

B Violations in covered interest parity and the euro's role as an international financing currency

By Johannes Gräß, Thomas Kostka and Arnaud Mehl

Prior to the global financial crisis of 2007-09, covered interest parity (CIP) was one of the most robust empirical relationships in international financial markets. CIP predicts that forward exchange rates reflect the current exchange rate as well as prevailing interest rate differences between two currencies. Sufficiently liquid markets should arbitrage away deviations from CIP, also known as the cross-currency swap (CCS) basis. The CCS basis is important for the euro's international role in global financial markets because it determines its attractiveness as an international funding currency for the synthetic issuance of US dollars. A negative CCS basis is equivalent to paying a premium for borrowing US dollars "synthetically" via another funding currency (by means of a CCS contract) over the price of US dollar borrowing in the wholesale money market (i.e. the LIBOR rate). Since the outbreak of the global financial crisis a decade ago, CIP has broken down and been persistently violated. The CCS basis has remained large and negative, albeit volatile, with important implications for global financial markets. This has contributed to a surge in US dollar-denominated international bond issuance in recent years and to discouraging synthetic US dollar issuance via currencies such as the euro. This section, the second special feature of this year's report, provides evidence that the move of the CCS basis into negative territory reflects a confluence of several factors, such as greater awareness among market participants of counterparty risk, regulatory reforms contributing to a reduction in supply of US dollars in wholesale money markets, and the effect of the non-standard monetary policy measures taken by major central banks. Moreover, acknowledging the ECB's neutral stance regarding the international use of the euro, this special feature presents tentative empirical estimates which show that the effect of the ECB's non-standard monetary policy measures on the role of the euro as an international financing currency is ambiguous. On the one hand, they lower the cost of borrowing euro in money markets but, on the other, they contribute to an increase in the CCS basis, reducing the euro's attractiveness as a unit for synthetic US dollar borrowing.

The cross-currency swap basis

The CCS basis is the premium (in excess of US LIBOR) at which synthetic US dollar funding can be obtained in the foreign exchange swap market.⁵¹

Synthetic US dollar funding describes a transaction in which a financial institution – due to limited supply of US dollars in wholesale money markets, for example – swaps a given (e.g. domestic) currency into US dollars for a given maturity. In addition to the CCS basis, the financial institution in question pays the US dollar

⁵¹ See also Borio, C., McCauley, R.N., McGuire, P. and Sushko, V. (2016), "Covered interest rate parity lost: understanding the cross-currency basis", *BIS Quarterly Review*, September. In the following we use CCS basis as shorthand for cross-currency basis swap, which is a specific kind of cross-currency swap.

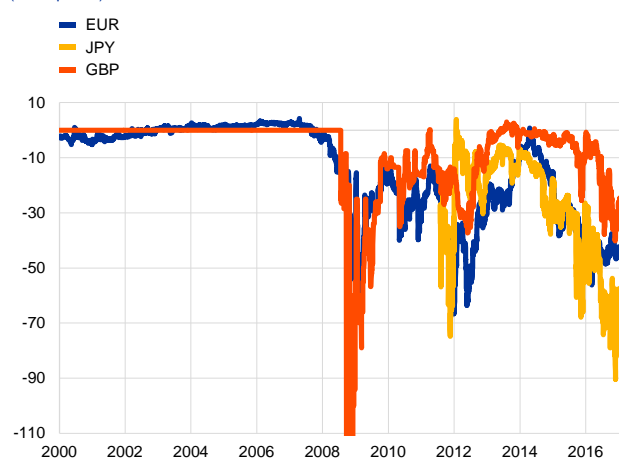
LIBOR rate and receives the domestic floating interest rate from its CCS counterpart until maturity.⁵² At maturity the principal currency payment is swapped back at the spot exchange rate prevailing at the onset of the transaction. In a CCS transaction, the exchange rate risk is fully hedged. Cross-currency basis swaps are primarily used by non-US banks with limited access to US dollar deposits. They are an alternative to other sources of US dollar funding such as US dollar repo funding. In addition, foreign investors rely on them to invest in US dollar securities without being exposed to the foreign exchange risk.

