WHY ARE RETURNS ON SWISS FRANC ASSETS SO LOW?

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Abstract

As is well known, the uncovered interest rate parity fails in the short run but usually holds in the long run. This paper analyses the long and short run interest rate parity of 10 mayor OECD currencies and finds that there is a long run failure of the uncovered interest rate parity condition for the Swiss Franc. After correcting for exchange rate changes, mean returns on Swiss assets have been significantly lower than in other currencies, an anomaly not found in any other major currency. The long run return differential has been stable over the last 20 years, transitory structural breaks are only found in times of currency turmoil. We suggest that the return anomaly may be due to an insurance premium against very rare catastrophic events, such as a major war. Supporting evidence for this hypothesis comes from two empirical findings: First, we show that the return differential is negatively affected by large unexpected geo-political events. Second we examine historical data on interest rates differentials and show that the abnormally low level of Swiss returns arises after the first world war only.

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1. Introduction

A well known puzzle of foreign exchange markets is the anomalous response of exchange rates to interest rate differentials. The literature that has documented this short run failure of the uncovered interest rate parity typically finds that an increase in the domestic interest of one percent is followed by an appreciation--rather than a depreciation--of the domestic currency at the annual rate of almost one percent or even more[1]. Thus the naive strategy of investing in the currency offering a higher interest rate promises abnormally excess returns. However, this anomaly seems to exist only in the short run. The unconditional mean of the appreciation rate of the US Dollar against major currencies does not seem to be statistically different from that of the interest rate differential (Hodrick, 2000). Therefore we can conclude that the failure of UIP in the short run (forward premium puzzle) offers only short run return opportunities which are subject to a considerable risk given the high volatility of exchange rates[2]

In this paper we show that this conclusion, which is valid for most pairs of major currencies, does not hold for the Swiss Franc. First, we document the anomaly that Swiss Franc mean returns are statistically significantly lower than the exchange rate change corrected return on all other major currencies. Second, we show that the return differential has been stable and it has not diminished over time. Next we show that the Swiss Franc is by no means special with regard to the short run failure of the uncovered interest rate parity (forward premium puzzle). Therefore, we identify a puzzle which present only in Swiss Franc assets and represents a failure of UIP on average over more than 20 years. [3]

A popular explanation for low returns on Swiss Franc assets is related to national or regulatory features of Switzerland (such as the Swiss banking secrecy). However, this explanation is not convincing since we find the return anomaly in Euromarket deposits, which are outside Swiss legislation.

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[1] Froot (1990) finds that the average coefficient of 75 studies of the forward discount bias is –0.88. More recent surveys often present coefficient estimates below for major currencies, Engle (1996), Hodrick (2000).
[2] This is the conclusion drawn by Cochrane (1999) in his survey on „New Facts in Finance“.
[3] Furthermore, an analysis of sources of *real* return differentials (after correcting for exchange rate changes) shows that they alos can be attributed mostly to the failure of uncovered interest rate parity, rather than a failure of relative purchasing power parity. See Kugler and Weder (2004).

We offer an alternative explanation based on a peso problem: Investors may be accepting somewhat lower returns in the expectation that the Swiss Franc would appreciate in the event of a large scale catastrophe. Since such events are rare and have not been observed in the past 20 years it is difficult to test the hypothesis for this period.

Nevertheless we find support for this hypothesis from two empirical findings: first, we show that the return differential is negatively affected in the short run by large unexpected geo-political events, such as the fall of the Berlin Wall, or the sudden death of Soviet leaders. Second we present historical evidence on interest rates differentials during the pre-war and inter-war period. These show that the abnormally low level of Swiss returns arises after the first world war only..[4]

The paper is organized as follows. Section 2 discusses the methodology and the data. Section 3 presents the results and section 4 concludes.

2. Methodology and Data

For each country we have three variables of interest: The interest rate (*i*), the change in the log of the nominal exchange rate defined as the home currency price of the foreign currency, (Δs) and the CPI Inflation rate (π). Foreign variables are denoted by *.

First of all we will consider the mean of the differential of the one month nominal returns in the foreign and home currency corrected for exchange rate changes:

$$d_{i,t} = i^{*}_{i,t-1} + \Delta s_{i,t} - i_{t-1}$$

According to a weak (long run) form of UIP the (unconditional) mean value of this variable should be zero.

