

# Internet Appendix to “Currency Regimes and the Carry Trade”

– NOT FOR PUBLICATION –

## *A. Robustness Tests for Floating and Fixed Carry Returns*

### *A1. Distinguishing Regime from Volatility*

Given that we classify exchange rate regimes based on cross rate volatility, it could be that carry trade returns are dependent on volatility per se rather than on regimes classified by a given volatility threshold. To clearly distinguish between these two types of dependence, we condition the carry trade strategy on a range of volatility thresholds. We sort currency pairs into six groups based on a range of volatilities: 2%, 4%, 8%, 10% and 12%. A linear carry trade strategy is constructed within each volatility group. Note that the first two groups, i.e., currency pairs with volatilities below 2% and between 2% and 4%, correspond to the fixed regime and the remaining four groups correspond to the floating regime, as defined in the previous section.

Although the expected return to the carry trade increases with the volatility of underlying exchange rates, the risk-adjusted return measured by the Sharpe ratio does not exhibit the same monotonicity. Once a currency pair enters into the floating regime, i.e., above the 4% threshold, the Sharpe ratio does not increase with volatility both before and after transaction costs (Table [IA.1](#)). Therefore, our evidence rejects the hypothesis that risk-adjusted carry returns are dependent on volatility per se.

### *A2. Varying Volatility Threshold*

Our volatility-based regime classification is based upon two inputs: the volatility measure and the threshold. We verify that our results are robust to a range of volatility thresholds up to 10%. Figure [IA.1](#) graphs the Sharpe ratio of the fixed and floating carry trades, respectively, both before and after transaction costs, and also displays the 5th and the 95th percentiles. A threshold of a little higher than 6% is required to produce a significantly positive Sharpe ratio for the fixed carry trade before transaction costs, and one of 10% after transaction costs. However, classifying a currency pair as fixed when its volatility is 6%, let alone 10%, would be inconsistent with the observed de jure regime classification during our sample period. In contrast, varying the volatility threshold does not have a significant effect on the Sharpe ratio of the floating carry trade.

### *A3. Alternative Volatility-Based Regime Classifications*

We now verify the robustness of our results using alternative regime classifications. Table [IA.2](#) summarizes descriptive statistics of returns to the fixed and floating carry trades, respectively, using the methodology in [Shambaugh \(2004\)](#) which measures volatility as the

absolute difference between the highest and the lowest exchange rate over the past year (Panel A) and in Menkhoff, Sarno, Schmeling, and Schrimpf (2012) which measures volatility as the mean absolute daily return within each month (Panel B). In both cases, we apply the same 4% volatility threshold and find our results hold. The annualized floating carry returns using the Shambaugh (2004) and Menkhoff, Sarno, Schmeling, and Schrimpf (2012) methods are 5.86% and 8.86% respectively, whereas the fixed carry returns are effectively zero.

#### *A4. Alternative Method of Distinguishing the Time Series and Cross Section of Regime-Dependence*

In Section 4.6, we verified that the variation of carry trade returns is present in both the time series and the cross section of exchange rate regimes by examining the performance of the floating and fixed carry strategies in three subsample periods. Here, we briefly discussed an alternative approach to modelling the time dimension of currency regimes by classifying each month according to whether there are more fixed currency pairs than floating ones or vice versa.

The results are summarized in Table IA.3. Before and after transaction costs, both the excess return (9.99% and 6.57%) and the Sharpe ratio (0.53 and 0.35) of the floating carry trade remain positive even in those months where the fraction of fixed currency pairs is more than half of all currency pairs in the sample.

#### *A5. Extended Sample*

Table IA.4 presents the detailed results for the regime-dependence of carry returns in an extended sample with emerging market currencies.

#### *A6. Base Carry Trade*

In section 4.5, we discussed results whether our finding of regime-dependence holds for different base currencies. The detailed results are summarized in Table IA.5. We find that only the floating base carry trade delivers outsized returns while the fixed base carry trade is not profitable, regardless of whether the base currency is the U.S. dollar (Panel A), the GBP (Panel B) or the Deutsche mark (or Euro from 1999 onwards) (Panel C).

#### *A7. Exclusion of the Period of 1939 to 1958*

Restrictions on foreign exchange trading in London existed between the outbreak of war in Sept. 1939 and the reintroduction of sterling convertibility for non-residents in Dec. 1958. Our main results regarding the regime-dependence of carry returns (Table IA.6) are robust to the exclusion of this period from our sample.

## *B. Robustness Tests for the Relationship between Floating and Fixed Carry Returns and Regime Shifts*

### *B1. U.S. dollar as the Reference Currency*

In Section 5, we examine the relationship between floating and fixed carry strategies and regime shifts by decomposing the return of each strategy into contributions from its long and short legs using the pound sterling (GBP) as the reference currency. Here, we verify the robustness of our results using the US dollar (USD) as the reference currency. Results are detailed in Table [IA.7](#).

### *B2. The Fraction of Regime-Switching Currency Pairs*

In Section 5, we examine the relationship between floating and fixed carry strategies and regime shifts represented by dummy variables. Here, we verify the robustness of our results using the fraction of currency pairs in the fixed (floating) regime switching to floating (fixed) in each month. Results are detailed in Table [IA.8](#).