Chart 24

CCS structurally negative since 2008; sharp increase since early 2014

Cross-currency swap basis of major currencies against the US dollar (three-month maturity)

(basis points)



Source: Bloomberg.

Notes: The CCS basis is quoted from the perspective of the dollar-providing counterpart (which receives the basis).

In the absence of friction, the CCS basis should be close to zero. This was predominantly the case before the global financial crisis, when higher demand was immediately offset by elastic supply of US dollars in the swap market (see [Chart 24](#)).⁵³ Here, the CCS basis is quoted from the perspective of the dollar-providing counterpart (which receives the basis). Hence a more negative basis means that swapping euros, sterling or yens into dollars becomes more costly. Since the onset of the global financial crisis, the CCS basis of major currencies has consistently been negative.

Two types of agents typically need synthetic US dollar funding and use the foreign exchange swap market to hedge their foreign exchange exposures.

First, non-US financial institutions may want to purchase US dollar-denominated assets without bearing the exchange rate risk.⁵⁴ One example would be a Japanese bank obtaining US dollars through a CCS contract in order to grant a dollar loan to an international borrower. Another example would be a euro area-based pension fund using a currency swap to

hedge a US dollar bond investment. The second type of agent is non-financial corporates with genuine financing needs in US dollars. These agents may issue bonds denominated in a currency other than US dollars, like the euro, and swap the proceeds into US dollars, thereby hedging against the foreign exchange risk. Examples are “reverse yankee” bonds, which have been popular in recent years, in particular among non-financial corporations. These are euro-denominated bonds issued by US companies where the euro proceeds are exchanged immediately into US dollars by means of CCS in order to hedge the US companies’ foreign currency exposure.

⁵² Because the financial institution has borrowed in domestic currency in the domestic money market, the total cost of US dollar funding in this transaction is US dollar LIBOR + CCS basis.

⁵³ Different developments in the basis for the different currencies reflect idiosyncratic factors, for instance the European sovereign debt crisis around 2012 for the euro, which led to heightened counterparty risk and diverging monetary policy stances from 2014 onwards for the euro and the Japanese yen. For some currencies, such as the Australian dollar, the basis has not become negative.

⁵⁴ By funding and investing in US dollars, these financial institutions avoid currency mismatches on their balance sheets.

Drivers of recent developments in the CCS basis

The rise in the CCS basis up to 2016 can be explained by an array of factors.

Such factors include greater awareness of counterparty risk, changes in regulation, consideration of balance sheet costs and limits to arbitrage, which have structurally reduced the availability of US dollar funding, pushing the CCS basis into negative territory. Another factor is that increasing interest rate differentials across major currencies have stimulated demand for assets denominated in higher-yielding currencies (the US dollar) and for liabilities denominated in currencies with lower funding costs (the yen and the euro).

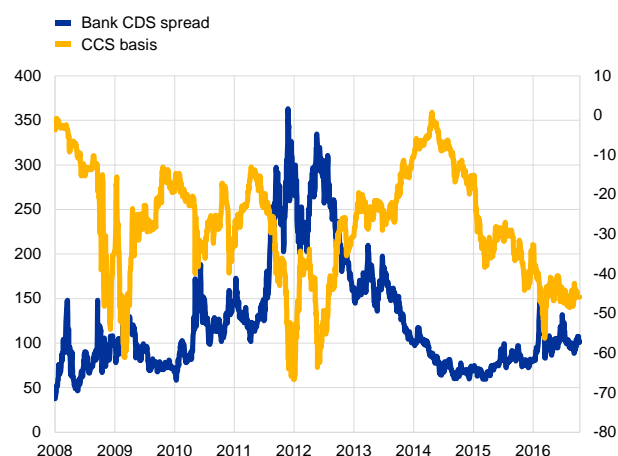
In particular, in reaction to the global financial crisis, arbitrageurs have become increasingly aware of counterparty risk, which has pushed the CCS basis deep into negative territory. Reflecting this, there is evidence that the CCS basis is correlated with domestic bank credit risk, as measured by bank credit default swap (CDS) spreads (see **Charts 25 and 26**).⁵⁵

Chart 25

Arbitrageurs have become increasingly aware of counterparty risk, which has pushed the CCS basis deep into negative territory for the euro...

