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Financialised Internationalisation and Structural Hierarchies: A mixed-method study of Exchange Rate Determination in Emerging Economies

Annina Kaltenbrunner
Economics Division, University of Leeds Business School (LUBS)
Maurice Keyworth Building
Leeds, LS29JT, UK
A.Kaltenbrunner@leeds.ac.uk

Abstract

This paper conducts an extensive mixed-method study of exchange rate determination in the Brazilian foreign exchange market. It combines semi-structured interviews with foreign exchange market participants in Brazil and London and advanced time-series econometrics. In line with PKtheory and critical realist ontology, the interviews uncover the context specific expectations and underlying processes and structures that condition exchange rate dynamics in Brazil and emerging economies more generally. The results point to important structural changes in Brazil's financial integration in the form of currency internationalisation and financialisation. Moreover, they show that this internationalisation has been mediated through a structured and hierarchic international monetary system which fundamentally distinguishes exchange rate drivers in emerging economies from those in developed ones.

1. Introduction

This paper presents an extensive mixed-method study of exchange rate (XR) determination in emerging economies (EE) based on Post Keynesian (PK) theory. It makes two contributions to the literature. First, it answers the call for methodological pluralism in heterodox economics through a study of foreign exchange (FX) market behaviour. Given its open-system ontology, several authors have called for a combination of methods as the appropriate empirical strategy for heterodox economics (Olsen 2002, Downward and Mearman 2007, McEvoy and Richards 2006, Dow 2001, Downward, Finch and Ramsay 2002). This is the

first empirical study in PK Economics to apply such a strategy explicitly.¹ Second, on an empirical level, the mixed-method study presents a powerful critique of mainstream XR theory. It points to the peculiar nature of XR determination in EEs and the recent changes in these countries' FX markets.

PK theory of financial price formation stresses the determining role of fundamental uncertainty and economic actors' inter-subjective and context specific expectations (Keynes 1997, Dow 2002, Chick 1983, Davidson 2002). In the FX market, this view has been developed most comprehensively by J.T. Harvey (1991, 2009, 1998). Harvey rejects the neoclassical view of the XR as a market equilibrating price which is determined by permanent fundamentals. He argues that it is expectations in short-term financial markets that drive XRs. These expectations are primarily anchored by social conventions which makes them necessarily context and time specific.

Harvey's theory reflects PK open system ontology, which rejects the assumption of the immutable nature of economic phenomena over time and stresses the organic and socially contingent nature of human agency. This ontology requires the use of qualitative methods to investigate the context and time specific expectations formation process (Lawson 1985). Moreover, as argued by Critical Realists (CRs), qualitative methods are crucial to uncover the underlying processes and structures which condition human agency beyond their specific context and temporality (Downward and Mearman 2007, Lawson 1997, Lawson 2003). Quantitative methods, in turn, allow additional insights into the structured and layered nature of economic reality (Lawson 1994, Lawson 1997, Downward and Mearman 2002, Downward and Mearman 2007, Dow 1990, Dow 1996). They can identify, quantify, and compare the potential empirical surface phenomena of these underlying processes and structures. Importantly though, in contrast to neoclassical economics, these empirical surface phenomena are to be seen as demi-regularities rather than empirical generalisations, which means they will be partial and multifaceted, and neither predictable nor universal (Dow 1996, Arestis, Dunn and Sawyer 1999, Mearman 2004, Lawson 1997).

¹ In general, despite the strong ontological case for methodological pluralism, applied mixed-method studies in heterodox economics are still very rare. Recent exceptions, published in the *Cambridge Journal of Economics*, include Jefferson (2007), Karacimen (2015), and Austen et al. (2015). Downward (e.g. 1999, 2000) engages extensively with PK pricing theory from a methodological pluralist perspective, but doesn't conduct qualitative studies.

This paper conducts such a mixed-method study of FX market behaviour in the case of the Brazilian Real (BRL). It combines insights from 52 semi-structured interviews with foreign currency traders in Brazil and London and advanced time series econometrics (Multivariate VAR-GARCH (MVGARCH) models). The interview results show the fundamental uncertainty in FX markets and the absence of permanent XR fundamentals for agents' expectations formation. They support Keynes' insight that financial price formation is an inherently social, heterogeneous, and inter-subjective process. Moreover, the qualitative study points to the recent changes and the underlying processes and structures, which have shaped EE FX market actors' expectations and behaviour over recent years. They show the increasingly internationalised and financialised character of these markets and the subordinated nature of EE's integration into them. Finally, the MVGARCH models grant further insights into some of the empirically observable implications these processes and structures have had for XR behaviour in Brazil.

Following this introduction, Section 2 sets out the case for a mixed-method study to investigate FX market behaviour from a PK perspective. Section 3 gives a short overview of the study conducted and Sections 4 and 5 present the qualitative and quantitative results respectively. Section 6 concludes.

2. FX market behaviour: The need for a mixed-method study

In neoclassical theory the XR is considered a relative price which adjusts to underlying fundamentals to restore efficient market equilibria. This holds true on goods market, as in Purchasing Power Parity (PPP) and macroeconomic balance models (Fundamental Equilibrium Exchange Rates (FEER); Behavioural Equilibrium Exchange Rates (BEER)), and asset markets, as in uncovered interest parity (UIP) and the monetary and portfolio models of the XR (Blecker 2005, Harvey 2001, Kaltenbrunner 2012). For example, in the case of PPP, an increase in prices, often as a result of excess demand and money creation, will lead to competitiveness problems, which require a change in the nominal exchange rate to restore equilibrium in the trade balance.² In a similar vein, in UIP XR expectations (which

² FEER and BEER models are based on a similar principle insofar as they indicate the exchange rate adjustment/value which ensures balance of payments equilibrium. However, in contrast to PPP, they are based on a country's underlying savings and investment decisions and are hence concerned with the real exchange rate.

are formed rationally and thus perfectly predict future exchange rates) adjust in order to ensure equilibrium on two countries' asset markets. Higher interest rates in one country will be accompanied by exchange rate depreciation, whereas the country with lower interest rates will be subject to XR appreciation.³

The incorporation of agents' behaviour and their expectations - formed rationally, that is endogenously to the model under consideration, or "irrationally" as in recent behavioural finance models - did little to change this view of XR determination. Rational traders are ultimately seen to keep the XR in line with the fundamentals specified in traditional XR models. For example, in recent heterogeneous agents models (e.g. De Grauwe and Grimaldi 2006), irrational traders (Chartists) can deviate the XR from its equilibrium value for sustained periods of time. However, ultimately rational traders (Fundamentalists), whose expectations are formed in line with mainstream exchange rate theories, will align the exchange rate with its value specified in the market-equilibrating approach to the XR (mostly PPP).

PK theory stresses the determining role of expectations in (short-term) financial markets for price formation (Keynes 1997, Dow 2002, Chick 1983, Davidson 2002, Harvey 1991, Harvey 2007, Harvey 2009, Davidson 1978, Lavoie 2000, Lavoie 2002-03, Prates and Andrade 2013, Herr and Hübner 2005). In contrast to neoclassical economics, these expectations are formed under fundamental uncertainty, which means no stable probability function exists to forecast future fundamentals. Conventions, the assumption "that the existing state of affairs will continue indefinitely, except in so far as we have specific reasons to expect a change", and the confidence with which we hold these conventions, govern investment behaviour (Keynes 1997: 152). In this view, there are no underlying objective economic relations that determine XRs at all times. 'Fundamentals' are whatever market participants expect the drivers of the XR to be in a given context and temporality (Harvey 1991, 2009, 1998). Price formation is an inherently social and intersubjective process. Moreover, given the all-pervading uncertainty

³ As pointed out by one referee, ultimately this conception of exchange rate determination is linked to the assumption of a natural rate of interest and/or unemployment in neoclassical economics. It is the absence of this assumption that constitutes another main difference to heterodox theories of the open economy. Another one is causality. For example, whereas PPP theory sees the causality from prices to the XR, heterodox models emphasise shocks to the XR, which then cause a change in prices. In a similar vein, whereas mainstream models emphasize the importance of the real inter-temporal natural rate of interest that equilibrates investment and savings as determining the monetary rate of the central bank, heterodox models focus on the role of the monetary rate in affecting real variables.

and precariousness of conventions, psychological phenomena play a crucial role in this framework (Dow 2011) .

This does not mean that economic indicators, or indeed variables specified in mainstream exchange rate theories, do not matter for agents' expectation formation in PK theory.

