships within this example are insignificant. A stakeholder/decision maker could, however, derive economic value from the relationship between the US-German exchange rate and German government bond volatility.

3) US/South Africa Exchange Rate

For South Africa, none of the variables in consideration have a significant effect on the exchange rate. This is interesting, as one might expect a developing and less hedged market to be more receptive to external shocks. In this case, it might be attributable to the fact that South Africa is famous for its commodity currency. Commodity currencies are those that are largely affected by the good(s) that are strongly linked to the economic performance of a country (Jacks, O'Rourke, & Williamson, 2011). In these countries, is it the price fluctuations of such trade that has large effects while the financial channel plays a much smaller role in influencing the exchange rate. This influence is in fact so strong that commodity price fluctuations affect policy decisions as well, through their effect on the exchange rate (Jacks, O'Rourke, & Williamson, 2011). It is therefore recommended that future research incorporate South Africa's commodity exports into an anlytrical framework such as the one used here; 60% of South African GDP comes from commodity exports. H01, H02, H03 and H04 cannot be rejected. Along with these results, the R-Squared of this regression is suspiciously high at 95.7%. This might be due to the interrelated trends in macroeconomic variables of a developing country which is less complex than the interrelatedness of such variables in developed markets.

The implications of these findings for the US-South African exchange mechanisms will be related to the importance of predictability on the choice of securities outlined by Abhyankara , Sarnob and Valente (2006). Predictability of the exchange rate is important in terms of deriving economic value and the risk associated with securities in consideration. All relationships for this exchange rate are insignificant thus no practical value can be derived.

4) US/Turkey Exchange Rate

Turkey displays the predicted result of exposure in a developing country. The S&P500 index significantly influences the exchange rate, for each unit increase, the exchange rate drops 0.001%, at a 95% confidence interval. This could be due to the fact that the Turkish economy benefits from the better functioning of American markets and attracts greater investment from those investors seeking diversification in emerging markets. The BIST100, BIST100 volatility and S&P500 volatility have no significant effect on the exchange rate however. Due to the latter, H01 and H02 still cannot be rejected. Government bonds were not analysed due to a lack of data. Although a developing market, the outcome here in Turkey might be due to the fact that after the 2001 Turkish economic crisis, the banking sector was overhauled to the extent that Turkish banks came out of the 2008 economic crisis without too much damage. This strong financial sector in Turkey might thus be showing the hedging ability of more developed markets.

The implications of these findings for the US-Turkey exchange mechanisms will be related to the importance of predictability on the choice of securities outlined by Abhyankara , Sarnob

and Valente (2006). Predictability of the exchange rate is important in terms of deriving economic value and the risk associated with securities in consideration. Most relationships within this example are insignificant. A stakeholder/decision maker could, however, derive economic value from the relationship between the US-Turkey exchange rate and the S&500 (US stock market index).

PART VI – Conclusion

Based on the findings outlined above, the research question

"Are stock and government bond markets significant in affecting bilateral exchange rates?"

cannot be answered in a way that indicates that such relationship exists on a global level. Throughout the analysis, it was not possible to prove the tested relationships as existing.

All alternative hypotheses have not been accepted, thus securities and exchange rates have no significant relationship per country. Significance is, however, observed when it comes to stand alone security values and their relationships with the exchange rates. Instead of all stock, stock volatility, bond and bond volatility values being significant with the exchange rate per country, one or two of these factors have been found to be significant. In these cases it is important to analyse their relationship further to derive economic value for decision makers in these specific situations. Due to this there is currently no economic model that can tackle all exchange rates at once and it depends, and so must be customized, on the time being considered, country's being studied and the frequency of data. What does this mean for decision makers such as investors, business leaders and governments? In making a decision, these stakeholders need to be advised on a very specific model per country and time period. A customized model is needed per country, this ought to be further analysed with more frequent local data and factors that affect solely those countries. The reason for this is that decision makers can derive economic value from the predictability of exchange rates and their risk for their portfolio decisions and for trade. Models incorporating multiple countries into their formulation cannot capture the complexity of individual countries. This is outlined below for the 3 types of stakeholders/decision makers discussed and can be taken into account for significant relationships per country or per specific situations as has been found by this paper:

1. Investors: In the case that there is a significance in the predictability of exchange rates, investors will be able to derive economic value in terms of the decisions they make in building their international portfolios of domestic and foreign assets (Abhyankara, Sarno, & Valente, 2006).

2. Business Leaders: In the case that there is a significance in the predictability of exchange rates, business leaders will be able to derive economic value in the case they have trade or import/export based supply chain exposure (Abhyankara, Sarno, & Valente, 2006). The significance of a relationship can thus aid in the hedging of trade risk for businesses.
3. Governments: In the case that there is a significance in the predictability of exchange rates, governments will be able to adjust their policies for benefit of their country. The significance of predictability translates into economic value derivation about securities trade as well as goods trade (Abhyankara, Sarno, & Valente, 2006). This means that governments would be able to adjust their policies based on the needs of their countries, whether this is to export more or less or affect the value of domestic assets.