[4] Our solution to the puzzle is akin to the one Jorion and Goetzmann (1999), offer for the equity premium puzzle. They showed that the equity price puzzle also disappears for countries that suffered catastrophic events, in particular the interruption of the stock exchange during the wars. Furthermore, this explanation for low retunrs is also compatible with a portfolio approach, which stresses the covariance of returns. In Kugler and Weder (2004) we show that some Swiss franc assets have a very low or even negative correlation with the returns of other risky assets.

Next we take into account the dynamics of the variables of interest. First we consider an univariate model: We study a system of AR(1) equations for all nine rate of return differentials.

$$i^*_{i,t-1} + \Delta s_{i,t} - i_{t-1} = \gamma_i + \delta_i (i^*_{i,t-2} + \Delta s_{i,t-1} - i_{t-2}) + e_{i,t}$$

This allows us to take into account the weak autocorrelation of the return differential of interest and to test jointly the hypotheses concerning the intercepts of these regressions which determines the mean rate of return differentials. Moreover we test the structural stability of these equations estimated for the nominal return differentials. To this end we apply the recently developed multiple break test with unknown break dates published by Bai and Perron (1998). This approach sequentially determines the break point according to the maximal F-statistic for all possible break points. This means that first the sample is split in two parts by this criterion. Then the same approach is applied to the two subsamples and so on. We consider a maximum of five break points and a minimum distance of four months between two breaks. The test is used in two variants: First stability with respect only to the intercept term is considered. Second intercept and slope coefficient are tested jointly.

In a next step we test for the equality of the unconditional mean of the log exchange rate change and the interest rate differential in a bivariate VAR(1) framework. This approach should give a more powerful test of the hypothesis of interest as it accounts for the dynamic interrelationship of the two variables. Denoting the white noise error terms of the (stable) VAR(1) system by ε we can write our model as follows:

$$\begin{aligned} \Delta s_t \quad &= c_1 + a_{11} \Delta s_{t-1} + a_{12} (i_{t-1} - i^*_{t-1}) + \varepsilon_{1t} \\ (i_t - i^*_t) &= c_2 + a_{21} \Delta s_{t-1} + a_{22} (i_{t-1} - i^*_{t-1}) + \varepsilon_{2t} \end{aligned}$$

Given this model we can easily derive the unconditional means of the two variables as

$$E(\Delta s_t) = \frac{(1-a_{22})c_1 + a_{12}c_2}{(1-a_{11})(1-a_{22}) - a_{12}a_{21}}$$
$$E(i_t - i_t^*) = \frac{(1-a_{11})c_2 + a_{21}c_1}{(1-a_{11})(1-a_{22}) - a_{12}a_{21}}$$

Therefore, the equality of the two means can be tested as the following cross equation restriction for our VAR(1) model

$$(1-a_{22})c_1 + a_{12}c_2 = (1-a_{11})c_2 + a_{21}c_1$$

This restriction is tested using a likelihood ratio test under the assumption of normally distributed error terms.

In a next step we examine the well known failure of UIP in the short run (forward premium puzzle) with our data set. Of course this could be done by testing the corresponding restrictions on the coefficients of our first VAR(1) equation.[5] As this puzzle is usually documented in a more restricted simple regression framework, namely by regressing the log exchange rate change on the lagged interest rate differential and by showing that the slope coefficient estimate is negative and statistically different from one, we will follow this practice. However, it should be mentioned that the test results obtained in the VAR framework are qualitatively equal to those provided by the simple regression method.

For the floating rate period, we check our interpretation of the persistently negative excess return of fixed income Swiss Franc asset as an insurance against catastrophic risks by analyzing the reaction of its conditional mean to variables measuring worldwide risk and geo-political uncertainty.[6] The basic idea is that the appreciation of the Swiss Franc decreases exchange rate corrected foreign currency returns in reaction to increased worldwide uncertainty with respect to economic and, in particular, political developments. World-wide risk is represented by economic factors as the (log) changes in the index of industrial production in industrialized countries (%IPI)

[5] $c_1 = 0, \ a_{11} = 0, \ a_{12} = 1$.