However, given that they work through the expectations of heterogeneous agents operating in a non-ergodic world, there is no reason why they should act permanently, ubiquitously and/or with the sign predicted by neoclassical exchange rate theory to restore market equilibrium.⁴

For example, based on historical observations, Harvey (2009) argues that interest rates, unemployment, the trade balance, and inflation have been the main indicators for agents' expectation formation in the post-Bretton woods area. However, his observations are based on the specific context of the US economy. The indicators might be very different in EEs given their different institutional characteristics, market maturity and structure, historical development, and integration in a structured and hierarchic international monetary system (Prates and Andrade 2013, Kaltenbrunner 2015).

PK XR theory, with its emphasis on the determining role of expectations formed under fundamental uncertainty, reflects PK open system ontology.⁵ By overthrowing the ergodic axiom and putting context and time specific expectations at the analytical core, Keynes' system rejects the assumption of the immutable nature of economic phenomena over time. Temporary 'quasi-closures' are established through conventional and institutional behaviour (Downward et al. 2002, Lawson 1985). In addition, PKs explicitly reject the assumption that knowledge of atomistic behaviour is sufficient to construct (macroeconomic) outcomes. Human agency is socially contingent, in an organic rather than atomistic view of the economic process (Dow 2001, Arestis et al. 1999).

The analytical primacy of (financial) agents' behaviour and context specific expectations requires different methods for the empirical investigation of XR determination. Qualitative

⁴ Another element of PK exchange rate theory, although less emphasised here, are the feedback relations between 'internal' and 'external' variables. That is the fact that the actions of financial actors themselves might change the economic indicators they consider. The importance of positioning, shown in the next section, is a case in point.

⁵ According to Dow (1998), given the widespread emphasis on uncertainty, historical processes and real choice, PKs share a common open system ontology. The existence of such a common ontology is still an issue of debate. Whereas for some authors such a common basis is a crucial unifying element of PK economics (Arestis et al. 1999, Lawson 1994, Dow 1999b, Arestis 1992, Lavoie 1992, Chick 1995), others think that settling on a unified methodological foundation might be counterproductive and limit the PK approach in its reach and breadth (Walters and Young 1999).

methods are needed to investigate the specific microstructure of FX markets and the determinants of agents' heterogeneous expectations formation processes. Quantitative data are conspicuously mute on the specific actors, their instruments and motivations to operate in financial markets. Moreover, as argued by CRs, qualitative methods are necessary to uncover the underlying processes and structures which shape human behaviour and thus potentially empirically observable surface phenomena ⁶ (Olsen 2002, Downard and Mearman 2007, McEvoy and Richards 2006, Dow 2001, Lawson 1997, Lawson 2003, Downard et al. 2002).⁷

As discussed above, PKs who stress Keynes' open system ontology highlight that the expectations formation must be a necessarily institutionally and historically contingent process (e.g. Dow and Chick 2005, Lawson 1985, Crotty 1994). This does not mean that such an approach is theoretically indeterminate, unable to say anything about XR determination beyond the specific context and time (Coddington 1982). However, in line with CR methodology, rather than pinning down objective causal relations and permanent empirical fundamentals as in mainstream XR theory, the analytical focus shifts to investigating the deeper processes and structures that are real but are not directly accessible to observation and only discernible through their effects.⁸

Indeed, Keynes' analysis of agent behaviour under uncertainty was not confined to the expectations formation process. It also highlighted the implications this uncertainty has for the underlying structures and institutions of an economy (Crotty, 1994). One such underlying structure, put forward in his liquidity preference theory, is a hierarchy among financial assets according to their relative ability to protect agents against the uncertainty. Money, as the

⁶ It is important to note though that these deeper processes and structures are not in any sense natural or immutable and might not be reflected in empirical surface events or be out of phase with them (Lawson 1997, Arestis et al. 1999, Dow 1996). Given the number of mechanisms working at the same time it is unlikely that one mechanism would dominate for the full period under consideration.

⁷ The research strategy suggested by Critical Realists to uncover the underlying structures that condition human behaviour is retrodution. Knowledge is acquired by formulating some idea (model) of the underlying mechanisms, processes and structures, which are then "tested" in an iterative and cumulative process using a selection of different techniques (Walters and Young 1999, Lawson 1994, Lawson 1997, Zachariadis, Scott and Barrett 2013).

⁸ To what extent PK scholars share a CR ontology is still open to debate. (Dow 1999b) highlights that although not explicitly espousing CR, the content and the manner in which these authors present their methodological statements indicate a strong affinity with it. Arestis (1996), McKenna and Zannoni (1999), Rotheim (1999), Lee (2002), Dunn (2004), and most prominently Lawson (1994), argue that PK ontology is indeed a CR one. In this vein, Rotheim (1999) points out that insofar as PKs make it their analytical endeavour to uncover underlying mechanisms and processes, acknowledge the time and context specific and transformative actuation of economic agents, and aim to explain rather than predict, their research project can indeed be seen as CR.

ultimate liquid asset, stands at the top of this hierarchy. Returns of all other assets are assessed against this asset with the highest liquidity premium (e.g. Davidson 1978, Keynes 1997). A similar hierarchic structure also exists in the open economy where currencies are assessed against the money of the system (in Keynes' time the Pound Sterling, nowadays the US Dollar (Riese 2001, Herr and Hübner 2005, Dow 1999a, Prates and Andrade 2013, Terzi 2006, Kaltenbrunner 2015). This hierarchy has important implications for agent behaviour and consequently XR dynamics, in particular for currencies at the lower level of the hierarchy which are subject to higher interest rates, external vulnerability, and monetary subordination.

Quantitative methods, on the other hand, can investigate the translation of agents' expectations, and hence indirectly the structures which shape them, into empirically observable surface phenomena and their statistical and economic significance. Even in an open system there may be underlying forces which maintain or restore order, if in an indeterminate way (Dow 1996). These may be due to relatively enduring underlying structures, institutions and processes and/or economic agents seeking stability in their decision-making (Keynes' aforementioned conventions are a case in point). If these conditions exist, underlying mechanisms and structures might be reflected in observable, regular events on the empirical level (Downward and Mearman 2003, Setterfield 2003, Mearman 2004, Downward et al. 2002, Lawson 1985). These empirical demi-regularities or quasi-closures can lend themselves to ex post statistical analysis and descriptions. For example, Downward et al. (2002: 495) write: "Researchers do not have to appeal to an omnipresent probability distribution to argue that relative frequency accounts of events can be possible despite being liable to change".

This does not mean quantitative methods 'validate' qualitative results. Rather, in line with CR ontology, they allow additional insights into the same structured and layered reality (Downward and Mearman 2007, Downward and Mearman 2002, Olsen and Morgan 2005). According to Downward and Mearman (2007) the aim is to construct a nexus of mutually supportive claims of reality, without the presumption of being exhaustive, in which the whole stands distinct from its parts. On a more epistemological level, Dow (1996, 1990) argues that given the open, organic, complex and transmutable nature of reality, knowledge of this reality can always only be partial. This requires a range of explicitly partial analyses, and indeed

methods, to deal with that incompleteness (Downward and Mearman 2002).¹⁰ For example, according to Downward and Mearman (2002): "...while descriptive and historical analysis might be suggestive of the causal mechanisms themselves, the effect of their action can be assessed, and hence the purported causal mechanism supported, with reference to more quantitative analysis" (p. 15). Moreover, quantitative methods could help to identify the changing nature of empirical demi-regularities, which can then be further investigated using qualitative methods (Downward and Mearman 2007, Olsen and Morgan 2005).

Following this reasoning, in this study time-series econometrics has complemented the qualitative results through providing additional insights into: (a) whether the quasi-closures invoked by the individual interviewees translated into empirically observable relations on the macroeconomic level between the XR and the empirical manifestations of the processes and structures shaping agents' behaviour¹¹; (b) the actual magnitude of these relations and their statistical probability; and finally (c) to what extent these quasi-closures or demi-regularities lasted and/or changed over time.¹²

By advocating mixed-method studies to support their ontological and epistemological background, CRs adopt a pragmatic approach to methodology, which is nonetheless consistent with their view of reality as inherently open, structured and organic. Methods are not linked to different ontological domains but are re-descriptive devices revealing different aspects of the same objects of analysis (Downward and Mearman 2007, Olsen and Morgan 2005, Downward and Mearman 2002). Importantly though this pragmatic view of methods is only appropriate if a common, open system ontological position is sustained (Dow 1998, McEvoy and Richards 2006) and it is acknowledged that in such an open system ontology any empirical closure can only be temporary and context-specific (Lawson 1997). Indeed, as Lawson (1997) argues: "...constant conjunctions of events are in fact extremely rare, spatiotemporally restricted and usually artificially produced." (p. 27).¹³

¹⁰ For a critical view of the fallibility of knowledge argument for mixed-method research see Lawson (2008).