However, these influences also depend on the level of development of an economy. The difference between developed and developing countries is also highlighted to be the fact that developing countries do not fit the data and theories as much as developed countries. This seems logical as most of the theories leading to the fundamentals approach were developed for the, then so called, first world. The insignificance observed here for developing countries once again highlights the fact that this model is not sufficient in explaining the practical situation in these countries and that a more customized model be developed per country. This insight answers the sub-question

"Do the developed and developing worlds' exchange rates behave in the same manner?"

in that the developing world economies' data, having less sophisticated economies in terms of the dynamics and interaction of variables, show difficulties in portraying relationships. Dare it be said that this research is about to be concluded with the old cliché adage of all economists? It seems so, even though research has come a long way from Friedman proclaiming in 1953 that foreign exchange fluctuations express the elemental economic situations of countries, there is still a lot of research and modelling that must go into exchange rate theory. So, in answering the research question of whether securities affect exchange rates, the answer has to be the cliché, 'it depends'. It depends, on different countries, and times being considered.

Limitations

Discussion on certain aspects of these results is necessary in this section because of limitations that might hinder the reliability of results obtained. First of all, strict exogeneity is impossible in these models due to the fact that the variables are macroeconomic in nature and therefore have dynamics amongst each other. The scope of this thesis poses limitations for investigating further into and correcting for this discrepancy. To take heteroskedasticity into account, robust standard errors were used to test the time series and overcome ordinary least squares bias. This might however fail to fully account for this as the interrelatedness of the variables causes the error term's variance to lean toward homoskedasticity. Identical and independent distribution is likely not to be valid here as the pro/anti-cyclical features of macroeconomic data cause an influence by systematic variation (Hashimzade & Thornton, 2013). This also means that conditional mean independence will most likely not hold.

Omitted variables bias is also important and as previously touched upon a few times, there are many factors that will cause spurious effects in to exchange rates. These omitted variables concern factors that affect the exchange rate on a day to day to basis.

PART VII – Future Research

Recognition that there exist forces of influence on exchange rates that are harder to observe have been around for a long time. Some such factors are exchange market uncertainty and presumptions about the future state of the economy both globally and domestically . Another such factor that is difficult to notice because it affects the residual of models incorporating it but is also engrained in economic theory are business cycles (MacDonald, 1999). Apart from the above, exchange rate microstructure also provides many new avenues of research and factors to be taken into considerations. However, such factors start bridging macroeconomic theory towards microeconomics as the short term is better reflected in the this strand of literature. A common example is order flows and high frequency trading data. In addition to all this, it is also advisable to look into non-linear, more sophisticated models in which studied on exchange rates that allow for changes in monetary policy as well as more realistic interactions due to the non-linearity factor. All such literature should be further considered and incorporated into a framework that better represents the dynamics between the different variables.

Although there has been further research, such as exchange rate microstructure, than what is discussed and tested in this thesis, this paper stops at the fundamentals approach. This is solely due to the fact that the next strand of research, Exchange Rate Microstructure, uses order flow as a main determinant of foreign exchange calculation. Order flow research is the interpretation in movements in

the exchange rate given by the real time orders put on bonds, stocks and even currency trading (Taylor, The Economics of Exchange Rates, 1995). These order prices reflect market sentiment which is driven by news. This thus lays the foundation of short term future predictability of exchange rate movements (Andersen, Bollerslev, Diebold, & Vega, 2003). Due to the difficulty of finding order flow data this paper's aim is once again underlined as being an addition to the literature that bridges the old with the new form of exchange rate determination. As mentioned before, exchange rate microstructure is the latest branch of research in this field and has been left to the future research part of this paper. Leaving it unaddressed, however, would not go in line with this discussion. The theory revolves around how news affects the prices of bids and offers on securities. As exchange rate determination is defined by changes in the macroeconomy, news surrounding the latest state of these fundamental variables plays a very important role in price determination leading to the appreciation and depreciation of currencies through the dynamics of money demand. Evans and Lyons (2002) set a very straight forward relationship for this. Fundamental information leads to changes in order flows which then has an effect on exchange rates. News incorporates the differentials in these fundamental variables (Evans & Lyons, 2003). Due to the importance of this topic, the author of this paper suggests further study into this topic by incorporating variables for news and order flows into the empirical equation used.

