The Credibility of Cabo Verde's Currency Peg*

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Abstract

This paper studies the credibility of the currency peg of Cape Verde (CV) by assessing the impact of economic fundamentals, our explanatory variables, on the stochastic properties of Exchange Market Pressure (EMP), the dependent variable, using EGARCH-M models. Our EMP descriptive analysis finds a substantial reduction in the number of crisis episodes and of (unconditional) volatility after the peg's adoption. Moreover, our estimation results suggest that mean EMP is driven by fundamentals and that conditional variability is more sensitive to negative shocks. We also find evidence that the expected return from holding CV's assets is lower under the currency peg for the same increase in monthly volatility. The reason is that the return's composition is "more virtuous", as it results from the strengthening of CV's foreign reserve position and is not due to either a larger risk premium or favourable exchange rate movements. We take this to be a sign of the credibility of the peg, which apparently reflects the intertemporal credibility of CV's economic policy and so has successfully withstood international markets' scrutiny.

Keywords: Currency Peg, Exchange Market Pressure, EGARCH-M.

JEL-Code: C22, F31, F33.

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Non-Technical Summary

In a country with established financial reputation, global capital markets judge the interaction between its economic and political governance to be credible. In particular, the credibility of the interaction between the degree of financial-market integration, exchange rate arrangements and the accompanying policy responses is of paramount importance. Under increasing financial-market integration, the commitment of authorities who seek exchange rate stability, through the adoption of fixed but adjustable exchange rate regimes, is not only the subject of close scrutiny by international lenders and credit rating agencies but is also likely to be tested. The observation that acquiring financial reputation necessarily implies a positive interaction between financial-market integration, exchange rate regime and economic policy motivates the present paper.

Specifically, our study seeks to infer the credibility of this interaction for Cape Verde's currency peg to the Euro, which is unique among the members of the Community of Portuguese Speaking Countries, also called lusophone countries. In doing so, we pursue a line of research that has previously looked at the Portuguese currency's entry into the Euro and the currency board arrangement of Macau's Pataca. We ascertain the credibility of Cape Verde's currency peg by analysing the impact of economic fundamentals, our explanatory variables, on the stochastic properties of exchange market pressure (EMP), the dependent variable, using suitable econometric modelling techniques.

Our choice of model is determined by the nature of EMP dynamics with respect to the conditional variance, namely a time-varying variance, the clustering of volatility and leverage effects associated with asymmetric responses shocks. We also allow mean EMP to depend on its conditional variance in order to capture the basic insight that risk-averse agents require compensation for holding risky assets. Given that an asset's riskiness can be measured by the variance of returns, the risk premium is an increasing function of the returns' conditional variance. In the context of EMP, the risk-return relationship implies that holding assets of a country in which EMP-volatility is high should be compensated by a greater return (lower EMP).

As for EMP, we measure it as a weighted linear combination of changes in the exchange rate, in foreign exchange reserves and in the interest rate differential. Our initial descriptive analysis of EMP finds a substantial reduction in the number

of crisis episodes and of (unconditional) volatility after the currency peg's adoption. Our econometric estimation results suggest that mean EMP is driven by the usual economic fundamentals and that conditional variability is more sensitive to "bad EMP news" than to "good EMP news". We also find evidence that the expected return from holding assets from Cape Verde under the currency peg is *lower* for the same increase in volatility.

We explain this finding by the fact that the composition of the expected return under the currency peg is "more virtuous" in that it is due to the strengthening of Cape Verde's foreign reserve position and does not result from either a larger risk premium or favourable exchange rate movements. This finding is reinforced if one bears in mind that there has been a strong and gradual build-up of foreign reserves since 2001, partly as a result of the Cape Verdian government's formal recognition of the need to consolidate monetary and fiscal policy through the adoption of the Maastricht criteria as reference values. We take this to be a sign of the credibility of the currency peg, which apparently reflects the intertemporal credibility of Cape Verde's economic policy and so has successfully withstood international markets' scrutiny.

1 Introduction

In a country with established financial reputation, global capital markets judge the interaction between its economic and political governance to be credible. This implies that both aspects of governance are sufficiently known for their interaction to be credible over time. The negative interaction between economic and political reforms may delay financial reputation, especially if past efforts have been reversed. The range of reforms, which are the subject of scrutiny by international lenders and credit rating agencies, is very broad, but multilateral surveillance usually focuses on monetary and fiscal issues.[1] Among these, the credibility of the interaction between the degree of financial-market integration, exchange rate arrangements and the accompanying policy responses is paramount.[2]

This scrutiny is consistent with the observation that "bad news" has a greater impact than "bad news" under the normal functioning of markets. It also motivates what one of us called a "Eurocentric" view, which essentially extends an interpretation of the first European attempts at promoting a multilateral payments systems into an argument for improving regional monetary and fiscal surveillance. While the quantitative relevance of multilateral surveillance to international lenders and credit rating agencies' scrutiny has not been tested directly, the European experience does signal when it is bound to be especially intense.

Under increasing financial-market integration, the commitment of authorities who seek exchange rate stability, through the adoption of fixed but adjustable exchange rate regimes, is likely to be tested.[3] This policy debate has become more prominent in connection with the so-called "benign peg" of the Chinese currency

[1] Three related points come to mind in this connection. First, the design of reforms may help speed up the process of earning financial reputation, not least by sustaining the growth process, see Braga de Macedo and Oliveira Martins (2006). Second, the scrutiny mentioned in the text has been close enough to reveal a positive relationship between globalisation and governance, measured by trade flows and corruption indices in Bonaglia, Braga de Macedo & Bussolo (2001). Third, the international monetary system may help or hinder the process: an historical perspective between the gold and the euro standards is provided in Braga de Macedo, Eichengreen and Reis (1996).

[2] For a central bank, credibility is usually associated with the perception of inflation aversion, even though other meanings such as incentive compatibility or pre-commitment have been pointed out. See Goldberg and Klein (2006).

[3] The relevance of the European Payments Union is pointed out in Braga de Macedo and Eichengreen (2001c). The "Eurocentric" view has been presented as evidence of an intermediate exchange rate system which helps acquire financial reputation and is applied to the Franc zone and to Latin America in Braga de Macedo, Cohen & Reisen (2001b).

to the US dollar. Indeed, a possible explanation of the current international monetary system goes back to the Bretton Woods system.[4]

Thus, contrary to the dominant conventional wisdom of the late 1990s, intermediate regimes can be justified in spite of the logic behind the so-called "impossible trinity" dilemma, which holds that a country can only attain two of the following three goals simultaneously: exchange rate stability, monetary independence and financial-market integration. In other words, when the exchange rate regime is chosen based on a social concern for financial reputation, the choice is not necessarily restricted to the two corner solutions of a hard peg or a pure float.[5] Intermediate solutions do raise the issue of how effective are capital controls, and how lasting is their effectiveness, an issue we do not pursue here.

Limiting exchange rate variability is often seen as a key element in acquiring financial reputation, especially when market access is contingent on currency stability. However, almost all currency crises in the past decade took place against a background of exchange rate regimes that were fixed but adjustable. In addition, the currency crises often then became financial crises as sovereign credit ratings plummeted and access to international capital was lost following a currency's collapse. In this regard, the East Asian "twin" financial and currency crashes of the 1990s underscored the relative ease with which it was possible to implement the "wrong" combination of currency pegs and economic policy under an increasing degree of financial-market integration. For the countries affected, the easier access to foreign capital coupled with the pursuit of exchange rate stability proved disastrous given their lack of financial reputation.

For any country, establishing financial reputation is important for two reasons: First, it leads to a low-risk borrower profile and improved credit terms when

[4]This was discussed at a conference at the University of Santa Cruz in May 2006 on "The Euro and the Dollar in a Globalized Economy", where one of us commented on a presentation by Michael Dooley on Interest rates, Exchange Rates and International Adjustment based on a joint paper with David Folkerts-Landau and Peter Garber. The argument that, under a fixed exchange rate between the renminbi and the dollar, China becomes a periphery of the US is based on the persistence of effective capital controls between the two currency areas and on perfect substitutability between euro and dollar denominated assets. As discussed in Kouri and Braga de Macedo (1978) and Krugman (1981), these assumptions are questionable to the extent that there is imperfect substitutability between euro and dollar denominated assets and that capital controls are quickly eroded under financial globalisation.

[5]Monetary transitions on the part of the new EU member states are thus described as "float in order to fix" in Braga de Macedo and Reisen (2004).

seeking foreign capital, as reflected in its international credit rating. Second, it is conducive to low and more stable domestic interest rates, especially under a credible currency-peg. Given that interest rates are an intertemporal price, and, as such, heavily influenced by agent's expectations, low interest rate spreads are considered to be an indicator of financial reputation. For policymakers, the need to acquire financial reputation has highlighted the importance of pursuing economic policies that accord with an economy's degree of international financial-market integration and with its prevailing exchange rate arrangements.