¹¹ This does not mean we are assuming atomistic agency (Lawson 1997). Quite to the contrary, one of the paper's emphases is on the (institutionally determined) heterogeneity of agency and the extent to which the interplay of this agency translates into generalised macroeconomic phenomena.

¹² Whereas the first insight could have been generated by simple graphical analysis, the latter two are more specific to econometric techniques.

¹³ This becomes particularly clear if one acknowledges that these event regularities are based on precarious, inter-subjective, and institutionally constructed conventions.

This consistency has been particularly controversial when it comes to the role of econometrics (Sayer 1992, Lawson 1997). This is so, because econometrics requires both intrinsic and extrinsic closure (Lawson 1989) and is based on an aggregation condition, typically an additive function of the behaviour of the individual components of the system (Lawson 1997, Downward et al. 2002).¹⁴ Moreover, it is argued that econometrics is conducted in a “black-box” fashion and disguises the actual process by which the data have been manipulated (Sayer 1992, Olsen and Morgan 2005). In line with what has been said above, this does not mean that econometrics should be rejected a priori but the researcher needs to take extra care to maintain a consistent ontological position and acknowledge the limited nature of empirical event regularities subject to econometric testing. Econometrics is used to investigate whether a causal mechanism was indeed, temporarily, operative on the empirical level in a concomitant way, rather than confirming and asserting permanent, causal closure by assumption as in neoclassical economics (Downward et al. 2002, Lawson 1995, Lawson 1997, Lawson 2008).

This “critical” view of econometrics also implies that certain econometric methods are more consistent with a CR methodology than others. For example, time-varying or non-parametric methods, which analyse one case study, are preferable to panel or cross sectional studies. In addition, this means that econometrics should be conducted primarily for explanatory rather than predictive reasons or even forecasting (Lawson 2008, Downward and Mearman 2002) and emphasis is put on the researcher’s interpretation of results (Olsen and Morgan 2005).

3. A Mixed-Method Study of the Brazilian FX Market

This paper applied such a mixed-method study to investigate XR determination in Brazil. Whereas the semi-structured interviews were aimed at uncovering agents’ context and time specific expectations and the underlying structures and processes shaping them, analytical statistics were used to investigate the temporary empirical demi-regularities between the XR

¹⁴ The intrinsic condition of closure (ICC) suggests that the structures of the phenomena under study are constant, unchanging and for any intrinsic state only one outcome is possible. The extrinsic condition of closure (ECC) proposes that the phenomena under study are isolated from other potential influences (Arestis et al. 1999, Downward and Mearman 2002, Lawson 1997).

and the empirical manifestations of these underlying structures and processes uncovered in the qualitative study. Following a retroductive strategy, initial hypotheses and beliefs about the underlying processes and structures were based on preliminary data analyses (both qualitative and quantitative)¹⁶ and the PK framework sketched out above.

The interviews were conducted between April and June 2008 in São Paulo and Rio de Janeiro (31 interviews) and between November 2009 and November 2010 in London (21 interviews) (for more details see Appendix 1). Sampling was conducted on a purposive basis, drawing on initial contacts and snowballing. The choice of offshore institutions was based on progressive theoretical sampling (Bryman 2001, Miles and Huberman 1994). In contrast to most existing studies of FX market actors, which do not discriminate between FX traders which purely operate for clients and “speculative” FX market actors (e.g. Frankel and Froot 1987, Cheung and Chinn 2001, Wansleben 2013, Cetina and Bruegger 2002, Oberlechner, Sluneko and Kronberger 2004), explicit focus was put on operators which take directional (“speculative”) FX positions and thus need to form a view about future XR developments. Questions focused on the Brazilian FX market, but were extended to other EEs in the case of offshore respondents. Given that the focus was on financial market participants’ perceptions and priorities, all questions were open ended (Foddy 1993). Responses were analysed following Miles and Huberman (1994) stages of data processing, that is, interviews were transcribed and coded in several iterations to identify relations and the underlying processes and structures.

The econometrics applied were multivariate VAR-GARCH (MVGARCH) models. In line with the methodological considerations in the previous section, these models were chosen for several reasons. First, MVGARCH models calculate both the variance and the covariance between variables in a time-varying way (Engle and Kroner 1995). This not only allows for robust estimation¹⁸, but also accounts for the limited and changing nature of event regularities. Second, VAR models consider the dynamic feedback relations between a system

¹⁶ A total of 36 additional interviews (with financial sector representatives, the central bank and FX traders) were conducted to investigate the structure of the Brazilian FX market, identify interview partners, explore the feasibility of the study, and form initial hypotheses about the underlying processes and structures shaping FX market behaviour in Brazil. In line with the methodology of the main study, these initial hypothesis were investigated using quantitative analyses including graphical analyses, simple statistics, and an event study.

¹⁸ Most XR series are subject to volatility clustering which causes heteroscedasticity related estimation problems. (Multivariate) GARCH models incorporate heteroscedasticity in the estimation procedure (e.g. Silvennoinen and Teräsvirta 2009).

of variables. Rather than testing pre-formed hypotheses about specific causal relations based on a-priori closures, these models ‘let the data speak’ and grant a flexible and open insight into empirical event regularities. This does not imply the primacy of empirical data¹⁹, but, in line with CR ontology, grants additional insights into the multifaceted, changing, and frequently limited relations between variables on the empirical level. Finally, it is important to reiterate that these estimations were not based on pre-formed theoretical hypotheses and the assumption of permanent and ‘forecastable’ event regularities, but aimed at granting additional insights into the layered and structured reality, in particular the existence, nature, magnitude, and regularity of empirical surface phenomena caused by temporary stability in human agency.

The VAR mean equation is specified as

$$r_t = \alpha + Ar_{t-1} + X + \varepsilon_t$$

where r_t is an $n \times 1$ vector of daily XR returns at time t and $\varepsilon_t | I_{t-1} \sim N(0, H_t)$. X denotes a vector of current or lagged indicators for the XR. These indicators represent the most important empirical manifestations of the processes and structures that have shaped FX market actors expectations and operations in the Brazilian FX market over recent years as identified by the qualitative study. The $n \times 1$ vector of random errors ε_t is the innovation for each XR at time t with its corresponding $n \times n$ conditional variance-covariance matrix H_t . The market information available at time $t-1$ is represented by the information set I_{t-1} .

Two methods are used to estimate the multivariate conditional variance matrix: the Baba-Engle-Kraft-Kroner (BEKK) model (Engle and Kroner 1995), and the Dynamic Conditional Correlation (DCC) model introduced by Engle (2002). The BEKK formulation has the advantage that the conditional covariance matrices are positive definite by construction for all t . In addition, it builds in sufficient generality, allowing the conditional variance and

¹⁹ For a critique of the extreme form of this approach, represented among others by Sims (1982), see Lawson (1997) and also Downward and Mearman (2003).

covariance to influence each other without requiring the estimation of a large number of parameters (Karolyi 1995). This, however, means that BEKK models incorporating more than a few variables can quickly become infeasible to estimate. Thus, bivariate BEKK models are complemented with DCC models, which allow for large covariance matrices. In addition, in the DCC class of models, the conditional correlation matrix is allowed to be time-varying, which accounts for the temporary nature of empirical closures (Christodoulakis and Satchell 2002, Engle 2002, Tse and Tsui 2002).