[6] **We thank Mathias Hoffmann for suggesting this analysis.**

and the price of oil (%POIL) as well as changes in world bond (%GSCIW), stock (MSCIW) and commodity market return (CGBIW) indexes. In addition, we included four dummy variables for representing unexpected events which are deemed to have increase the worldwide political uncertainty, namely the death of the Sowjet leader Cherneko (March 11, 1985), the Tschernobyl nuclear accident (April 28, 1986), the fall of the Berlin wall (November 9, 1989) and the invasion of Kuwait (August 2, 1990). These events where selected because of their clearly exogenous nature and because they were large and unexpected surprises with a significant geo-plolitical impact. The statistical significance of theses variables on return differentials is then tested in the framework of a multiple regression model for the return differentials of Siwss franc and foreign currency money market investment using data for the period 1985 to 1998 for which all the economic factors including the world bond index were available.

Data:

Interest rates are 1 month Euro deposits for 10 currencies, namely Belgian Franc (BEF), Canadian Dollar (CAD), Deutschmark (DEM), French Franc (FFR), Italian Lira (ITL), Japanese Yen (JAP), Dutch Guilder (NLG), Pound (UKP), Dollar (USD) and Swiss Franc (SFR). The data source is Datastream for the Euro interest rates, for exchange rates, for world bond (GSCI), stock (MSCI) and commodity return (CGBI) indexes. Data on CPI inflation, industrial production in industrialized countries and on oil prices was obtained from IFS. The exchange rate are Dollar rates or cross rates, respectively.

We use two data sets. First, we use monthly data set from 1980-98. This period was selected as international capital movements were completely liberalized in the countries at the end of the seventies. [7] The second data set contains yearly data on short term interest rates (3 months) from 1880-1970 for seven major countries.[8] We consider evidence from the period is the classical gold standard which is usually dated from 1880 until the first Word war in 1914, from the inter-war period with the restored gold standard (lasted between 1923/26 and 1931/36, depending on the country) and from the Bretton Woods period.

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3. Results

Table 1 reports the mean values of all 45 return differentials of our ten currencies and the standard errors, where the row indicates the home country. This table shows an interesting pattern: The Swiss Franc is the only currency for which consistently a positive nominal return differential is reported, i.e. the foreign investment has a higher mean return. This difference is largest with respect to the Non-European currencies and the Lira and lowest with respect to the DM and the Guilder. For all other currencies we observe changing signs. Moreover, we should note that the standard errors are rather large reflecting the high month to month exchange rate variability.

Table1: Rate of Return Differentials (after exchange rate adjustment), Percent p.a.
Mean 1980-1998 and Standard Errors in Parenthesis

	CAD	*DEM*	*FFR*	*ITL*	*JYN*	*NLG*	*UKP*	*USD*	*SFR*
BEF	0.18	-0.95	0.53	1.76	1.22	-0.88	1.13	0.48	1.88
	(2.71)	(0.56)	(0.69)	(1.42)	(2.49)	(0.55)	(2.08)	(2.68)	(1.22)
CAD		-1.23	0.35	1.58	1.04	-1.06	0.95	0.30	2.06
		(2.74)	(2.67	(2.56)	(2.99)	(2.76)	(2.63)	(1.09)	(3.01)
DEM			1.58	2.81	2.27	0.71	2.18	1.53	0.83
			(0.60)	(1.37)	(2.49)	(0.37)	(2.09)	(2.68)	(1.09)
FFR				1.23	0.69	-1.41	0.60	-0.05	2.41
				(1.39)	(2.47)	(0.59)	(2.06)	(2.61)	(1.21)
ITL					-0.54	-2.64	-0.63	-1.28	3.64
					(2.72)	(1.38)	(2.07)	(2.56)	(1.85)
JYN						-2.10	-0.09	-0.74	3.10
						(2.48)	(2.28)	(2.87)	(2.49)
NLG							2.01	1.36	1.00
							(2.02)	(2.67)	(1.08)
UKP								-0.65	3.01
								(2.63)	(2.27)
USD									2.36
									(2.93)

Now let us focus our analysis on the difference between the nine other currencies and the Swiss Franc rate of returns. Table 2 shows the results of a system of AR(1) equations for all nine rate of return differentials. This allows us to take into account the weak autocorrelation of the

[8] We thank Michael Bordo for providing this data set.

variables of interest and to test jointly hypotheses concerning the intercepts of these regressions which determines the mean rate of return differentials.