Another part of the literature which arrived as a suggestion due to the lack of significant results obtained from the regressions concerning South Africa is that of Commodity Currencies. These are references to currencies of countries whose GDP is mainly made up of the export of commodity (non-manufactured) products such as oil, soybeans and ... Examples are countries like Australia, Canada, New Zealand, Brazil, Chile and South Africa (Cashin, Cespedes, & Sahay, 2004). In the case of South Africa, these products are, for example, gold, platinum, iron ores, diamonds and agricultural products. The fluctuations of the prices of these goods is much like the effect that the fluctuation of stock prices has on monetary flows (Frenkel, A Monetary Appraoch to the Exchange Rate: Doctrinal Aspects and Empirical Evidence, 1976). A live and simple example of this is oil and has been incorporated into the model in this paper More of such commodities ought to be included in more customized models per country being analysed.

Specific to this paper, more frequent data on China should be found so as to include the world's second largest economy into the mix of countries being studied. Another point specific to this paper, and kept out due to limitations of this thesis is the incorporation of corporate bond indices alongside the major stock market indices and government bonds that have been analysed in this study.

PART VIII – Apprendix

USUK	US UK Exchange Rate	IRTUR	Interest Rate Turkey
USDEU	US Germany Exchange Rate	IPUS	Industrial Production US
USSA	US South Africa Exchange Rate	IPUK	Industrial Production UK
USTUR	US Turkey Exchange Rate	IPDEU	Industrial Production Germany
USUKV	US UK Exchange Rate Volatiloty	IPSA	Industrial Production South Africa
USDEUV	US Germany Exchange Rate Volatility	IPTUR	Industrial Production Turkey
USSAV	US South Africa Exchange Rate Volatility	FDIUS	Foreign Direct Investment US
USTURV	US Turkey Exchange Rate Volatility	FDIUK	Foreign Direct Investment UK
GDPUS	Gross Domestic Product US	FDIDEU	Foreign Direct Investment Germany
GDPcapUS	Gross Domestic Product per capita US	FDITUR	Foreign Direct Investment Turkey
GDPUK	Gross Domestic Product UK	OP	Oil Price
GDPcapUK	Gross Domestic Product per capita UK	SP500	Standard and Poor's 500 index
GDPDEU	Gross Domestic Product Germany	SP500V	Volatility for SP500
GDPcapDEU	Gross Domestic Product per capitaGermany	FTSE100	Financial Times Stock Exchange 100
GDPSA	Gross Domestic Product South Africa	FTSE100V	Volatility for FTSE100
GDPcapSA	Gross Domestic Product per capita Souh Africa	DAX30	Deutscher Aktienindex 30
GDPTUR	Gross Domestic Product Turkey	DAX30V	Volatility for DAX30
CD	Crisis Existence Variable	JSEFTSEtop40	Johannesburg Stock Exchnage top 40
UUS	Unemployment in the US	JSEFTSEtop40V	Volatility for JSEFTSEtop40
UUK	Unemployment in the UK	BIST100	Borsa Istanbul 100
UDEU	Unemployment in Germany	BIST100V	Volatility for BIST100
UTUR	Unemployment Turkey	GBYUS	Government Bond Yields US
CABUS	Current Account Balance US	GBYUSV	Volatility for GovBYUS
CABUK	Current Account Balance UK	GBYUK	Government Bond Yields UK
CABDEU	Currernt Account Balance Germany	GBYUKV	Volatility for GovBYUK
CABSA	Current Account Balance South Africa	GBYDEU	Government Bond Yields Germay
CABTUR	Current Account Balance Turkey	GBYDEUV	Volatility for GovBYGermany
IRUS	Interest Rate US	GBYSA	Government Bond Yields South Africa
IRUK	Interest Rate UK	GBYSAV	Volatility for GovBYSouthAfrica
IRDEU	Interest Rate Germany	GBYTUR	Government Bond Yields Turkey
IRSA	Interest Rate South Africa	GBYTURV	Volatility for GovBYTurkey