One question that remains to be answered is whether such application of econometrics is consistent with Keynes' own methodology. Indeed, according to Lawson (2009): "... if econometrics is not to be rejected as being of little value [from a (Post)Keynesian perspective], the econometric practice must be justified within Keynes' own account" (p. 131). Keynes himself was very sceptical of econometrics. In addition to 'technical' issues, this scepticism was rooted in his own ontology and epistemology. In a nutshell, Keynes argued that the quantification of probabilities required reference to atomistic entities (a requirement which was also reflected in his principle of independent limited variety) and most importantly that the environment should be uniform and homogenous over time; both of which he thought were rarely given in social systems (Downward and Mearman 2002, Lawson 2009, Klant 2009). Keynes did, however, acknowledge that human agency might create some temporary stability through the existence of conventions, which could lend themselves to ex post statistical analysis (Pheby 2009, Downward et al. 2002). Importantly though, he saw these statistical devices as useful, descriptive tools of reality, rather than as means of induction to test theoretical, deductively derived hypotheses (Pesaran and Smith 2009, Downward and Mearman 2002). "...Keynes' inductive account is concerned with the opinion or degree of belief in a hypothesis that a person is entitled to hold given the available evidence" rather than with the validity of the hypothesis itself (Lawson 2009: 124). This also implies that whereas econometrics might be a useful tool to describe the past (taking account of structural breaks and the potentially time varying nature of coefficients), it, or any other empirical method for that matter, has no value or place in predicting the future.

4. Qualitative Results

Fundamental Uncertainty, Context Specific Expectations and Social Price Formation

Table 1 summarises the main strategic financial actors identified in Brazil's FX market, their motivation (M) to operate in FX, their trading strategies (S), time horizons (H), and the most frequently mentioned indicators they consider for their expectations formation.

Table 1: Heterogeneous Agents and their Expectations Formation

		Onshore		Offshore	
		Nature of Operations	Expectations Formation	Nature of Operations	Expectations Formation
Bank	Commercial	M: Client Trading S: Volatility Trading H: Intra-day to 3 weeks	Stock Market S&P Interest Rates Other Currencies Commodities	M: Client and Proprietary Trading S: Trend Trading H: Intraday to 3 months	Sentiment International Risk Aversion Technicals
	Investment	M: Proprietary Trading S: Trend Trading H: 3 weeks to 3 months	Other Currencies S&P Commodities Stock Market Flows		
Fund	Hedge Fund	M: Proprietary Trading S: Trend Trading H: 3 weeks to 3 months	Other Currencies Flows Positioning Macro-scenario	M: Proprietary Trading S: Trend Trading H: 3 days to 3 months	Flows Fundamentals (Macro-indicators) Carry
	Real Money Fund	X	X	M: Proprietary S: Trading Investing H: 3 months and above	Fundamentals (e.g. PPP, FEER) Flows Politics Carry

Notes: Indicators for Expectations formation are listed according to frequency of mentioning

Brazil's (and indeed EE's more widely) FX trading today is dominated by three main actors: Banks, Hedge Funds and Real Money Funds. Due to their distinct trading strategies, onshore banks can again be divided into commercial and investment banks.²⁰ Whereas commercial

²⁰ Due to the difficulty of accessing them and their higher complexity, this distinction could not be made in the case of offshore banks.

banks mainly operate on behalf of their clients (client trading), investment banks primarily take proprietary decisions (on behalf of the bank itself). These different motivations are also reflected in the banks' varying trading strategies and time horizons. Whereas commercial banks mainly operate intra-day (on rare occasions proprietary traders in commercial banks take longer positions up to 3 weeks), traders in investment banks have a trading horizon between 3 weeks and 3 months. Commercial banks' revenue mainly stems from the intra-day volatility and the bid-ask spread (volatility trading). Investment banks, in turn, make money through betting on an exchange rate trend (trend trading). Trend trading is also the dominant strategy for offshore banks.

Hedge funds (both onshore and offshore) operate very similar to proprietary traders in investment banks: relatively short-term positions (between 3 weeks and 3 months) to "speculate" on future exchange rate trends. Given that funds don't need to perform FX services for clients, their operations are by definition proprietary. Finally, real money investors are more medium to long-term operators with a trading horizon above 3 months. Their clients are long-term oriented institutional investors, such as pension and insurance funds, who tend to invest – rather than trade – EE assets. In contrast to the banks and hedge funds, returns for these actors also stem from the underlying assets (equity and domestic currency bonds) in addition to XR gains.

Table 1 also shows that agents' expectations formation process was fundamentally influenced by these institutional differences. Rather than following uniform fundamentals, as in mainstream XR theory, actors differed as to which factors were important for their decision making. For example, whereas operators in banks focused primarily on short-term financial returns (including stock, bond, FX, and commodity markets) and market sentiment (including international risk aversion and technicals (some configuration of past price behaviour), operators in funds also considered more medium-term indicators, such as the macro-scenario (growth, inflation, current account) or indeed fundamental values as specified in mainstream XR theory.

On a more general level, there was profound uncertainty over what XR fundamentals, or even the drivers of the XR rate are. Large numbers of the interviewees could not identify stable, permanent indicators for their expectations formation, but responded that these changed according to market conditions and times. In line with Keynes' social conventions, themes

emerged between and across the actors and disappeared as quickly as they had surfaced. According to a proprietary trader at an offshore bank,

“...the FX market is much more random than other markets, so it is enough that a certain theme gains enough traction with enough people and then it will cause the move, so everybody starts talking about undervaluation then people will start on the bandwagon and then it will work, but usually it doesn't.” (Interview OFB2, 4th December 2009)

Moreover, very few respondents had a conception of the XR fundamentals put forward by neoclassical exchange rate theory.²² As can be seen in Table 1, it was only offshore institutions which mentioned fundamentals for their expectations formation. The understanding of what these fundamentals referred to, however, differed again substantially. Whereas hedge funds referred to macroeconomic indicators (e.g. inflation, current account etc.)²³, it was only operators in real money funds that had some notion of underlying fundamental values, such as PPP or FEERs/BEERs. These differences notwithstanding, even these more long-term oriented operators paid substantial attention to short-term returns (in the form of the carry). As one respondent in an offshore real money fund put it:

“...ah...fundamentals...I don't really believe in fundamentals...the interesting thing as economist you appreciate...we had decades...how long have people tried to build models of sovereign default...and the only useful piece of information we got out of all of this is that nobody has a model...that is information...that is telling you...the basis of all credits is trust...it is all to do with trust and bargaining position” (Interview OFRMF7, 19th March 2010)

²² It is interesting to note the similar experience of the Oxford Economists' Research Group when they surveyed and interviewed businessmen about the way they fixed prices and output. In contrast to what would be advocated by neoclassical theory, very few of the respondents engaged in profit maximization through the equalization of marginal cost and revenue (Hall and Hitch 1939). One of the main reasons for this was businessmen's uncertainty about key parameters needed to operate based on neoclassical profit maximization (e.g. demand conditions, consumer preferences and the reaction of competitors).

²³ In principle, these macroeconomic indicators can also be considered fundamentals because they are central for theories such as PPP or FEER. However, their influence on the XR was mediated through the expectations of FX market actors, many of whom were not aware of these theories or did not trade according to them. This meant that their nature and importance changed with time and institutions and that their expected influence on the XR was frequently inconsistent with neoclassical XR theories.

Psychological phenomena, such as animal spirit, greed and momentum, were mentioned by participants across all institutions.

Notwithstanding these differences in actors' expectations formation processes, two indicators – which were mentioned across all institutions – are important to highlight: flows and positioning. In principle, flows refer to any FX buying or selling decisions. These include, depending on the operators' motivation and strategy, client orders (e.g. in the case of commercial banks) or balance of payments flows (e.g. in the case of funds who don't have access to client flows). In practice, respondents primarily referred to short-term financial flows in particular positions by short-term operators, with large directional positions such as offshore hedge funds.

Analytically, the importance of flows does not seem to add much to our understanding of exchange rate determination. For this paper, however, it is important for two reasons. First, it confirms that the XR is not a market equilibrating price, as put forward by mainstream XR theory, but the outcome of buying and selling decisions by (short-term) financial market actors. Second, it shows the important social and intersubjective nature of financial market behaviour. Rather than analysing objective underlying fundamentals, FX market participants focus their attention on the operations of other (financial) market participants and try to predict their operations. As one operator in an offshore bank put it:

“...but then you can obviously not ignore the flow, right, despite the fact that you like the fundamentals, but if there is a big flow going against you, you rather wait; you have to be aware what is going in the market...” (Interview OFB3, 4th December 2009)

This relational, intersubjective aspect of price formation is also reflected in the second variable mentioned across institutions: positioning. So far, positioning, has received hardly any attention in the academic literature. The interviews, however, showed that it is a crucial aspect of agents' process of expectations formation. In simple terms, positioning is the outstanding stock of previously accumulated flows into a currency. It refers to the net exposure of the market to a currency and thus its sensitivity to (unexpected) exchange rate changes. According to one onshore fund manager:

“...what moves the XR very quickly is the net position of the market...the technical position of the market... if the market is at bottom of this spectrum and wants to unwind this position very quickly this is what really can cause substantial and abrupt currency moves.” (Interview ONF3, 25th May 2009)

Thus, acquiring a sense of other actors’ exposure to a currency was a crucial element of respondents’ FX decisions.²⁴ This knowledge became particularly important in the 2008 international financial crisis. Half of all onshore interviewees closed their positions in the BRL because of the large short positions, mostly by foreign investors. In a similar vein, offshore respondents first closed their positions in currencies which they considered to be “overbought” (the BRL among them).²⁵

Underlying Processes and Structures

The above discussion enquired into the context and time specific expectations formation process of EE FX operators. However, as argued in Section 2, open system theorising needs to go beyond these observed surface phenomena, which are institutionally, historically and socially contingent, and ask for the underlying processes and structures which condition human agency.