The observation that acquiring financial reputation necessarily implies a positive interaction between financial-market integration, exchange rate regime and economic policy has been applied to the Portuguese currency's entry into the Euro. In conformity with the objective of better understanding the relative importance of foreign exchange market intervention and regime change, we have also sought to infer the credibility of the interaction between financial-market integration, exchange rate regime and economic policy in the currency board arrangement of Macau's Pataca.[6] Against this background, we now look at Cape Verde's currency peg, which was adopted in January 1999. The peg of the Cape Verde Escudo (CVE) to the Euro is unique among the members of the Community of Portuguese Speaking Countries (CPLP), also called lusophone countries.

The rest of the paper is as follows. In the next section, we first review the history of the CVE's exchange rate arrangements and outline the currency peg's economic impact. We then measure the currency's exchange market pressure (EMP) in order to identify crisis episodes before and after the peg's adoption. In section 3, we assess the stochastic properties of EMP and explore to what extent these can be explained by economic fundamentals. This allows us to infer the credibility of the interaction between financial-market integration, exchange rate regime and economic policy in Cape Verde. Section 4 contains our agenda for deepening and widening this research in support of Cape Verde's development strategy as a CPLP country that is graduating from aid-dependence and whose political governance has been praised by the international community.

[6]Braga de Macedo, Braz, Brites Pereira and Catela Nunes (2006). See also Braga de Macedo (1996, 2001), Braga de Macedo, Catela Nunes and Covas (1999, 2004a), and, using intervention data, Braga de Macedo, Catela Nunes & Brites Pereira (2003), and Brites Pereira (2005a, b).

2 Cape Verde's Currency Peg

2.1 Brief Overview

In order to facilitate the reader's understanding of the ensuing analysis, we begin by briefly review Cape Verde's monetary history and the currency peg's impact upon the Cape Verdian economy.[7] As of January 1999, the CVE has been pegged to the Euro at the nominal exchange rate of 110.27 CVE/EUR. The CVE was first issued on July 1, 1977 by the *Banco Central de Cabo Verde* (BCV), the country's central bank. At that point in time, the CVE was pegged to a basket of currencies following its unlinking from the Portuguese Escudo (PTE) in the wake of the latter's depreciation. The CVE was again pegged to PTE at a rate of 0.50 CVE/PTE following of the signing of the *Acordo de Cooperação Cambial* (Exchange Cooperation Accord) between Cape Verde and Portugal on March 13, 1998. Prior to the agreement becoming operational in July 1998, the CVE was devalued to the rate of 0.55 CVE/PTE on March 30, 1998.

As for Cape Verde's economy, Weber (2005) finds that the main economic and financial indicators reveal a strong performance in terms of real and nominal growth. Cape Verde has enjoyed high economic growth, low inflation and generally favourable macroeconomic conditions. The fiscal slippages that occurred in 2000 were not repeated subsequently, and the government has formally recognised the need to consolidate monetary and fiscal policy through the adoption of the Maastricht criteria as reference values. Foreign reserves have increased gradually since 1999, large attributable to increased foreign grants and, since 2001, less expansionary fiscal policies.

The analysis of Cape Verde's balance of payments situation, reveals that the existence of a structural account deficit. The trade deficit has been relatively unchanged since 1996, at roughly 35-37% of Gross Domestic Product (GDP), which mainly reflects Cape Verde's dependence on imports, most of which are from the Eurozone. Indeed, such imports have increased more than five fold in value during the period 1990-2003, and from 52.9% to 77.7% of total imports.

Exports, meanwhile, are mostly directed at Portugal, whose share has risen from an average of 65.9% during 1990-97 to an average of 84.8% since 1998.

[7] The exposition that follows draws primarily on Weber's (2005) study of Cape Verde's current exchange policy and its alternatives. A complete description of Cape Verde's monetary history is given in Schuler (2004).

The financial account exhibits near zero portfolio investment, indicative of the fact that Cape Verde currently engages in little trading in international financial and capital markets. In addition, there is low foreign direct investment (FDI) and some capital inflows in the form of foreign loans.

The geographical distribution of emigrant's remittances is skewed towards Euro transfers, which make up almost 70% of total remittances. Needless to say, the importance of these remittances for Cape Verde is paramount as the current exchange rate regime is difficult to sustain without substantial monetary transfers by private individuals. Indeed, remittances are the major channel through which the BCV's interest rate policy attracts foreign capital and, as such, they are instrumental in sustaining the peg. As a result, Cape Verde's monetary authorities have sought to improve the peg's credibility in order to attract these private transfers.

As for the economic impact of the peg itself, Weber (2005) finds that the exchange rate anchor has lead to benefits such as lower inflation and price volatility, a steady build-up of foreign reserves and an increased degree of integration with the Eurozone, as evidenced by the changes in Cape Verde's trade pattern and the geographical distribution of remittances. The peg's impact on price stability is also reflected in the depreciation of the real effective exchange rate, which is tantamount to a rise in external competitiveness.

Weber (2005) notes, however, that these benefits come at the cost of having to leave domestic interest rates high so as to attract foreign capital, which inhibits private investment and economic growth somewhat. Based on his analysis, he concludes that Cape Verde's prevailing currency peg is capable of reaping more economic benefits, some akin to those only achievable under full Eurosation, given its significant room for manoeuvre and scope for further improvement.

2.2 Measuring Exchange Market Pressure

EMP is defined as the magnitude of international money-market disequilibrium that arises when the total value of foreign goods and assets demanded by domestic residents is not equal to that demanded by foreigners at the prevailing exchange rate. In a floating exchange rate regime, this excess currency demand is removed entirely by changes in the exchange rate while, under fixed exchange rates, the burden of adjustment falls on foreign reserve changes. In intermediate regimes, the excess demand is relieved by some combination of changes in the exchange rate, in forex reserves and in domestic credit.

The literature identifies two main ways of measuring EMP.[8] The first, following Girton & Roper's (1977) contribution, uses a summary statistic calculated as a weighted sum of changes in foreign reserves and exchange rate changes. This approach's basic insight is that exchange rate changes necessarily reflect a central bank's passive adjustment to EMP while its purchases/sales of foreign assets are its active response. The weights used in the measure are typically estimated from a structural model of the economy, implying that the EMP measures are therefore model-dependent. Moreover, these measures do not explicitly allow for the interest rate channel for relieving EMP.

The second approach, proposed by Eichengreen, Rose & Wyplosz (1995, 1996), holds that model-dependency is undesirable given the tenuous connection between the exchange rate and economic fundamentals. As a result, a model-independent EMP measure is adopted based on the channels through which EMP is relieved, including the interest rate channel. In practice, EMP is measured as a weighted linear combination of these changes, where the weights are chosen so as to equalise the conditional volatilities of the EMP measure's constituent components.

Given the importance of the interest rate channel in altering the relative supply of domestic money *vis-à-vis* foreign monies under a currency peg, we adopt the second approach. Specifically, the EMP measure used here assumes that the strain on a country's external imbalance is absorbed by changes in the exchange rate (Δe_t), in foreign exchange reserves (Δr_t) and in the interest rate differential $\Delta(i_t - i_t^*)$. It is calculated as a weighted linear combination of these observed changes, hence:

$$EMP_t = \Delta e_t + \eta_r \Delta r_t + \eta_i \Delta(i_t - i_t^*)$$

where $\eta_r = -\frac{sd(\Delta e_t)}{sd(\Delta r_t)}$ and $\eta_i = \frac{sd(\Delta e_t)}{sd(\Delta(i_t - i_t^*))}$ are the conversion factors chosen so as to equalise the conditional volatilities of the EMP measure's constituent components. Note that Δe_t is chosen as the reference variable and that sd denotes the standard deviation of the variable under consideration. The conversion factors take on the signs $\eta_r < 0$ and $\eta_i > 0$, implying that a central bank sells (purchases) foreign reserves in response positive (negative) EMP while the interest rate dif-

[8] For a comprehensive review of the EMP literature, refer to Weymark (1995 and 1998) and Spolander (1999).

ferential increases (decreases) as domestic interest rates are raised (lowered).[9] In spite of the *ad-hoc* nature of this measure, it allows for both a descriptive analysis and for decomposition of EMP, as discussed in section 3, which allows us to have some understanding of the impact of the change in exchange rate regime on EMP dynamics.

Our estimated measures of EMP for the period January 1992-May 2006 are given in Table 1 and are also depicted graphically in Figure 1. Our first observation is that the monthly EMP values appear to be quantitatively plausible through this period. As is clear from EMP's descriptive statistics (see Appendix 1), negative EMP is much more prevalent after the change in exchange rate regime in January 1999. Indeed, average EMP for this period is -6.34% p.a. Prior to the peg's adoption, EMP is generally positive at +8.76% p.a. and, accordingly, the CVE depreciates by 3.35% p.a. on average under that exchange rate regime.