Euro CCS basis and bank credit risk of euro area banks

(basis points)



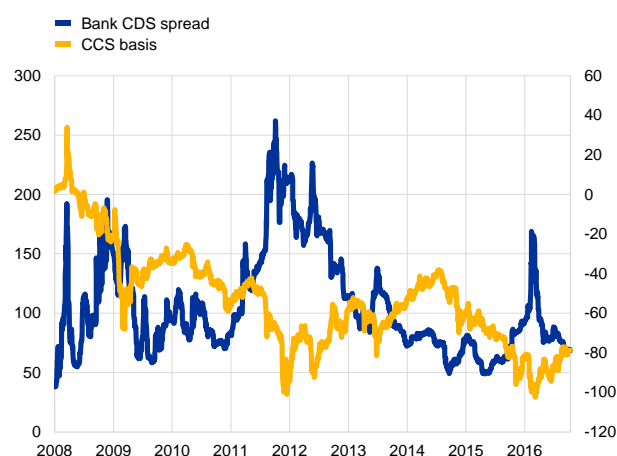
Sources: Bloomberg, Datastream.

Chart 26

... and for the Japanese yen

Japanese yen CCS basis and bank credit risk of Japanese banks

(basis points)



Sources: Bloomberg, Datastream.

Recent adjustments to US money market fund (MMF) regulations are yet another factor. The adjustments in question have reduced the availability of US dollar liquidity in US wholesale markets, thereby putting further downward pressure on the CCS basis. US MMFs have been increasingly discouraged from lending to

⁵⁵ Before the crisis, the CCS basis was virtually zero and moved independently from bank credit risk. This suggests that the sensitivity of the CCS basis with respect to credit risk has increased since 2008, but not necessarily that bank credit risk per se has increased.

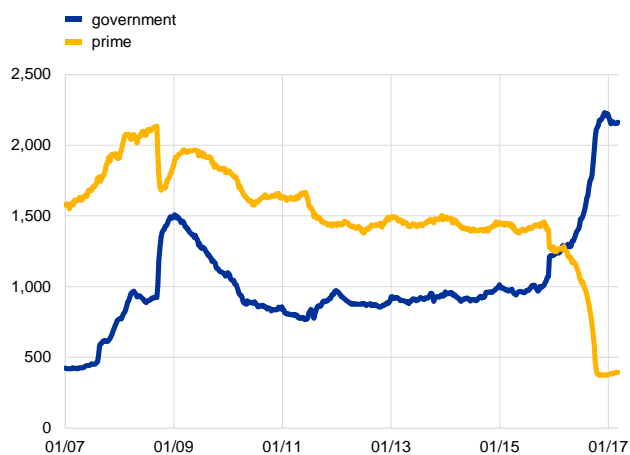
non-sovereign borrowers, in accordance with domestic regulations.⁵⁶ As a result, funds migrated from US prime MMFs (i.e. funds that invest mainly in private securities) to government MMFs (i.e. funds that invest mainly in government securities; see **Chart 27**). This has pushed global banks, which had previously tapped the US dollar wholesale market, into other markets (including the currency swap market) to cater for their US dollar funding needs. In mid-2015, the CCS basis started to go further into negative territory as money market funds presumably prepared for the entry into force of regulatory reforms in October 2016. Further mirroring the reduced supply of dollar liquidity via traditional channels on the US money markets, unsecured US money market rates (e.g. US LIBOR rates) increased significantly above Treasury bill rates of comparable maturities.

Chart 27

Assets under management migrated from US prime MMFs to government MMFs

Assets under the management of US money market funds

(USD billions)



Source: ICI.

Notes: Money market fund assets by fund type. The most recent observation is for March 2017.

The official sector's investment has compensated for the reduced supply of US dollar liquidity, but only partly.

Reports suggest that some central banks have recently allocated parts of their US dollar reserves to CCS contracts to earn the CCS basis, which is an attractive investment in an environment of historically low interest rates.⁵⁷ Moreover, state agencies have reportedly exploited their top credit rating status to issue at close to risk-free rates in US dollars and swap those US dollars for euro or other currencies while earning the CCS basis.^{58, 59}

On the demand side, monetary policy divergence between the United States and some other major advanced economies has stimulated the appetite for investing in higher-yielding dollar assets and issuing in lower-yielding currencies, contributing to a further widening in the CCS basis.

