Sovereign Momentum Currency Returns

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Abstract

We study the relationship between cross-sectional sovereign credit risk and currency spot prices. We find that past sovereign credit risk, measured by sovereign credit default swap (CDS) spreads, predict future currency spot returns. In particular, we document a significant cross-sectional currency portfolio spread in excess of the risk-free rate of return (up to 9.4% p.a.) between the highest and the lowest quintile sovereign CDS spreads. These results suggest a new profitable currency return strategy based on sovereign credit risk.

Keywords: Sovereign Credit Risk, Sovereign Momentum Risk, Sovereign Credit Default Swap, Currency Return

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1 Introduction

There is a growing body of work in the financial economics literature that explores the impact of sovereign credit risk on the currency exchange rate. The literature has documented that actual sovereign defaults have been followed by severe currency depreciations and foreign currency rate uncertainty (Reinhart, 2002; Reinhart and Rogoff, 2009). In addition, since the inception of the sovereign CDS market, sovereign CDSs have been widely used to measure the likelihood of sovereign credit risk, and a number of recent papers have identified a direct link between sovereign CDS spreads and currency returns (Coudert and Mignon, 2013; Foroni et al., 2018; Calice and Zeng, 2021; Della Corte et al., 2021). It is important to note that studies on the currency-sovereign (credit) risk relation focus solely on the time-series implications for currency pricing. Indeed, to the best of our knowledge there is no study investigating the effects of *cross-sectional* sovereign credit risk on currency returns. Understanding the cross-sectional impact is crucial in asset pricing, as it tells us if an exposure to a certain factor or a source of risk is *systematically* important. One of the central doctrines of modern financial theory is that even if a source of risk affect asset prices, it would still be possible to hedge out idiosyncratic risk. Hence, our study provides an answer to whether sovereign credit risk is a significant systematic factor in explaining currency pricing.

Another research question that we tackle in this paper is the speed of information between the sovereign CDS market and the currency market. Information revelation in interlinked financial markets is usually not synchronous. Nonetheless, these two markets have a rather different market structure. The currency market is considered as one of the largest and most close to the ideal of perfect competition, due to the low search costs and frictions faced by market participants in trading their currencies assets. However, CDS contracts are traded over the counter by professional financial institutional investors. Hence, such differences in market structure and potentially asynchronous information revelation may lead to informational price spillovers between the two markets.

In this paper, we provide the first attempt to explore the cross-section of sovereign credit risk and we argue that the cross-sectional information of CDS spreads can have a persistent impact on currency returns. Our hypothesis builds on several grounds. Important academic studies have documented that sovereign credit risk is co-integrated at country level and is also substantially related to a common set of global market factors (Longstaff et al., 2011). In addition, since the currency rate reflects the comparative return of countries, according to

the traditional (currency) interest rate parity, sovereign credit risk, as measured by the cross-sectional sovereign CDS spreads, is also expected to affect currency returns.

Inspired by the long-documented profitable currency momentum strategy (Okunev and White, 2003; Burnside et al., 2011; Menkhoff et al., 2012; Asness et al., 2013), namely a long (short) trading strategy on a currency on the basis of past winner (loser) currency, we study currency return predictability by using sovereign CDS spreads. Empirically, in this paper, we investigate the existence of *sovereign credit risk momentum*, a significant cross-sectional spread on currency return between the past high and low sovereign credit risk, proxied by sovereign CDS spreads.

We include a large cross-sectional data of 48 countries with 32 currencies over the sample period from January 2007 to March 2021.[1] We begin by documenting strong empirical evidence consistent with the hypothesis that the sovereign momentum impacts on currency returns. Importantly, we show that this effect is significant and persistent. In particular, we investigate whether different formation periods of the past sovereign CDS levels (i.e. average sovereign CDS spread over prior 1 month to 12 months) can predict further currency returns in different holding periods (1-month to 12-month holding periods of currency return), and observe significant positive spreads when shorting the currency with past high sovereign CDS level (i.e. higher credit risk), while simultaneously taking a long position in the currency with low sovereign CDS level (i.e. lower credit risk).[2]

Additionally, we find that the sovereign momentum effect is strong and persistent over different formation periods of past sovereign CDS levels (i.e. average sovereign CDS spread over the prior 1 month to 12 months) and currency holding periods (1-month to 12-month holding periods of currency return), and observe a significant positive spread when shorting the currency with past high sovereign CDS level (i.e. higher risk of default), while simultaneously assuming a long position in the currency with low sovereign CDS level (i.e. lower risk of default). Furthermore, we show that the sovereign momentum currency return is not captured by a traditional set of key systematic factors and is robust to the inclusion of country-specific macroeconomic and financial market conditions.

We further analyze the sovereign momentum effect on currency returns under several al-

[1]The unequal number of countries and currencies stems from the inclusion of the Euro currency. We do not exclude the Euro currency in our study because it is one of the most traded currencies in the FX market. Nevertheless, our results are still robust when the Euro is excluded in our analysis. In addition, we start the sample period from 2007 because there was not sufficient cross-sectional spreads in sovereign CDSs before 2007. The number of individual sovereign CDS spreads is rather abundant and stable since then.

[2]See Section 2.1 for a rationale on the negative currency-sovereign relationship.

ternative scenarios. We find that that the sovereign momentum effect is more pronounced for free-floating currencies or currencies allowed to have larger bands of movement. In addition, the effect becomes increasingly more important when an abnormal CDS term structure is associated with economic downturns. On the other hand, we find much stronger effects of past (contemporaneous) sovereign credit risk on the currency returns of developing countries (developed countries). This implies that the momentum effect is consistent with the market efficiency hypothesis, where the momentum effect is stronger in less efficient financial markets.

Since our measure of sovereign momentum is based on the level of sovereign CDS, we investigate whether the sovereign momentum effect on currency return is driven by potential stale sovereign CDS prices. Interestingly, we find evidence that currency returns are still sensitive to changes in past sovereign CDS spreads. In general, short-term currency returns are more sensitive to recent sovereign CDS spreads changes, while long-term currency returns reflect both recent and past changes in sovereign CDS spreads. However, we also find some evidence that past sovereign credit risk has still significant explanatory power for currency returns with a short holding period. Hence, this finding rejects the hypothesis of stale sovereign CDS prices. It is worth-noting that our results extend prior studies (e.g., Coudert and Mignon, 2013; Calice and Zeng, 2021; Della Corte et al., 2021), focused on the recent or contemporaneous currency-sovereign credit risk relationship.

This paper contributes to several strands of the literature. As noted above, prior studies on the currency-sovereign (risk) relationship consider merely contemporaneous or short periods (e.g. 1 week or 1 month). The length of period may be chosen arbitrarily and investigations over longer periods are absent in empirical studies. Hence, we fill a gap in the literature by providing evidence on the impact and persistence of the sovereign CDS market on currency markets. As such, we are able to shed light on whether the impact of sovereign credit risk on currencies is a short- or long-lived phenomenon, which is a key element for the implementation of currency trading strategies. Our paper is more closely related to the strand of the empirical literature that examines the relationship between sovereign credit risk and foreign currency markets. Coudert and Mignon (2013), Foroni et al. (2018), and Della Corte et al. (2021) document that generally currencies tend to depreciate when sovereign credit risk increases, while Della Corte et al. (2021) further shows that global sovereign default risk is a significant factor driving currency depreciation. Global sovereign credit risk is echoed also in prior studies, which provide evidence of a strong systematic (common set of global market factors) component in sovereign CDS spreads(Longstaff et al., 2011; Augustin and Tedongap, 2016). Calice and Zeng

(2021) show that the sovereign CDS term structure cross-sectionally predict foreign currencies. Some recent research provides evidence that the currency momentum return for a number of countries share a strong asymmetric relation to sovereign credit risk (Huang and MacDonald, 2015; Karnaukh, 2016).

The rest of the paper is structured as follows. Section 2 provides the research design and our theoretical framework for the sovereign-currency relationship. Section 3 describes the data and summary statistics. Section 4 presents our empirical results. Section 5 concludes.

2 Research design

2.1 Currency return and sovereign credit risk

In this section, we start by explaining the relationship between currency return and sovereign credit risk. The derivation of the sovereign risk impact on currency return is in the same spirit of Coudert and Mignon (2013).

Consider a scenario of cross-country investment. An investor borrows \$1 (or short US Treasury bonds of equivalent notional amount) with the rate of i_t^{US} at time t and convert it to the foreign country with FX rate S_t. Throughout this paper, the definition of the FX spot rate is USD per foreign currency. Based on this definition, the increase (decrease) in the FX rate means the appreciation (depreciation) in the foreign currency. Then, the investor invests the $1/S_t$ in the foreign *defaultable* fixed income security with yield of i_t^{FX}.

Setting the timeline from t to $t+1$, in absence of default events, the investor will get $\frac{1}{S_t} \times e^{i_t^{FX}} \times S_{t+1}$ in foreign country investment, but he/she needs to return $\$1 \times e^{i_t^{US}}$ at $t+1$. Under the assumption of interest rate parity, then the overall payoff cancels off:

$$\frac{S_{t+1}}{S_t} \times e^{i_t^{FX}} - e^{i_t^{US}} = 0. \tag{1}$$

This implies that the logarithm of the FX spot rate in $t+1$ can be determined as $s_{t+1} = s_t + (i_t^{US} - i_t^{FX})$, where $s = \log(S)$.

The above equation is in line with the standard definition of interest rate parity, when a country's default is not taken into account. Next, we explicitly formalize the probability of default. The construction of credit event is similar to Coudert and Mignon (2013), but we focus on the impact on the payoff. We assume that default occurs only at time $t+1$ and that

both countries can default with default intensities of λ_{t+1}^{FX} and λ_{t+1}^{US}, with recovery rates of R_{t+1}^{FX} and R_{t+1}^{US}. If the foreign country defaults, then the foreign part becomes $\frac{1}{S_t} \times e^{R_{t+1}^{FX}\, i_t^{FX}} \times S_{t+1}$, implying that the payoff at $t+1$ in terms of logarithm is equal to:

$$s_{t+1} = s_t + (i_t^{US} - R_{t+1}^{FX}\, i_t^{FX}), \tag{2}$$

with default probability of $\lambda_{t+1}^{FX} \times (1 - \lambda_{t+1}^{US})$. To sum up, if two countries can default, then at $t+1$, there are four possibilities:

Scenario	Probability	Payoff at $t+1$
Default at foreign country	$\lambda_{t+1}^{FX} \times (1 - \lambda_{t+1}^{US})$	$s_t + (i_t^{US} - R_{t+1}^{FX}\, i_t^{FX})$
Default at US	$\lambda_{t+1}^{US} \times (1 - \lambda_{t+1}^{FX})$	$s_t + (R_{t+1}^{US}\, i_t^{US} - i_t^{FX})$
Both countries default	$\lambda_{t+1}^{FX} \times \lambda_{t+1}^{US}$	$s_t + (R_{t+1}^{US}\, i_t^{US} - R_{t+1}^{FX}\, i_t^{FX})$
No default	$(1 - \lambda_{t+1}^{FX}) \times (1 - \lambda_{t+1}^{US})$	$s_t + (i_t^{US} - i_t^{FX})$

Hence, the expected payoff after considering a country's default becomes:

$$\begin{aligned} E(s_{t+1}) = {} & [\lambda_{t+1}^{FX}\, (1 - \lambda_{t+1}^{US})]\, (i_t^{US} - R_{t+1}^{FX}\, i_t^{FX}) + [\lambda_{t+1}^{US}\, (1 - \lambda_{t+1}^{FX})]\, (R_{t+1}^{US}\, i_t^{US} - i_t^{FX}) \\ & + [\lambda_{t+1}^{FX}\, \lambda_{t+1}^{US}]\, (R_{t+1}^{US}\, i_{t+1}^{US} - R_{t+1}^{FX}\, i_t^{FX}) + [(1 - \lambda_{t+1}^{FX})\, (1 - \lambda_{t+1}^{US})]\, (i_t^{US} - i_t^{FX}) + s_t. \end{aligned} \tag{3}$$

To derive the currency log-return, we assume that the US bond is default free (i.e. $\lambda^{US} = 0$) and move the s_t to the left hand side of the equation. We can simply re-express the Equation (3) by:

$$\begin{aligned} r_{t+1} &= E(s_{t+1}) - s_t \\ &= \lambda_{t+1}^{FX}\, (i_t^{US} - R_{t+1}^{FX}\, i_t^{FX}) + (1 - \lambda_{t+1}^{FX})\, (i_t^{US} - i_t^{FX}) \\ &= \lambda_{t+1}^{FX}\, \tilde{R}_{t+1}\, (i_t^{US} - i_t^{FX}) + (1 - \lambda_{t+1}^{FX})\, (i_t^{US} - i_t^{FX}) \\ &= [1 - (1 - \tilde{R}_{t+1})\, \lambda_{t+1}^{FX}]\, (i_t^{US} - i_t^{FX}) \\ &= (1 - k_{t+1}^{FX})\, (i_t^{US} - i_t^{FX}), \end{aligned} \tag{4}$$

where k^{FX} is the sovereign CDS spread for the foreign country[3] and $\tilde{R}$ is the adjusted recovery rate by $(i^{US} - R^{FX} i^{FX})/(i^{US} - i^{FX})$. Equation (4) shows that the currency return (i.e. $s_{t+1} - s_t$) is negatively related to the sovereign CDS spread.