Table2: Results from AR(1) Models for Nominal Return Differentials, Swiss Franc vis-à-vis 9 Currencies, Monthly Data 1980-98,

$$i^*_{i,t-1} + \Delta s_{i,t} - i_{t-1} = \gamma_i + \delta_i (i^*_{i,t-2} + \Delta s_{i,t-1} - i_{t-2}) + e_{i,t}$$

OLS-Estimates, Standard Errors in Parentheses

Currency	γ	δ
BEF	2.08 (1.26)	0.059 (0.063)
CAD	2.56 (3.03)	0.021 (0.063)
DEM	1.39 (1.14)	0.13 (0.063)
FFR	2.72 (1.25)	0.12 (0.062)
ITL	4.18 (1.85)	0.031 0.064)
JAP	1.67 (2.43)	0.091 (0.063)
NLG	1.64 (1.13)	0.13 (0.063)
UKP	3.77 (2.27)	0.14 (0.063)
USD	2.81 (2.98)	0.047 (0.064)

For most of these intercept terms the hypothesis that they are zero cannot be rejected individually. However, the Wald Test that all intercept terms are jointly zero can be clearly rejected at the 5 percent significance levels. The test statistic, which is χ square distributed with nine degrees of freedom under the null, take the value 20.86 with a marginal significance level of 0.013. Moreover, the hypothesis that all intercept terms are the same cannot be rejected. The corresponding Wald test statistics is 2.44 and the marginal significance level for the χ-square distribution with 8 degrees of freedom is 0.964. Thus, there is no statistically significant difference of the mean nominal return differential of all nine currencies and the Swiss Franc. The same result applies to the positive AR(1) coefficients, which were jointly statistically significantly different from zero, but there is no statistically significant difference among these coefficients.

Table 3 presents Bai and Perron´s (1998) test of the structural stability of these equations estimated for the nominal return differentials.

Table 3: Results of the Sequential Bai-Perron Test for Multiple Structural Changes AR(1) Models for Nominal Return Differentials, Swiss Franc vis-à-vis 9 Currencies, Monthly Data 1980-98

$$i^*_{i,t-1} + \Delta s_{i,t} - i_{t-1} = \gamma_i + \delta_i (i^*_{i,t-2} + \Delta s_{i,t-1} - i_{t-2}) + e_{i,t}$$

Currency	*Break in intercept*		*Break in intercept and slope*	
	Break Point	F-statistic	Break point	F-statistic
BEF	82:3	6.70	82:2	7.31
	89:12	3.93	81:9	7.17
	81:2	2.40	98:6	2.71
CAD	85:2	7.43	85:2	7.02
	86:2	6.37	86:8	8.97
	87:12	2.25	84:3	3.79
DEM	82:2	2.97	83:1	3.69
	83:3	4.58	81:9	4.65
	93:2	0.86	98:7	3.46
FFR	81:12	2.72	86:1	2.52
	86:1	2.52	81:12	2.35
	87:12	1.86	82:5	6.31
ITL	95:3	4.34	95:3	4.23
	92:4	15.99***	95:11	21.79***
	96:12	2.85	92:4	15.26*
JYN	81:2	10.39**	80:12	17.51***
	82:3	3.50	98:8	9.52
	93:7	4.25	98:4	7.63
NLG	81:12	2.39	98:7	3.04
	83:2	1.87	98:2	2.22
	93:2	1.59	97:5	2.35
UKP	81:2	6.42	81:2	11.48*
	82:2	5.84	81:9	11.10
	95:12	4.83	96:12	6.59
USD	85:2	10.55**	85:2	8.78
	87:12	8.02	87:4	13.03*
	89:5	4.62	84:3	4.04

Sequential F-Statistics *, **, and *** denotes significance at the 10, 5 and 1 percent level, respectively, critical values from Bai/Perron (1998, tableII)