### *B3. Spot Returns after Transaction Costs*

In Section 5, we examine the relationship between the realized spot returns before transaction costs of the floating and fixed carry strategies and regime shifts. Here, we verify our main results in Section 5 using realized spot returns after transaction costs. The results are summarized in Table [IA.9](#).

### *B4. Alternative Regime Shift Indicators*

To further validate our results, we modify the regime shift indicator to exclude regime shifts triggered by only very small volatility changes that pass the threshold (e.g., volatility changes from 3.9% to 4.1%). Table [IA.10](#) summarizes the results for regressions using these modified regime change indicators. Volatility has to increase by at least 1% to qualify for a fixed-to-floating switch in Panel A and by at least 2% in Panel B. In both cases, the fixed-to-floating regime shock negatively impacts carry trade returns.

Since our sample of fixed-to-floating regime switches includes an extreme carry trade return of -44.9% in June to July 1931, we check our regression results excluding this outlier (Panel C). Again, carry trade returns remain negatively correlated with fixed-to-floating switches. Finally, to disentangle the confounding effects of fixed-to-floating and floating-to-fixed regime shifts, we exclude those months in which both regime shifts occur (Panel D). We find that fixed-to-floating regime shifts still have a statistically significant adverse impact on floating carry returns. Furthermore, the average decline in returns becomes greater (-175 basis points, after transaction costs).

### *B5. Exclusion of the Period of 1939 to 1958*

For the same reason explained in Section A7, we verify that our main results regarding the relationship between floating and fixed carry returns and regime shifts (Table IA.11) are robust to the exclusion of the period of 1939 to 1958 from our sample.

### *B6. Historical Events Associated with Floating Carry Strategy Losses at the Time of Currency Peg Collapses*

Table IA.12 exemplifies noteworthy flight-to-safety episodes in the history of international finance that are associated with dramatic losses to the floating carry strategy at the time of currency peg collapses. These events are documented by secondary sources such as Eichengreen (1996), Aldcroft and Oliver (1998), James (2012), and Reinhart and Rogoff (2011).

## *REFERENCES*

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**Table IA.1**  
**Carry Trade Performance Conditional on Exchange Rate Volatility**

Table IA.1 reports how the performance of the carry trade varies with ex ante exchange rate volatility. All currency pairs are sorted into 6 categories by the cross rate volatility measured at the beginning of each month. The first two categories, i.e., volatility lower than 2% ( $[0, 2]$ ) and volatility between 2% and 4% ( $[2, 4]$ ), comprise currency pairs in the fixed regime. The remaining categories comprise floating currency pairs. For each volatility category, we report the mean of log excess returns (EXRET, % per annum), carry components (CARRY, % per annum), and exchange rate returns (SPOT, % per annum), standard deviation (SD, % per annum) and skewness (SKEW) of log excess returns, and the Sharpe ratio (SR, annualized). Standard errors, obtained by bootstrapping under the assumption of independent and identically distributed (IID) returns, are shown in parentheses. The sample runs from Dec. 1919 to Dec. 2017.

$\sigma$	Volatility	T	Before Transaction Costs						After Transaction Costs					
			EXRET	CARRY	SPOT	SD	SKEW	SR	EXRET	CARRY	SPOT	SD	SKEW	SR
	[0, 2]	928	0.07 (0.80)	2.13 (0.31)	-2.06 (1.12)	6.98 (2.78)	-21.70 (6.12)	0.01 (0.19)	-0.82 (0.80)	1.53 (0.30)	-2.35 (1.06)	6.99 (2.79)	-21.72 (5.86)	-0.12 (0.10)
	[2, 4]	750	1.87 (1.03)	4.71 (0.39)	-2.84 (1.14)	8.12 (1.96)	-10.65 (3.38)	0.23 (0.20)	-0.47 (1.04)	3.47 (0.36)	-3.94 (1.27)	8.16 (1.98)	-10.90 (3.16)	-0.06 (0.13)
	[4, 6]	816	5.29 (1.02)	6.67 (0.39)	-1.38 (0.96)	8.33 (0.78)	0.19 (1.41)	0.63 (0.13)	2.99 (1.01)	5.42 (0.34)	-2.42 (0.95)	8.28 (0.77)	-0.20 (1.36)	0.36 (0.13)
	[6, 8]	672	6.57 (1.43)	7.84 (0.48)	-1.27 (0.73)	10.74 (1.06)	-1.78 (1.39)	0.61 (0.16)	3.44 (1.42)	6.48 (0.41)	-3.04 (1.40)	10.60 (1.07)	-2.04 (1.40)	0.32 (0.15)
	[8, 12]	632	8.11 (2.29)	8.44 (0.45)	-0.33 (2.04)	16.52 (1.63)	-2.01 (1.18)	0.49 (0.17)	4.43 (2.29)	7.00 (0.37)	-2.57 (2.28)	16.49 (1.65)	-2.16 (1.18)	0.27 (0.15)
	> 12	695	13.66 (3.33)	11.91 (0.61)	1.74 (2.10)	25.55 (1.79)	0.20 (0.73)	0.53 (0.13)	10.03 (3.33)	10.21 (0.55)	-0.18 (3.38)	25.52 (1.80)	0.10 (0.75)	0.39 (0.13)