[3] CDS spreads, k, can be estimated by $[(1 - R) \times \lambda]$.

2.2 Sovereign CDS momentum currency return

Equation (4) illustrates how sovereign CDS spreads are related to currency returns. Although the FX market is in general regarded as one of the most efficient financial markets, CDS contracts, which are traded over the counter, are more illiquid and the market is far less efficient. Recent studies (Lee et al., 2021; Wang et al., 2021) have documented the CDS momentum effect (i.e. past CDSs affect current CDSs), revealing the importance of the past information on CDS prices. Hence, Equation (4) can be extended in the case of the sovereign CDS momentum effect:

$$r_{t+1} = (1 - k_{t+1}^{Proj}) \, (i_t^{US} - i_t^{FX}) \tag{5}$$

The term k_{t+1}^{Proj} is the projected sovereign CDS spread by past j information sets. We set $k_{t+1}^{Proj} = f(k_t, \ldots, k_{t-j-1})$ with some function f. Note that we do not specify the form of the past information, but one can empirically assume an equal weight of the past information. Hence, $k_{t+1}^{Proj} = (k_t + \cdots + k_{t-j-1}) \, / j$.

2.3 Main variables of interest

We have shown how the sovereign CDS spread is related to the currency return, specifically that a higher country sovereign CDS spread (i.e. higher sovereign credit risk) depreciates foreign country's currency, thereby leading to a decline of the currency log-return. Empirically, there exists a growing body of work that demonstrates that the currency return is indeed related to sovereign credit risk (e.g., Du and Schreger, 2016; Foroni et al., 2018; Calice and Zeng, 2021; Della Corte et al., 2021).

However, these prior studies focus mainly on the time-series dimension and/or contemporaneous effects of sovereign credit risk. For instance, Della Corte et al. (2021) study the return and contemporaneous change of the CDS spreads. Yet, these studies analyse, to a limited degree, the cross-sectional impact of sovereign credit risk (e.g., Calice and Zeng, 2021; Della Corte et al., 2021) or the predictability (e.g., Foroni et al., 2018) by focusing on the time-series and/or the change of (log) CDS spreads. However, the change of the CDS spread variable ignores the information about the nature of cross-country sovereign credit risk.

Different from prior studies, we are interested in the cross-sectional variation of sovereign credit risk on currency return. Hence, in our analysis, we use the *level* of the CDS spread. In addition, we also investigate the informational effectiveness of past values. In particular, we form two key variables and study their relationship:

(1) r_{it}^h: currency holding period return over the future h months, defined as $r_{it}^h = \frac{12}{h}[\log(S_{it+h}) - \log(S_{it})]$, where $S_{i,t}$ is the month-end FX rate (\$ per FX currency) at month t for country i. The multiplier $\frac{12}{h}$ is used for annualizing return. Moreover, the currency return in excess of risk-free rate is denoted as $exr_{it}^h = r_{it}^h - rf_t$, where we use 1-month US T-bill rate as risk-free rate throughout the paper.

In a similar vein, a related variable for currency return is the past currency return, calculated by $r_{it}^f = \frac{12}{f}[\log(S_{it}) - \log(S_{it-f})]$. Again, the multiplier $\frac{12}{f}$ is used for annualizing the past currency return. We use this variable to measure the currency momentum. Likewise, the corresponding excess return is the raw return subtracted by risk-free rate.

(2) $scds_{it}^f$: the averaged log-spread of the 5-year CDS contracts over the past f months. $scds_{it}^f = \frac{1}{f} \sum_{j=1}^{f} \log SCDS_{it-j}$, where $SCDS_{it}$ is the month-end sovereign CDS spreads at month t for country i. We use log-spread in order to minimize the non-linearity effect in sovereign CDS spreads, which is especially important in regression analyses.

An auxiliary variable of sovereign CDS is also constructed by the change in log-spreads, $\Delta scds_{it}^f = \log(SCDS_{it}) - \log(SCDS_{it-f})$. This variable is to capture the sovereign risk change over the formation period f.

We test how the past sovereign credit risk information affects the future currency return for different formation periods with f = 1, 3, 6, 9, and 12 (months) and holding periods with h = 1, 3, 6, 9, and 12 (months). As such, there are 25 combinations in total. We examine different combinations of formation and prediction periods to establish whether the relationship varies between short- and long-term horizons.

3 Data

We obtain the FX spot prices data from Thomson Reuters. Sovereign CDS spreads come from Markit. Our sample coverage is from January 2007 to March 2021. All the data are month-end. In our analysis, we focus on sovereign CDS with 5-year tenor, as the 5-year tenor is the most liquid contract.

We match the FX data with sovereign CDS data and the matched monthly observations include 48 country with 32 currencies globally. Each country has its own currency, with the exception of some European countries which are also members of the European Monetary Union (EMU) and share the Euro currency. Since we are interested in the cross-sectional effect on

currency return, we avoid the double-inclusion of currency returns in our analyses. To this end, we simply take the cross-sectional average of the sovereign CDS spreads for the EMU countries. Such treatment removes duplicate returns on Euro in our sample.

The remaining 32 country-currency are: Bulgaria, Bahrain, Brazil, Canada, China, HK, Czech, Denmark, EU, Iceland, Indonesia, Israel, Japan, Jordan, Kazakhstan, S. Korea, Malaysia, Nigeria, Norway, Poland, Qatar, Russia, S. Africa, Sri Lanka, Sweden, Taiwan, Thailand, Turkey, UAE, UK, Ukraine, and Vietnam. Additionally, the list of the Euro countries is: Austria, Belgium, Finland, Greece, Italy, Slovakia, Slovenia, Spain, Cyprus, Portugal, France, Lithuania, Germany, Ireland, Netherlands, Latvia, and Estonia.

Table 1 reports the summary statistics for the variables. The number of observations is 5212 for non-missing currency spot prices and sovereign CDS spreads. The sample average of the sovereign CDS spreads is around 185 bps, with the maximum of 17170 bps and minimum of just above 1 bps. Normally, the maximum value of the CDS spread does not exceed 10000 bps, but for annualized spread the CDS spread exceeds 10000 if the CDS market expects that default in sovereign bonds occurs in due time. The maximum value of sovereign CDS spreads that exceeds 10000 bps appeared in the European sovereign debt crisis in 2010–2011.

[Table 1 is about here.]

The bottom part plots the number of currencies included in the sample. The number of the currencies are stable, around 30, over the sample period. We also plot the number of the currencies by the level of economic development. We use the UN's Human Development Index (HDI) to determine each country's classification as a developed or emerging economy. We use the HDI value of 0.85 as a break point because it approximately bisects our sample of country-currencies equally. See Section 4.6 for more details regarding economic development data.

We also plot the number of pegged currencies over the sample period. The currency regime information is obtained from the IMF AREAER database. We quantify the number of currencies with hard or soft pegging rules. We observe that more currencies were pegged over the 2009–2013 period, possibly a consequence of the 2008–2009 global financial crisis. There are much fewer currencies that are pegged after 2015. See Section 4.5 for more details regarding currency regime data.

4 Empirical results

4.1 Currency portfolio sorts on past sovereign CDS

We first test the effect of the past cross-sectional sovereign CDS spreads on currency return at portfolio level. Each month, we sort the currencies based on the past level of sovereign credit risk, $scds_{it}^{f}$, into five portfolios. We then study the currency return difference between portfolios. The rationale behind the portfolio sorting is to determine whether the expected returns of an asset are related to a certain characteristic, in our case, past level of sovereign credit risk. This methodological approach is widely used in recent empirical studies because it relies on a basic building block of modern finance: a portfolio of assets, which produces an intuitive estimator of the relationship between asset returns and characteristics (Cattaneo et al., 2020); it has been recognized in the literature as a nonparametric alternative to imposing linearity on the relationship between returns and characteristics (Fama and French, 2008; Cochrane, 2011).

We expect a significant currency return difference between the highest and the lowest levels of sovereign credit risk, measured by the sovereign CDS spreads. Moreover, recall from our model of motivation, a negative currency-sovereign relationship indicates that the currency portfolio return with more severe sovereign credit risk, i.e. higher values of sovereign CDS spreads, is *lower* than that with lower sovereign credit risk. Additionally, if the momentum effects of the sovereign CDS on the currency exists, we expect the effect is still pronounced when performing portfolio sorting exercise on the basis of the past sovereign CDSs.

Next we briefly describe our portfolio sorting exercise. Each month, we sort the currencies into quintiles, with $p = 1$ ($p = 5$) indicating the lowest (highest) quintile of past sovereign CDSs. Table 2 reports the currency portfolio returns sorted on the past levels of sovereign CDS spreads. The left table shows the annualized currency portfolio return in excess of risk-free rate for 1-month holding period. Columns (1)–(5) reports the time-series average of the currency excess return for each portfolio, accordingly. In addition, since we consider different formation periods (i.e. by the averaged CDS spreads over the past months $f = 1$, 3, 6, 9, or 12 months), the results corresponding to formation periods are presented in Rows (1)–(5), accordingly. It shows that the 1-month holding excess return for the lowest sovereign credit risk is -0.018, but insignificant, while the excess return for the portfolio with the highest sovereign credit risk is -0.068, significantly at 1% level. This indicates that the currency return, in general, decreases as sovereign credit risk increases, which is consistent with our model prediction. The currency portfolio spread between the highest and lowest past 1-month sovereign CDS spread

is 0.05, significant at 1% level (see T2, [C6, R1]), implying the existence of sovereign credit risk momentum in currency returns.

It is also worth-noting that we find that the effect of sovereign credit risk on currency is asymmetric, as investing in countries of currencies with low sovereign credit risk does not seem to generate positive returns, while we observe a negative currency return for countries with high sovereign credit risk. This finding indicates that sovereign credit risk reflects downside risk in currency pricing (Lettau et al., 2014).

[Table 2 is about here.]

Our findings on the prior one month sovereign CDS to predict the currency return supports the effect of sovereign CDS momentum on currency return. We further test if longer formation periods of past CDSs can still predict the currency return. As reported in Rows (2)–(5), we consider the formation periods of 3, 6, 9, and 12 months, respectively. We document consistent results of statistically significant and negative currency excess returns for the portfolios with high sovereign CDSs. Moreover, we find evidence of strong persistence of currency portfolio spreads between the highest and lowest sovereign CDSs (see T2, [C6, R2–R5]). This confirms the importance of sovereign CDS spreads for all the formation periods on currency returns. This also suggests that cross-sectional sovereign risk information has a persistent impact on the currency market.

Our results so far show a statistically significant currency portfolio spread between the highest and the lowest past sovereign credit risk, measured by sovereign CDS spreads. The Low-Minus-High (LMH) spread ranges between 0.036 to 0.05 in terms of annualized currency return for 1-month holding period. We next investigate if the portfolio spread shows also persistence for longer holding periods. We repeat the portfolio sorting exercise on past sovereign CDS spreads for longer holding periods for $h = 3$, 6, 9, and 12 months. As presented in Columns (7)–(10), we find again positive LMH portfolio spreads for all the cases. As such, the sovereign-momentum effect on currency return is consistent and persistent.