	Min	Max	Mean	Median	25th Percentile	75th Percentile	Observations
USUK	1.116	2.385	1.638	1.603	1.511	1.755	153
USUKV	-0.171	0.124	-0.002	0.000	-0.023	0.021	153
GDPUS	2796.523	19960.097	10089.791	9447.103	5669.993	14568.093	153
GDPcapUS	12313.000	60961.000	34860.039	33970.000	22922.500	47739.000	153
GDPUK	62111.000	516913.000	267045.712	254346.000	153332.000	386438.500	153
GDPcapUK	56291.000	66362.000	59547.704	58606.000	57087.000	61472.250	152
CD	0.000	1.000	0.301	0.000	0.000	1.000	153
UUS	3.900	10.667	6.312	5.833	5.000	7.367	153
UUK	4.700	11.867	7.683	7.733	5.500	9.567	147
CABUS	-6.210	0.660	-2.583	-2.570	-3.793	-1.443	136
CABUK	-5.460	3.960	-1.453	-1.340	-2.455	-0.450	137
IRUS	1.563	14.847	6.243	5.617	3.690	8.370	153
IRUK	0.841	16.020	6.888	5.528	4.224	9.923	153
IPUS	48.243	115.902	85.798	94.829	65.740	105.690	153
IPUK	76.668	109.135	98.323	101.882	94.834	104.944	153
FDIUS	91900.000	4658905.000	1496192.539	933873.500	438715.750	2548788.750	152
FDIUK	-109679800000.000	1261683000000.000	11994838235.294	6766605000.000	2160622500.000	14627535000.000	136
OP	11.090	122.477	41.946	29.398	18.708	56.148	150
SP500	109.970	2611.237	906.177	928.217	319.967	1330.697	152
SP500V	-0.255	0.190	0.023	0.024	-0.004	0.061	151
FTSE100	1000.000	7687.770	4421.082	4854.350	2545.050	5980.900	138
FTSE100V	-0.276	0.208	0.017	0.024	-0.021	0.061	137
GBYUS	1.563	14.847	6.193	5.607	3.642	8.237	153
GBYUSV	-0.244	0.362	-0.006	-0.010	-0.062	0.042	152
GBYUK	0.841	16.020	6.805	5.518	4.168	9.887	153
GBYUKV	-0.429	0.543	-0.010	-0.016	-0.056	0.040	152
CPIUK	0.300	21.548	3.649	2.500	1.600	4.436	153
CPIUS	-1.623	14.506	3.279	2.867	1.881	3.854	153
USDEU	0.621	1.581	1.133	1.162	1.007	1.289	152
USDEUV	-0.130	0.162	0.002	0.000	-0.038	0.042	152
GDPDEU	217.515	834.612	499.059	509.969	333.976	629.349	153
GDPcapDEU	5269.080	10361.524	7863.091	8000.217	6282.174	9044.745	153
UDEU	3.067	11.867	8.189	8.000	6.817	9.683	153
CABDEU	-2.380	7.850	2.231	1.750	-0.850	4.835	137
IRDEU	-0.123	10.600	5.141	5.160	3.333	7.200	153

IPDEU	62.041	118.214	87.540	85.145	74.995	103.543	153
FDIDEU	-25793320000.000	161871480000.000	6085026496.350	1146850000.000	153240000.000	8521055000.000	137
DAX30	475.200	12917.640	4381.391	3929.030	1471.880	6458.950	151
DAX30V	-0.368	0.351	0.028	0.045	-0.021	0.092	150
GBYDEU	-0.123	10.600	5.093	5.113	3.313	7.067	152
GBYDEUV	-2.542	0.955	-0.039	-0.022	-0.063	0.040	152
CPIDEU	-0.923	7.140	2.115	1.728	1.137	2.790	153
USSA	0.745	15.545	5.772	5.873	2.562	7.967	153
USSAV	-0.191	0.347	0.021	0.013	-0.025	0.064	152
GDPSA	35486.168	83223.550	54900.364	48435.851	41921.132	70444.439	153
GDPcapSA	624.347	1530.555	993.239	901.772	764.701	1256.165	153
CABSA	-9.120	11.820	-1.345	-1.260	-3.713	1.010	152
IRSA	7.290	17.790	12.194	12.653	8.718	15.390	153
IPSA	73.596	115.833	96.887	99.244	90.705	103.810	153
JSEFTSE40	791.553	3532.661	2176.389	2446.183	1250.144	2919.604	77
JSEFTSE40V	-0.281	0.298	0.025	0.028	-0.043	0.110	76
GBYSA	7.290	17.790	12.191	12.653	8.718	15.390	153
GBYSAV	-0.150	0.248	0.001	-0.004	-0.035	0.032	152
CPISA	-1.761	19.250	8.984	8.128	5.400	13.598	153
USTUR	0.563	3.817	1.787	1.529	1.361	1.998	73
USTURV	-0.107	0.499	0.030	0.017	-0.023	0.074	72
GDP Turkey	166940759389.333	441747605340.521	268904118606.974	254057609048.898	188515147567.201	338202130369.085	81
UTUR	220731.089	3001111.569	1035629.286	849638.346	494146.041	1161450.686	153
CABTUR	-9.420	4.420	-3.569	-3.940	-5.495	-1.660	66
IRTUR	8.750	79.000	37.875	43.000	20.833	52.000	153
IPTUR	24.568	174.720	73.049	59.307	44.103	98.693	153
FDITUR	-365000000.000	9510000000.000	1294073770.492	263500000.000	137500000.000	2139250000.000	122
BIST100	385.251	112948.667	38318.160	35563.683	9798.010	64961.583	92
BIST100V	-0.416	1.289	0.083	0.055	-0.046	0.147	91
CPITUR	4.344	122.535	41.013	35.662	9.264	66.216	153

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