One of these processes uncovered by the qualitative study was the BRL’s (and indeed other EE currencies’) recent internationalisation process. The interviews showed the increased importance of a heterogeneous set of foreign investors in Brazilian domestic currency assets. In contrast to the 1990s, where EE domestic currency assets were the domain of a few specialised banks and hedge funds, over recent years EE currencies have become a standard part of international portfolios, including those of large macro-hedge funds and institutional investors such as pension funds and insurance companies. When asked which players they thought most influenced the value of the BRL, more than half of all onshore respondents pointed to foreign investors. Moreover, according to the respondents, XR gains more than

²⁴ Acquiring this information, however, is not easy. Again depending on their position in the market, respondents relied on client flows, communication with other operators, or available data such as balance of payments flows and positions on the local futures exchange.

²⁵ It is interesting to note though that despite the social constitution of the FX market by an array of heterogeneous actors, of which the interviewees clearly formed a part, this social element was frequently externalised by respondents (often as ‘the market’). Rather than appreciating that they formed part of the flows and positioning, these factors were treated as exogenous forces.

outperformed returns on the underlying assets over recent years and were one of the main reasons for holding EE domestic currency assets.²⁶

This internationalisation process was also reflected in the main indicators considered by the interviewees. Table 1 shows that for onshore players, international market conditions, reflected in the S&P500 and commodities as new internationally traded asset class, were crucial factors for their decision making.²⁷ Offshore players referred directly to international risk aversion, frequently approximated by the VIX (the implied volatility of S&P500 index options), as an important element of their expectations formation. As one onshore hedge fund manager put it (translated from Portuguese):

“...the big difference is that the Brazilian Real has become an internationally traded currency which is traded with a basket of other internationally traded currency...”, which means that “...you internalize dynamics which are not yours...” (Interview ONF7, 9th June 2009)

In CR terms, these indicators were the temporary, institutionally conditioned empirical manifestations of the underlying internationalisation process. Probably the most direct empirical indicator of the BRL’ internationalisation process, however, was the crucial importance of other internationally traded currencies for onshore actors’ expectations. The currencies most frequently mentioned by the interviewees were the Australian Dollar, the Mexican Peso, the Turkish Lira, the New Zealand Dollar and the South African Rand (in order of frequency of mentioning). The Australian and New Zealand Dollar are the world’s most traded commodity and carry trade currencies. In a similar vein, the EE currencies mentioned are among the globally most liquid (BIS 2010, BIS 2013). Interestingly, it was also exactly those same EE currencies which were most heavily traded by the offshore institutions interviewed.

²⁶ The interviews also pointed to the rising importance of the BRL offshore market. Quantitative data are difficult to come by, but the interviewees thought that the offshore market had attained more than half the size of the onshore market.

²⁷ Several authors have pointed to the “financialisation” of commodity markets (Newman 2009, Silvennoinen and Thorp 2010) According to the interviewees, the importance of commodity prices for the BRL is a result of them being traded as similar (risky) assets, rather than the country’s underlying export profile. The share of commodities in Brazilian exports reaches approx. 40%, compared to more than 60% in Australia.

Moreover, the interviews showed that this internationalisation took a financialised and subordinated character. The above discussion highlighted the importance of short-term speculative flows for participants' expectations formation. Although interviewees confirmed the rising importance of more long-term oriented real money investors, they also thought that the market continued to be dominated by short-term players, primarily offshore hedge funds. Moreover, as could also be seen in Table 1, even more long-term oriented institutions were strongly motivated by short-term financial returns, i.e. the carry.

The financialised character of the BRL's internationalisation process was also mirrored in the main indicators the respondents considered for their operations. International market conditions aside, Table 1 shows that short-term financial returns, such as short-term interest rates (the carry) and stock market returns, were most frequently mentioned across most institutions. In this context it is also important to note that the most important reference currency for onshore traders was the Australian Dollar. Indeed, several traders argued that the BRL and the Australian Dollar had become so similar in their liquidity-return characteristics that they were traded as the same asset class, with arbitrage operations keeping them in a tight band. However, as indicated above, the Australian Dollar is today's most liquid international carry trade and commodity currency, reflecting on the BRL's financialised internationalisation path.

Finally, the interviews confirmed that FX market actors' expectations and operations were fundamentally conditioned by the hierarchic structure of the international monetary system and EE currencies' subordinated position in this hierarchy. As one interviewee in an offshore bank noted:

"...if you are an EE currency you are constantly perceived to be under threat, and that can become a self-fulfilling prophecy...." (Interview OFB9, 20th July 2010). In a similar vein, an operator from an offshore real money fund: *"...all countries are risky, EE are assets were the risk is priced in..."* (Interview OFRMF7, 19th March 2010)

In contrast to developed currencies, which are mainly determined by domestic factors (Harvey, 2009), conditions in developed financial markets (primarily the US) played a dominant role for economic actors in the Brazilian/EE FX markets. Again quoting an interviewee from an offshore bank:

“...and another thing is that while in G7 currencies it does not matter what happens in EM, for EM currencies it is very important what happens in G7” (Interview OFB3, 4th December 2009)

EE currencies’ subordinated position in the international currency hierarchy makes them very sensitive to international market conditions, as any change in international liquidity preference can lead to large buying and selling decisions often independent of domestic economic conditions (Dow 1999a, Herr and Hübner 2005, Prates and Andrade 2013). At the same time, monetary conditions in the country with the global currency will affect the relative return of all other currencies in the system. The important role of the S&P500 (the US’ main stock index) for onshore agents’ expectations reflects this dominance. This asymmetric integration was also reflected in agents’ varying expectations formation. Whereas onshore actors were primarily concerned with international market conditions and largely took their decisions as a derivative of those of foreign investors, actors in offshore institutions had a more “autonomous” view and acted with reference to sentiment, carry trade, or indeed some form of “fundamental” analysis.

Moreover, although foreign investors have increasingly accepted holding domestic currency denominated EE assets²⁹, these flows have remained short-term, volatile and primarily enticed by Brazil’s high interest rates. As one respondent in an offshore bank noted:

“...the other ones [referring to EE] are totally volatile and those countries have more hot money...” (Interview OFB7, 16th December 2009). And an offshore hedge fund: “...in a nutshell, what makes BRL attractive is the highest real rates in the world” (Interview OFHF3, 20th September 2010)

The high interest rates, however, are necessary to maintain investment demand due to EE currencies’ lower position in the international currency hierarchy (Herr 1992, Herr and Hübner 2005, Riese 2001).³⁰ In a similar vein, the short-term nature of EE assets ensures

²⁹ EM currencies’ internationalisation process is in contrast to their “original sin”, that is their inability to borrow in domestic currency.

³⁰ Again this is in analogue to Keynes’ liquidity preference theory in the closed economy where the interest rate on bonds is a compensation for these assets’ lower liquidity premium relative to the security of money. On this

(foreign) investors quick and relatively costless exit when international market conditions change.