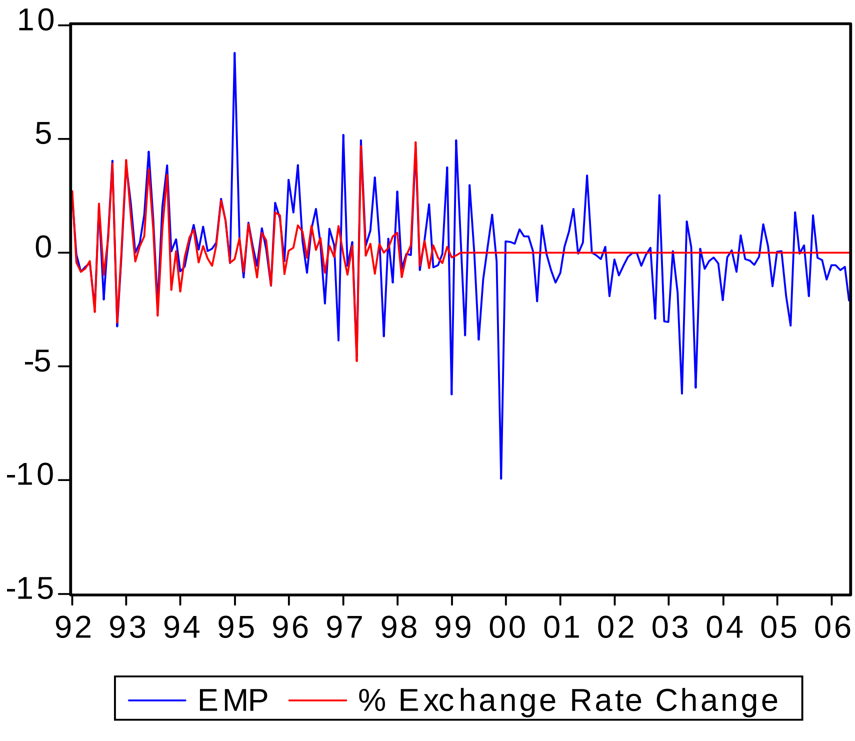

Figure 1

[9]Using the data for the whole sample period, we calculate the following conversion factors: $\eta_r = -0.0608$ and $\eta_i = 0.0945$.

Next, we proceed to identify crisis episodes, which we take to refer to an EMP value that exceeds average EMP by one and a half times EMP's standard deviation.[10] Under this definition, we find that the EMP measure correctly indicates some known crises periods (e.g. ERM crises, the run-up to, and the wake of, the currency peg's adoption).[11] Other crises episodes, however, need to be further investigated in order to understand the exact nature of the economic and institutional factors that might explain their occurrence. Bubula and Otker-Robe's (2003) study also sought to identify crises episodes for numerous countries using a similar methodology, including Cape Verde. Based on our results, we found no support for their identification of May 1995 and October 2000 as crises episodes, respectively characterised by reserve loss/depreciation and devaluation/reserve loss.

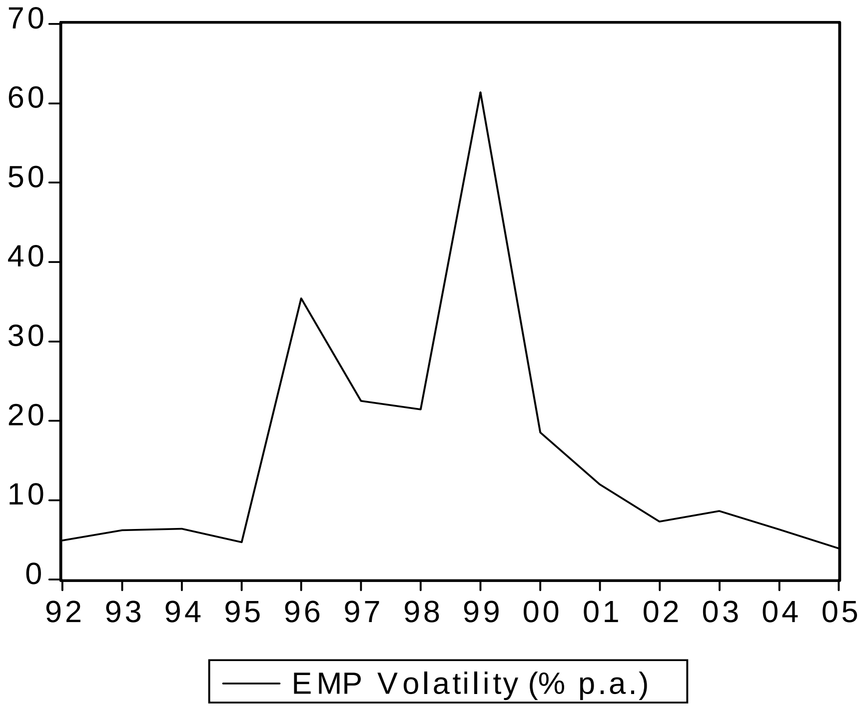

Figure 2

[10]In other words, a crisis episode is characterised by EMP values that satisfy the condition $EMP_t > \overline{EMP} + 1.5sd$, where $\overline{EMP}$ and sd respectively denote the EMP series' unconditional mean and standard deviation.

[11]In Table 1, a crisis episodes' date of occurrence is denoted using **bold** type.

Table 1 - EMP Estimates & Constituent Components (%)

Date	EMP	Δe	Δr	Δ(i-i*)
1992 JAN	2.437	2.699	4.301	0.000
1992 FEB	-0.083	-0.431	-5.714	0.000
1992 MAR	-0.841	-0.853	-0.198	0.000
1992 APR	-0.632	-0.705	0.277	0.010
1992 MAY	-0.452	-0.361	1.501	0.000
1992 JUN	-2.408	-2.620	-3.490	0.000
1992 JUL	2.024	2.154	2.130	0.000
1992 AUG	-2.071	-0.979	13.513	-0.030
1992 SEP	0.841	0.661	-2.958	0.000
1992 OCT	4.050	3.930	-0.502	0.010
1992 NOV	-3.240	-3.070	2.802	0.000
1992 DEC	-0.213	0.000	3.496	0.000
1993 JAN	3.876	4.076	3.280	0.000
1993 FEB	2.180	1.629	-6.099	0.020
1993 MAR	-0.002	-0.376	-0.235	0.040
1993 APR	0.426	0.279	3.484	0.040
1993 MAY	1.656	0.712	-5.182	0.070
1993 JUN	4.454	3.673	-5.466	0.050
1993 JUL	1.502	1.048	2.864	0.070
1993 AUG	-2.309	-2.767	2.795	0.070
1993 SEP	2.002	1.030	-5.665	0.070
1993 OCT	3.852	3.426	4.795	0.080
1993 NOV	0.064	-1.648	-16.336	0.080
1993 DEC	0.585	0.073	-5.476	0.020
1994 JAN	-0.827	-1.723	-7.353	0.050
1994 FEB	-0.607	-0.177	10.006	0.020
1994 MAR	0.494	0.675	5.927	0.020
1994 APR	1.227	1.006	-2.155	0.010
1994 MAY	0.137	-0.429	-7.834	0.010
1994 JUN	1.151	0.300	-11.045	0.020
1994 JUL	0.072	-0.254	-5.364	0.000
1994 AUG	0.175	-0.575	-10.861	0.010
1994 SEP	0.447	0.331	-1.912	0.000
1994 OCT	2.367	2.278	-1.460	0.000
1994 NOV	1.407	1.423	0.249	0.000
1994 DEC	-0.455	-0.440	0.249	0.000
1995 JAN	8.793	-0.276	-0.117	1.010
1995 FEB	0.635	0.645	1.629	0.010
1995 MAR	-1.099	-0.844	2.708	-0.010
1995 APR	1.324	1.256	0.365	0.010
1995 MAY	0.322	0.141	-1.512	0.010
1995 JUN	-0.592	-1.099	-8.335	0.000
1995 JUL	1.084	0.879	-3.363	0.000
1995 AUG	0.162	0.542	6.245	0.000
1995 SEP	-1.464	-1.437	1.929	0.010
1995 OCT	2.186	1.764	-6.945	0.000
1995 NOV	1.498	1.644	2.402	0.000
1995 DEC	-0.367	-0.953	-8.162	0.010
1996 JAN	3.205	0.085	-51.300	0.000
1996 FEB	1.760	0.216	-25.378	0.000
1996 MAR	3.860	1.201	-42.249	0.010
1996 APR	0.510	0.929	5.415	-0.010
1996 MAY	-0.902	-0.219	12.706	0.010
1996 JUN	1.039	1.183	2.367	0.000
1996 JUL	1.922	0.123	-28.094	0.010
1996 AUG	0.390	0.653	5.792	0.010
1996 SEP	-2.239	-0.902	23.454	0.010
1996 OCT	1.049	0.313	-9.154	0.020
1996 NOV	0.330	-0.177	-6.853	0.010
1996 DEC	-3.856	1.173	84.154	0.010