Table IA.2

## Fixed and Floating Carry Returns Based on Alternative Classifications of Exchange Rate Regimes

Table IA.2 reports descriptive statistics for the performance of the fixed and floating carry trade strategies based on alternative classifications, i.e., [Shambaugh \(2004\)](#) which measures volatility as the absolute difference between the highest and lowest exchange rate over the past year (Panel A) and [Menkhoff, Sarno, Schmeling, and Schrimpf \(2012\)](#) which measures volatility as the mean absolute daily return within each month (Panel B). A currency pair is classified as in the fixed regime if its ex ante volatility is below 4% per annum and in the floating regime otherwise. For each regime, we report the mean of log excess returns (EXRET, % per annum), carry components (CARRY, % per annum), and exchange rate returns (SPOT, % per annum), standard deviation (SD, % per annum) and skewness (SKEW) of log excess returns, and the Sharpe ratio (SR, annualized). Standard errors, obtained by bootstrapping under the assumption of independent and identically distributed (IID) returns, are shown in parentheses. The sample runs from Dec. 1919 to Dec. 2017.

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		Before Transaction Costs						After Transaction Costs					
	T	EXRET	CARRY	SPOT	SD	SKEW	SR	EXRET	CARRY	SPOT	SD	SKEW	SR
Panel A: <a href="#">Shambaugh (2004)</a>													
Fixed	1110	0.87 (0.59)	2.81 (0.22)	-1.94 (0.72)	5.63 (1.60)	-15.92 (4.87)	0.15 (0.17)	-0.43 (0.59)	1.97 (0.21)	-2.40 (0.73)	5.67 (1.59)	-15.89 (4.57)	-0.08 (0.10)
Float	1009	8.17 (1.68)	8.44 (0.37)	-0.27 (1.71)	15.50 (1.31)	-0.42 (1.25)	0.53 (0.12)	5.86 (1.67)	6.93 (0.33)	-1.07 (1.69)	15.45 (1.35)	-0.82 (1.33)	0.38 (0.12)
Panel B: <a href="#">Menkhoff, Sarno, Schmeling, and Schrimpf (2012)</a>													
Fixed	1162	1.37 (0.65)	4.46 (0.23)	-3.09 (0.67)	6.32 (1.35)	-11.23 (3.83)	0.22 (0.15)	-0.50 (0.65)	3.46 (0.22)	-3.96 (0.79)	6.34 (1.34)	-11.19 (3.73)	-0.08 (0.10)
Float	742	11.58 (2.28)	9.54 (0.43)	2.04 (1.43)	17.95 (1.50)	0.87 (1.04)	0.64 (0.13)	8.86 (2.27)	8.14 (0.39)	0.72 (2.29)	17.85 (1.52)	0.66 (1.11)	0.50 (0.13)

Table IA.3

## Variation of Fixed and Floating Carry Returns with the Fraction of Fixed Currency Pairs

Table IA.3 reports descriptive statistics for the performance of the fixed and floating carry trade strategies for each of the two subsamples defined by whether the fraction of fixed currency pairs in a month is above 0.5 (Panel A) or below 0.5 (Panel B). A currency pair is classified as in the fixed regime if its ex ante volatility is below 4% per annum and in the floating regime otherwise. For each regime, we report the mean of log excess returns (EXRET, % per annum), carry components (CARRY, % per annum), and exchange rate returns (SPOT, % per annum), standard deviation (SD, % per annum) and skewness (SKEW) of log excess returns, and the Sharpe ratio (SR, annualized). Standard errors, obtained by bootstrapping under the assumption of independent and identically distributed (IID) returns, are shown in parentheses. The sample runs from Dec. 1919 to Dec. 2017.

		Before Transaction Costs						After Transaction Costs					
	T	EXRET	CARRY	SPOT	SD	SKEW	SR	EXRET	CARRY	SPOT	SD	SKEW	SR
<i>Panel A. Fraction of Fixed Currency Pairs &gt; 0.5</i>													
Fixed	474	0.55	3.46	-2.91	5.52	-8.92	0.10	-0.82	2.38	-3.20	5.57	-8.97	-0.15
		(0.87)	(0.31)	(1.06)	(1.28)	(1.65)	(0.22)	(0.88)	(0.29)	(1.06)	(1.29)	(1.62)	(0.15)
Float	228	9.99	9.67	0.32	18.97	-1.33	0.53	6.57	7.50	-0.93	18.89	-1.67	0.35
		(4.42)	(1.38)	(4.47)	(2.74)	(1.46)	(0.27)	(4.40)	(1.25)	(4.46)	(2.88)	(1.54)	(0.26)
<i>Panel B. Fraction of Fixed Currency Pairs &lt; 0.5</i>													
Fixed	654	0.84	2.90	-2.05	7.35	-18.59	0.11	-0.36	2.31	-2.67	7.36	-18.60	-0.05
		(0.99)	(0.39)	(1.25)	(3.00)	(7.22)	(0.27)	(0.99)	(0.38)	(1.32)	(3.00)	(6.85)	(0.17)
Float	702	9.18	8.34	0.84	14.12	1.86	0.65	7.28	7.14	0.14	14.13	1.82	0.52
		(1.87)	(0.27)	(1.24)	(1.31)	(1.13)	(0.12)	(1.87)	(0.23)	(1.86)	(1.31)	(1.13)	(0.12)