The concern for the ability to make a quick and immediate exit became particularly clear in interviewees' responses to how they thought EE currency trading differed from that in G7 currencies. What really mattered to large parts of the interviewees was (a) to find liquidity in the domestic market; and (b) to be able to quickly reverse their positions if they wanted to do so. As one actor in an offshore bank put it:

"...no fundamentals, this is all market...the price you trade...the liquidity...the products"
(Interview OFB9, 20th July 2010)

The elements of this liquidity were again context and institution specific. In the EE context, interviewees were particularly concerned with capital account restrictions, the size of bid-offer spreads, 24 hour access, and the operations of central banks as ultimate providers of liquidity in foreign currency.³¹

Finally, the interviews attested to the potentially self-perpetuating nature of international currency hierarchies and EEs' subordinated position in them (Kaltenbrunner and Paineira 2015). As part of the importance of positioning for their decision making, one important and recurrent concern for all interviewees was the "quality" of flows, that is, whether XR movements were caused by short-term capital flows, or exports and foreign direct investment (FDI). Whereas FDI and exports were considered fundamental and sustainable, short-term capital flows, which could be easily reversed and caused volatile XR movements, were not. For many market participants the share of short-term capital flows in a currency was in itself an important indicator of its "fundamental" value. At the same time, it was this same concern about the preponderance of volatile capital flows in EE currencies which made respondents reluctant to commit longer-term funds and/or made them expect higher interest rates, thus propagating these currencies' subordinated position in the international currency hierarchy.

view, the EM carry trade is a structural feature of the international monetary system rather than a temporary market failure as in neoclassical theory's UIP.

³¹ This result is also in line with Keynes' own work who had pointed to the crucial role liquidity plays for financial market actors (Argitis 2008-09, Keynes 1936). In line with the argument of this paper, on this view, rather than pinning down permanent economic fundamentals, uncovering the "institutional" features of a market and their interaction with economic actors' decision making are crucial to understanding price dynamics.

5. Quantitative Results

The above section gave detailed insights into the inter-subjective and context specific nature of agents' expectation formation process and the underlying processes and structures which conditioned these expectations. It also pointed to some of the empirical manifestations of these underlying processes and structures, reflected in the indicators considered by the interviewees. As set out in section two, the quantitative part of the mixed-method study further investigated whether and how agents' expectations, and the underlying processes and structures shaping them, were translated into empirically observable relations with the XR, both across time and institutions. More concretely, it further explored two results of the qualitative study: first, the increased co-movement between the BRL and other internationally traded currencies as one manifestation of their internationalisation process; second, the economic and statistical significance of the main indicators for FX market actors' expectations formation presented in Table 1.

The relationship between the BRL and the other internationally traded currencies is investigated using bilateral VAR-BEKK Models. This allows consideration of the relations between the currencies both in returns (through the mean equation) and in volatilities (through the covariance structure). The time-varying volatility spillovers between the currencies are further investigated using a VAR-DCC model for all six currencies. Finally, the empirical manifestations of actors' expectations formation are explored through the indicators' inclusion in the mean equation of the bilateral BEKK models. In line with the qualitative results, the currencies considered are the Australian Dollar (AUD), the Mexican Peso (MEX), the Turkish Lira (TRY), the New Zealand Dollar (NZD) and the South African Rand (ZAR). The indicators most frequently considered by the FX actors (other than the currencies) were the S&P 500, interest rates, commodities and international risk aversion (in order of frequency of mentioning).³²

³² Again, it is important to note that while these indicators include variables which also form part of mainstream exchange rate theories (e.g. commodity prices and the interest rate differential), in the PK/CR conception put forward in this paper, these variables were mediated through the expectations of heterogeneous agents, operating under fundamental uncertainty, rather than acting as permanent, empirical fundamentals. As the econometric results show, this meant that their empirical relevance changed, had the wrong sign, and/or did not matter at all.

All XRs are nominal and measured relative to the US\$, such that an increase implies a depreciation. The interest rate is approximated with the difference between the Brazilian overnight rate, the Selic, and the US Fed Fund rate.³³ The Commodity Research Bureau (CRB) spot index represents commodity prices. In line with the interview results, international risk aversion is measured with the VIX. The series are daily and expressed in the return³⁴ of their natural logarithms (except interest rates). All series, except the currencies and the interest rate differential, are included with contemporaneous values. Thus, significant coefficients indicate statistically significant correlation rather than causation. The currencies and interest differential are included with a first lag to deal with autocorrelation and endogeneity respectively. The data period estimated ranges from the 1st of July 1999 (when Brazil introduced its floating XR regime) until the 1st of June 2010 when most interviews had been completed.³⁵ To take account of the time-varying nature of empirical surface phenomena, two more sub-periods are estimated: First, from January 2003, when liquidity returned to international financial markets; and second, from August 2007 to March 2009, to investigate the specific dynamics in the international financial crisis.

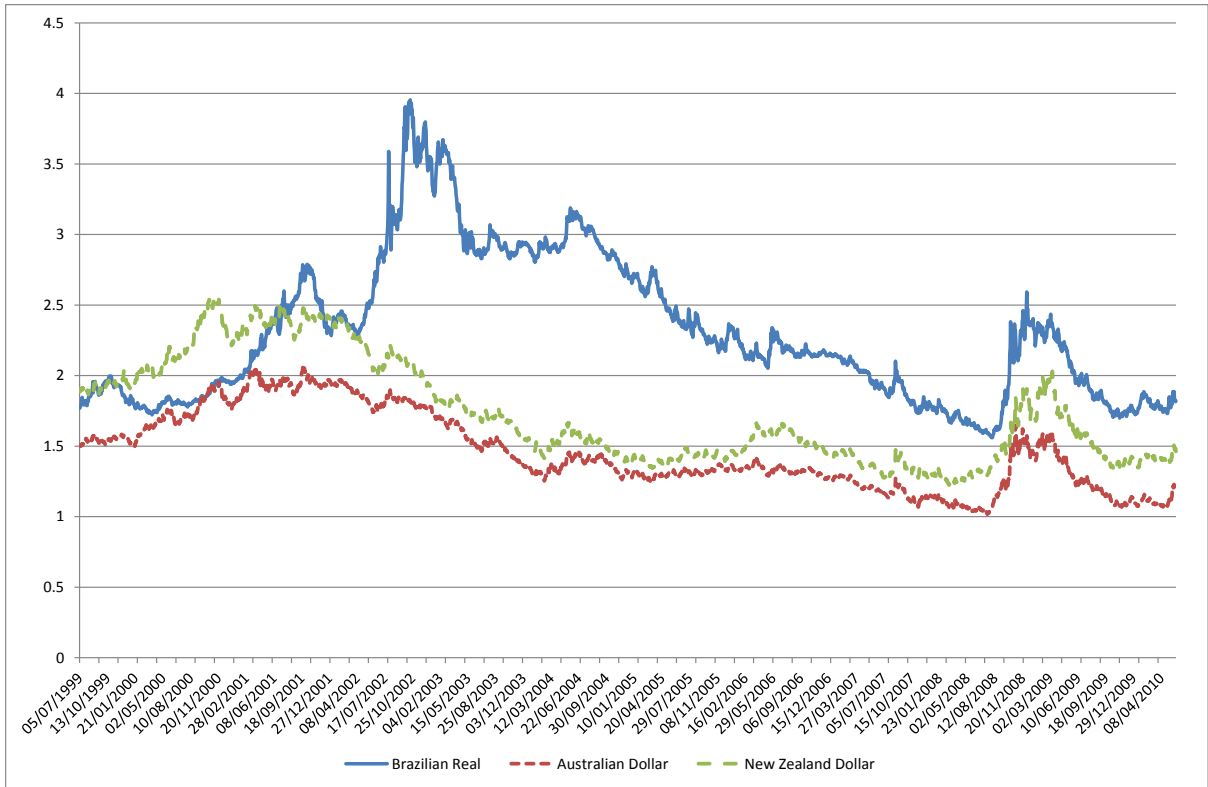
Figures 1 and 2 show the BRL with the AUSD and NZLD, and the three EE currencies, respectively.

Figure 1: Brazilian Real, Australian Dollar, and New Zealand Dollar

³³ In the case of foreign investors, it is the difference between the funding interest rate and the target interest rate that matters. The Fed Fund rate has been chosen in light of the US Dollar's dominant role in the international monetary system.