Date	EMP	Δe	Δr	Δ(i-i*)
1997 JAN	5.176	-0.080	-8.233	0.000
1997 FEB	-0.577	-0.983	0.702	0.010
1997 MAR	0.466	0.309	7.743	0.010
1997 APR	-4.574	-4.776	2.582	0.010
1997 MAY	4.939	4.688	0.303	0.020
1997 JUN	0.313	-0.128	-4.300	0.010
1997 JUL	0.969	0.392	-5.065	0.010
1997 AUG	3.318	-0.941	-64.110	0.530
1997 SEP	0.694	0.378	-5.204	0.050
1997 OCT	-3.678	0.006	13.349	0.070
1997 NOV	0.623	0.214	-6.727	0.040
1997 DEC	-1.320	0.714	33.429	0.030
1998 JAN	2.685	0.878	-4.631	0.020
1998 FEB	-0.720	-1.076	-4.380	0.030
1998 MAR	-0.053	-0.124	0.314	0.040
1998 APR	-0.103	0.327	-3.247	0.000
1998 MAY	4.635	4.863	5.231	-0.320
1998 JUN	-0.778	-0.575	3.335	0.000
1998 JUL	0.584	0.522	0.454	0.000
1998 AUG	2.127	-0.688	-44.798	0.170
1998 SEP	-0.663	0.330	17.805	0.010
1998 OCT	-0.543	-0.223	6.750	0.010
1998 NOV	-0.049	-0.446	-5.055	-0.070
1998 DEC	3.763	0.262	-56.080	0.010
1999 JAN	-6.244	-0.214	84.379	0.000
1999 FEB	4.952	-0.124	-77.547	0.010
1999 MAR	0.644	0.000	-4.692	0.010
1999 APR	-3.636	0.000	34.695	0.010
1999 MAY	2.974	0.000	-35.614	0.010
1999 JUN	0.028	0.000	2.497	0.010
1999 JUL	-3.818	0.000	3.769	0.010
1999 AUG	-1.182	0.000	20.897	-0.100
1999 SEP	0.361	0.000	-5.929	0.040
1999 OCT	1.668	0.000	-27.413	0.040
1999 NOV	-0.378	0.000	4.745	-0.170
1999 DEC	-9.953	0.000	163.606	0.090
2000 JAN	0.498	0.000	-27.361	0.020
2000 FEB	0.470	0.000	-7.718	-0.400
2000 MAR	0.400	0.000	-6.574	0.010
2000 APR	1.022	0.000	-19.742	0.000
2000 MAY	0.709	0.000	-11.649	0.000
2000 JUN	0.719	0.000	-11.825	-0.010
2000 JUL	0.069	0.000	-7.026	0.000
2000 AUG	-2.135	0.000	35.095	-0.130
2000 SEP	1.196	0.000	-21.132	0.000
2000 OCT	-0.057	0.000	2.419	0.000
2000 NOV	-0.777	0.000	11.300	-0.020
2000 DEC	-1.317	0.000	23.123	0.000
2001 JAN	-0.891	0.000	13.167	0.000
2001 FEB	0.259	0.000	-2.787	-0.040
2001 MAR	0.929	0.000	-13.802	0.000
2001 APR	1.922	0.000	-0.627	-0.010
2001 MAY	-0.038	0.000	-0.857	0.010
2001 JUN	0.451	0.000	-2.989	-0.010
2001 JUL	3.404	0.000	4.511	0.010
2001 AUG	0.005	0.000	2.871	-0.010
2001 SEP	-0.096	0.000	4.532	0.010
2001 OCT	-0.283	0.000	7.594	0.010
2001 NOV	0.264	0.000	0.078	0.210
2001 DEC	-1.908	0.000	35.783	-0.010

Date	EMP	Δe	Δr	Δ(i-i*)
2002 JAN	-0.294	0.000	6.306	0.010
2002 FEB	-1.001	0.000	17.924	0.010
2002 MAR	-0.593	0.000	11.225	0.010
2002 APR	-0.181	0.000	-1.451	-0.030
2002 MAY	-0.007	0.000	0.114	0.000
2002 JUN	-0.005	0.000	0.087	0.000
2002 JUL	-0.568	0.000	0.485	-0.060
2002 AUG	-0.107	0.000	4.716	0.020
2002 SEP	0.220	0.000	-2.139	0.010
2002 OCT	-2.914	0.000	5.134	-0.250
2002 NOV	2.531	0.000	-3.253	0.010
2002 DEC	-3.020	0.000	17.191	-0.060
2003 JAN	-3.053	0.000	1.519	-0.450
2003 FEB	0.069	0.000	-9.982	0.000
2003 MAR	-1.770	0.000	12.865	-0.090
2003 APR	-6.197	0.000	1.568	-0.780
2003 MAY	1.374	0.000	1.009	-0.100
2003 JUN	0.239	0.000	-0.978	-0.100
2003 JUL	-5.943	0.000	-2.595	-0.110
2003 AUG	0.177	0.000	-2.912	0.000
2003 SEP	-0.720	0.000	17.728	0.040
2003 OCT	-0.361	0.000	-13.239	-0.130
2003 NOV	-0.211	0.000	6.423	0.020
2003 DEC	-0.457	0.000	4.555	-0.020
2004 JAN	-2.088	0.000	0.405	-0.230
2004 FEB	-0.204	0.000	4.826	0.010
2004 MAR	0.114	0.000	-4.822	-0.020
2004 APR	-0.852	0.000	6.638	-0.050
2004 MAY	0.766	0.000	2.150	0.100
2004 JUN	-0.276	0.000	0.113	-0.030
2004 JUL	-0.336	0.000	2.569	-0.020
2004 AUG	-0.530	0.000	8.713	0.000
2004 SEP	-0.174	0.000	4.335	0.010
2004 OCT	1.246	0.000	-2.227	0.124
2004 NOV	0.283	0.000	-3.171	0.010
2004 DEC	-1.495	0.000	18.672	-0.040
2005 JAN	0.054	0.000	-0.883	0.000
2005 FEB	0.070	0.000	1.797	0.020
2005 MAR	-1.922	0.000	4.306	-0.185
2005 APR	-3.208	0.000	5.163	-0.323
2005 MAY	1.779	0.000	9.111	0.260
2005 JUN	-0.035	0.000	-0.908	-0.010
2005 JUL	0.329	0.000	-3.940	0.010
2005 AUG	-1.907	0.000	3.690	-0.188
2005 SEP	1.637	0.000	-3.310	0.160
2005 OCT	-0.221	0.000	2.153	-0.010
2005 NOV	-0.318	0.000	0.806	-0.030
2005 DEC	-1.189	0.000	6.270	-0.090
2006 JAN	-0.553	0.000	4.668	-0.030
2006 FEB	-0.554	0.000	3.201	-0.040
2006 MAR	-0.783	0.000	-4.830	-0.120
2006 APR	-0.626	0.000	2.917	-0.050
2006 MAY	-2.104	0.000	8.775	-0.175

We find that the pre-peg period witnessed ten crisis episodes, all associated with positive EMP pressures, whilst only two occurred afterward. This finding suggests that two distinct EMP states might be present over our sample period, each characterised by a different volatility level. To see if this is the case, we calculate the mean annual EMP-volatility using the (unconditional) standard deviation of the monthly EMP values.

As can be seen in Figure 2, we observe that EMP volatility has declined dramatically since 1999, during which it peaked at 61.4%. Moreover, volatility has remained low and relatively stable over the period 2000-2005, averaging 9.44% *p.a.*. In contrast, volatility averages 20.35% *p.a.* for the remaining period. This last observation clearly points to a secular change of EMP dynamics during 1999, which clearly needs to be further explored. In the next section, therefore, we study the stochastic properties of EMP's *conditional* mean and variance so as to better understand the behaviour of Cape Verde's exchange rate arrangements over time.

3 Econometric Analysis

3.1 Model Specification

Following Braga de Macedo *et al.* (2004a, 2006) and Brites Pereira (2005a), we propose an $EGARCH(p,q)$ process for the conditional variance equation in order to capture possible heteroskedasticity effects, volatility clustering and leverage effects associated with asymmetric responses shocks:

$$\begin{aligned} \epsilon_t &= \sigma_t z_t \\ z_t &\sim D_\vartheta(0,1) \\ \ln\sigma_t^2 &= \lambda s_t + \sum_{j=1}^{p}\beta_j \ln\sigma_{t-j}^2 + \sum_{i=1}^{q}\left(\alpha_i\left|\frac{\epsilon_{t-i}}{\sigma_{t-i}}\right| + \gamma_i\frac{\epsilon_{t-i}}{\sigma_{t-i}}\right) \end{aligned}$$

where ϵ_t is the mean EMP equation's disturbance term, assumed to have a zero mean and to be serially uncorrelated, while $D_\vartheta(0,1)$ is a probability density function with zero mean and unit variance.[12] Moreover, s_t is an $r\times1$ vector of explanatory variables, including a constant term, and λ is the respective $1\times r$ coefficient

[12] Optionally, ϑ are additional distributional parameters that can be used to describe a distribution's skew and shape. For a full discussion of this class of models, refer to Engle (1982) and Bollerslev (1986).

vector. Note that the left-hand side above is the logarithm of the conditional variance, which implies that the associated leverage effect is exponential rather than quadratic. In addition, forecasts of the conditional variance are guaranteed to be non-negative under this specification.