**Table IA.4**  
**Fixed and Floating Carry Returns When Emerging Market Currencies Are Included**

Table IA.4 reports descriptive statistics for the performance of the fixed and floating carry trade strategies when USD-based exchange rates of emerging market currencies are included (Panel A for only emerging market currencies and Panel B for currencies of both developed and emerging markets). For each panel, we report the mean of log excess returns (EXRET, % per annum), carry components (CARRY, % per annum), and exchange rate returns (SPOT, % per annum), standard deviation (SD, % per annum) and skewness (SKEW) of log excess returns, and the Sharpe ratio (SR, annualized). Standard errors, obtained by bootstrapping under the assumption of independent and identically distributed (IID) returns, are shown in parentheses. The sample runs from Oct. 1983 to Dec. 2013.

		Before Transaction Costs						After Transaction Costs					
	T	EXRET	CARRY	SPOT	SD	SKEW	SR	EXRET	CARRY	SPOT	SD	SKEW	SR
<i>Panel A. Emerging Markets Only</i>													
Fixed	359	0.49 (0.43)	1.99 (0.14)	-1.51 (0.24)	2.36 (0.29)	-2.57 (1.07)	0.21 (0.20)	0.00 (0.43)	1.75 (0.13)	-1.75 (0.44)	2.38 (0.30)	-2.78 (1.07)	0.00 (0.19)
Float	363	12.74 (2.85)	16.91 (1.40)	-4.16 (2.31)	15.66 (1.19)	1.46 (0.36)	0.81 (0.16)	10.37 (2.78)	15.13 (1.28)	-4.76 (2.27)	15.28 (1.16)	1.31 (0.39)	0.68 (0.17)
<i>Panel B: Both Developed and Emerging Markets</i>													
Fixed	363	1.13 (0.38)	2.51 (0.13)	-1.38 (0.18)	2.13 (0.22)	-1.86 (0.89)	0.53 (0.21)	0.47 (0.39)	2.21 (0.12)	-1.74 (0.39)	2.16 (0.23)	-2.05 (0.86)	0.22 (0.19)
Float	363	13.89 (2.36)	16.17 (1.24)	-2.28 (1.39)	12.99 (0.99)	1.66 (0.30)	1.07 (0.15)	11.49 (2.30)	14.43 (1.14)	-2.94 (1.85)	12.68 (0.97)	1.52 (0.33)	0.91 (0.16)



**Table IA.5**  
**Regime-Dependent Returns to the Base Carry Trade Strategies**

Table IA.5 reports descriptive statistics for the performance of the fixed and floating base carry trade strategies for three base currencies, USD (Panel A), GBP (Panel B), and DEM (EUR) (Panel C). A currency pair is classified as in the fixed regime if its ex ante volatility is below 4% per annum and in the floating regime otherwise. For each regime, we report the mean of log excess returns (EXRET, % per annum), carry components (CARRY, % per annum), and exchange rate returns (SPOT, % per annum), standard deviation (SD, % per annum) and skewness (SKEW) of log excess returns, and the Sharpe ratio (SR, annualized). Standard errors, obtained by bootstrapping under the assumption of independent and identically distributed (IID) returns, are shown in parentheses. The sample runs from Dec. 1919 to Dec. 2017.

		Before Transaction Costs						After Transaction Costs						
		T	EXRET	CARRY	SPOT	SD	SKEW	SR	EXRET	CARRY	SPOT	SD	SKEW	SR
<i>Panel A. Average Forward Discount against USD</i>														
6	Fixed	704	0.75	1.22	-0.47	3.58	-4.86	0.21	-0.42	0.40	-0.82	3.66	-4.90	-0.11
			(0.46)	(0.10)	(0.48)	(0.50)	(1.47)	(0.15)	(0.47)	(0.09)	(0.49)	(0.50)	(1.40)	(0.12)
	Float	912	4.51	2.30	2.21	10.80	0.12	0.42	3.55	1.64	1.91	10.82	0.10	0.33
			(1.23)	(0.11)	(1.23)	(0.58)	(0.60)	(0.12)	(1.23)	(0.10)	(1.23)	(0.58)	(0.60)	(0.11)
<i>Panel B. Average Forward Discount against GBP</i>														
	Fixed	597	-0.49	1.14	-1.62	5.03	-5.61	-0.10	-1.19	0.62	-1.81	5.11	-6.03	-0.23
			(0.72)	(0.11)	(0.76)	(0.92)	(2.71)	(0.14)	(0.73)	(0.11)	(0.77)	(0.97)	(2.74)	(0.12)
	Float	910	3.52	2.04	1.48	10.21	0.94	0.34	2.80	1.52	1.27	10.20	0.90	0.27
			(1.17)	(0.10)	(1.16)	(0.70)	(0.82)	(0.11)	(1.17)	(0.09)	(1.16)	(0.69)	(0.82)	(0.11)
<i>Panel C. Average Forward Discount against DEM (EUR)</i>														
	Fixed	758	0.63	1.44	-0.81	2.66	1.56	0.24	-0.68	0.71	-1.39	2.49	-1.98	-0.27
			(0.33)	(0.07)	(0.33)	(0.40)	(3.16)	(0.13)	(0.31)	(0.06)	(0.31)	(0.28)	(1.73)	(0.12)
	Float	738	5.82	3.10	2.72	13.50	3.77	0.43	4.57	2.19	2.38	13.52	3.71	0.34
			(1.73)	(0.12)	(1.72)	(1.69)	(1.62)	(0.11)	(1.73)	(0.10)	(1.72)	(1.69)	(1.64)	(0.11)