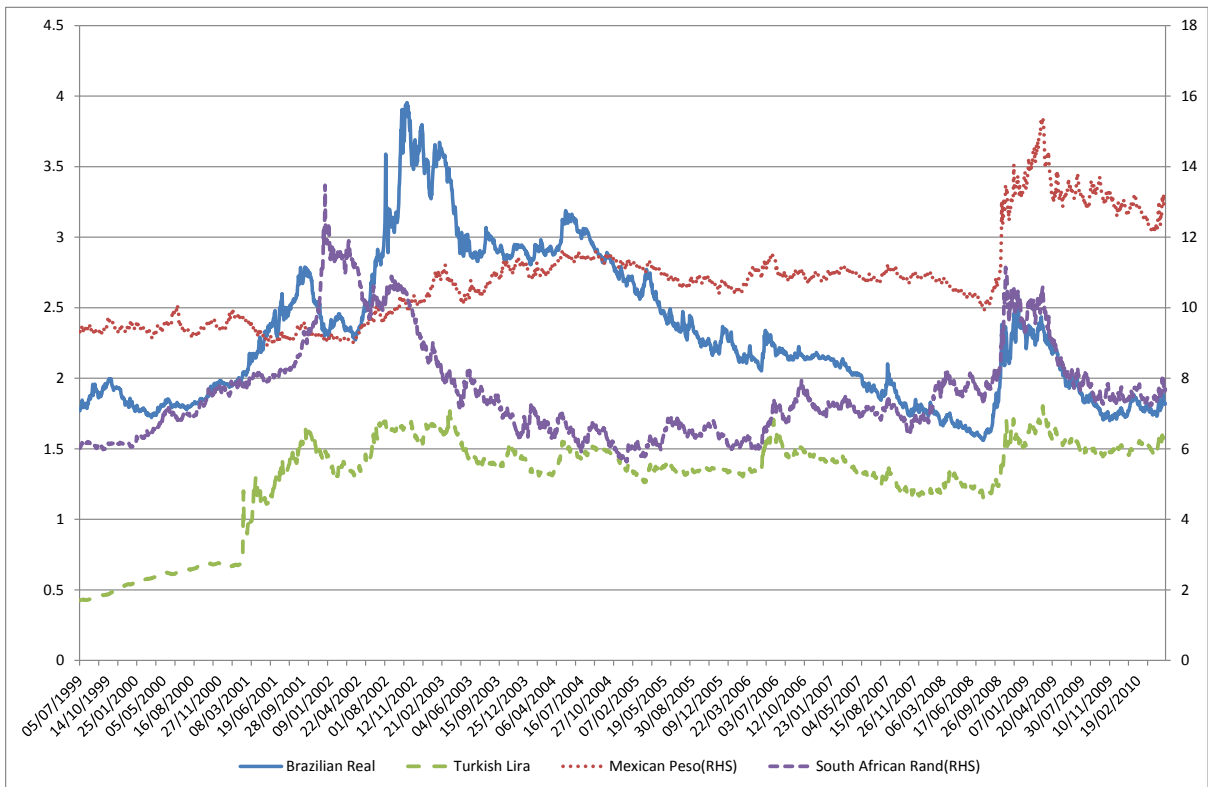
³⁴ First differences were taken to ensure stationarity.

³⁵ Selected interviews were conducted afterwards to clarify some of the results and specific mechanisms at hand.



Source: Datastream

Figure 2: Brazilian Real, Mexican Peso, South African Rand, and Turkish Lira



Source: Datastream

One can observe the strong co-movement and substantial volatility of the six currencies. All currencies depreciated sharply in the international financial crisis of 2008. Most of them experienced sustained appreciation trends before this, a pattern akin to carry trade currencies (Brunnermeier, Nagel and Pedersen 2008). Summary statistics, presented in Appendix 2, confirm the positive returns investors could earn on the six currencies over the period investigated. The mean appreciation was highest for the BRL, followed by the AUD and NZLD. All currencies were subject to strongly non-normal and skewed returns, also characteristic of carry trade currencies.

Tables 2 and 3 show the VAR-Mean equation and the own and joint volatility spillovers and persistence for the bilateral BEEK estimation between the BRL and the AUD. None of the other currencies had a significant impact on the BRL and vice versa. All other coefficients remained the same across all currency pairs.³⁶ Residual diagnostic tests (Ljung Box Q-statistic, MVQ; MVQ-SQ) are presented at the bottom of Table 3.

Table 2: Bivariate VAR-BEKK-Brazilian Real-Australian Dollar: Mean Equation

BRAZILIAN REAL (BRL) – AUSTRALIAN DOLLAR (AUD): MEAN EQUATION			
	1 st July 1999 – 1 st June 2010	1 st January 2003- 1 st June 2010	1 st August 2007- 1 st April 2009
RBRL(-1)	0.029* (1.75)	0.021 (1.22)	-0.084* (-1.75)
RAUSD (-1)	0.026 (1.50)	0.026* (1.79)	0.150*** (3.13)
RSP500	-0.076*** (-5.15)	-0.111*** (-6.09)	-0.117*** (-4.36)
RIRD (-1)	-0.000 (-0.82)	-0.000 (-0.24)	-0.007*** (-3.57)
RCRB	-0.191*** (-6.89)	-0.282*** (-8.63)	-0.681*** (-10.5)
RVIX	0.005* (1.89)	0.003 (1.11)	0.001 (0.18)
RBRL(-1)	0.043*** (3.44)	-0.059*** (4.81)	-0.054 (-1.16)
RAUSD (-1)	-0.005 (-0.26)	-0.242 (-1.24)	0.126*** (2.59)

³⁶ All results available upon request.

RSP500	-0.030*	-0.098***	-0.069***
	(-1.95)	(-4.43)	(-2.63)
RIRD (-1)	0.000	-0.000	-0.006***
	(0.998)	(-0.06)	(-2.95)
RCRB	-0.303***	-0.388***	-0.816***
	(-11.28)	(-11.62)	(-11.75)
RVIX	-0.002	-0.010***	0.000
	(-0.74)	(-2.68)	(0.08)

Notes: *, **, *** indicate statistical significance at 10%, 5%, and 1% respectively

The results confirmed the important role of the AUD for exchange rate dynamics in Brazil. Past returns (RAUSDI (-1)) had a significant, positive relation with BRL returns from the beginning of 2003; a relation which increased even further in the international financial crisis of 2008. In a similar vein, the S&P500 (RSP500) and commodity prices (RCRB) showed a strong and rising co-movement with the BRL over the period estimated. In the case of commodity prices, the effect reached nearly -0.7% in the international financial crisis. In both cases it was negative which meant that increases/decreases in US stock market returns and international commodity prices were accompanied by an appreciation/depreciation of the BRL.³⁷ The lagged interest rate differential (RIRD(-1)), in turn, only became significant in the international financial crisis. In contrast to what would be predicted by UIP, and in line with the profitability of carry trade operations, the coefficient was negative: past increases in the interest rate differential were accompanied by exchange rate appreciation (and vice versa for decreases).³⁸ The VIX had no consistent, statistically significant relation with the BRL. These results confirm the time-varying and temporary nature of empirical event regularities based on institutionally and conventionally induced regularity in human agency.³⁹

Table 3 confirms the significant spillovers also in the volatility (ARCH) and volatility persistence (GARCH) between the BRL and the AUD, in particular during the international financial crisis.

³⁷ This is in contrast to a portfolio diversification hypothesis of international capital flows. Rather, low international risk aversion seems to have led to increasing asset prices across the globe.

³⁸ It is also significant for the AUD which probably shows the impact of US interest rate decisions on capital flows more generally.

³⁹ For example, recent evidence shows that market players have begun to consider the VIX a less reliable indicator of international risk aversion and have moved to other, institutionally created, indicators (Financial Times 2016).

Table 3: Bivariate VAR-BEKK-Brazilian Real-Australian Dollar: Volatility Structure

BRAZILIAN REAL (BRL) – AUSTRALIAN DOLLAR (AUD): VOLATILITY STRUCTURE			
	1 st July 1999 – 1 st June 2010	1 st January 2003- 1 st June 2010	1 st August 2007- 1 st April 2009
C(BRL,BRL)	0.126*** (9.59)	0.136*** (8.66)	0.191*** (4.48)
C(AUSD,BRL)	-0.006 (-0.74)	0.007 (0.35)	0.193*** (4.93)
C (AUSD,AUSD)	0.076*** (7.56)	0.077*** (6.29)	0.000 (0.00)
ARCH(BRL,BRL)	0.374*** (19.557)	0.358*** (15.42)	0.006 (0.09)
ARCH(BRL,AUSD)	0.014 (1.58)	0.030 (1.60)	-0.250*** (-5.4)
ARCH(AUSD,BRL)	0.007 (0.73)	0.028 (1.12)	0.382*** (7.11)
ARCH(AUSD,AUSD)	0.216*** (18.17)	0.222*** (14.14)	0.474*** (12.11)
GARCH(BRL,BRL)	0.918*** (107.36)	0.918*** (94.34)	1.026*** (51.49)
GARCH(BRL,AUSD)	-0.003 (-1.07)	-0.007 (-0.915)	0.197*** (9.53)
GARCH(AUSD,BRL)	0.008 (1.15)	0.004 (0.47)	-0.250*** (-10.20)
GARCH(AUSD,AUSD)	0.972*** (308.68)	0.972*** (203.75)	0.792*** (39.33)
MVQ (T-STAT/P-VALUE)	50.12 (0.13)	41.99 (0.38)	49.08 (0.15)
MVQ-SQ (T-STAT/P-VALUE)	34.78 (0.70)	23.89 (0.98)	51.67 (0.10)

Notes: *, **, *** indicate statistical significance at 10%, 5%, and 1% respectively.