In general we can say that the nominal return differentials seem to be rather stable over time. In particular this applies to the differential with respect to the Belgian Franc, Canadian Dollar, DM, French Franc and the Dutch Guilder. For the Italian Lira we have one or even two breaks in the first half of the nineties. If we estimate the mean for the period 1980-91, 1992-1995 and 1996-98 we obtain values of 5.74, -6.51 and 9.65, respectively. Thus, we have a nominal return differential in favor of the Swiss Franc for the periods of the European currency crises and the two following years. This mainly reflects the fact that the Lira did not depreciate as much as expected in this period. Interestingly the years before the introduction of the Euro witness a sharply increasing nominal return differential in favor of the Lira, which probably reflects a strong degree of uncertainty with respect to the participation of the Lira in the Euro zone. The return differential to the Yen and the Pound are very high at the beginning of the eighties (28 percent) and revert then to a level of 1.7 and 2.7 percent, respectively. For the US Dollar we have evidence for breaks in 1985 and 1987. The mean return differential is 17.4 (1980-84), -20.4 (1985-87) and 1.83 (1988-98). In the first subperiod high US interest rates coupled with a persistently appreciating Dollar are clearly the reason for dramatic nominal return differential in favor of the Dollar. In the second subperiod this pattern is reversed: The Dollar depreciated much more strongly than reflected by the interest rate differential. After these turbulent episodes the nominal return differential came back to a "normal" level slightly below 2 percent. In general we can, however, say that with the exception of the two relatively short lived episodes (Lira from 1992-95 and the US Dollar from 1985-87) there is clear evidence for a persistently lower nominal return on short term Swiss Franc assets.

Now let us consider the results obtained for the hypothesis of the equality of the unconditional means of the change in the log exchange rate and the interest rate differential in a VAR(1) framework. Table 4 contains the likelihood ratio statistics for the corresponding cross equation restriction, which follows a chi square distribution with one degree of freedom under the null of equality of means.

Table4: Likelihod Ratio Test of the Equality of the Mean of the log Exchange Rate Change and the Interest Rate Differential in a VAR(1) Model, Swiss Franc vis-à-vis 9 Currencies, Monthly Data 1980-98,

$$\Delta s_t = c_1 + a_{11}\Delta s_{t-1} + a_{12}(i_{t-1} - i^*_{t-1}) + \varepsilon_{1t}$$
$$(i_t - i^*_t) = c_2 + a_{21}\Delta s_{t-1} + a_{22}(i_{t-1} - i^*_{t-1}) + \varepsilon_{2t}$$
$$\textit{restriction}:$$
$$(1 - a_{22})c_1 + a_{12}c_2 = (1 - a_{11})c_2 + a_{21}c_1$$

Currency	*LR-Test*
BEF	3.968**
CAD	6.008**
DEM	5.746**
FFR	2.944*
ITL	3.748*
JAP	5.892**
NLG	4.806**
UKP	5.718**
USD	6.020**

*, ** and *** indicates significance at the 10, 5 and 1% level, respectively

In seven out of nine cases the cross equations restriction implied by the equality of the unconditional mean of the log exchange rate change and the interest rate differential can be rejected at the 5% significance level. For the French Franc and the Italian Lira the restriction is rejected at the 10% significance level. Therefore the results of our VAR framework strengthen the evidence provided by the AR(1) model for the return differentials. Indeed the more powerful bivariate test allows to reject the long run validity of UIP for individual currencies and not only for all currencies jointly as in the univariate framework.

We should stress that the violation of the long run validity holds only for the Swiss Franc according to our tests. The test of the joint hypothesis test in the univariate model for the return differential for any other currency, which is not reported in detail, cannot be rejected at any reasonable significance level. The same applies to the VAR cross equations restriction test for any pair of currencies excluding the Swiss Franc.

Now let us turn to the results concerning the UIP in the short run (forward premium puzzle) obtained with our data. In order to contrast these result with the long run findings reported above we run the simple test regression for all 45 possible currency pairs of our sample. The results are reported in table 5.