Overall, the LMH portfolio spread ranges from 0.036 (when $h = 1, f = 6$) and 0.05 (when $h = 1, f = 1$). Our results show that the spreads are likely to drop for longer formation and /or holding periods. The highest spread appears for the shortest formation and holding periods, while the spread drops to 0.04 gradually for the longest formation and holding periods. This indicates that, in general, the sovereign-momentum effect, proxied by the average of the past sovereign CDS spreads, on currency return is of the strongest magnitude for short-term periods,

and the effect is less pronounced for longer periods. However, the drop in the magnitude of the impact is not strictly monotonic. Another interesting finding is that the sovereign-momentum effect is quantitatively more important when the formation and holding periods are close to each other. For example, the portfolio spread is larger for shorter formation and holding periods than for a longer formation but a shorter holding period. This implies that the magnitude of the sovereign-momentum effect is also related to matching the formation and holding periods.

The currency portfolio spread, reported in Table 2, represents the long-short strategy performance of being a long on low sovereign-risk currencies while shorting high sovereign risk currencies. However, note that such long-short strategy is not risk-free because there are other risks involved such as market liquidity (Banti and Phylaktis, 2015) and limit to arbitrage (Shleifer and Vishny, 1997; Taylor, 1989; Akram et al., 2008). Hence, to account for the unobserved opportunity costs for implementing and trading the currency strategy relating to sovereign momentum, we further test the currency portfolio excess spread, defined as the currency portfolio spread subtracted by the risk-free rate.

As shown in Table 3, we find that the currency portfolio excess spreads are still statistically significant at 5% level for all formation and holding periods, after deducting the risk-free rate return. The statistical significance is slightly reduced for the short-holding and long-formation cases. Therefore, the short-holding periods are noisier and hence the sovereign momentum on currency return is less pronounced.

[Table 3 is about here.]

We conclude this section by presenting the time-series plot of the sovereign-momentum currency return. Figure 1 plots the cumulative return for the currency portfolio spread for 1-month holding period. The upper sub-figure plots the portfolio spread ($r^{h,f}_{1-5}$) while the lower sub-figure shows the portfolio excess spread ($exr^{h,f}_{1-5}$). We can see a pretty steady upward trend in cumulative currency return, confirming our previous argument that the sovereign-momentum effect is persistent and consistent in currency returns.

[Figure 1 is about here.]

4.2 Risk factors in sovereign-momentum currency return

Next we explore the information content of the sovereign-momentum currency return. In particular, we study the sovereign-momentum currency portfolios in relation to other known system-

atic factors. Here, we consider the systematic factors from equity, CDS and currency markets.

For equity systematic factors, we consider the most popular Fama-French 3 factors - equity market, small-minus-big and high-minus-low - and Carhart momentum factor models. We use the cross-sectional average of the 1-month CDS log-return as the CDS market factor; likewise, the cross-sectional average of the 1-month currency return as the currency market factor. Prior studies have documented that currency return is strongly related to its past return (Menkhoff et al., 2012; Asness et al., 2013). In our setting, we include the currency momentum, defined as the 1-month holding return difference between the past 12-month winner (i.e. top quintile group) and loser (i.e. bottom quintile group) currencies.[4]

Since the systematic factors are expressed on a monthly basis, we use the 1-month holding currency portfolio as our main variable of interest:

$$\begin{aligned} exr^{h,f}_{LMH,t} = \alpha + \beta_1\, MKT\_EQ_t + \beta_2\, SMB\_EQ_t + \beta_3\, HML\_EQ_t + \beta_4\, MOM\_EQ_t \\ + \beta_5\, MKT\_CDS_t + \beta_6\, MKT\_CCY_t + \beta_7\, MOM\_CCY_t + \varepsilon_t \end{aligned} \tag{6}$$

where $exr^{h,f}_{LMH,t}$ is the LMH currency portfolio return in excess of the risk-free return; MKT_EQ, SMB_EQ, HML_EQ, and MOM_EQ are equity systematic factors; MKT_CDS is the CDS systematic factor; and MKT_CCY and MOM_CCY are currency systematic factors. Note that we focus on 1-month holding period and the LMH is the difference between the top and bottom quintile portfolios. Hence, we set $exr^{h,f}_{LMH}$ as $exr^{h=1,f}_{1-5}$ with different formation periods.

Equation (6) enables us to explore how the sovereign-momentum effect on currency return is related to other systematic factors. More importantly, a statistically significant α indicates that the sovereign momentum is risk premia priced in currency returns that cannot be captured by these systematic factors.

Table 4 reports the time-series regression results for the LMH currency portfolio excess spread on the systematic factors. Columns (1)–(4) report the results for the 1-month formation period ($exr^{h=1,f=1}_{1-5}$), with Columns (1)–(3) reporting the risk factors for individual financial markets and Column (4) for the complete regression specification.

[Table 4 is about here.]

[4]The monthly equity systematic factors are obtained on Kenneth French website: https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. We are grateful to the author to make the data publicly available. Note that the original factors are provided for developed and developing markets separately. Thus, we take the average of the developed and developing market factors as the global equity factors. The CDS and currency systematic factors are constructed from our sample.

We find that the sovereign-momentum currency return is closely related to the currency systematic factors. The portfolio excess spread is positively related to MKT_CCY and MOM_CCY, indicating that the spread increases in cases of higher currency return as well as larger return difference between winner and loser currencies. On the other hand, the LMH portfolio excess spread is negatively correlated to the equity market and future equity returns. This means that the currency spread on sovereign credit risk is likely larger when the equity market is bearish. Finally, we find a positive link between the sovereign-moment currency return and the sovereign CDS market, although the statistical significance is marginal in the complete regression model. More importantly, we find α is statistically positive for all settings, after controlling for systematic factors from equity, CDS, and currency markets. This suggests that the sovereign-momentum effect in the currency market cannot be fully explained by the risk premia identified in prior studies.[5] We further test the currency portfolio excess spread for different formation periods. A shown in Columns (5)–(8), the linkage between the excess spread and the systematic factors remains largely of the same magnitude, but, again, we document a strong positive α?s for all other cases.

4.3 Crisis, CDS term structure, and sovereign momentum

The risk factor analyses discussed above highlight that the sovereign momentum effect on currency return is not captured by well-known systematic factors. Next, we investigate the behavior of the sovereign-momentum currency return. Particularly, we are interested in the influence of abnormal events. Specifically, we study two types of events - crisis and abnormal CDS term structure. Our sample covers three global crises - the global financial crisis (2007–2008), the European sovereign debt crisis (January 2009–June 2012), and the COVID-19 pandemic (February 2020–2021). We aim to study whether the currency portfolio spread caused by the sovereign momentum is time-varying in crisis times.

Additionally, we are interested to examine the impact of the sovereign CDS term structure. Since CDS contracts on the same underlying can have different maturities, studies provide evidence that the term structure of the CDS spread corresponding to times to maturity provides useful information regarding the components of sovereign credit risk. Normally, longer-term

[5]In our main analysis on risk factors, we do not include systematic factors from bond market. In an unreported results, we further include the TERM - the difference between the US 3-month and 10-year T-bill yields - and TED spread as proxies for bond systematic factors. We find our main conclusion is not changed but the coefficients for the TERM and TED are insignificant. These factors stand more for US bond conditions and are possibly weak proxies for global bond factors. In addition, following the classical Interest Rate Parity, the currency return is also expectedly related to country's interest rate. We present the main results in Section 4.7, where sovereign-momentum currency returns are studied at country level.

maturities CDS spreads tend to be higher. Such upward-sloping CDS term structure implies that a country's sovereign credit risk is driven by the component of global sovereign credit risk, as documented by Longstaff et al. (2011) who show that sovereign CDS spreads have a strong co-movement with their peer CDSs. However, when the CDSs exhibit a downward-sloping term structure, the CDS spreads embodies relatively higher local sovereign credit risk (Augustin, 2018). Calice and Zeng (2021) also document that the CDS slope is positively related to currency returns.

Against this background and inspired by this strand of the literature, we investigate how the sovereign CDS term structure affects the sovereign-momentum currency return. In addition, we investigate the curvature of the CDS term structure. Normally, CDS spreads increase with a marginally decreasing rate (or concave curvature) with time to maturity. Hence, we study the relatively rare cases of convex CDS curves. Interestingly, to the best of our knowledge, there is no study on the curvature of the sovereign CDS term structure. Hence, our study is the first of its type to shed light on the CDS term structure.

Following prior studies (Augustin, 2018; Calice and Zeng, 2021), we also use 1-year and 10-year CDS contracts to construct the CDS term structure. Specially, we identify a negative slope if the 1-year CDS spread is larger than the 10-year value. Likewise, the term structure is convex if the average of 1-year and 10-year spreads is larger than 5-year spread. Obviously, since we investigate the currency return driven by the sovereign credit risk momentum at portfolio level, the CDS spreads used to determine curve slopes and curvatures are the cross-sectional sample average for each month.

Methodologically, we expand Equation (6) with dummy variables:

$$exr^{h,f}_{LMH,t} = \alpha + \gamma\ D_t + \boldsymbol{\beta}\ Controls_t + \varepsilon_t \tag{7}$$

where D is the dummy variable of interest, which captures the above-mentioned crisis periods and the abnormal CDS term structure events, and $Controls$ is a vector of systematic factors in Equation (6), used as control variables. In addition, we choose the currency portfolio with the shortest formation and holding periods (i.e. $h = 1$ and $f = 1$) as main dependent variables of interest. Namely, we set $exr^{h,f}_{LMH}$ as $exr^{h=1,f=1}_{1-5}$.

Panel A of Table 5 reports the regression results for the crisis periods. Overall, we find that the currency portfolio spread is slightly larger than in the normal period, but the increment is not statistically significant. When we breakdown our sample into different crisis periods, we

find a statistically significant increase in the portfolio spread only over the COVID-19 period. This indicates that the sovereign credit risk associated with the global financial crisis and the European sovereign debt crisis did not impose *additional* effects on currency returns caused by the sovereign momentum. Although the global financial crisis has had a devastating economic impact, the most critical shocks occurred mainly in the US financial system. Likewise, the European sovereign debt crisis was only country-specific to the European region. Hence, the overall sovereign credit risk did not increase during these crises. On the contrary, the COVID-19 pandemic has posed so far a tremendous burden on governments public debt[6]; hence, we observe a statistically significant increment in the currency spread caused by the sovereign momentum during the COVID-19 crisis. The spread in excess of risk-free return is larger by 11.4%, comparing the spread with other times.

[Table 5 is about here.]

Panel B reports the results for the CDS term structure. Although a negative slope and a convex CDS curve resemble a shock to country's local sovereign credit risk, we do not find statistical significance for the dummy variables. A possible explanation is that the abnormal CDS term structure may also reflect market participants preference in the sovereign CDS market. Hence, there is no additional sovereign credit risk effect on currency return caused by the abnormal CDS term structure.

Notably, the α's in Panels A and B are all statistically significant at 10% level, suggesting that the sovereign momentum effect on currency return is prevalent and not driven by market anomalies.

We further explore the abnormal CDS term structure. As noted earlier, the abnormal term structure may embody not only local sovereign credit risk but also market participants preferences. To single out the abnormal term structure driven by local sovereign credit risk, we employ the occurrences of the convex CDS curve or negative CDS slope only during crisis periods. Such occurrences are less likely to reflect investors risk attitudes but are instead inherently attributable to fundamental economic factors. Methodologically, we interact the dummies of the CDS term structure with those of the crisis periods. As can been clearly seen in Panel C, the abnormal CDS term structure that is driven by the crisis has a larger sovereign-momentum effect on currency return than in other periods (Column (1)). Although those

[6]See the account "Global Debt Monitor COVID Drives Debt Surge–Stabilization Ahead?" (published on 17 February 2021) by Institution of International Finance, https://www.iif.com/Research/Capital-Flows-and-Debt/Global-Debt-Monitor.

events combined with crisis and the abnormal term structure are relatively infrequent, e.g., only 7 occurrences over the 170 observations (months), the additional effect is pretty large and cannot be neglected. Additionally, when we consider different crisis periods or types of term structure anomalies, the increment is statistically significant (Columns (2)–(5)). This means that the sovereign-momentum effect is indeed more pronounced in presence of a crisis-driven abnormal CDS term structure.[7] Again, all the α's in Panel C are still statistically significant, indicating that the sovereign-momentum effect is an important determinant of currency returns.