As for the mean EMP equation, we follow Engle, Lilien & Robins (1987) in allowing mean EMP to depend on its own conditional variance. This captures the basic insight that risk-averse agents will require compensation for holding a risky asset. Given that an asset's riskiness can be measured by the variance of returns, the risk premium is an increasing function of the returns' conditional variance. For exchange rates, the risk premium associated with the underlying volatility can be either positive or negative.[13]

In the context of EMP, the risk-return relationship implies that holding assets of a country in which EMP-volatility is high (large σ_t^2) should be compensated by a greater return (lower EMP). This implies that $\mu < 0$ in our specification of the mean EMP equation, given below:

$$EMP_t = \mu \ln \sigma_t^2 + \theta x_t + \sum_{i=1}^{m} \xi_i EMP_{t-i} + \sum_{j=1}^{n} \psi_j \epsilon_{t-j} + \epsilon_t$$

which also incorporates the effect of economic fundamentals. Their impact is captured by the $k \times 1$ vector of explanatory variables x_t (includes a constant term), with θ being the respective $1 \times k$ coefficient vector. All explanatory variables are lagged one period in order to avoid the problem of contemporaneous simultaneity with the dependent variable. We also allow for $ARMA(m, n)$ terms in our mean equation given our lack of data pertaining to economic fundamentals for part of our sample.

For the full sample period, we estimate the above "EGARCH in the Mean" (EGARCH-M) model which additionally incorporates a dummy variable that captures the CVE's change in exchange rate regime. As such, the dummy takes on the value one $\forall t \geq$1999:01 and zero otherwise. Our choice of economic fundamentals is based on the relevant theoretical and empirical literature, as discussed

[13]As Engel (1996) shows, the direction of the effect of conditional variance on risk premiums depends on the variance of nominal consumption. Fukuta & Saito (2002) show that the signs of the coefficients on risk premiums depend on the covariance between consumption growth and inflation, the intertemporal marginal rate of substitution, and the variances of inflation in Japan and the United States.

in Flood and Marion (1998). For Cape Verde, however, our choice is severely restricted by the lack of data pertaining to some of these fundamentals. At best, the data are available but have a low trimesterly or annual frequency. At worst, the data simply do not exist, as is especially true prior to January 1999.

In practice, we were able to choose four fundamentals for the mean equation that had the desired monthly frequency (see Appendix 3 for the data's description): domestic credit growth rate ($\triangle dc_t$), real depreciation rate (q_t), government borrowing growth rate ($\triangle gvt_t$) and the change in emigrant's remittances ($\triangle rem_t$).[14] The choice of the last variable is justified primarily by the importance that emigrant's remittances have in the Cape Verdian economy, as discussed above. Moreover, it is the only element of Cape Verde's current account that can be included in our analysis, given the monthly frequency of the data. In the conditional variance equation, we include foreign reserve changes ($\triangle r_t$) given their important role in EMP dynamics under the currency peg.[15]

Turning to the expected signs of these other variables, domestic credit growth and increased government borrowing necessarily lead to greater EMP, implying that the estimated coefficients are expected to be positive. On the other hand, increased external transfers and real depreciation lead to lower EMP, hence the expected signs are negative. As for conditional variance, while the expected sign of the (lagged) explanatory variables is not easily predictable *a priori* on theoretical grounds, their effects are easily interpretable upon estimation. In the case of foreign reserves, for example, a negative coefficient indicates that an increase in foreign reserves lowers conditional volatility. Finally, the impact of shocks is asymmetric if $\gamma \neq 0$ while the presence of leverage effects can be tested by the hypothesis that $\gamma < 0$, i.e. negative shocks increase conditional volatility more than positive shocks, as is to be expected under the normal functioning of markets.

3.2 Estimation Results

The empirical analysis is undertaken using monthly data for the period January 1992-May 2006. We first estimate an EGARCH-M model for the full sample period using domestic credit growth, real depreciation and the regime dummy

[14]The data pertaining to the latter three variables are available only as of January 1999.

[15]Note that changes in reserves and in the interest rate differential are not included in the mean equation as they are already present in the EMP measure.

as explanatory variables. The summary of this estimation's results, as that of subsequent ones, is given in Table 2.

Table 2 - Summary of EGARCH-M Estimation Results

Sample Period		**FULL**	**PEG**	**PRE-PEG**
Are economic fundamentals important? (Mean Equation)	Δdc_t	Yes	Yes	Yes*
	q_t	Yes	Yes	Yes
	Δgvt_t	-	Yes	-
	Δrem_t	-	Yes	-
Asymmetric leverage effect of shocks? (Variance Equation)	γ	Yes	Yes	No*
Evidence of Risk-Return Relationship?	μ	Yes	Yes	Yes

Notes: *Refer to the comment of footnote 16. For the estimation procedure and results, see Appendix 2.

We find economic fundamentals to be important, as expected. In addition, there is evidence of the risk-return relationship and of an asymmetric leverage effect of shocks on the conditional variance. Significantly, we find that the change in exchange rate regime also explains EMP dynamics over the sample period, and is associated with a reduction of mean EMP and of volatility.

This last result reinforces our earlier finding that two distinct EMP regimes might be present over the sample period. With this mind, we gain additional insight by dividing the sample into two sub-samples, associated with the "pre-" and "post-" currency peg arrangement. Although data availability hampers an effective comparison of these two periods, it is nonetheless clear after looking at the estimation results that fundamentals account for EMP's behaviour better under the currency peg.

Prior to the regime change, changes in domestic credit growth and in the real exchange rate affect mean EMP and do not affect the conditional variance.[16] As was also the case under the full sample, volatility is driven essentially by changes

[16]Compared to the results obtained under a currency peg and the full sample, however, it would appear that more complete and higher frequency data would improve upon these results.

in foreign exchange reserves. However, now there is no evidence of negative shocks affecting volatility differently, which also contrasts with the result obtained under the currency peg. The estimate of the risk-return relationship for "pre-peg" period implies that a 1% increase in monthly volatility is associated with a reduction of 0.52% in mean EMP, or equivalently 6.26% p.a.[17]

Under the currency peg, increases in domestic credit and government debt lead, as expected, to greater EMP. The same holds true for a decline in emigrant's remittances and for a real exchange rate appreciation. Conditional volatility remains driven by foreign reserve changes and negative shocks affect volatility differently than do positive shocks. We again find that an increase in monthly volatility leads to lower EMP but the risk-return relationship is such that a 1% increase in monthly volatility leads to *smaller* reduction of mean EMP - almost half of that found for the "pre-peg" period given our estimated return of 0.25%.

The expected return from holding assets from Cape Verde under the currency peg is thus *lower* for the same increase in volatility. We explain this finding after assessing how the three channels for the relief of EMP operate across the two regimes. In other words, we seek to decompose the change in EMP into the underlying changes of its constituent elements in order to see how these are relieving, or not, prevailing EMP.[18] The result of this decomposition is shown in Table 3.

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[17] To see this, note that the derivative of mean EMP with respect to σ_t^2 yields the semi-elasticity of changes in EMP for a given percentage change in variability ($\frac{dEMP_t}{d\sigma_t^2/\sigma_t^2} = \mu$), *ceteris paribus.* Assuming discrete monthly changes, the latter expression can be rewritten as $\Delta EMP_t = \mu \frac{\Delta\sigma_t^2}{\sigma_t^2}$ so as to highlight the risk-return relation. When variability increases by 1%, EMP must decrease by μ% in order for this relation to hold.

[18] To undertake this task, we define the change in EMP as

$$\Delta EMP_t = \Delta^2 e_t + \eta_r \Delta^2 r_t + \eta_i \Delta^2 (i_t - i_t^*)$$

where Δ^2 denotes the second difference operator. We then rewrite the above expression as

$$\Delta EMP_t = \Delta e_t \left[\frac{\Delta^2 e_t}{\Delta e_t}\right] + \eta_r \Delta r_t \left[\frac{\Delta^2 r_t}{\Delta r_t}\right] + \eta_i \Delta (i_t - i_t^*) \left[\frac{\Delta^2 (i_t - i_t^*)}{\Delta (i_t - i_t^*)}\right]$$

in order to estimate the three expressions given by the square brackets, which are interpretable as the rate of acceleration of the changes in e_t, r_t and $(i_t - i_t^*)$ respectively. Estimation is possible as there is one equation for each of the three sample periods considered. Moreover, the system of equations is identifiable as there exists an unique value for ΔEMP_t and also unique mean values for Δe_t, Δr_t and $\Delta (i_t - i_t^*)$ for each sample period. Upon estimation, we find that $\frac{\Delta^2 e_t}{\Delta e_t} =$

Table 3 - Decomposition of EMP Return (%)

	PEG	PRE-PEG
$\Delta^2 e_t$	0.000	-0.611
$\eta_r \Delta^2 r_t$	-0.564	0.318
$\eta_i \Delta^2 (i - i^*)$	0.313	-0.229
ΔEMP_t	**-0.251%**	**-0.522%**
Estimated equivalent annual return	**-3.01%**	**-6.26%**

Notes: Recall that $\Delta EMP_t = \Delta^2 e_t + \eta_r \Delta^2 r_t + \eta_i \Delta^2 (i - i^*)$. For each regime, the above terms are calculated using the mean values of $\Delta e_t, \Delta r_t$ and $\Delta (i - i^*)$, as discussed in footnote 18.