**Table IA.6**  
**Fixed and Floating Carry Returns When the Period of 1939 to 1958 Is Excluded**

Table IA.6 reports descriptive statistics for the performance of the fixed and floating carry trade strategies in periods excluding that of 1939 to 1958. A currency pair is classified as in a fixed regime if its ex ante volatility is below 4% per annum and in a floating regime otherwise. For each regime, we report the mean of log excess returns (EXRET, % per annum), carry components (CARRY, % per annum), and exchange rate returns (SPOT, % per annum), standard deviation (SD, % per annum) and skewness (SKEW) of log excess returns, and the Sharpe ratio (SR, annualized). Standard errors, obtained by bootstrapping under the assumption of independent and identically distributed (IID) returns, are shown in parentheses. The sample runs from December 1919 to December, 2017, excluding the period from Aug. 1939 to Dec. 1958.

		Before Transaction Costs						After Transaction Costs					
	T	EXRET	CARRY	SPOT	SD	SKEW	SR	EXRET	CARRY	SPOT	SD	SKEW	SR
Fixed	896	0.77 (0.81)	3.34 (0.33)	-2.57 (0.77)	7.02 (2.30)	-17.00 (5.35)	0.11 (0.20)	-0.49 (0.82)	2.61 (0.32)	-3.10 (1.08)	7.05 (2.30)	-16.93 (5.13)	-0.07 (0.12)
Float	851	9.81 (1.90)	8.95 (0.41)	0.87 (1.79)	15.95 (1.30)	0.46 (1.10)	0.62 (0.12)	7.67 (1.89)	7.56 (0.37)	0.11 (1.90)	15.93 (1.33)	0.29 (1.16)	0.48 (0.12)

**Table IA.7**  
**Floating and Fixed Carry Returns and Exchange Rate Regime Shifts Using**  
**USD as the Reference Currency**

Table [IA.7](#) reports the relationship between exchange rate regime shifts and carry trade returns. Using USD as the reference currency, we regress the monthly spot returns (basis points) for the floating and fixed carry trades on dummy variables indicating fixed-to-floating ( $D_{\text{Fixed} \rightarrow \text{Float}}$ ) and floating-to-fixed ( $D_{\text{Float} \rightarrow \text{Fixed}}$ ) regime changes in the investment universe, controlling for volatility risks of the U.S. equity market ( $\Delta \text{EQV}$ ) and of floating currency pairs in the foreign exchange market ( $\Delta \text{FXV}$ ). We then repeat this regression for monthly returns of each of the long (Long) and short (Short) legs of the floating and fixed carry trades. Volatility is measured as the exponentially weighted moving average of daily returns and volatility risk is measured as the one-month first difference of volatility. \*, \*\*, and \*\*\* indicates statistical significance at 10%, 5%, and 1% levels, respectively. The sample runs from Dec. 1919 to Dec. 2017.

**Table IA.7**  
**Floating and Fixed Carry Returns and Exchange Rate Regime Shifts Using**  
**USD as the Reference Currency (cont.)**

		Constant	$D_{\text{Fixed} \rightarrow \text{Float}}$	$D_{\text{Float} \rightarrow \text{Fixed}}$	$\Delta \text{FXV}$	$\Delta \text{EQV}$
(1)	Floating Carry	32	-116***	0		
	Long	-19	-36	15		
	Short	-51***	80***	15		
(2)	Fixed Carry	-3	-48**	-11		
	Long	3	-12	-17		
	Short	5	35**	-6		
(3)	Floating Carry	3			-9*	
	Long	-21*			1	
	Short	-24*			10**	
(4)	Fixed Carry	-19**			-2	
	Long	-7			-1	
	Short	11*			1	
(5)	Floating Carry	6				-3*
	Long	-22*				-3*
	Short	-27**				0
(6)	Fixed Carry	-18**				0
	Long	-7				0
	Short	11*				0
(7)	Floating Carry	28	-112***	1	-8	
	Long	-18	-37	14	1	
	Short	-46***	75**	14	9**	
(8)	Fixed Carry	-3	-48**	-11	0	
	Long	2	-12	-17	0	
	Short	5	35**	-6	0	
(9)	Floating Carry	33*	-114***	-3		-3*
	Long	-18	-35	12		-3*
	Short	-51***	80***	16		0
(10)	Fixed Carry	-3	-49**	-11		0
	Long	2	-13	-17		0
	Short	5	35**	-6		0

**Table IA.8**  
**Floating and Fixed Carry Returns and Exchange Rate Regime Shifts**  
**Represented by the Fraction of Fixed (Floating) Pairs Switching to Floating**  
**(Fixed)**