Accommodative monetary policy measures taken by major central banks in the euro area, Japan and Switzerland have led to rising interest rate differentials vis-à-vis the United

States. This has spurred demand for CCS contracts for two distinct reasons. First, relatively high yields on US dollar assets incentivise investments in US dollar assets together with purchases of CCS contracts to hedge the resulting exposures to

⁵⁶ In contrast to MMFs invested in short-term sovereign paper, MMFs invested in short-term bank debt (e.g. commercial paper) were required to adopt a floating net present value (NAV) system as of 14 October 2016. As a consequence, many MMFs have shifted large portfolio shares from US dollar-denominated commercial paper to US Treasury bills. There is also anecdotal evidence that Japanese banks replaced commercial paper and certificates of deposits denominated in US dollars with US dollar deposits, and less long-term currency swaps.

⁵⁷ On this side of the CCS contract, the US dollar reserve manager is hedged against depreciations in the other currency (e.g. yen). It has been argued that there have been alternative US dollar providers for swaps involving the Japanese yen and the US dollar, in particular in emerging market economies.

⁵⁸ This strategy amounts to the inverse of US corporates issuing and hedging euro-denominated bonds described above.

⁵⁹ Since mid-2015 assets under the management of US prime MMFs have declined by about USD 1.5 trillion. By comparison, outstanding official central bank reserves of US dollars amount to USD 4.5 trillion, and total US dollar-denominated issuance by European state agencies in 2015 amounted to USD 0.1 trillion.

foreign exchange risk. Second, relatively low interest rates in the euro area, Japan and Switzerland encourage synthetic dollar issuance and, in turn, purchases of CCS contracts to swap foreign currency proceeds into US dollars to hedge the foreign currency exposure.

Impact of the ECB's non-standard monetary policy measures

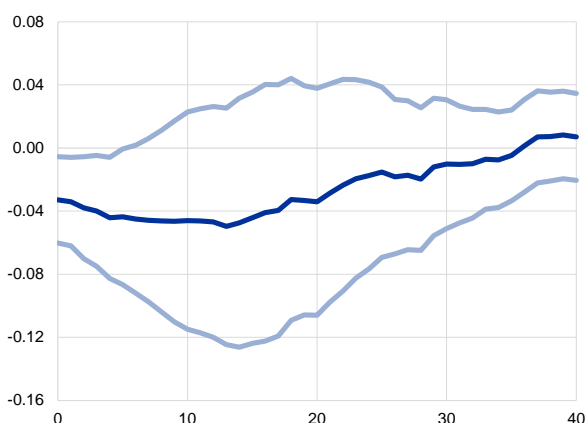
It is in this context that empirical evidence for the impact of the ECB's non-standard monetary policy measures on international bond issuances in euro and violations from CIP can be considered.

Chart 28

Two-year sovereign yield differential widens

Impulse response of two-year interest rate differential (euro area-United States)

(y-axis: percentage; x-axis: weeks)



Sources: Haver, Dealogic and ECB staff estimates.
Notes: The light blue lines indicate 90% confidence bands.

Four theoretical channels – which possibly offset each other – need to be looked at to gauge the full effect of the ECB's non-standard measures. The first channel is that these non-standard monetary policy measures lower interest rates in money markets in the euro area. These lower money market rates encourage, on the one hand, euro area residents to invest in relatively high-yielding US dollar assets and, on the other hand, synthetic US dollar issuance in which the euro is used as a funding currency. These two types of financial behaviour, the second and third channels, strengthen demand for hedging the resulting foreign exchange exposures in the guise of CCS contracts, which widens the basis. The final channel is that the wider basis in turn makes issuance of international bonds in euro more costly, which discourages the use of the euro as an international financing currency. Overall, the net effect of the ECB's non-standard monetary policy measures on international issuances in euro is a priori ambiguous. If the effect on money

markets (lower interest rates) dominates the effect on the CCS basis (higher swap costs), then the net effect on international issuance in euro should be positive. If the latter effect dominates the former, the net effect should be negative.