Prior to the peg's adoption, we know that the CVE was depreciating and that the interest rate differential was increasing, both at a decelerating rate based on our calculations, while foreign reserves were declining at an accelerating rate, as can be seen in Figure 3. As a result, the foreign reserves channel is associated with a positive monthly change in EMP, which represents a *loss* on holding Cape Verdian assets estimated to be 0.32%. The opposite is true, meanwhile, for the other two channels and, as is clear from Table 3, the net effect implies a negative change in EMP (positive return) for the "pre-peg" period.

Note, however, that this return is largely due to the exchange rate channel, i.e. a slowing CVE depreciation rate, hence the increasing economic benefit associated with holding assets denominated in CVE. Indeed, once this channel's effect is netted out, the combined impact of the remaining channels actually implies an expected annual loss of 1.07% on holding such assets. In contrast, the interest rate differential was decreasing at an accelerating rate while foreign reserves were increasing at a decelerating rate during the "peg" period. Here, the foreign reserves channel is associated with a positive return while the interest rate channel's contribution is negative given the lower interest rate differential (see Figure 3).

-2.72%, $\frac{\Delta^2 r_t}{\Delta r_t} = 2.54\%$ and $\frac{\Delta^2 (i_t - i_t^*)}{\Delta (i_t - i_t^*)} = -1.02\%$, which allows us to decompose ΔEMP into the underlying changes of its constituent elements, as shown in Table 3.

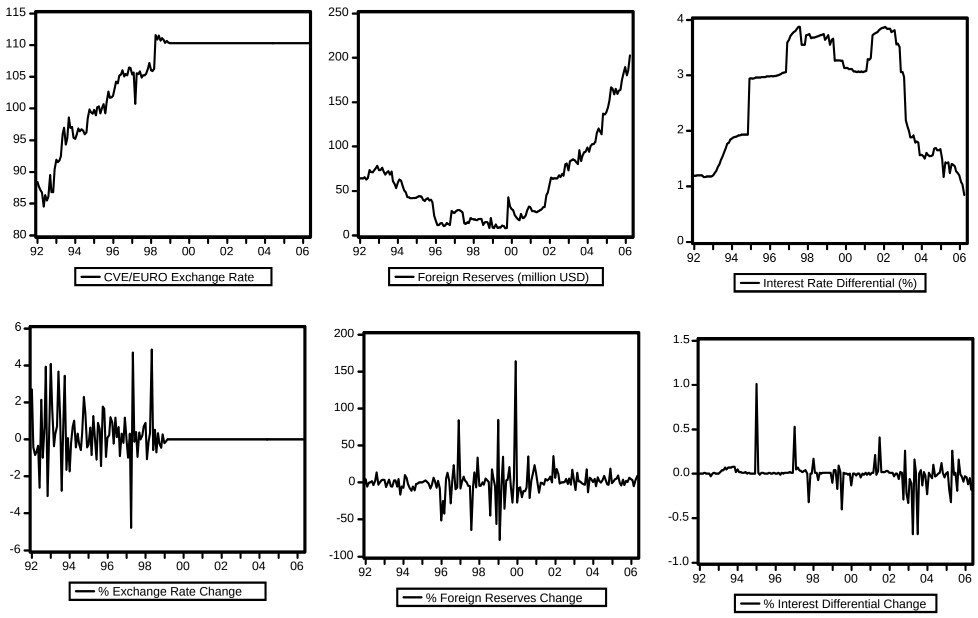

Figure 3

The composition of the expected return under the currency peg is "more virtuous" in that is it not due either to a larger risk premium, as measured by the interest rate differential, nor favourable exchange rate movements. Rather, it is due to the strengthening of Cape Verde's foreign reserve position, which we take to be a sign of the credibility of its currency peg, especially as Cape Verde's foreign reserves are particularly sensitive to external and fiscal factors, as discussed in Weber (2005). This last finding is reinforced by the fact that we also find evidence of the asymmetric leverage effect of shocks where the influence of "bad EMP news" outweighs that of "good EMP news", as is to be expected under increased market scrutiny.

4 Conclusion

This paper seeks to infer the credibility of Cape Verde's interaction between exchange rate, economic policy regime and financial-market integration. In doing so, we continue the line of research that previously studied the cases of Portugal's Escudo and Macau's Pataca. The former currency disappeared and the latter has an unique double peg under a currency board, in which the nature of EMP changes in a fundamental way. For Cape Verde, we were able to ascertain the credibility of its currency peg to the Euro by analysing the impact of economic fundamentals, our explanatory variables, on the stochastic properties of EMP, the dependent variable, using EGARCH-M models. We measure EMP as a weighted linear combination of changes in the exchange rate, in foreign exchange reserves and in the interest rate differential.

Our initial descriptive analysis of EMP finds a substantial reduction in the number of crisis episodes and of (unconditional) volatility after the currency peg's adoption. Moreover, our subsequent EGARCH-M estimation results suggest that mean EMP is driven by the usual economic fundamentals and that conditional variability is more sensitive to "bad EMP news" than to "good EMP news". We also find evidence that the expected return from holding assets from Cape Verde under the currency peg is *lower* for the same increase in volatility.

We explain this finding by the fact that the composition of the expected return under the currency peg is "more virtuous" in that is it not due to either a larger risk premium nor favourable exchange rate movements. Rather, it is due to the strengthening of Cape Verde's foreign reserve position, which we take to be a sign of the credibility of its currency peg. Our view is further reinforced if one bears in mind that there has been a strong and gradual build-up of foreign reserves since 2001, partly as a result of the Cape Verdian government's formal recognition of the need to consolidate monetary and fiscal policy through the adoption of the Maastricht criteria as reference values.

In other words, Cape Verde has "got it right" when it comes to its currency peg, as the peg apparently reflects the intertemporal credibility of Cape Verdian economic policy and so has successfully withstood the scrutiny of international markets. Needless to say, our finding needs to be further tested given that our analysis is based on an *ad-hoc* EMP measure, which implies some degree of caution when interpreting our estimates. This task will also be greatly facilitated by the availability of more detailed data of higher frequency and more sophisticated modelling techniques. Until then, we would like to compare the operation of the Cape Verdian and the Pataca pegs, by using the latter specification insofar as we have monetary data with sufficiently high frequency.

Our agenda for deepening and widening this research seeks to support Cape Verde's development strategy as a CPLP country that is graduating from aid-dependence and whose political governance has been praised by the international community.[19] In addition, Cape Verde may decide to increase its trading in international financial and capital markets in the future. Deepening the analysis thus involves investigating the costs and benefits of adopting the Euro at some point in the future, a decision that requires an understanding of prevailing currency peg's credibility. On the other hand, broadening the analysis leads to comparisons with other CPLP countries and Macau.

We will also turn our attention to the operation of exchange rate regimes in other Lusophone countries, such as those of Mozambique and São Tomé e Principe, where similar EMP variables could be calculated with the available data and compare their managed floating to the Cape Verdian experience. In doing so, we hope to provide evidence on the benefits of greater mutual knowledge among not just CPLP member countries but also between these and the various economic regimes present in China.

[19] Braga de Macedo, Braz and Mantero (2003) present the implications of the Monterrey consensus for CPLP and emphasize the role of public-private partnerships as a means to promote better policies. Macau has been active in seeking cooperation with CPLP since the Ministerial conference of October 2003, where, significantly, the OECD experience with peer-pressure was discussed. The fact that the Chinese authorities have established the secretariat of the sino-lusophone economic partnership forum in Macau might encourage further comparative studies along these lines.

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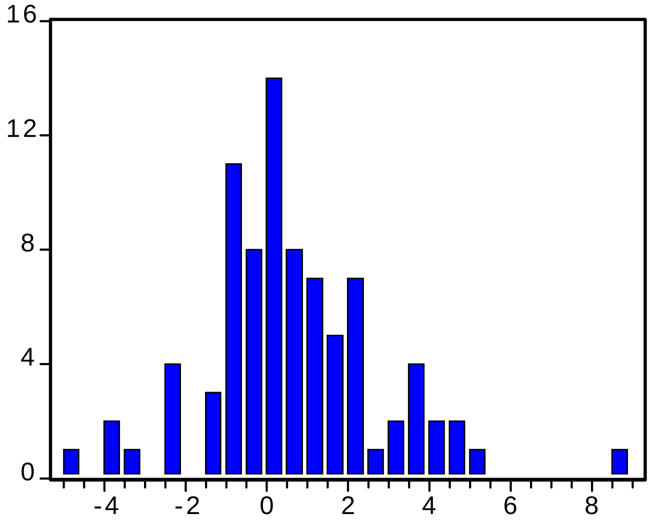
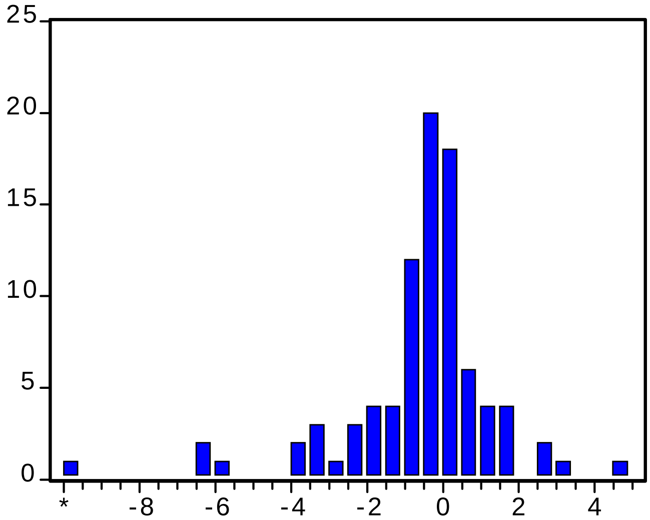
Appendix 1