4.4 Sovereign momentum and currency momentum

The portfolio-sorting results confirm the existence of the sovereign CDS momentum on currency return. We further investigate the portfolio spread of the sovereign CDS momentum in conjunction with the currency momentum. Prior studies have documented that the currency return is related to its past return (Menkhoff et al., 2012; Asness et al., 2013). Specifically, Menkhoff et al. (2012) find prevalent and significant cross-sectional spread in currency return between past winner and loser currencies. Hence, we repeat the portfolio sorting exercise on past sovereign credit risk, conditional on different levels of past currency returns as well. Such double-sorting portfolio exercises sheds light on how the portfolio spread respond to momentum effects. Each month, we sort the currencies into six portfolios, based on three sovereign risk momentum groups (Low, Medium, and High in $scds_{it}^{f}$) and two currency momentum groups (Loser and Winner during the corresponding formation period). Note that we reduce the number of sorts on $scds_{it}^{f}$ from 5 to 3, because of the insufficient number of currencies to form such large groups in double-sorting exercises.

Table 6 reports the results for the double-sort portfolio tests. Similarly, the LMH portfolio [excess] spread is given in Columns (1)–(5) [Columns (6)–(10)]. The top panel reports the sovereign momentum results conditional on past loser; the bottom panel reports the sovereign momentum results conditional on past winner. Overall, we find statistical LMH cross-sectional portfolio (excess) spreads in different currency momentums. Thus, this finding confirms that sovereign CDS momentum is not driven by certain contingent currency momentum conditions.

[Table 6 is about here.]

[7] We do not find any occurrence of abnormal term structure during the COVID-19 period; therefore, there is no result for $ABNTERM \times COVID$ case. In addition, we are interested in crisis-driven term structure events. As such, we include only the interactive term of the dummy variables, for comparison with the currency portfolio spread in normal times. In unreported estimation results, we also run our baseline regressions with individual dummies and the dummy interaction; our conclusion is not altered.

Interestingly, we find that the cross-sectional spread in the sovereign CDS momentum is larger in the case of past loser than in the case of past winner. The cross-sectional portfolio spread is around 5%–10% at the upper panel while 2%–5% at the bottom panel. Therefore, this is consistent with our previous finding that LMH spread is more sensitive to negative shocks. Hence, we can conclude that underperformed currencies are more sensitive to sovereign credit risk.

4.5 Sovereign momentum and currency regimes

In today's globalized markets and international trade, the prices of goods and services of a domestic country are typically related to those of other foreign countries, and are sensitive to currency exchange rates. To maintain the advantage of global market competition, it is common that domestic governments do not structurally allow their currency rates to be completely free floating; instead, governments may directly intervene in the FX market to influence currency rates via monetary policy at times of high volatility of the currency exchange rate. The strength of the intervention (currency regimes) varies from the strongest fixed currency arrangement (i.e. its domestic currency rate is anchored to another currency) to floating (i.e. the currency price is largely determined by market forces with minimal intervention). Interestingly, even for free-floating regimes, governments may still operate in the FX market, as long as the intervention is aimed only at smoothing out unusual fluctuations in the exchange rates, rather than at targeting the value of the exchange rate (International Monetary Fund, 2020). Of course, the currency regime can shift from time to time, e.g., from pegged currency regime to unpegged, or vice versa, depending on the government's economic policy goals.

In the classical macroeconomic paradigm, the government's choice on a certain currency regime is determined relying on actual information on the nature of economic shocks to currency markets: if the shocks are nominal, then regimes to fixed exchange rates are preferred; on the other hand, if the shocks are real, then floating rates are preferable, because lower price restrictions can moderate the real impact (Hausmann et al., 2001). It is important to point out that although the choice of a currency regime in practice may depend on other factors as well (Meissner and Oomes, 2009), the final choice may not align with conventional wisdom (Calvo and Reinhart, 2002).

Although the scope of this paper is not about the choice of currency regimes, studies have suggested that currency regime potentially affects the implementation of currency strategies. Empirically, if the currency is not pegged or is allowed to move freely within a larger band,

it would be easier to implement currency trading strategies. For instance, Accominotti et al. (2019) document an outsized carry trade return (i.e. a strategy of being long on a currency with high interest rate while shorting the currency with a low interest rate) exclusively under floating currency regimes; similarly, Menkhoff et al. (2012) find that the currency momentum return is higher for floating currencies.

Building on the insights of this literature described above, we also test the sovereign-momentum currency return for unpegged currencies. The currency regime information is obtained from the IMF AREAER database[8]. We match the annual information on currency regimes for each country to our sample. Note that at the time of data collection, only the currency regime information until 2019 is available. Therefore, we assume that the currency regimes in 2020-2021 remain unchanged in 2019. Note that for each month, we use currencies that are unpegged[9] in each particular year. We repeat our main currency portfolio sorting exercise on past sovereign CDS spreads to estimate the sovereign momentum effect on portfolio spreads.

Table 7 reports the sovereign momentum currency return results for the unpegged currencies. The structure of the table is similar to that of Tables 2 and 3, where we present the main results for portfolio spreads (LMH portfolios sorting on sovereign CDSs) and portfolio excess spreads. Consistent with our main results, we further confirm positive and significant currency portfolio (excess) spreads constructed by the sovereign momentum. We also find that the sovereign momentum currency return is slightly higher when we use only unpegged currencies (see, e.g., Table 7 and 3 for comparison between excess spreads). Importantly, our finding is comparable to prior studies (Menkhoff et al., 2012; Accominotti et al., 2019) that emphasize that currency strategies are more effective among unpegged currencies.

[Table 7 is about here.]

4.6 Sovereign momentum and economic development

We now investigate the effectiveness of cross-sectional sovereign credit risk on developed and emerging market countries. Several studies have long argued and documented that the level of economic development of a country is one of the most influential factors that dictates the

[8]IMF AREAER: https://www.elibrary-areaer.imf.org/Pages/Home.aspx.

[9]The IMF classifies the currency regimes into several categories. The unpegged currencies used in the analysis are under the categories of (1) managed floating and (2) independently floating, before 2007, and (1) floating and (2) free floating, after 2008.

pattern of currency performance (Bansal and Dahlquist, 2000; Pojarliev, 2005). Since currency and sovereign CDS markets are typically larger and more liquid among developed economies, we expect the momentum effect to be weaker in developed economies.

We use the Human Development Index (HDI) to proxy for the level of economic development of a country. Note that at the time of data collection, the latest HDI values are available as of 2019. Moreover, we assume the HDI values be constant throughout the sample period, as the HDI is rather stable for individual economies HDI values over time. Also, since there are not conventional criteria to classify a country as a developed or emerging economy, we use 0.85, the median of the HDI values in our sample, so that we can split our sample evenly into developed economies (HDI more than 0.85) and emerging economies (HDI less than 0.85). In addition, we treat the Euro as a developed economies currency since the EU constituents are mostly developed economies. The complete list of developed economies is: Bahrain, Canada, HK, Czech, Denmark, EU, Iceland, Israel, Japan, S. Korea, Norway, Poland, Sweden, Taiwan, UAE, and UK. We rerun the currency portfolio sorting exercise on past sovereign CDS spreads. Note that, since we are left with a lower number of currencies, we sort the currencies into 3 portfolios.

Overall, we find weak evidence of a sovereign momentum effect in developed economies. However, we document a much stronger effect of past sovereign credit risk on currency return for the group of emerging economies. This result indicates that the magnitude of the sovereign momentum is consistent with market efficiency. The detailed results for developed and developing countries are shown in Table 8.

[Table 8 is about here.]

4.7 Control for macroeconomic and financial market conditions

Our previous results confirm the sovereign-momentum currency return at portfolio level. We further investigate if the sovereign momentum is robust to a set of macroeconomic and financial market conditions. To verify the effect, we turn to a panel regression analysis as the macroeconomic and financial market variables are country-specific. Recall from our theoretical motivation, we posit a negative currency-sovereign relationship. In addition, if the market is not perfectly efficient, the currency-sovereign relationship may not fully materialize immediately, leading to a strong impact of past sovereign credit risk information on future currency return

(i.e. sovereign risk momentum). To test our hypothesis, we run the following panel regression:

$$exr_{it}^{h} = \beta_0 + \beta_1 \; scds_{it}^{f} + \gamma \; Controls_{it} + \varepsilon_{it} \tag{8}$$

where exr_{it}^{h} is the currency excess return (in excess of the risk-free rate) for currency i over the holding period of h months, constructed at month t; $scds_{it}^{f}$ is the average of log-spread over the past f months; and $Controls$ is a vector of control variables. We also use time fixed effects to control for unobserved time-varying effects. Note that we do not consider panel regressions with country fixed effects due to its inability to capture the cross-sectional variation in sovereign CDS spreads. It is also worth-nothing that, in this setting, we test a lead-lag relationship between currency return and sovereign credit risk. Although the subscripts resemble contemporaneous notation, in fact, they are already in a lead-lag form by the nature of the variable construction.

The existence of the sovereign credit risk momentum implies a negative β_1 coefficients on past sovereign CDS spreads. Again in line with our previous estimations, in our panel regression analysis, we test the robustness of our main results, with respect to different formation periods with $f = 1$, 3, 6, 9, or 12 (months) and holding periods with $h = 1$, 3, 6, 9, or 12 (months). We examine a combination of formation and prediction periods to verify whether the relationship changes over short- and long-term horizons.

The control variables related to financial market conditions include: (1) the past currency return, defined as the annualized currency excess return over the formation period (exr^{f}) and (2) the change of sovereign credit risk, defined as the log-spread change over the formation period ($\Delta scds^{f}$). The first control variable is to capture all the information related to the currency market during the formation period, while $\Delta scds$ is to quantify the information flow of the sovereign CDS markets at the same time.

The macroeconomic variables include (1) relative inflation (REL_INF), defined as the ratio of foreign inflation to the US inflation; (2) growth in GDP (GDP); (3) fiscal deficit (DEFICIT), defined as general government fiscal deficit in percentage of GDP; and (4) interest rate differential (IR_DIFF), defined as the interest rate differential between a foreign country and the US. The macroeconomic variables are obtained from public organizational or governmental websites, e.g., World Bank, IMF, and OECD. If a variable is available only on an annual basis, we assume that the variable is constant each month in that year.

Table 9 shows the panel regression results for Equation (8) for a specific case of $h = 1$ and $f = 1$. Column (1) reports the results by only including past sovereign CDS; Column (2) include

also currency and CDS market variables; Column (3) reports the complete results, controlling for both macroeconomic and financial market conditions. Unsurprisingly, we can see that the coefficient β_1 is statistically significant and negative for all cases, confirming that the sovereign momentum effect remains sizeable, after we control for individual country characteristics.

[Table 9 is about here.]

There are some other noteworthy findings. First, we find that shocks to sovereign credit risk (i.e. $\Delta scds$) are also key to currency return prediction. Yet, the statistical significance is marginal. Interestingly, the results suggest that the past level of sovereign credit risk is stronger than the past change in predicting currency return. In addition, for past currency returns, our results are not statistically significant, indicating no time-series currency momentum effect. This implies that this technical trading rule was temporarily profitable (Neely et al., 2009) but that these gains often tend to deteriorate over time as more traders learn about these strategies and start exploiting them (Pukthuanthong-Le and Thomas III, 2008; Neely et al., 2009). For our set of macroeconomic variables, we find that currency appreciation is marginally positively associated with economic growth. Finally, we further show a strong positive relation between currency returns and the interest rate differential, revealing that the interest rate parity holds in our sample.

Table 10 presents the panel regression results for Equation (8) for all the formation and holding periods. To save space, we only report the β_1 coefficient of the regression equation. Panel A provides the baseline regression results, in which the univariate panel regression is performed. We find that the β_1 coefficients are statistically negative, and all significant at 1% level except for some cases of $h = 1$ being significant at 5% level. This suggests that the sovereign credit risk momentum is strongly persistent and prevalent for both short- and long-term currency returns.

[Table 10 is about here.]

To summarize, three main takeaways emerge from the analysis conducted in this section: (1) the sovereign risk momentum is rather prevalent and persistent in currency returns. (2) the magnitude of the effect is stronger with respect to a long-term holding period and recent sovereign credit risk information. (3) the short-term holding period return is noisy; hence, the sovereign CDS momentum effect is slightly less marked.

4.8 Information flow of the sovereign CDSs

Our analysis provide empirical support for the effect of sovereign credit risk momentum on currencies, namely, that past cross-sectional sovereign credit risk, measured by sovereign CDS spreads, can predict future currency returns. Moreover, our results provide strong evidence that the sovereign momentum effect is persistent and consistent in different holding and formation periods.