The empirical evidence suggests that the effects, in fact, broadly offset each other. The net impact of ECB non-standard measures on international bond issuances in euro is therefore limited. In a recent study, Dedola et al. (2017) aim to estimate the impact of central bank balance sheet policies on exchange rates, interest rates, risk premia and deviations from CIP.⁶⁰ They use announcements of non-standard monetary policy measures as instruments to identify innovations in central bank balance sheets due to liquidity supply shocks. They use a statistical method known as local projections to obtain the response of the aforementioned variables to a liquidity supply shock over the medium term. One preliminary finding of

⁶⁰ See Dedola, L., Georgiadis, G., Gräß, J. and Mehl, A. (2017), "Does a big bazooka matter? Central bank balance sheet policies and exchange rates", ECB mimeo, April.

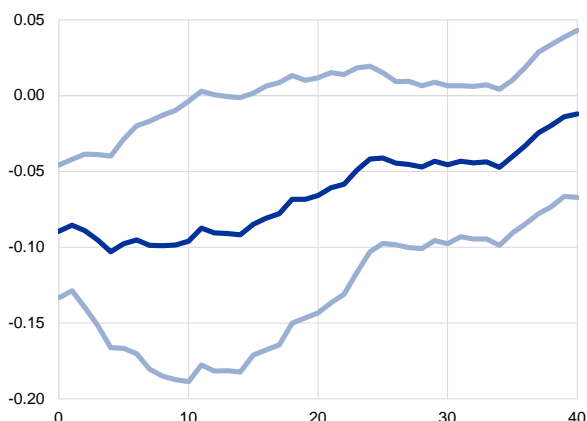
their study is that, in response to an average liquidity supply shock arising from the ECB's non-standard measures, euro area interest rates would decline significantly, which should contribute a priori to stimulating international issuances in euro (see [Chart 28](#)). According to the study's estimates, a 1% increase in the ECB's balance sheet relative to the Federal Reserve System's balance sheet would lower euro area interest rates by around 5 basis points (at the two-year maturity). At the same time, the same average liquidity supply shock arising from the ECB's non-standard measures would lead to significantly wider deviations from CIP (i.e. to a more negative basis), which discourages international issuances in euro (see [Chart 29](#)). According to the estimates, a 1% increase in the ECB's balance sheet relative to the Federal Reserve System's would widen the deviations from CIP for the USD/EUR by about 10 basis points. By and large, the two effects tend to offset each other, as suggested by the statistically insignificant response of international bond issuances in euro to an average liquidity supply shock arising from the ECB's non-standard measures (see [Chart 30](#)).⁶¹

Chart 29

Deviations from CIP widen

Impulse response of deviations from CIP at the two-year maturity

(y-axis: percentage; x-axis: weeks)



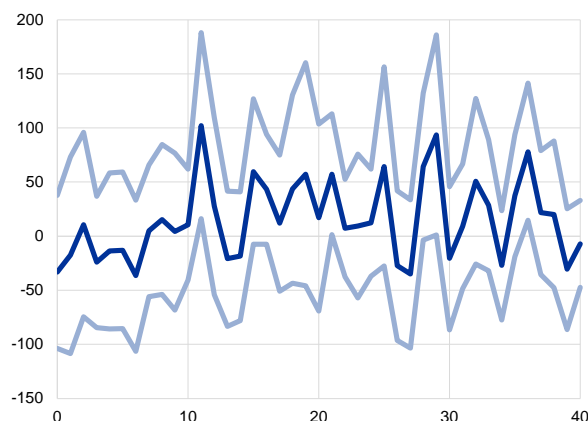
Sources: Haver, Dealogic and ECB staff estimates.
Note: The light blue lines indicate 90% confidence bands.

Chart 30

Muted impact on international bond issuance in euro

Impulse response of issuance of euro-denominated international bonds

(y-axis: USD millions; x-axis: weeks)



Sources: Haver, Dealogic and ECB staff estimates.
Note: The light blue lines indicate 90% confidence bands.

In any case, the ECB stance vis-à-vis the international role of the euro is neutral in this domain, i.e. the ECB's non-standard monetary policy measures are not aimed at influencing euro-denominated international bond issuance.

⁶¹ The results are qualitatively unchanged when using the share of the euro in outstanding international debt securities as the dependent variable.