Table [IA.8](#) reports the relationship between exchange rate regime shifts and carry trade returns. Using GBP as the reference currency, we regress the monthly spot returns (basis points) for the floating and fixed carry trades on dummy variables indicating fixed-to-floating ( $P_{\text{Fixed} \rightarrow \text{Float}}$ ) and floating-to-fixed ( $P_{\text{Float} \rightarrow \text{Fixed}}$ ) regime changes in the investment universe, controlling for volatility risks of the U.S. equity market ( $\Delta \text{EQV}$ ) and of floating currency pairs in the foreign exchange market ( $\Delta \text{FXV}$ ). We then repeat this regression for monthly returns of each of the long (Long) and short (Short) legs of the floating and fixed carry trades. Volatility is measured as the exponentially weighted moving average of daily returns and volatility risk is measured as the one-month first difference of volatility. \*, \*\*, and \*\*\* indicates statistical significance at 10%, 5%, and 1% levels, respectively. The sample runs from Dec. 1919 to Dec. 2017.

**Table IA.8**  
**Floating and Fixed Carry Returns and Exchange Rate Regime Shifts**  
**Represented by the Fraction of Fixed (Floating) Pairs Switching to Floating**  
**(Fixed) (cont.)**

		Constant	$P_{\text{Fixed} \rightarrow \text{Float}}$	$P_{\text{Float} \rightarrow \text{Fixed}}$	$\Delta \text{FXV}$	$\Delta \text{EQV}$
(1)	Floating Carry	22	-185**	-41		
	Long	-16	93	-37		
	Short	-39**	278***	4		
(2)	Fixed Carry	-5	-138***	-28		
	Long	0	-38	-33		
	Short	5	101***	-5		
(3)	Floating Carry	3			-9*	
	Long	-21*			1	
	Short	-24*			10**	
(4)	Fixed Carry	-19**			-2	
	Long	-7			-1	
	Short	11*			1	
(5)	Floating Carry	6				-3*
	Long	-22*				-3*
	Short	-27**				0
(6)	Fixed Carry	-18**				0
	Long	-7				0
	Short	11*				0
(7)	Floating Carry	19	-177**	-42	-1	
	Long	-16	92	-37	0	
	Short	-35**	270***	5	1*	
(8)	Fixed Carry	-5	-137***	-28	-1	
	Long	0	-37	-33	0	
	Short	5	100***	-5	1	
(9)	Floating Carry	22	-179**	-42		-3*
	Long	-16	96	-38		-2
	Short	-38**	275***	4		1
(10)	Fixed Carry	-5	-139***	-28		-1
	Long	0	-39	-33		0
	Short	5	100***	-5		1

**Table IA.9**  
**The Relationship between Spot Returns after Transaction Costs of Floating and Fixed Carry Strategies and Regime Shifts.**

Table IA.9 reports results for the relationship between regime changes and monthly returns to the carry trade (basis points). We regress the realized spot returns after transaction costs for the floating and fixed carry trades respectively on variables indicating exchange rate regime changes in the investment universe. We model regime changes, both fixed to floating and vice versa, by dummy variables (Panel A) and the fraction of currency pairs experiencing regime shifts (Panel B). \*, \*\*, and \*\*\* indicates statistical significance at 10%, 5%, and 1% levels, respectively. The sample runs from Dec. 1919 to Dec. 2017.

	Float			Fixed		
	(1)	(2)	(3)	(1)	(2)	(3)
<i>Panel A. Dummy Variables for Regime Changes</i>						
CONSTANT	26	0	25	-9	-20**	-7
$D_{\text{Fixed} \rightarrow \text{Float}}$	-121***		-121***	-75***		-74***
$D_{\text{Float} \rightarrow \text{Fixed}}$		-5	2		-13	-6
<i>Panel B. Fraction of Currency Pairs Experiencing Regime Changes</i>						
CONSTANT	14	0	17	-12	-24***	-11
$P_{\text{Fixed} \rightarrow \text{Float}}$	-200***		-205***	-180***		-181***
$P_{\text{Float} \rightarrow \text{Fixed}}$		-25	-49		-10	-27

**Table IA.10**  
**The Relationship between Spot Returns after Transaction Costs of Floating and Fixed Carry Strategies and Regime Shifts Using Alternative Regime Shift Indicators**

Table IA.10 reports results for the relationship between regime changes and monthly returns to the carry trade (basis points) using modified regime change indicators. We regress the realized spot returns after transaction costs for the floating and fixed carry trades respectively on different definitions of the dummy variables indicating exchange rate regime changes in the investment universe. In Panel A volatility must increase by at least 1% to qualify for a regime change and in Panel B by at least 2%. In Panel C, we exclude an extreme carry return outlier for July to August, 1931. Finally, in Panel D, we exclude those months in which both fixed-to-floating and floating-to-fixed regime shifts occur. \*, \*\*, and \*\*\* indicates statistical significance at 10%, 5%, and 1% levels, respectively. The sample runs from Dec. 1919 to Dec. 2017.