The persistent predictability of the sovereign CDS spreads on the currency return can be attributed to the relatively lower liquidity of the sovereign CDS market. Hence, since sovereign CDSs are traded over the counter, the market is less efficient. We expect that the impact of the sovereign CDS market on the currency market is "delayed" due to their different levels of market efficiency. However, one may argue that if the sovereign CDSs may be stale due to the market inefficiency, the variable of interest, $scds^f$, with different formation periods might not adequately capture sovereign credit risk information at the corresponding formation period. If so, then the results would be less meaningful.

To corroborate the robustness of the formation period f in our setting, we breakdown the past sovereign CDS spreads into monthly changes, and test the informativeness of the sovereign CDS spreads in relation to currency returns. If the above-mentioned hypothesis on stale sovereign CDS price holds, then the procedure would yield statistically insignificant estimates for past sovereign CDS changes. Specifically, our test for the informativeness of the sovereign credit risk momentum takes the following form:

$$exr_t^h = \beta_0 + \sum_{j=1}^{12} \beta_j \, \Delta scds_{t-j+1,t-j} + \gamma_1 \, \Delta scds_{t+h,t} + \gamma_2 \, exr_{t,t-12} + \varepsilon_t \tag{9}$$

where $\Delta scds_{t_a,t_b}$ is the log-spread changes between month t_a and t_b. Hence, we test the sovereign risk information flow over the past 12 months. We also add two control variables: the contemporaneous change in sovereign CDS log-spread ($\Delta scds_{t+h,t}$) and past 12-month currency return ($r_{t,t-12}$). In addition, we control for country fixed effects in the regression. Note that, to make the equation as concise as possible, we omit the subscript i in the equation.

The panel regression results for informativeness are presented in Table 11. The first (to last) column reports the results for the 1-month (to 12-month) holding period. Overall, we do not find evidence in support of the hypothesis of stale sovereign CDS prices, as past sovereign CDS spread changes still negatively predict future currency returns, when controlling for the

statistically significance on the contemporaneous currency-sovereign relation. What is noteworthy here is that while the estimated currency-sovereign relationship is comparable to prior studies (see, e.g., Calice and Zeng, 2021; Della Corte et al., 2021, among others), the results that we obtain allow us to confirm the lead-lag relation for a longer time horizon. Interestingly, the predictability of the sovereign CDS spread is unambiguously linked to the holding period. In general, we can see that shorter-term currency returns are strongly related to more recent sovereign CDS information while past sovereign CDSs are still important factors in explaining longer-term currency returns. This finding suggests that the sovereign-momentum effect is larger for currencies trading over a longer holding period.

In contrast, we still see some evidence of the central role of past sovereign CDS information, regardless of the holding periods. For example, $\Delta scds_{t-11,t-12}$ is statistically significant for all holding periods at 10% level, except for $h = 12$, although the significance is indeed weaker for short holding periods. In summary, our results provide direct support for the prediction that the sovereign-momentum effect is important for currency returns determination.

[Table 11 is about here.]

4.9 Additional results

In this section, we provide a set of two additional results. We first study the effect of the individual past month sovereign CDS spreads on currency returns. Recall that we construct the sovereign CDS momentum by calculating the average of the log-spreads over the past months. Hence, our objective is to identify whether the sovereign momentum is uniformly distributed over the sample period or predominantly relevant in certain month(s). In the analyses above, we provided evidence that the sovereign-momentum effect is markedly robust in different formation periods. Accordingly, the effect should be on average of a similar magnitude during the sample period.

To confirm our baseline findings, we repeat the currency portfolio sorting on sovereign CDS spreads by a specific past month only. As we show in more detail in Table A.1 of the Appendix, we sort the currencies on the previous 1st, 3rd, 6th, 9th, or 12th month, respectively. We find evidence of significantly positive portfolio (excess) spreads for all the cases, meaning that the sovereign momentum effect loads equally throughout the whole sample period, instead of being "idiosyncratic" to a certain month.

In our second test, we explore the sovereign momentum effect on currency returns using

CDS returns. Recall that, in our setting, the sovereign momentum is derived from the CDS spread (not the CDS return). Hence, we adopt a data-driven approach based on currencies with different *degrees* of sovereign default risk. Recent papers (Lee et al., 2021; Wang et al., 2021) provide evidence of a momentum effect related to the CDS market (i.e. CDS return exploited by the past CDS return). In light of their findings, we test if past changes in CDS spreads can predict currency returns. Note that past changes in sovereign CDS spreads indicate past shocks in sovereign credit risk. Again, we repeat our approach for currency portfolio sorting but on past changes of sovereign log-CDS spreads. The results in Table A.2 of the Appendix, show that the LMH portfolio spreads are statistically significant for the short formation and holding period cases. In contrast, the portfolio excess spreads are statistically significant only for the shortest formation and holding period. Thus, institutional investors seem to be familiar with the mechanism at play between the sovereign CDS market and the currency market. However, our results also suggest that the currencies with different levels of sovereign credit risk may be still unexploited. Thus, this translates into abnormal currency returns based on past levels of sovereign CDS spreads.

5 Conclusion

In this paper, we study the pricing implications of sovereign credit risk on currency returns. Different from prior studies, we are interested in the *past and cross-sectional* sovereign CDS information and hypothesize a direct link with the currency market. Using a sample of 48 countries with 32 currencies over the sample period from January 2007 to March 2021, we document a strong sovereign momentum effect on currency returns. Furthermore, we find a significant cross-sectional spread impact on currency returns between the past high and low sovereign credit risk, as measured by sovereign CDS spreads.

Our empirical results demonstrate that the sovereign momentum effect is persistent and consistent in different formation periods of the past sovereign CDS levels (i.e. average sovereign CDS spread over prior 1 month to 12 months) and currency holding periods (1-month to 12-month holding periods of currency return). We also find significant positive spreads when shorting the currency with past high sovereign CDS level (i.e. higher credit risk), while simultaneously taking a long position in a lower sovereign CDS (i.e. lower credit risk). Additionally, our evidence suggests that traditional systematic factors are unable to explain the sovereign-momentum currency return. Notably, this finding is virtually identical when we control for a

set of country-specific macroeconomic and financial market variables.

Finally, we examine the sovereign momentum effect on currency returns in several scenarios. We find that the sovereign momentum effect is stronger for free-floating currencies or for currencies allowed to have wider bands of movement. Our results also indicate that such effect is more pronounced in conjunction with an economic downturn, as proxied by an abnormal sovereign CDS term structure. On the other hand, past sovereign credit risk explains a significantly larger proportion of the variation in currency returns of developing countries while a contemporaneous relation mostly emerges for developed countries. Thus, the momentum effect appears to be consistent with the market efficiency hypothesis, which states that the momentum effect is in general more severe in less efficient financial markets.

Our paper provides new insights on the cross-sectional impact of sovereign CDS on currency returns. The most important implication from our results is that that sovereign credit risk is not actually priced by any of the existing well-known systematic factors.

Future research should be devoted to further explore the linkages between sovereign CDS and currency markets. Our analysis focuses on currency spot markets. Hence, it would be interesting to investigate whether the sovereign momentum effect can be implemented in conjunction with currency trading strategies, such as currency carry trades. Another potential avenue for future research would be extending our framework to alternative econometric specifications on other CDS maturities (e.g. 10-year) and the CDS term premium to study other cross-sectional, and possibly time series patterns, in currency markets.

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Table 1: Summary Statistics
This table reports the summary statistics of the variables with the sample coverage from January 2007 to March 2021. The upper part provides the sample mean, standard deviation, maximum, minimum, and the number of the observations. The bottom figure plots the number of the currencies included in the sample over the sample period.

	Mean	STD	Max	Min	N
FX Spot	0.375	0.591	2.667	0.000	5212
5y CDS Spread (bp)	184.731	555.765	17169.890	1.234	5212

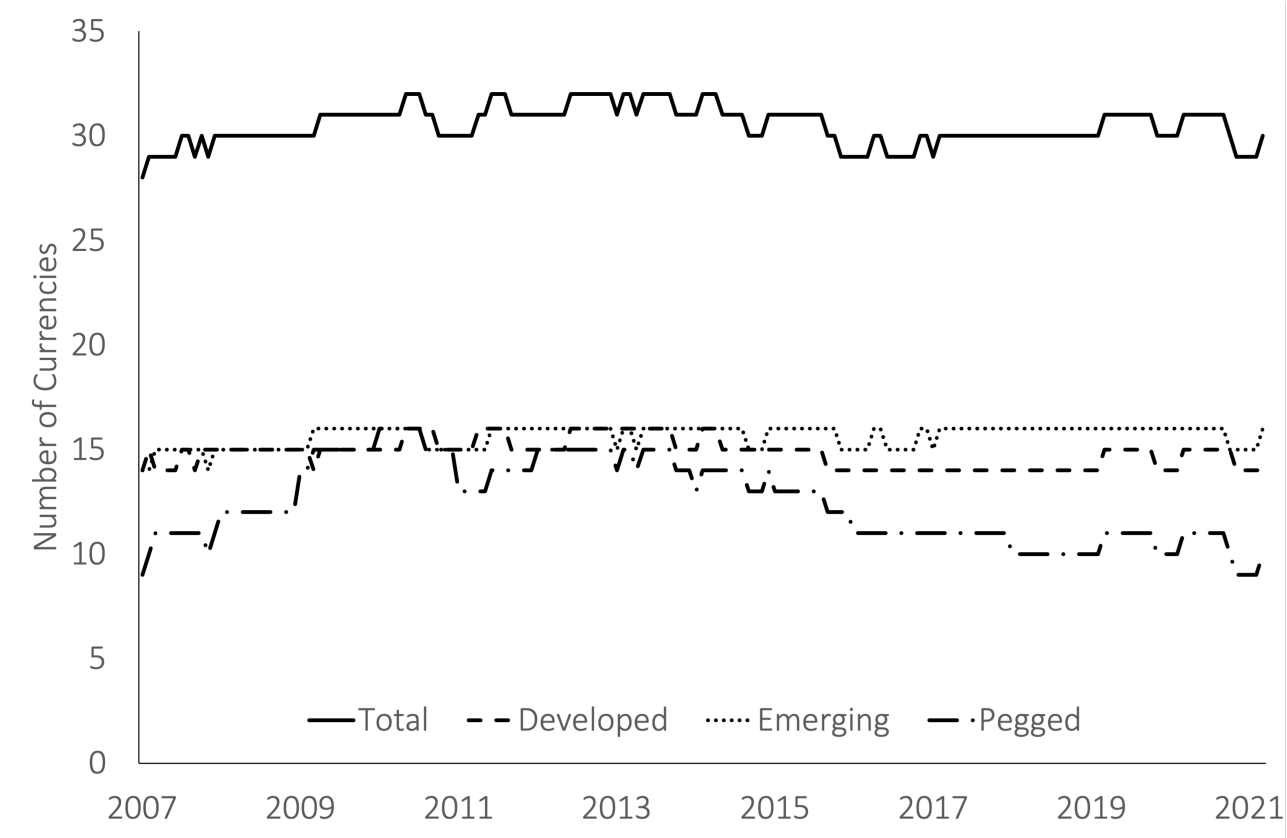


Table 2: Currency Excess Return Sorting on Past Sovereign CDS Spreads

This table reports the currency return in excess of risk-free rate sorting on past sovereign CDS spreads. Each month, we sort the currencies into quintile portfolios (p is from 1 (lowest sovereign risk, Low SR) to 5 (highest sovereign risk, High SR)) based on level of past (f = 1, 3, 6, 9, or 12 months) sovereign CDS spreads and calculate the excess returns for the currency portfolios over the holding period (h = 1, 3, 6, 9, or 12 months). Columns (1)–(5) report the currency excess returns for each portfolio for 1-month holding period; Columns (6)–(10) report *Low-Minus-High* (LMH) portfolio spread for h-month holding period. Rows (1)–(5) report the results for portfolio returns or portfolio spreads given past f months of formation period. Newey-West (1987) with 12-month lags t-statistic is reported in the squared braces. ***, **, and * stand for 1%, 5%, and 10% levels, respectively.