Table 5: Test Results for UIP (Unbiasdness of the Forward Premium),

Monthly Data 1980-98, 10 Currencies

$$\Delta s_t = \alpha + \beta(i_{t-1} - i^*_{t-1}) + u_t$$

OLS estimates of β, standard errors in parentheses

	CAD	*DEM*	*FFR*	*ITL*	*JYN*	*NLG*	*UKP*	*USD*	*SFR*
BEF	-1.48	0.53	0.91	-0.28	-0.30	0.46	-1.11	-0.91	0.60
	(1.01)	(0.19)	(0.25)	(0.38)	(0.76)	(0.19)	(0.56)	(0.80)	(0.37)
CAD		-1.31	-0.43	0.35	-3.55	-1.94	-4.65	-1.70	-2.23
		(0.91)	(079)	(0.67)	(1.10)	(0.96)	(1.08)	(0.55)	(0.91)
DEM			1.12	0.23	-1.74	-1.25	-1.10	-0.95	-1.39
			(0.14)	(0.29)	(1.10)	(0.30)	(0.75)	(0.81)	(0.79)
FFR				0.01	0.45	1.14	-0.68	-0.14	0.88
				(0.49)	(0.62)	(0.15)	(0.46)	(0.66)	(0.27)
ITL					0.23	0.26	-0.54	0.51	0.25
					(0.63)	(0.30)	(0.45)	(0.63)	(0.35)
JYN						-2.14	-4.59	-2.60	-3.49
						(1.26)	(1.54)	(0.97)	(1.00)
NLG							-1.42	-1.62	-1.49
							(0.85)	(0.84)	(0.77)
UKP								-2.64	-1.96
								(0.93)	(0.84)
USD									-1.68
									(0.77)

The pattern of the short run violations of UIP is clearly different from that found above for the long run: For the exchange rate of the Swiss Franc against the Belgian Franc, the French Franc and the Italian Lira there is no short run UIP failure. The slope coefficient estimate is positive and not statistically (at the 5 percent level) different from one. For the DM and the Dutch Guilder the respective coefficient estimate is negative but not statistically different from zero. The puzzle clearly shows up with the Canadian Dollar, the Yen, the Pound and the Dollar. The hypothesis that the slope coefficient for these currencies and the DM as well as Guilder are the same cannot be rejected at any reasonable significance level: The Wald Statistic is 0.636 with a marginal significance level of 0.986.

In general UIP works better between the continental European currencies than for the other currencies. There are several attempts to explain the short run failure of UIP (forward premium puzzle) which will not be discussed here further. For our purpose it is only important to stress that the Swiss Franc is by no means special with respect to the short run failure of UIP. It is in the long run failure of UIP, where the Swiss Franc is unique.

Next let us consider the results of the regressions of return differentials on lagged variables representing world-wide aggregate risk. For the results shown in Table 6 we cumulated the differentials over five month since such large risk events would have effects extending over several months. The results are robust to variation of the number of future periods (2 to 6 months) over which returns are cumulated. Of course, the cumulation of returns leads to autocorrelation which is accounted for by using the Newey-West autocorrelation and heteroskedasticity consistent coefficient covariance estimate. Moreover, it should be mentioned that the short run variation of the return differentials is dominated by exchange rate component which has a variance many times larger that that of the interest rate differential.

Table 6 shows a very clear pattern : The economic factors are hardly significant, but the geo-political dummy variables (with the exception of the Kuwait dummy) all have a negative and statistically and economically highly significant effect on future excess returns. Therefore, the “normal” up and downs of the world economy reflected by the economic factors have hardly a significant influence on the Swiss franc exchange rate and the return differentials. However, large and unexpected geo-political events lead to a very strong appreciation of the Swiss franc (an decrease in s) driving down the return differential. These findings are in line with our suggested peso problem interpretation of long run negative excess return of Swiss franc fixed income assets.

Table 6: Results of a Factor Model for Swiss Franc Money Market Excess Returns 1985-1998

$$\sum_{j=0}^{4}(i^{*}_{i,t-1+j}+\Delta s_{i,t+j}-i_{t-1+j})=\beta_{i,0}+\sum_{l=1}^{m}\beta_{i,l}z_{l,t-1}+\nu_{i,t}$$

OLS Estimates of the slope coefficients $\beta_{i,l}$ with t values in parentheses, which are based on heteroskedasticity and autocorrelation corrected covariance estimate (Newey- West with truncation lag 4). Excess returns are annualized and in percent.