EMP Descriptive Statistics



Series: EMP	
Sample 1992:01 1998:12	
Observations 84	
Mean	0.715476
Median	0.460000
Maximum	8.790000
Minimum	-4.570000
Std. Dev.	2.153844
Skewness	0.570363
Kurtosis	4.701327
Jarque-Bera	14.68519
Probability	0.000647



Series: EMP	
Sample 1999:01 2006:05	
Observations 89	
Mean	-0.513146
Median	-0.180000
Maximum	4.950000
Minimum	-9.950000
Std. Dev.	2.047069
Skewness	-1.529094
Kurtosis	8.416259
Jarque-Bera	143.4694
Probability	0.000000

Appendix 2

EGARCH-M Estimation Results

In the estimation of the our EGARCH-M models, we started with a general specification of the mean and variance equations. The orders of the variance equation and ARMA process in the mean equation were determined by the partial autocorrelation and the autocorrelation function of the EMP series. Non-significant variables are excluded from an estimated equation whenever appropriate. We use the Schwartz Information Criterion (SIC) to assess a model's relative fit, implying that we choose those models for which the (negative) SIC is smallest. The final EGARCH-M specifications were decided by looking at the properties of standardised residuals (SR) and squared standardised residuals (SSR).

The models were estimated using E-Views 3.0, and we employed the Marquardt nonlinear optimization algorithm to compute maximum likelihood parameters. Bollerslev and Wooldridge (1992) note that maximising a mis-specified likelihood function in a GARCH framework provides consistent parameter estimates, though the standard errors will be understated. Accordingly, we use their consistent variance-covariance estimator to correct the covariance matrix. We thus report asymptotic standard errors for the estimated parameters that are robust to departures from normality.

Correctly specified EGARCH-M models will have SR and SSR that are white noise, i.e. they are independent and identically distributed random variables with mean zero and variance one.[20] As model diagnostic tools, we use the modified Box-Ljung (B-L) procedure on the SR series to test for remaining serial correlation in the mean equation. To detect remaining ARCH effects in the variance equation, we use the B-L test as well as the ARCH-LM test on SSR. Based on the results of the diagnostic tests, we find ample support for our model specification. The B-L Q-statistics are insignificant at the 5% level for both the mean and variance equation, as are those of the ARCH-LM test.

[20]If the standardised residuals are also normally distributed, then the estimates are maximum likelihood estimates which are asymptotically efficient. However, even if the residual's distribution is not normal, the estimates are still consistent under quasi-maximum likelihood assumptions.

Table A2.1 - FULL Sample Period: 1992:01 2006:05

Mean: $EMP_t = \mu \ln \sigma^2 + \text{DUMMY} + \theta_0 + \theta_1 \Delta dc_{t-3} + \theta_2 q_{t-7} + \xi_1 EMP_{t-1} + \varepsilon_t$

Parameter	Estimate	Std. Error	t-Statistic	p-value
μ	-8.509144	3.292073	-2.584737	0.0097**
DUMMY	-0.009118	0.002093	-4.356396	0.0000**
θ_0	0.009435	0.002264	4.167470	0.0000**
θ_1	0.151282	0.031037	4.874198	0.0000**
θ_2	-0.177364	0.043724	-4.056472	0.0000**
ξ_1	-0.145674	0.049092	-2.967362	0.0030**

Variance: $\ln \sigma^2_t = \text{DUMMY} + \lambda_0 + \lambda_1 \Delta r_{t-2} + \lambda_2 \Delta r_{t-3} + \lambda_3 \Delta r_{t-9} + \alpha_1 \left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \gamma_1 \frac{\varepsilon_{t-1}}{\sigma_{t-1}}$

DUMMY	-0.699251	0.338118	-2.068065	0.0386*
λ_0	-7.750207	0.260143	-29.79215	0.0000**
λ_1	-5.151746	0.470296	-10.95426	0.0000**
λ_2	-1.252714	0.394093	-3.178730	0.0015**
λ_3	-1.569033	0.331614	-4.731500	0.0000**
α_1	0.012708	0.176261	0.072099	0.9425
γ_1	-0.323115	0.117119	-2.758871	0.0058**

Diagnostics

	Ljung-Box Standardised Residuals		Ljung-Box Squared Residuals		ARCH-LM Statistic	
Lag	**Q**	**p-value**	**Q^2**	**p-value**	**LM**	**p-value**
Lag1	1.5695	0.210	0.4417	0.506	0.015103	0.7444
Lag2	4.1114	0.128	0.4770	0.788	-0.077877	0.1312
Lag3	6.1143	0.106	0.6834	0.877	-0.011084	0.8917
Lag4	6.3763	0.173	0.8711	0.929	-0.016844	0.7653
Lag5	6.4248	0.267	1.1180	0.952	-0.039866	0.3550
Lag6	7.2954	0.294	1.6650	0.948	-0.021707	0.7914
Lag7	7.3028	0.398	1.7521	0.972	-0.076957	0.1113
Lag8	7.3255	0.502	2.7290	0.950	-0.030174	0.5162
Lag9	7.6434	0.570	3.4612	0.943	-0.095946	0.0712
Lag10	9.4747	0.488	5.1373	0.882	-0.066391	0.1363
Lag11	11.337	0.415	5.3151	0.915	0.072194	0.5766
Lag12	1.5695	0.210	0.4417	0.506	-0.049595	0.2651
	No. of Observations		**Log-Likelihood**		**SIC**	
	163		430.8775		-4.8806	

Notes: The parameters are as defined in the main text. A double (single) asterisk indicates that the estimated parameter is significantly different from zero at the 1% (5%) level.

Table A2.2 - PEG Sample Period: 1999:01 2006:05

Mean: $EMP_t = \mu \ln\sigma^2 + \theta_0 + \theta_1 \Delta dc_{t-3} + \theta_2 q_{t-2} + \theta_3 \Delta gvt_{t-1} + \theta_4 \Delta rem_{t-2} + \xi_2 EMP_{t-2} + \varepsilon_t$

Parameter	Estimate	Std. Error	t-Statistic	p-value
μ	-25.07902	6.883798	-3.643195	0.0003**
θ_0	-0.000018	0.001614	-6.293150	0.5542
θ_1	0.126127	0.011710	10.77061	0.0000**
θ_2	-0.201724	0.040910	-4.930950	0.0000**
θ_3	0.082055	0.007732	10.61264	0.0000**
θ_4	-0.010158	0.001614	-6.293150	0.0000**
ξ_2	-0.044702	0.006064	-7.371781	0.0000**

Variance: $\ln\sigma^2_t = \lambda_0 + \lambda_1 \Delta r_{t-2} + \lambda_2 \Delta r_{t-3} + \lambda_3 \Delta r_{t-9} + \alpha_1 \left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \gamma_1 \frac{\varepsilon_{t-1}}{\sigma_{t-1}}$

λ_0	-8.001452	0.244823	-32.68260	0.0000**
λ_1	-7.230037	0.541340	-13.35581	0.0000**
λ_2	-2.297204	0.696531	-3.298062	0.0010**
λ_3	-2.194838	0.359837	-6.099539	0.0000**
α_1	-1.093911	0.224641	-4.869594	0.0000**
γ_1	-0.949438	0.181944	-5.218294	0.0000**

Diagnostics

	Ljung-Box Standardised Residuals		Ljung-Box Squared Residuals		ARCH-LM Statistic	
Lag	**Q**	**p-value**	**Q^2**	**p-value**	**LM**	**p-value**
Lag1	0.7889	0.374	0.1353	0.713	0.156352	0.1872
Lag2	0.7932	0.673	0.7789	0.677	-0.138131	0.2717
Lag3	0.9269	0.819	0.7797	0.854	0.223788	0.2957
Lag4	0.9270	0.921	1.0320	0.905	-0.109044	0.3381
Lag5	1.1182	0.952	1.4195	0.922	0.179680	0.1127
Lag6	1.1485	0.979	1.4714	0.961	-0.184948	0.0590
Lag7	1.2944	0.989	1.8006	0.970	0.067827	0.7225
Lag8	1.3134	0.995	2.0008	0.981	-0.028805	0.8148
Lag9	1.3140	0.998	2.0259	0.991	0.001195	0.9415
Lag10	2.0649	0.996	2.0262	0.996	-0.015050	0.4470
Lag11	2.2970	0.997	2.1063	0.998	0.003805	0.8222
Lag12	2.4421	0.998	2.1067	0.999	-0.017295	0.1169
	No. of Observations		**Log-Likelihood**		**SIC**	
	84		258.1291		-5.5657	

Notes: The parameters are as defined in the main text. A double (single) asterisk indicates that the estimated parameter is significantly different from zero at the 1% (5%) level.