	Float			Fixed		
	(1)	(2)	(3)	(1)	(2)	(3)
<i>Panel A. <math>\Delta\sigma_t^{i,j} &gt; 1</math> to Qualify for Fixed-Floating Switch</i>						
CONSTANT	22	0	24	-9	-20**	-5
$D_{\text{Fixed} \rightarrow \text{Float}}$	-202***		-202***	-140***		-140***
$D_{\text{Float} \rightarrow \text{Fixed}}$		-5	-7		-13	-13
<i>Panel B. <math>\Delta\sigma_t^{i,j} &gt; 2</math> to Qualify for Fixed-Floating Switch</i>						
CONSTANT	18	0	22	-9	-20**	-5
$D_{\text{Fixed} \rightarrow \text{Float}}$	-240***		-241***	-179***		-180***
$D_{\text{Float} \rightarrow \text{Fixed}}$		-5	-11		-13	-16
<i>Panel C. Excluding the Return from June 1931 to July 1931</i>						
CONSTANT	26**	8	28	-9	-20**	-8
$D_{\text{Fixed} \rightarrow \text{Float}}$	-100***		-100***	-75***		-75***
$D_{\text{Float} \rightarrow \text{Fixed}}$		-12	-7		-13	-6
<i>Panel D: Excluding the Months in Which Both Regime Shifts Occur</i>						
CONSTANT	26	0	36*	-9	-20***	-3
$D_{\text{Fixed} \rightarrow \text{Float}}$	-165***		-175***	-96**		-103***
$D_{\text{Float} \rightarrow \text{Fixed}}$		5	-31		-7	-25



**Table IA.11**  
**The Relationship between Spot Returns after Transaction Costs of Floating and Fixed Carry Strategies and Regime Shifts When the Period of 1939 to 1958 is Excluded**

Table IA.11 reports results for the relationship between regime changes and monthly returns to the carry trade (basis points) when the period 1939-1958 is excluded from the sample. We regress the realized spot returns after transaction costs for the floating and fixed carry trades respectively on variables indicating exchange rate regime changes in the investment universe. We model regime changes, both fixed to floating and vice versa, by dummy variables (Panel A) and the fraction of currency pairs experiencing regime shifts (Panel B). \*, \*\*, and \*\*\* indicates statistical significance at 10%, 5%, and 1% levels, respectively. The sample runs from December 1919 to December, 2017, excluding the period from Aug. 1939 to Dec. 1958.

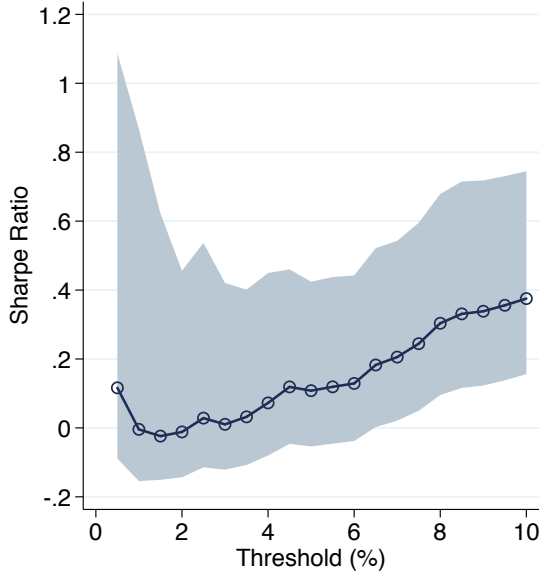
	Float			Fixed		
	(1)	(2)	(3)	(1)	(2)	(3)
<i>Panel A. Dummy Variables for Regime Changes</i>						
CONSTANT	30	3	30	-11	-21*	-8
$D_{\text{Fixed} \rightarrow \text{Float}}$	-122***		-122***	-60***		-59***
$D_{\text{Float} \rightarrow \text{Fixed}}$		-6	0		-15	-11
<i>Panel B. Fraction of Currency Pairs Experiencing Regime Changes</i>						
CONSTANT	17	1	17	-19	-25***	-10
$P_{\text{Fixed} \rightarrow \text{Float}}$	-197***		-200***	-170***		-173***
$P_{\text{Float} \rightarrow \text{Fixed}}$		-18	-43		-25	-46

Table IA.12

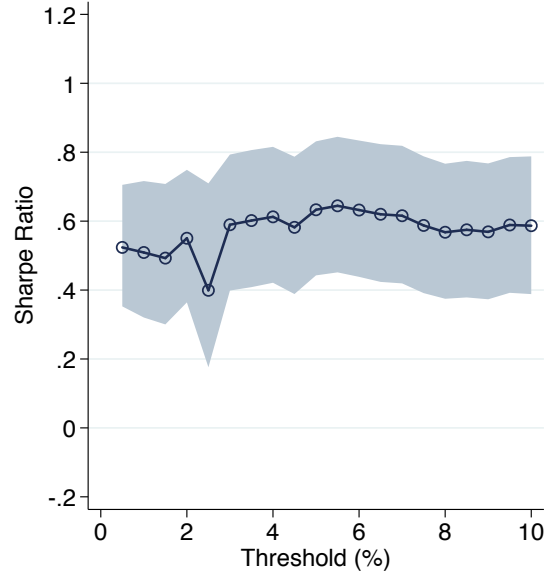
**Fixed-to-Floating Regime Changes Associated with the Largest Monthly Losses of the Floating Carry Trade**

Table IA.12 reports the 25 monthly losses to the floating carry trade associated with a fixed-to-floating regime shift. All but five of these 25 months coincide with events that shaped the history of the international financial system and of exchange rate regimes as documented in the secondary sources (Eichengreen (1996), Aldcroft and Oliver (1998), James (2012), and Reinhart and Rogoff (2011)).