	Currency Portfolio Excess Return, $exr_p^{h,f}$					Currency Portfolio Spread, $r_{1-5}^{h,f} = exr_1^{h,f} - exr_5^{h,f}$				
	Holding Period (Month t to $t+h$)					Holding Period (Month t to $t+h$)				
	$h = 1$					$h = 1$	$h = 3$	$h = 6$	$h = 9$	$h = 12$
	$p = 1$ Low SR	$p = 2$	$p = 3$	$p = 4$	$p = 5$ High SR	Low-Minus-High SR				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Formation Period (Month $t-f$ to $t-1$)										
(1) $f = 1$	-0.018	-0.012	-0.024	-0.054**	-0.068***	0.050***	0.044***	0.040***	0.040***	0.038***
	[-0.94]	[-0.80]	[-1.38]	[-2.40]	[-3.06]	[3.26]	[3.55]	[3.59]	[3.82]	[3.99]
(2) $f = 3$	-0.024	-0.009	-0.022	-0.055**	-0.066***	0.043***	0.040***	0.042***	0.039***	0.038***
	[-1.17]	[-0.53]	[-1.33]	[-2.56]	[-3.12]	[3.27]	[3.44]	[3.52]	[3.49]	[3.85]
(3) $f = 6$	-0.022	-0.007	-0.024	-0.063***	-0.058***	0.036***	0.038***	0.039***	0.040***	0.040***
	[-1.11]	[-0.49]	[-1.44]	[-2.82]	[-2.89]	[2.77]	[2.90]	[3.08]	[3.37]	[3.88]
(4) $f = 9$	-0.019	-0.009	-0.026	-0.061***	-0.059***	0.040***	0.038***	0.039***	0.041***	0.039***
	[-0.94]	[-0.63]	[-1.62]	[-2.67]	[-2.87]	[2.77]	[2.75]	[2.92]	[3.32]	[3.75]
(5) $f = 12$	-0.020	-0.010	-0.024	-0.062***	-0.061***	0.041***	0.042***	0.043***	0.043***	0.040***
	[-0.96]	[-0.69]	[-1.48]	[-2.68]	[-2.88]	[2.75]	[2.88]	[2.99]	[3.36]	[3.69]

Table 3: Currency Portfolio Excess Spread Sorting on Past Sovereign CDS Spreads
This table reports the currency portfolio spread in excess of risk-free rate sorting on past sovereign CDS spreads. Each month, we sort the currencies into quintile portfolios based on level of past (f = 1, 3, 6, 9, or 12 months) sovereign CDS spreads and calculate the excess returns for the currency portfolios over the holding period (h = 1, 3, 6, 9, or 12 months). Columns (1)–(5) report *Low-Minus-High* (LMH) portfolio spread in excess of risk-free rate for h-month holding period. Rows (1)–(5) report the results for portfolio returns or portfolio spreads given past f months of formation period. Newey-West (1987) with 12-month lags t-statistic is reported in the squared braces. ***, **, and * stand for 1%, 5%, and 10% levels, respectively.

	Currency Portfolio Excess Spread, $exr^{h,f}_{1-5} = exr^{h,f}_{1} - exr^{h,f}_{5} - rf$				
	Holding Period (Month t to $t+h$)				
	$h=1$	$h=3$	$h=6$	$h=9$	$h=12$
	(1)	(2)	(3)	(4)	(5)
Formation Period (Month $t-f$ to $t-1$)					
(1) $f=1$	0.042***	0.035***	0.032***	0.032***	0.029***
	[2.65]	[2.81]	[2.80]	[2.94]	[3.01]
(2) $f=3$	0.034**	0.032***	0.033***	0.030***	0.029***
	[2.56]	[2.65]	[2.75]	[2.62]	[2.91]
(3) $f=6$	0.028**	0.030**	0.031**	0.031**	0.031***
	[2.08]	[2.21]	[2.34]	[2.57]	[3.03]
(4) $f=9$	0.031**	0.030**	0.030**	0.032***	0.030***
	[2.14]	[2.11]	[2.25]	[2.63]	[3.05]
(5) $f=12$	0.032**	0.034**	0.034**	0.035***	0.032***
	[2.13]	[2.25]	[2.39]	[2.75]	[3.09]

Table 4: Sovereign-momentum Currency Return Risk Factors

This table reports risk factors for sovereign-momentum currency return. The dependent variable is the currency portfolio excess spread, defined as the LMH currency portfolio spread in excess of risk-free rate ($exr^{h,f}_{LMH}$). The independent variables include the Fama-French 3 equity factors, Carhart equity momentum factor, cross-sectional average of CDS spread return, cross-sectional average of currency return, and the currency return difference between the winner and loser currencies over the past 12 months. Newey-West (1987) with 12-month lags t-statistic is reported in the squared braces. ***, **, and * stand for 1%, 5%, and 10% levels, respectively.

	Currency Portfolio Excess Spread, $exr^{h=1,f}_{1-5}$							
	$f=1$				$f=3$	$f=6$	$f=9$	$f=12$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Alpha = Intercept	0.052***	0.041***	0.046***	0.058***	0.049***	0.043**	0.051***	0.049**
	[3.10]	[2.60]	[2.73]	[2.96]	[2.86]	[2.42]	[2.70]	[2.55]
MKT_EQ	-0.100***			-0.089 ***	-0.074**	-0.062*	-0.054	-0.050
	[-3.43]			[-2.59]	[-2.41]	[-1.72]	[-1.56]	[-1.42]
SMB_EQ	0.006			0.058	0.035	0.040	0.068	0.032
	[0.07]			[0.53]	[0.34]	[0.36]	[0.60]	[0.28]
HML_EQ	-0.110			-0.133**	-0.111*	-0.103	-0.168**	-0.180***
	[-1.64]			[-2.16]	[-1.91]	[-1.55]	[-2.57]	[-2.67]
MOM_EQ	-0.052			-0.059	-0.046	-0.025	-0.057	-0.068
	[-1.18]			[-1.33]	[-1.18]	[-0.62]	[-1.11]	[-1.22]
MKT_CDS		0.102		0.244*	0.290**	0.266*	0.220	0.266*
		[0.61]		[1.82]	[2.22]	[1.89]	[1.56]	[1.80]
MKT_CCY			0.448***	0.526***	0.531***	0.574***	0.586***	0.514***
			[3.57]	[3.09]	[3.19]	[3.03]	[3.02]	[2.65]
MOM_CCY			0.244***	0.219***	0.210***	0.199***	0.167**	0.159**
			[4.10]	[3.70]	[3.57]	[3.18]	[2.51]	[2.46]
Adj. R^2	0.05	0.00	0.16	0.24	0.24	0.22	0.21	0.17
N	170	170	170	170	170	170	170	170

Table 5: Sovereign-momentum Effect in Crisis Period and Abnormal CDS Term Structure
This table reports sovereign-momentum effect on currency return for crisis period and CDS term structure. The dependent variable is the currency portfolio excess spread, defined as the LMH currency portfolio spread in excess of risk-free rate ($exr^{h,f}_{LMH}$). Dummy variables are used to identify the events of crisis and abnormal CDS term structure. Next to the dummy variables, we indicate the number of events identified. The control variables include the Fama-French-Carhart 4 factors, CDS market factor, and currency market and momentum factors. Newey-West (1987) with 12-month lags t-statistic is reported in the squared braces. ***, **, and * stand for 1%, 5%, and 10% levels, respectively.

Panel A: Crisis	Currency Portfolio Excess Spread, $exr^{h=1,f=1}_{1-5}$			
	(1)	(2)	(3)	(4)
Alpha = Intercept	0.041*	0.061***	0.053**	0.050**
	[1.86]	[3.32]	[2.39]	[2.49]
D_CRISIS (73)	0.037			
	[1.00]			
D_GFC (18)		-0.028		
		[-0.51]		
D_EDC (42)			0.019	
			[0.52]	
D_COVID (13)				0.114**
				[2.56]
Controls	Yes	Yes	Yes	Yes
Adj. R^2	0.24	0.23	0.23	0.25
N	170	170	170	170

Panel B: CDS Term Structure			
	(1)	(2)	(3)
Alpha = Intercept	0.051***	0.055***	0.055***
	[2.77]	[2.97]	[2.96]
D_ABNTERM (18)	0.064		
	[1.02]		
D_CONVEX (14)		0.039	
		[0.51]	
D_NEGSLOPE (14)			0.038
			[0.64]
Controls	Yes	Yes	Yes
Adj. R^2	0.24	0.23	0.23
N	170	170	170

Panel C: Interaction with Crisis and CDS Term Structure					
	(1)	(2)	(3)	(4)	(5)
Alpha = Intercept	0.047**	0.051***	0.051***	0.052***	0.053***
	[2.58]	[2.81]	[2.80]	[2.89]	[2.81]
D_ABNTERM	0.201***				
× D_CRISIS (7)	[3.80]				
D_ABNTERM				0.269***	
× D_GFC (3)				[4.70]	
D_ABNTERM					0.139***
× D_EDC (4)					[2.62]
D_CONVEX		0.264***			
× D_CRISIS (4)		[3.05]			
D_NEGSLOPE			0.179***		
× D_CRISIS (2)			[6.18]		
Controls	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.26	0.26	0.25	0.25	0.24
N	170	170	170	170	170

Table 6: Sovereign Momentum and Currency Momentum

This table reports the currency portfolio spread sorting on past sovereign CDS spreads. Each month, we sort the currencies into six portfolios: (1) three groups of past (f = 1, 3, 6, 9, or 12 months) sovereign CDSs (High, Medium, and Low) combined with two groups of past currency return (Winner and Loser). We calculate the currency portfolio returns over the holding period (h = 1, 3, 6, 9, or 12 months). Columns (1)–(5) [Columns (6)–(10)] report the LMH portfolio [excess] spread for h-month holding period. Rows (1)–(5) report the results given past f-months of formation period. Newey-West (1987) with 12-month lags t-statistic is reported in the squared braces. ***, **, and * stand for 1%, 5%, and 10% levels, respectively.

	Currency Portfolio Spread, $r^{h,f}_{1-3}$					Currency Portfolio Excess Spread, $exr^{h,f}_{1-3}$				
	$h=1$ (1)	$h=3$ (2)	$h=6$ (3)	$h=9$ (4)	$h=12$ (5)	$h=1$ (6)	$h=3$ (7)	$h=6$ (8)	$h=9$ (9)	$h=12$ (10)
	Panel A.1: Conditional on Past CCY Loser					**Panel B.1: Conditional on Past CCY Loser**				
(1) $f=1$	0.102***	0.089***	0.066***	0.059***	0.059***	0.094***	0.080***	0.057***	0.050***	0.050***
	[4.16]	[4.25]	[4.35]	[4.54]	[4.89]	[3.71]	[3.74]	[3.64]	[3.74]	[4.04]
(2) $f=3$	0.089***	0.078***	0.056***	0.057***	0.057***	0.080***	0.070***	0.048***	0.048***	0.048***
	[3.78]	[4.14]	[3.96]	[4.45]	[4.50]	[3.35]	[3.53]	[3.14]	[3.53]	[3.64]
(3) $f=6$	0.072***	0.066***	0.062***	0.063***	0.060***	0.064***	0.058***	0.054***	0.054***	0.051***
	[4.02]	[4.14]	[4.23]	[4.54]	[4.64]	[3.40]	[3.41]	[3.57]	[3.93]	[4.09]
(4) $f=9$	0.069***	0.064***	0.065***	0.060***	0.058***	0.060***	0.056***	0.056***	0.052***	0.049***
	[3.29]	[3.23]	[3.70]	[3.82]	[4.02]	[2.78]	[2.72]	[3.18]	[3.28]	[3.48]
(5) $f=12$	0.068***	0.065***	0.065***	0.060***	0.060***	0.059***	0.056***	0.057***	0.051***	0.051***
	[3.53]	[3.79]	[4.12]	[3.91]	[4.24]	[2.96]	[3.14]	[3.50]	[3.29]	[3.67]
	Panel A.2: Conditional on Past CCY Winner					**Panel B.2: Conditional on Past CCY Winner**				
(6) $f=1$	0.032*	0.044***	0.049***	0.053***	0.044***	0.024	0.036**	0.041***	0.044***	0.035***
	[1.84]	[2.74]	[3.76]	[4.56]	[4.58]	[1.38]	[2.21]	[3.18]	[3.79]	[3.60]
(7) $f=3$	0.035*	0.050***	0.050***	0.048***	0.042***	0.026	0.041**	0.041***	0.040***	0.033***
	[1.83]	[2.65]	[3.53]	[3.90]	[3.98]	[1.40]	[2.25]	[3.00]	[3.23]	[3.21]
(8) $f=6$	0.035*	0.045**	0.048***	0.046***	0.046***	0.026	0.036**	0.039**	0.037***	0.037***
	[1.86]	[2.38]	[2.99]	[3.49]	[3.95]	[1.43]	[1.97]	[2.47]	[2.80]	[3.20]
(9) $f=9$	0.038**	0.055***	0.050 ***	0.046***	0.038***	0.029**	0.047**	0.041***	0.037***	0.029***
	[2.55]	[2.72]	[3.18]	[3.65]	[3.59]	[2.04]	[2.30]	[2.61]	[3.03]	[2.87]
(10) $f=12$	0.037**	0.045***	0.050***	0.044***	0.037***	0.028*	0.037**	0.041***	0.035***	0.028***
	[2.14]	[2.88]	[3.78]	[3.85]	[3.62]	[1.72]	[2.40]	[3.23]	[3.29]	[3.04]

Table 7: Sovereign-momentum Currency Return for Unpegged Currencies

This table reports the currency portfolio spread sorting on past sovereign CDS spreads. Each month, we sort the currencies into quintile portfolios of past (f = 1, 3, 6, 9, or 12 months) sovereign CDSs for unpegged currencies and calculate the currency portfolio returns over the holding period (h = 1, 3, 6, 9, or 12 months). Columns (1)–(5) [Columns (6)–(10)] report the LMH portfolio [excess] spread for h-month holding period. Rows (1)–(5) [Rows (6)–(10)] report the results for currencies of emerging [developed] economies. Newey-West (1987) with 12-month lags t-statistic is reported in the squared braces. ***, **, and * stand for 1%, 5%, and 10% levels, respectively.