$z_{l,t-1}$	*BEF*	*CAD*	*DEM*	*FFR*	*ITL*	*JAP*	*NLG*	*UKP*	*USD*
%IPIC	0.0028 (0.07)	0.1094 (0.83)	-0.0109 (-030)	0.0094 (0.28)	0.0793 (0.87)	0.0292 (0.28)	-0.0102 (-0.28)	0.2385 ((2.22)	0.0802 (0.64)
%POIL	0.0084 (1.08)	-0.0130 (-050)	0.0096 (1.18)	0.0142 (1.23)	-0.0088 (-0.68)	-0.0084 (-0.46)	0.0101 (1.30)	-0.0050 (-0.27)	-0.0026 -0.09)
%MSCIW	-0.0079 (-0.82)	0.0068 (0.26)	-0.0041 -0.40)	-0.0054 (-0.38)	0.0162 (1.04)	-0.0334 (-1.13)	-0.0039 (-040)	-0.0009 (-0.04)	0.0309 (0.15)
%GSCIW	0.0037 (0.30)	0.0363 (0.83)	0.0030 (0.24)	0.0057 (0.28)	0.0504 (2.09)	-0.0296 (-1.07)	0.0015 (0.12)	0.0260 (1.07)	0.0130 (0.33)
%CGBIW	0.0408 (1.83)	0.0878 (1.08)	0.0356 (1.61)	0.0470 (1.52)	0.0313 (0.66)	0.1670 (2.45)	0.0413 (1.90)	-0.0555 (-0.84)	0.0704 (0.93)
Chernenko	-7.0013 (-5.50)	-27.986 (-5.12)	-9.0943 (-6.21)	-5.5726 (-2.74)	-15.635 (-4.76)	-20.933 (-5.12)	-7.4365 (5.19)	5.3135 (1.16)	-29.042 (-5.71)
Tschernobyl	-11.162 (-6.33)	-29.207 (-4.49)	-8.6003 (-4.78)	-14.165 (-6.40)	-11.519 (-3.67)	-6.0211 (-1.45)	-8.4773 (-4.90)	-45.801 (-11.7)	-26.037 (-4.29)
Berlin wall	-2.0488 (-1.90)	-16.091 (3.94)	-7.3725 (-7.30)	-2.8363 (-2.45)	-5.4350 (-2.75)	-48.073 (-17.3)	-6.5614 (-6.72)	-9.7095 (-3.80)	-20.313 (-5.18)
Kuwait	-1.6951 (-0-40)	0.0617 (0.004)	-0.5914 (0.13)	-6.8269 (-0.98)	1.4160 (0.19)	23.790 (2.29)	-1.0283 (-1.03)	-0.0712 (-0.01)	0.2966 (0.02)

Finally we turn to historical evidence to determine if the return differential dates back longer than 30 years. Our hypothesis is that the pricing anomaly may be due to a peso effect, investors may be paying an insurance premium for holding Swiss Francs because of expectations of a rare, discrete shift in the return distribution (for instance caused by a war).[9] This suggests that historical data from the period before the World wars might be revealing to test the hypothesis: If the Swiss interest rate anomaly was a phenomenon of the post-war period only, this would support the peso hypothesis. We consider historical interest rate differentials between interest rates in Switzerland and seven major currencies countries for three periods.[10]

Table 7 presents results from systems of AR(1) equations for seven interest rate differentials and three periods[11]. The system estimates are analogous to those for the post-Bretton Woods period reported in table 2 with the only difference that return differentials can be directly measured by the interest rate differentials given fixed exchange rates. The coefficient of interest is the intercept γ which represents the mean return differential after controlling for the AR(1) process (coefficient δ).

Table 7: Historical Swiss Franc Interest Rate Differentials,
Yearly data for Gold Standard 1880-1914; Restored Gold Standard 1923-1936;
Bretton Woods System 1958-1969, Results from AR(1) Models:

$$i^*_{i,t-1} - i_{t-1} = \gamma_i(1-\delta_i) + \delta_i(i^*_{i,t-2} - i_{t-2}) + e_{i,t}$$

OLS-Estimates, Standard Errors in Italics

	Gold Standard		*Restored Gold Standard*		*Bretton Woods*	
	γ	δ	γ	δ	γ	δ
BEF	-0.78	0.71	1.29	0.52	2.20	0.30
	(0.27)	(0.13)	(0.61)	(0.27)	(0.42)	(0.27)
FFR	-1.19	0.76	0.33	0.46	3.16	0.68
	(0.25)	(0.11)	(0.55)	(0.22)	(1.23)	(0.40)

9 See for instance Evans (1996) for a survey of the implications of peso problems for asset pricing.

10 Yearly interest rate data from 1880-1992 was kindly provided by Michael Bordo. We use the short term (3 Month) interest rates.

11 The bivariate VAR test was not applied to this data set given the rather short sample sizes and the statistical significance of the individual AR(1) estimates.