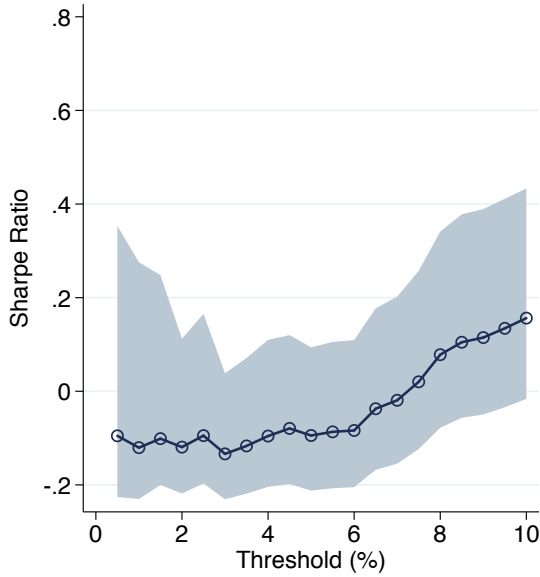
Month $t + 1$	Return (bp)	Example of collapsed pegs	Main Historical Event
1931m07	-4490	DEM/USD	The collapse of the gold standard system in the 1930s: July 1931 German Crisis
1977m07	-1415	ESP/FRF	————
1922m11	-1098	CHF/USD	Pressure on CHF, followed by a referendum on the introduction of a capital levy
1926m04	-988	ESP/DEM	Speculation on ESP in the hope of stabilization at the prewar gold parity
1926m05	-987	ESP/USD	Speculation on ESP in the hope of stabilization at the prewar gold parity
1939m09	-965	BEF/USD	The collapse of the managed floating regimes in Europe at the outbreak of WWII
1993m07	-957	BEF/DEM	The European Monetary System crisis of 1992-1993: the widening ERM band
1995m03	-901	PTE/DEM	Spain and Portugal exchange rate realignment
1987m10	-865	ESP/NLG	1987 Stock Market Crash spill-over to the foreign exchange markets
1935m03	-759	BEF/FRF	Belgium suspended the gold standard
1977m08	-739	FRF/USD	Sweden suspended agreement with Snake: DEM/SEK volatility increased from 7% to 21%
2008m09	-739	SEK/EUR	Nadir of the 2008 GFC (The bankruptcy of Lehman Brothers)
2007m08	-721	CHF/EUR	SNB and ECB responded to money market tension at the beginning of the GFC
1924m07	-720	CHF/USD	CHF and GBP started appreciating against USD before returning to the gold standard
1992m09	-628	GBP/DEM	The European Monetary System crisis of 1992-1993: Black Wednesday
1933m04	-607	USD/FRF	The collapse of the gold standard in the 1930s: the US April 1933 devaluation
1989m02	-599	ITL/CHF	————
2010m05	-566	CHF/EUR	The climax of the European debt crisis: Greece asked for financial support from IMF
1980m04	-531	NOK/SEK	————
2015m01	-519	CHF/EUR	SNB abandoned euro cap
1973m06	-515	DEM/NLG	Snake realignment: DEM revalued by 5.5%
1976m04	-496	ATS/NOK	————
2007m11	-494	CHF/EUR	SNB, ECB, FED introduced swap lines following dollar liquidity shortages among EU banks
1992m01	-470	ATS/BEF	————
1976m03	-457	FRF/DEM	France withdrew from Snake again following its first withdrawal in Jan 1974



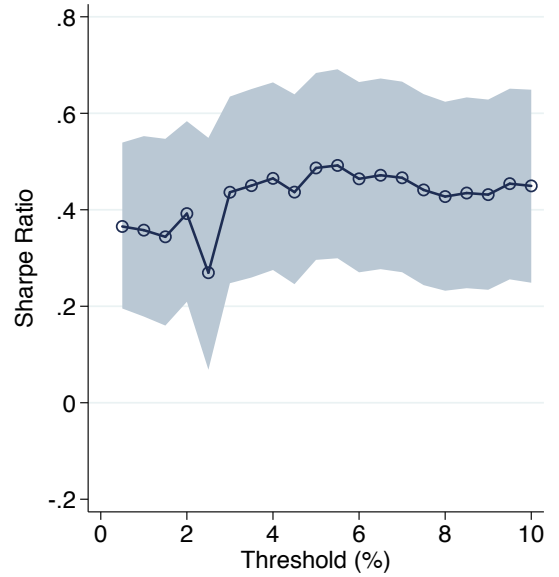
(a) Fixed regime, before transaction costs



(b) Floating regime, before transaction costs



(c) Fixed regime, after transaction costs



(d) Floating regime, after transaction costs

**Figure IA.1. Sharpe Ratios of Fixed and Floating Carry Trades across Different Volatility Thresholds.** Figure IA.1 summarizes the Sharpe ratios (including the 5th and the 95th percentiles), before and after transaction costs, corresponding to the fixed regime (graphs (a) and (b)) and floating regime (graphs (c) and (d)) respectively, using a range of volatility thresholds to classify exchange rate regimes over the period Dec. 1919 to Dec. 2017.