Table A2.3 - PRE-PEG Sample Period: 1992:01 1998:12

Mean: $EMP_t = \mu \ln\sigma^2 + \theta_0 + \theta_1 \Delta dc_{t-2} + \theta_2 q_{t-3} + \xi_1 EMP_{t-1} + \xi_2 EMP_{t-2} + \xi_3 EMP_{t-3} + \psi_1 \varepsilon_{t-1} + \psi_2 \varepsilon_{t-2} + \varepsilon_t$

Parameter	Estimate	Std. Error	t-Statistic	p-value
μ	-52.23944	23.61302	-2.212315	0.0269*
θ_0	0.029649	0.005884	5.038987	0.0000**
θ_1	-0.211114	0.054662	-3.862177	0.0001**
θ_2	-0.206451	0.057801	-3.571741	0.0004**
ξ_1	-0.320130	0.050626	-6.323459	0.0000**
ξ_2	-0.840518	0.024433	-34.40028	0.0000**
ξ_3	-0.283066	0.041766	-6.777481	0.0000**
ψ_1	-0.098286	0.024881	-3.950292	0.0001**
ψ_2	0.954739	0.022616	42.21508	0.0000**

Variance: $\ln\sigma^2_t = \lambda_0 + \lambda_1 \Delta r_{t-2} + \lambda_2 \Delta r_{t-3} + \lambda_3 \Delta r_{t-9} + \alpha_1 \left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \gamma_1 \frac{\varepsilon_{t-1}}{\sigma_{t-1}}$

λ_0	-7.671796	0.315678	-24.30258	0.0000**
λ_1	-0.985628	0.387202	-2.545513	0.0109*
λ_2	0.684963	0.501770	1.365093	0.1722
λ_3	-1.407724	0.517449	-2.720507	0.0065**
α_1	-0.641733	0.244187	-2.628036	0.0086**
γ_1	0.043852	0.104720	0.418753	0.6754

Diagnostics

	Ljung-Box Standardised Residuals		Ljung-Box Squared Residuals		ARCH-LM Statistic	
Lag	**Q**	**p-value**	**Q^2**	**p-value**	**LM**	**p-value**
Lag1	2.4366	0.119	0.0736	0.786	0.003201	0.8983
Lag2	2.5308	0.282	0.0930	0.955	-0.017088	0.4878
Lag3	2.5674	0.463	0.1137	0.990	-0.010469	0.5020
Lag4	2.5739	0.631	0.1329	0.998	-0.086750	0.4395
Lag5	2.5827	0.764	0.1516	1.000	0.008703	0.7758
Lag6	2.6127	0.856	0.1695	1.000	-0.063620	0.4549
Lag7	2.6149	0.918	0.1928	1.000	-0.096782	0.4270
Lag8	2.6149	0.956	0.2150	1.000	-0.008545	0.5186
Lag9	2.6214	0.977	0.2157	1.000	-0.008222	0.4471
Lag10	2.6214	0.989	0.2165	1.000	-0.018768	0.4171
Lag11	2.6318	0.995	0.2172	1.000	-0.057575	0.4622
Lag12	2.4366	0.119	0.2179	1.000	-0.399223	0.4518
	No. of Observations		**Log-Likelihood**		**SIC**	
	79		210.4824		-4.4990	

Notes: The parameters are as defined in the main text. A double (single) asterisk indicates that the estimated parameter is significantly different from zero at the 1% (5%) level.

Appendix 3

Data Description

The data used in the analysis are monthly and the sample period runs from January 1992 until May 2006. Some series, however, are unavailable with a monthly frequency prior to January 1999, as detailed in the main text. Where appropriate, changes between two consecutive months, denoted by the $\triangle$ symbol, are calculated as the natural log difference of the variables in question, with the exception of interest rates.

e_t - Bilateral CVE/Euro exchange rate. Source: *Banco de Cabo Verde* (BCV).[21]

$\triangle e_t$ - Depreciation rate of CVE *vis-à-vis* the Euro.

$\triangle r_t$ - Change in Cape Verde's international reserves (r_t). Source: BCV.

i_t - Cape Verde 3-Month Deposit Rate (%). Source: BCV.

i_t^* - Eurozone 3-Month Deposit Rate (%). Source: European Central Bank.

$i_t - i_t^*$ - Interest rate differential (%).

p_t - Cape Verde Consumer Price Index. Source: BCV.

p_t^* - German Consumer Price Index (log). Source: *Deutsche Bundesbank*.[22]

q_t - Real depreciation rate defined as $q_t = \triangle e_t - \triangle p_t + \triangle p_t^*$

$\triangle dc_t$ - Domestic credit growth rate. Source: BCV.

$\triangle gvt_t$ - Government borrowing growth rate. Source: BCV.

$\triangle rem_t$ - Change in emigrant remittances. Source: BCV

[21]Webite: www.bcv.cv. Note that the European Currency Unit (ECU) is used as a proxy for e_t prior to Euro's introduction, while the German 3-month deposit rate is used in the case of i_t^*.

[22]The use of the German CPI as a proxy for the ECB's HIPC (available at www.ecb.eu) is dictated by the fact that the latter only begins in January 1995.

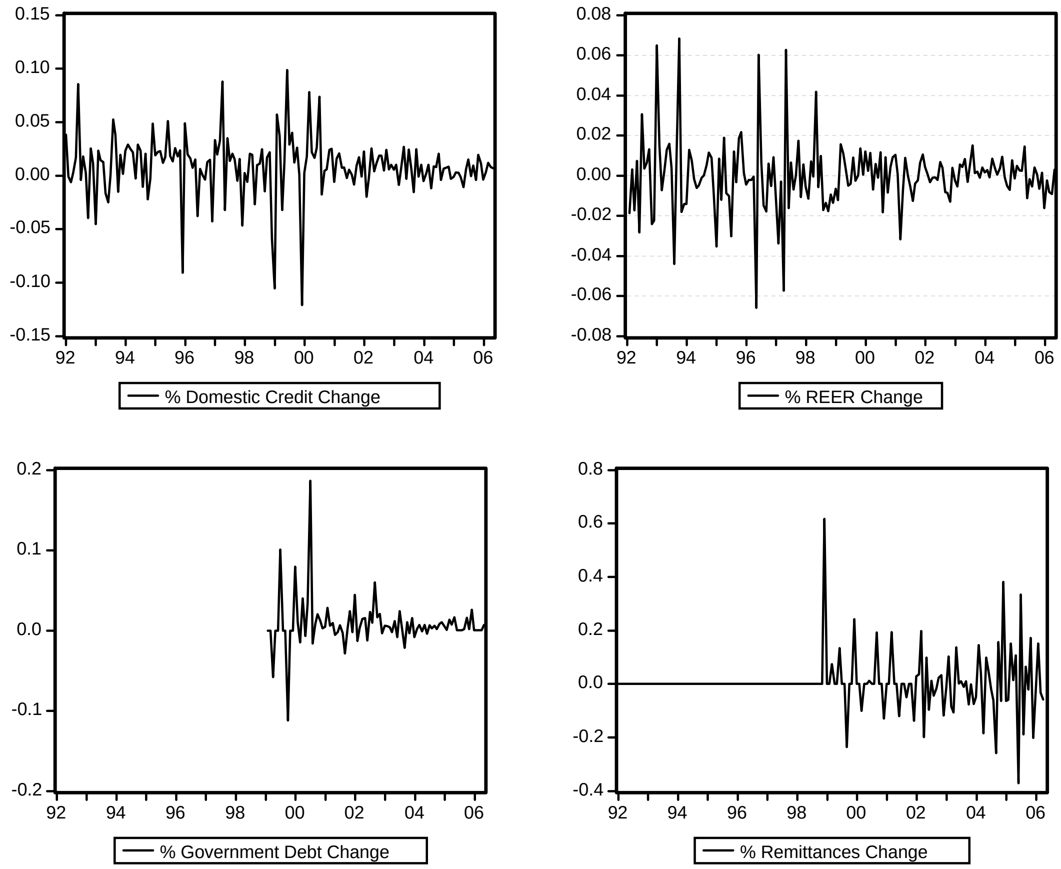

0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
92 94 96 98 00 02 04 06
% Domestic Credit Change
0.08
0.06
0.04
0.02
0.00
-0.02
-0.04
-0.06
-0.08
92 94 96 98 00 02 04 06
% REER Change
0.2
0.1
0.0
-0.1
-0.2
92 94 96 98 00 02 04 06
% Government Debt Change
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
92 94 96 98 00 02 04 06
% Remittances Change

Figure A3.1