DEM	-0.41	0.48	2.60	0.52	1.32	0.01
	(0.16)	(0.15)	(0.61)	(0.27)	(0.27)	(0.31)
JAP	-1.20	0.49	-0.51	0.45	2.90	0.82
	(0.21)	(0.16)	(0.34)	(0.23)	(2.22)	(0.20)
NLG	-0.73	0.64	0.18	0.03	1.02	0.56
	(0.26)	(0.15)	(0.17)	(0.24)	(0.46)	(0.27)
UKP	-0.84	0.66	1.02	0.14	3.46	0.49
	(0.27)	(0.13)	(0.44)	(0.21)	(0.63)	(0.33)
USD	1.19	0.27	1.34	0.03	2.73	0.70
	(0.21)	(0.17)	(0.18)	(0.43)	(1.25)	(0.33)

Note: Periods for the inter-war gold standard differ, since the suspension dates differ: Japan, Germany -1931 UK 1925-1931, US -1933, Belgium -1935, Switzerland, Netherlands and France -1936, Source: Bordo and Schwarz (1994)

The first two columns of table 6 show the results for the period of the gold standard. The intercept is negative for almost all currencies, implying that Swiss interest rates were between 0.4 an 1.2 percent higher than in other countries. There is only one exception to this rule, the United States had even higher interest rates than Switzerland pointing to the an Emerging market status of the United States at the time. All intercepts are individually (and jointly) significantly different from zero.[12] The next two columns of table 6 show that this situation changed after the first World war: Swiss interest rates are lower vis-à-vis all currencies with the exception of Japan. The differences are individually statistically significant vis-a-vis Belgium, Germany, the UK and the US and the largest differential is obtained for Germany, the country most affected by war and hyperinflation. The last two columns show that under Bretton Woods Switzerland had significantly lower interest rates than any other major country. All intercept terms are individually significant and the differentials are as large as 3.5 percent in the case of the UK pound. They are smallest with

[12] The limping gold standard in Belgium and France seem to have had little effect on interest rates given that differentials were not significantly different from those of currencies that were on a pure gold standard. The Wald test that the intercepts for the European currencies (BEL, FFR, DEN, NLG and UKP) are the same cannot be rejected at the 10 percent level.

respect to Germany and the Netherlands, a pattern that will prevail in the post-Bretton Woods period. The Wald test of the hypothesis that all return differentials are the same is rejected with a χ-square value of 15.76 and a marginal significance level of 0.015.

This evidence is consistent with the hypothesis that investors are paying an insurance premium on Swiss Franc assets for catastrophic events. However, the magnitude of the return differentials during interwar period and the Bretton Woods period have be to interpreted with care since they probably incorporate expectations of disruptions and devaluations.[13]

[13] By 1923/25 the core countries had restored the gold standard. Japan, Germany and UK abandoned the gold standard in 1931 at the onset of the great depression. The United States followed suite in 1933, Belgium abandoned in 1935, and Switzerland, Netherlands and France held on until 1936. Virtually all central banks broke the ”rules of the game” during this period by attempting to shield the domestic economy from foreign disturbances and offsetting attempting to sterilize changes in international reserves with changes in domestic credit. Thus, the exchange rate peg did not have the same credibility during the period of the restored gold standard as it had enjoyed during the period of the classical gold standard. A caveat applies to the Bretton Woods period given the possibility of revaluations under this system.

4. Conclusions

This paper has presented evidence of a long run anomaly in Swiss assets returns. The nominal returns of Swiss assets has been significantly lower than in other major currencies after correcting for exchange rate changes. This has been true on average for more than 25 years implying unexploited arbitrage gains in shortening Swiss Francs. This long run deviation from UIP is different from the anomaly generally identified in the literature that refers to the short run anomalous response of exchange rates to changes in the interest rate differential.

The interest rate puzzle cannot be explained with specific national features of Switzerland as the Swiss banking secrecy since it is present also in the returns of Euromarket Swiss Franc deposits located outside Switzerland.

We suggest that the most likely explanation for this puzzle is a peso problem: investors are willing to pay a premium for holding Swiss Frank assets expecting that in a severe crisis situation the Swiss Frank would appreciate. We find support for this hypothesis from two empirical findings: first, we show that the return differential is negatively affected in the short run by large unexpected geo-political events. Second the examination of historical data on interest rates differentials during the pre-war and inter-war period show that the abnormally low level of Swiss returns arises after the first world war only.. Before 1914 Switzerland had higher interest rates than most other countries under the gold standard.

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