The time-varying correlations of the DECC(6) model (presented in Appendix 3) confirm this result and extend it to the other currencies.⁴⁰ Despite different spatial, macroeconomic, and institutional configurations, all currencies have shown an increasingly similar volatility

⁴⁰ For the DCC(6) a simple VAR(1) mean equation was specified. All currencies also showed strong own ARCH and GARCH effects. The volatility interdependencies were stable. The DCC(6) model suffered from some autocorrelation which disappeared if the TKL and MEX were excluded from the estimation. All results available upon request.

pattern over recent years. As indicated by the interviews, this rising co-movement is the result of the internationalisation of these currencies and their trading as similar asset classes on international financial markets.

6. Conclusions

This paper presented an extensive mixed-method study of the Brazilian FX market. It combined 52 semi-structured interviews with currency traders and advanced time series econometrics. It made two contributions to the literature. First, it answered to the call for empirical pluralism in Heterodox Economics with a PK study of the FX market. Second, on the empirical level, it presented a critique of mainstream XR theory and highlighted the recent processes and underlying structures in EE FX markets.

The results confirmed the context specific and inter-subjective nature of financial price formation put forward by Keynes. FX market actors operated in fundamental uncertainty and had little conception of the XR fundamentals put forward by mainstream XR theory – still less traded according to them. Rather, it was the operations of other agents, in the form of flows and positioning, that mattered for their FX operations. Moreover, the paper presented detailed insights into the current microstructure of EE FX markets and showed the actors' distinct processes of expectations formation depending on their institutions, location, and motivation for participating in FX markets.

These differences aside, the interviews also showed that agents' operations were fundamentally shaped by the recent process of EE currency internationalisation. Moreover, they highlighted the financialised and subordinated character of this internationalisation. Foreign flows have remained very short-term, volatile and driven by short-term returns, as high yields and “institutional” liquidity had to compensate for EE currencies' lower position in the international currency hierarchy. On the empirically observable level, this financialised and structured internationalisation manifested itself in the overriding importance of international market conditions and short-term returns for actors' expectations formation. The multivariate GARCH models showed that it was particularly the American stock market and international commodity prices which mattered for the Brazilian XR.

Finally, the interviews uncovered that it was this same prevalence of volatile capital flows in EM currencies that acted as an indicator of their “fundamental” value and precluded agents from committing longer-term funds to these currencies. This result has important policy implications. If it is the nature of capital flows themselves that indicates a currency’s sustainable value, rather than underlying economic variables as claimed in mainstream XR theory, a prudent management of these capital flows becomes essential to reduce exchange rate volatility, lower interest rates, and manage EEs’ integration into the world economy more sustainably.

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Appendices

Appendix 1: Types and Number of Interviews

TYPE OF INSTITUTION	NUMBER OF INTERVIEWS
ONSHORE COMMERCIAL BANKS	10
ONSHORE INVESTMENT BANKS	14
ONSHORE HEDGE FUNDS	7
OFFSHORE BANKS	9
OFFSHORE HEDGE FUNDS	4
OFFSHORE REAL MONEY FUNDS	8

Appendix 2: Summary Statistics of Exchange Rate Data

	BRAZILIAN REAL	AUSTRALIAN DOLLAR	NEW ZEALAND DOLLAR	MEXICAN PESO	SOUTH AFRICAN RAND	TURKISH LIRA
MEAN	-0.0003	-0.0002	-0.0001	0.0001	-0.0001	0.0000
MAX	0.0812	0.0883	0.0665	0.0755	0.0981	0.0677
MIN	-0.0739	-0.0670	-0.0588	-0.0477	-0.0639	-0.0643
STANDARD DEVIATION	0.0102	0.0096	0.0097	0.0068	0.0117	0.0094
SKEWNESS	0.7013	1.1086	0.4927	0.8836	0.4341	0.7039
KURTOSIS	12.3488	16.6553	8.7370	19.7346	7.0751	10.8704
JARQUE- BERA	7205.2***	15430.2***	2731.9***	2283.6***	1399.7***	5153.9***

Appendix 3: Time-Varying Correlations DCC(6) Model

Figure 1: Time-Varying Correlation (DCC): Brazilian Real - Australian Dollar

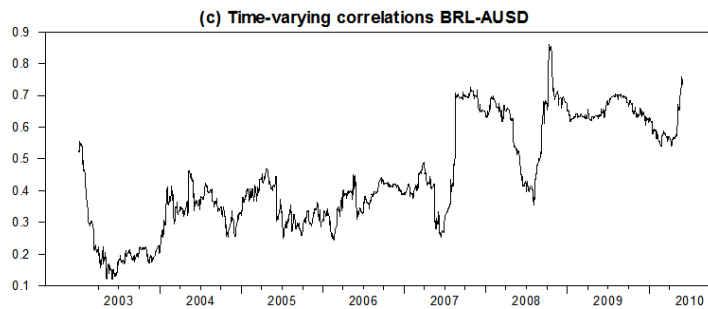


Figure 2: Time-Varying Correlation (DCC): Brazilian Real - New Zealand Dollar

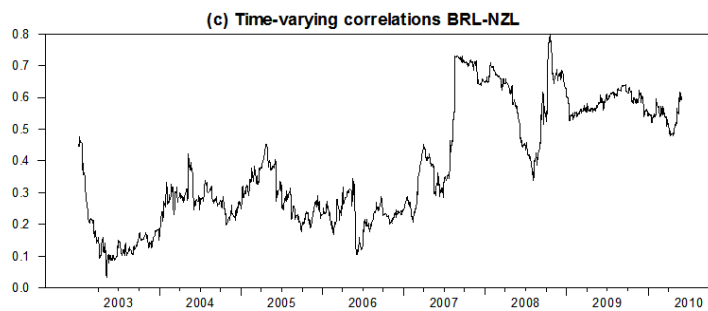


Figure 3: Time-Varying Correlation (DCC): Brazilian Real - Mexican Peso

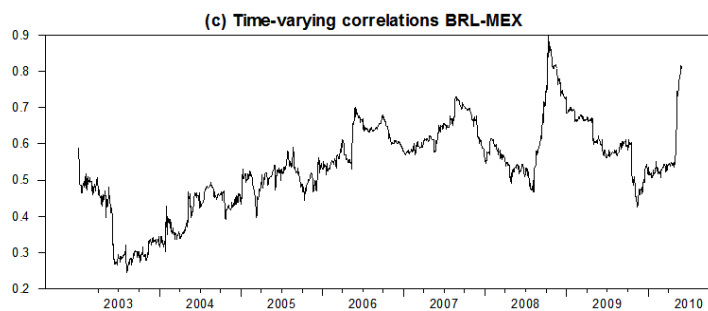


Figure 4: Time-Varying Correlation (DCC): Brazilian Real - Turkish Lira

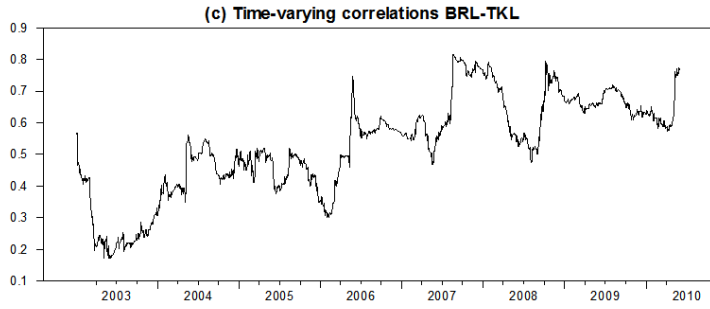


Figure 5: Time-Varying Correlation (DCC): Brazilian Real - South African Rand