	Currency Portfolio Spread, $r^{h,f}_{1-5}$					Currency Portfolio Excess Spread, $exr^{h,f}_{1-5}$				
	$h=1$	$h=3$	$h=6$	$h=9$	$h=12$	$h=1$	$h=3$	$h=6$	$h=9$	$h=12$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) $f=1$	0.070***	0.065***	0.065***	0.062***	0.060***	0.062***	0.057**	0.056**	0.054**	0.051***
	[3.08]	[2.79]	[2.79]	[2.87]	[3.14]	[2.62]	[2.36]	[2.36]	[2.39]	[2.59]
(2) $f=3$	0.061**	0.064***	0.062***	0.060***	0.060***	0.053**	0.055**	0.054**	0.052**	0.051***
	[2.52]	[2.65]	[2.64]	[2.79]	[3.14]	[2.13]	[2.24]	[2.21]	[2.32]	[2.59]
(3) $f=6$	0.066***	0.063**	0.061***	0.060***	0.059***	0.057**	0.054**	0.052**	0.051**	0.050**
	[2.63]	[2.52]	[2.61]	[2.81]	[3.07]	[2.24]	[2.12]	[2.18]	[2.34]	[2.52]
(4) $f=9$	0.059**	0.060**	0.059**	0.058***	0.057***	0.051*	0.051**	0.051**	0.050**	0.048**
	[2.27]	[2.47]	[2.55]	[2.71]	[2.94]	[1.90]	[2.06]	[2.13]	[2.25]	[2.39]
(5) $f=12$	0.055**	0.055**	0.055**	0.054**	0.054***	0.047*	0.047*	0.047**	0.045**	0.045**
	[2.26]	[2.30]	[2.42]	[2.49]	[2.83]	[1.87]	[1.91]	[2.01]	[2.04]	[2.30]

Table 8: Sovereign-momentum Currency Return and Economic Development

This table reports the currency portfolio spread sorting on past sovereign CDS spreads. Each month, we sort the currencies into three groups of past (f = 1, 3, 6, 9, or 12 months) sovereign CDSs, conditional on economic development. We calculate the currency portfolio returns over the holding period (h = 1, 3, 6, 9, or 12 months). Columns (1)–(5) [Columns (6)–(10)] report the LMH portfolio [excess] spread for h-month holding period. Rows (1)–(5) [Rows (6)–(10)] report the results for currencies of emerging [developed] economies. Newey-West (1987) with 12-month lags t-statistic is reported in the squared braces. ***, **, and * stand for 1%, 5%, and 10% levels, respectively.

	Currency Portfolio Spread, $r^{h,f}_{1-3}$					Currency Portfolio Excess Spread, $exr^{h,f}_{1-3}$				
	$h=1$ (1)	$h=3$ (2)	$h=6$ (3)	$h=9$ (4)	$h=12$ (5)	$h=1$ (6)	$h=3$ (7)	$h=6$ (8)	$h=9$ (9)	$h=12$ (10)
	Panel A.1: Emerging Economies					**Panel B.1: Emerging Economies**				
(1) $f=1$	0.053***	0.051***	0.052***	0.053***	0.052***	0.045***	0.043***	0.043***	0.044***	0.043***
	[3.44]	[3.73]	[4.05]	[4.10]	[4.57]	[2.69]	[2.89]	[3.19]	[3.26]	[3.69]
(2) $f=3$	0.049***	0.051***	0.054***	0.054***	0.055***	0.040***	0.043***	0.045***	0.045***	0.046***
	[3.29]	[3.67]	[3.82]	[4.08]	[4.48]	[2.61]	[2.90]	[3.03]	[3.28]	[3.74]
(3) $f=6$	0.052***	0.051***	0.053***	0.055***	0.055***	0.043***	0.043***	0.045***	0.047***	0.047***
	[3.36]	[3.39]	[3.84]	[4.17]	[4.44]	[2.72]	[2.69]	[3.10]	[3.44]	[3.74]
(4) $f=9$	0.053***	0.057***	0.058***	0.060***	0.060***	0.045***	0.049***	0.050***	0.051***	0.051***
	[3.25]	[3.58]	[3.90]	[4.24]	[4.50]	[2.63]	[2.94]	[3.24]	[3.61]	[4.04]
(5) $f=12$	0.052***	0.059***	0.060***	0.060***	0.059***	0.044**	0.051***	0.051***	0.051***	0.050***
	[3.11]	[3.50]	[3.82]	[4.13]	[4.25]	[2.55]	[2.92]	[3.21]	[3.59]	[3.88]
	Panel A.2: Developed Economies					**Panel B.2: Developed Economies**				
(6) $f=1$	0.003	0.001	-0.001	-0.005	-0.007	-0.005	-0.007	-0.010	-0.014	-0.016
	[0.20]	[0.08]	[-0.08]	[-0.40]	[-0.62]	[-0.38]	[-0.63]	[-0.80]	[-1.25]	[-1.53]
(7) $f=3$	-0.002	-0.001	-0.005	-0.007	-0.010	-0.010	-0.009	-0.013	-0.015	-0.019*
	[-0.14]	[-0.07]	[-0.38]	[-0.56]	[-0.89]	[-0.83]	[-0.79]	[-1.16]	[-1.41]	[-1.82]
(8) $f=6$	0.000	-0.003	-0.005	-0.007	-0.011	-0.008	-0.012	-0.014	-0.016	-0.020*
	[0.02]	[-0.25]	[-0.42]	[-0.56]	[-1.00]	[-0.66]	[-0.95]	[-1.21]	[-1.40]	[-1.95]
(9) $f=9$	-0.007	-0.006	-0.007	-0.010	-0.011	-0.015	-0.015	-0.016	-0.018*	-0.020**
	[-0.51]	[-0.49]	[-0.63]	[-0.87]	[-1.05]	[-1.22]	[-1.27]	[-1.47]	[-1.79]	[-2.08]
(10) $f=12$	-0.007	-0.008	-0.009	-0.010	-0.010	-0.016	-0.016	-0.018*	-0.019*	-0.019**
	[-0.63]	[-0.66]	[-0.81]	[-0.92]	[-0.92]	[-1.43]	[-1.49]	[-1.69]	[-1.90]	[-2.01]

Table 9: Regression Results for Sovereign-momentum Currency Return
This table reports the panel regression results of currency excess return for 1-month holding period, controlling for macroeconomic and financial market conditions. The sample period is from 2007 to 2021. HAC with 12-month lags t-statistic is reported in the squared braces. ***, **, and * stands for 1%, 5%, and 10% levels, respectively.

	1-Month Holding Period Currency Excess Return		
	(1)	(2)	(3)
$scds^{f=1} = scds_{t-1}$	-0.018***	-0.018***	-0.013**
	[-3.45]	[-3.44]	[-2.53]
$\Delta scds_{t,t-1}$		-0.069*	-0.068*
		[-1.66]	[-1.77]
$exr^{f=1} = exr_{t,t-1}$		0.026	0.022
		[0.76]	[0.61]
REL_INF			-0.001
			[-1.38]
GDP			0.332*
			[1.74]
DEFICIT			0.123
			[0.69]
IR_DIFF			0.002***
			[4.61]
Time FE	Yes	Yes	Yes
Adj. R^2	0.004	0.005	0.008
N	5183	5162	5162

Table 10: Regression Results for Different Formation and Holding Periods
This table reports the panel regression results of currency excess return for different holding and formation periods, controlling for macroeconomic and financial market conditions. The sample period is from 2007 to 2021. To save space, we only report the coefficients on $scds^f$. The column and row headers provide the corresponding formation and holding period information for the coefficient $\beta(scds^f)$ in the table. HAC with 12-month lags t-statistic is reported in the squared braces. ***, **, and * stands for 1%, 5%, and 10% levels, respectively.

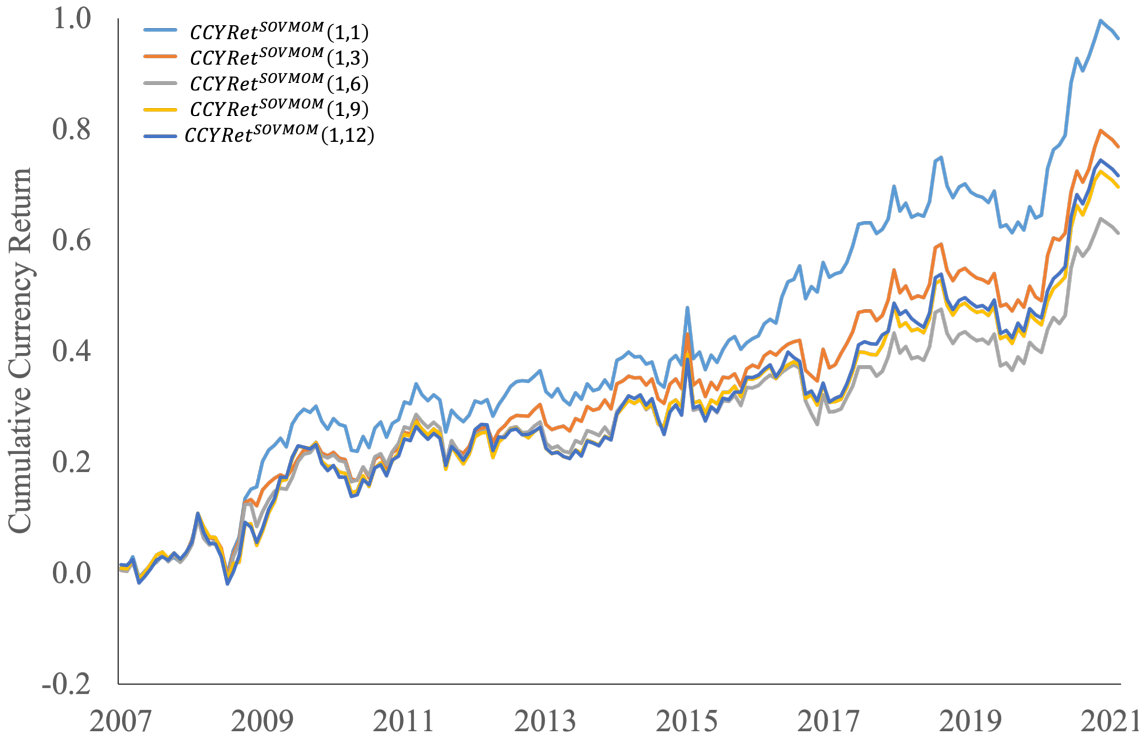
	Holding Period Currency Excess Return, exr^h				
	$h=1$	$h=3$	$h=6$	$h=9$	$h=12$
	(1)	(2)	(3)	(4)	(5)
$\beta(scds^f)$					
(1) $f=1$	-0.013**	-0.017***	-0.018***	-0.018***	-0.018***
	[-2.53]	[-2.84]	[-3.02]	[-3.23]	[-3.38]
(2) $f=3$	-0.013**	-0.018***	-0.018***	-0.018***	-0.018***
	[-2.39]	[-2.79]	[-3.01]	[-3.27]	[-3.46]
(3) $f=6$	-0.014**	-0.019***	-0.019***	-0.019***	-0.020***
	[-2.42]	[-2.81]	[-3.12]	[-3.44]	[-3.60]
(4) $f=9$	-0.015**	-0.020***	-0.021***	-0.021***	-0.020***
	[-2.55]	[-2.98]	[-3.34]	[-3.59]	[-3.71]
(5) $f=12$	-0.016***	-0.021***	-0.022***	-0.021***	-0.021***
	[-2.77]	[-3.24]	[-3.50]	[-3.68]	[-3.74]

Table 11: Sovereign Risk Information Flow

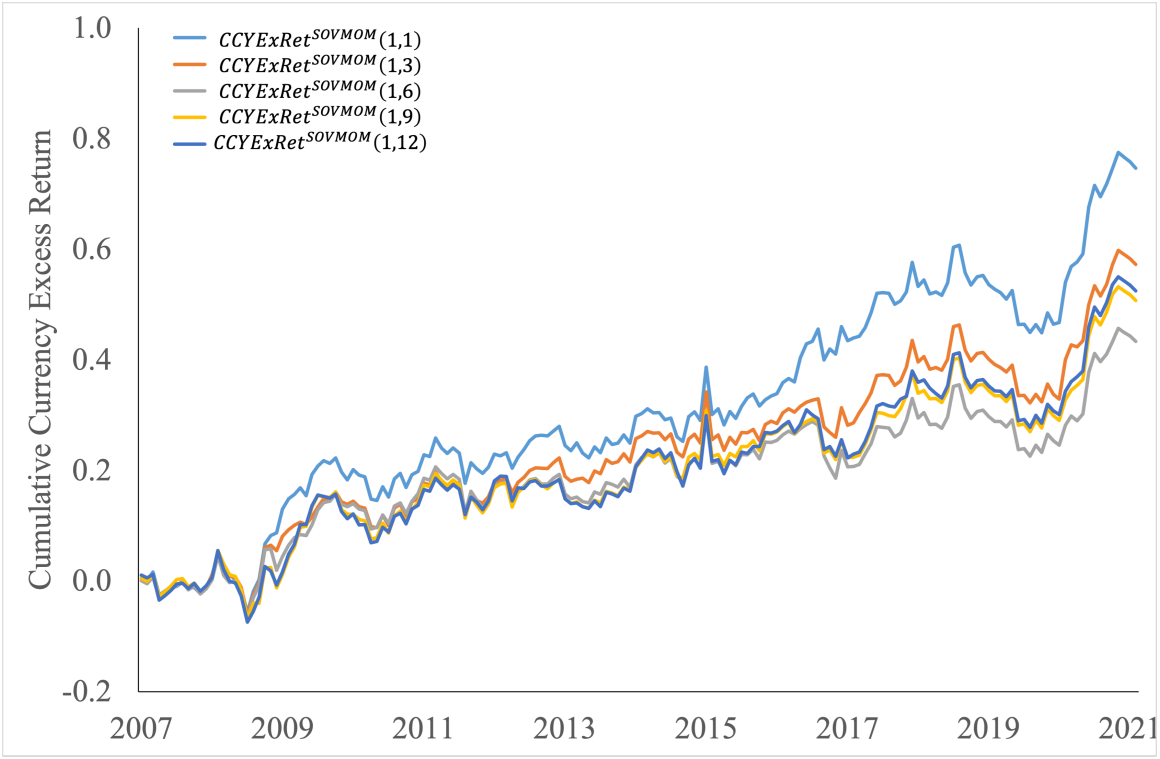
This table reports the panel regression results for sovereign risk information flow. The sample period is from 2007 to 2021. Columns (1)–(5) report results for 1-, 3-, 6-, 9-, and 12-month holding period currency returns. HAC with 12-month lags t-statistic is reported in the squared braces. ***, **, and * stands for 1%, 5%, and 10% levels, respectively.

	Holding Period Currency Excess Return (Month t to $t+h$), exr^h				
	$h=1$	$h=3$	$h=6$	$h=9$	$h=12$
	(1)	(2)	(3)	(4)	(5)
$\Delta scds_{t,t-1}$	-0.075**	-0.021	-0.028**	-0.014	-0.022**
	[-2.10]	[-1.04]	[-2.14]	[-1.27]	[-2.15]
$\Delta scds_{t-1,t-2}$	0.012	0.017	0.002	-0.012	-0.018**
	[0.37]	[0.82]	[0.20]	[-1.06]	[-1.99]
$\Delta scds_{t-2,t-3}$	0.009	-0.021	-0.010	-0.012	-0.022**
	[0.26]	[-1.26]	[-0.88]	[-1.19]	[-2.39]
$\Delta scds_{t-3,t-4}$	0.012	-0.034**	-0.009	-0.023**	-0.030***
	[0.37]	[-2.02]	[-0.68]	[-2.11]	[-3.07]
$\Delta scds_{t-4,t-5}$	-0.068**	-0.004	-0.024*	-0.030**	-0.028***
	[-2.38]	[-0.24]	[-1.66]	[-2.57]	[-2.86]
$\Delta scds_{t-5,t-6}$	-0.037	0.001	-0.015	-0.031**	-0.024***
	[-1.20]	[0.05]	[-1.04]	[-2.52]	[-2.59]
$\Delta scds_{t-6,t-7}$	0.109***	0.017	-0.025	-0.039***	-0.032***
	[3.98]	[0.68]	[-1.55]	[-2.92]	[-3.47]
$\Delta scds_{t-7,t-8}$	-0.062	-0.043	-0.046***	-0.047***	-0.045***
	[-1.36]	[-1.58]	[-2.84]	[-3.74]	[-5.06]
$\Delta scds_{t-8,t-9}$	0.010	-0.036*	-0.043***	-0.038***	-0.040***
	[0.29]	[-1.84]	[-3.00]	[-3.72]	[-4.76]
$\Delta scds_{t-9,t-10}$	-0.074**	-0.063***	-0.057***	-0.043***	-0.032***
	[-2.04]	[-3.58]	[-4.31]	[-4.53]	[-4.00]
$\Delta scds_{t-10,t-11}$	-0.022	-0.033*	-0.039***	-0.041***	-0.016**
	[-0.72]	[-1.83]	[-2.99]	[-4.22]	[-1.96]
$\Delta scds_{t-11,t-12}$	-0.073**	-0.031*	-0.032***	-0.035***	-0.012
	[-2.32]	[-1.80]	[-2.75]	[-3.40]	[-1.46]
$exr_{t,t-12}$	-0.004	-0.072	-0.144**	-0.161***	-0.141***
	[-0.06]	[-1.22]	[-2.48]	[-2.87]	[-3.28]
$\Delta scds_{t+h,t}$	-0.767***	-0.289***	-0.135***	-0.083***	-0.059***
	[-10.48]	[-10.11]	[-8.21]	[-7.49]	[-7.16]
Country FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.15	0.19	0.20	0.20	0.18
N	4981	4908	4811	4714	4619

Figure 1: Cumulative Currency Portfolio Spread
This figure plots the cumulative currency portfolio spread $r_{1-5}^{h,f}$ (at upper sub-figure) and excess spread $exr_{1-5}^{h,f}$ (at lower sub-figure) for 1-month holding period case with formation periods of $f = 1$, 3, 6, 9, or 12 months. The cumulative return is calculated by $CUMRET_t = \Pi_t(1 + RET_t/12) - 1$.



(i) Portfolio Spread



(ii) Portfolio Excess Spread

Appendix

This appendix provides additional results for sovereign-momentum currency return.

- Table A.1 reports the currency portfolio sorting results on past month sovereign CDS spreads.
- Table A.2 reports the currency portfolio sorting results on past change in sovereign CDS spreads.

Table A.1: Currency Portfolio Sorting Using Past Month Sovereign CDS Spread

This table reports the currency portfolio spread sorting on sovereign CDS spreads in a particular past month. Each month, we sort the currencies into quintile portfolios of sovereign CDSs in the past 1st, 3rd, 6th, 9th, or 12th month only and calculate the currency portfolio returns over the holding period (h = 1, 3, 6, 9, or 12 months). Columns (1)–(5) [Columns (6)–(10)] report the LMH portfolio [excess] spread for h-month holding period. Newey-West (1987) with 12-month lags t-statistic is reported in the squared braces. ***, **, and * stand for 1%, 5%, and 10% levels, respectively.

	Currency Portfolio Spread, $r_{1-5}^{h,f}$					Currency Portfolio Excess Spread, $exr_{1-5}^{h,f}$				
	$h=1$	$h=3$	$h=6$	$h=9$	$h=12$	$h=1$	$h=3$	$h=6$	$h=9$	$h=12$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Formation at Month $t-f$ Only										
(1) $f=1$	0.051***	0.042***	0.039***	0.040***	0.038***	0.043***	0.034***	0.031***	0.031***	0.029***
	[3.38]	[3.42]	[3.50]	[3.82]	[4.01]	[2.75]	[2.69]	[2.71]	[2.93]	[3.02]
(2) $f=3$	0.034***	0.033***	0.039***	0.038***	0.037**	0.025**	0.025***	0.031***	0.029***	0.029***
	[2.84]	[2.92]	[3.51]	[3.58]	[4.00]	[2.11]	[2.12]	[2.70]	[2.67]	[3.03]
(3) $f=6$	0.042***	0.045***	0.042***	0.041***	0.040***	0.034**	0.037***	0.033**	0.033***	0.031***
	[3.07]	[3.39]	[3.33]	[3.62]	[4.06]	[2.47]	[2.70]	[2.54]	[2.78]	[3.19]
(4) $f=9$	0.038***	0.037***	0.040***	0.040***	0.037**	0.030**	0.029**	0.031**	0.032***	0.028***
	[2.80]	[2.83]	[3.23]	[3.60]	[3.76]	[2.07]	[2.06]	[2.44]	[2.78]	[2.89]
(5) $f=12$	0.038**	0.042***	0.043***	0.039***	0.035***	0.030*	0.033**	0.034***	0.030**	0.026***
	[2.47]	[2.95]	[3.30]	[3.25]	[3.57]	[1.87]	[2.30]	[2.62]	[2.55]	[2.73]

Table A.2: Currency Portfolio Sorting Using Past Change in Sovereign CDS Spread

This table reports the currency portfolio spread sorting on the past change in sovereign CDS spreads. Each month, we sort the currencies into quintile portfolios of sovereign CDS changes in the past 1-, 3-, 6-, 9-, or 12-month period and calculate the currency portfolio returns over the holding period (h = 1, 3, 6, 9, or 12 months). Columns (1)–(5) [Columns (6)–(10)] report the LMH portfolio [excess] spread for h-month holding period. Newey-West (1987) with 12-month lags t-statistic is reported in the squared braces. ***, **, and * stand for 1%, 5%, and 10% levels, respectively.

	Currency Portfolio Spread, $r_{1-5}^{h,f}$					Currency Portfolio Excess Spread, $exr_{1-5}^{h,f}$				
	$h=1$	$h=3$	$h=6$	$h=9$	$h=12$	$h=1$	$h=3$	$h=6$	$h=9$	$h=12$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Formation Period (Month $t-f$ to $t-1$)										
(1) $f=1$	0.054***	0.015*	0.017***	0.005	0.006	0.046**	0.006	0.008	-0.003	-0.003
	[2.89]	[1.73]	[3.20]	[1.03]	[1.37]	[2.39]	[0.63]	[1.22]	[-0.56]	[-0.42]
(2) $f=3$	0.016	0.008	0.012	0.005	0.005	0.008	-0.001	0.004	-0.004	-0.004
	[0.90]	[0.63]	[1.12]	[0.45]	[0.54]	[0.41]	[-0.04]	[0.30]	[-0.37]	[-0.42]
(3) $f=6$	0.035**	0.028*	0.021	0.010	0.004	0.027	0.020	0.012	0.001	-0.005
	[2.23]	[1.86]	[1.37]	[0.77]	[0.38]	[1.57]	[1.21]	[0.75]	[0.09]	[-0.37]
(4) $f=9$	0.032	0.025	0.019	0.007	0.006	0.023	0.016	0.010	-0.001	-0.003
	[1.63]	[1.36]	[1.06]	[0.52]	[0.51]	[1.17]	[0.86]	[0.55]	[-0.09]	[-0.25]
(5) $f=12$	0.030	0.019	0.011	0.006	0.006	0.022	0.011	0.002	-0.003	-0.003
	[1.62]	[1.15]	[0.66]	[0.46]	[0.55]	[1.11]	[0.60]	[0.12]	[-0.18]	[-0.24]