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# 1 THE EURODOLLAR MARKET

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## 1.1 WHAT ARE EURODOLLARS?

Eurodollars are bank deposits denominated in dollars but held in banks located outside the US, including foreign branches of US-based banks not subject to US legislation (typically, Caribbean branches).<sup>1</sup> Originally, this type of deposits was held almost exclusively in Europe; hence, the name Eurodollars. Now they are held in countries like Bahamas, Bahrain, Canada, the Cayman Islands, Hong Kong, Japan, the Netherlands Antilles, Panama, and Singapore.

Note that there exist also euroyens, eurofrancs, and even euroeuros, namely, deposits denominated in yens, francs, and euros, held outside Japan, Switzerland, and the EMU, respectively: the prefix “euro” has nothing to do with Europe or the Euro, but it survives from the original expression “Eurodollars” to denote deposits in a given currency held outside the jurisdiction of the country of that currency.

Although Eurodollar deposits, by definition, are held by institutions outside the United States, there is an active market for Eurodollar deposits inside the United States, particularly in New York City. U.S. depository institutions and U.S. branches of foreign banks (FBOs), which we will collectively refer to as U.S.-based banks, indirectly borrow in Eurodollars by accepting Eurodollar deposits through offshore branches and then transferring the funds onshore. U.S.-based banks take Eurodollar deposits predominantly through their Caribbean branches (usually located in the Bahamas and the Cayman Islands). While these trades are booked offshore, the transactions are typically negotiated by traders located in the United States and the proceeds are often used to fund U.S. operations.

Fixed-rate time deposits (TDs) is the typical instrument of eurodollars. The typical maturity is between one week and six months. The bulk of Eurodollar TDs are interbank liabilities. They pay a fixed,

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<sup>1</sup> Since 1981, “U.S.-based banks can also take eurodollar deposits domestically through [international banking facilities](#) (IBFs). However, Caribbean Eurodollar activity is estimated to be much larger than IBF Eurodollar activity because of regulatory limitations on IBFs. For example, IBFs can only take Eurodollar deposits from foreign institutions and have additional restrictions for foreign corporate depositors. In contrast, Caribbean branches of U.S.-based banks can also take deposits from U.S. institutions and have no restrictions on foreign corporate depositors.” Marco Cipriani and Julia Gouny: “[The Eurodollar market in the United States](#)”, *Liberty Street Economics*, May 27, 2015

competitively determined rate of return. Another important Eurodollar instrument is the Eurodollar certificate of deposit (CD).

## 1.2 THE MECHANICS OF EURODOLLAR CREATION

Most people think of Eurodollars as “dollars piled up abroad” As Milton Friedman wrote in a paper originally published in 1969: “a high official of an international financial organization [ .....] was asked: “What is the source of these [eurodollar] deposits?” His answer was: partly, U.S. balance-of-payments deficits; partly, dollar reserves of non-U.S. central banks; partly, the proceeds from the sale of Euro-dollar bonds.” The idea would be that a balance of payment deficit means that the US importers transfer their dollar deposits abroad to pay for their imports; the dollar reserves of non US central banks are like dollars held abroad; etc. This answer is “almost completely nonsense”, says Friedman: “The correct answer for both Euro-dollars and liabilities of U.S. banks is that their major source is a bookkeeper’s pen”. In other words, it is money creation. Let’s see how it happens.

In step 1, Sheik transfers \$1000 from his deposit at a US bank to a UK bank, Bank 0. Bank 0 has an account in the US system, and initially it deposits the extra \$1000 at the US system. So total deposits at the US bank system do not change, while the Eurodollar system gains \$1000 of deposits.

Eurodollar banks, however, even if they are not subject to required reserves, hold excess reserves, like any other bank. But while US banks hold their excess reserves at the FED, Eurosystem banks cannot do that: instead, they hold their excess reserves in Eurodollar deposits at US banks. If they typically hold, say, 10 percent of free reserves, they will deposit \$100 at the US bank system and will loan out \$900 to, say, a German citizen. This is shown in step 2.

As usual, Hans will use the loan to do something. Presumably, he needed the dollars in order to pay, say, for some import. He then pays \$900.000 to his French supplier, Jean, by crediting Jean’s account at UK Bank 1 exactly \$900.000. Hence, the Eurodollar system has acquired another \$900.000 of deposits. As usual, it holds 10 percent of it as reserves at the US bank system, while it lends the remaining \$810.000 to Gigi, an Italian enterpreneur.

You can see that the process essentially works like the money multiplier, with the US banking system paying the role of the FED in that this is where the Eurodollar banks keep their dollar reserves.

In the end, the initial \$1000 of Eurodollar deposit at UK Bank 0 multiplies into an increase by \$10.000 eurodollar deposits. On the asset side, these are divided between \$1000 in reserves (held at the US banking system) and \$9000 of Eurodollar loans.

Note that total deposits at the US banking system do not change! US money supply also does not change: recall that M2 includes dollar deposits held by US residents at non US banks but excludes deposits held by foreign residents held at US banks.

Table 1: The Eurodollar multiplier

UK banks' Eurodollar deposits	UK banks' \$ reserves at US banks	UK banks' Eurodollar loans	US banks' deposits
+1000 (Sheik's deposit at UK Bank 0)	+100 (Bank 0's free reserves held at US bank system)	+900 (Bank 0's loan to Hans)	-1000 (Sheik's deposit) +100 (Bank 0's free reserves held at US bank system)
+900 (Jean's deposit at UK Bank 1)	+90 (Bank 1's free reserves held at US bank system)	+810 (Bank 1's loan to Gigi)	+90 (Bank 0's free reserves held at US bank system)
$1000 * \sum_{i=0}^{\infty} (0.9)^i$ $= \frac{1000}{1 - 0.9}$ $= 10.000$	$100 * \sum_{i=0}^{\infty} (0.9)^i$ $= \frac{100}{1 - 0.9}$ $= 1.000$	$1000 * \sum_{i=1}^{\infty} (0.9)^i$ $= -1000$ $+ \frac{1000}{1 - 0.9}$ $= 9.000$	$-1000 + 100$ $* \sum_{i=1}^{\infty} (0.9)^i$ $= -1000 + \frac{100}{1 - 0.9} = 0$

### 1.3 REGULATORY ARBITRAGE

Eurodollars benefitted from four regulatory advantages relative to dollar deposits at US banks:

First, Regulation Q, that imposed a ceiling on interest rates on deposits at US banks; when this ceiling became binding, depositors shifted from US banks to Eurocurrency deposits; US banks then borrowed in the Eurocurrency market in order to replace the deposits they had lost. However, Regulation Q ceiling's on time and savings deposits started being phased out in 1978 and lifted entirely in 1986 (the 0 interest rate ceiling on demand deposits was lifted in 2011).

Second, Regulation D imposes reserve requirements on US banks but exempted Eurodollar deposits at foreign based branches of US banks. Until 2008 such reserves could not be remunerated, hence they were an implicit tax on the deposits at US banks. This was another reason why they could pay lower interests on their deposits than Eurodollar deposits, that were not subject to such an implicit tax. In 1990, the FED eliminated the 3 percent reserve requirements on large certificates of deposits and non personal time deposits in the US, thereby eliminating also this regulatory advantage for Eurodollar deposits.

Third, FDIC deposit insurance assessments, that from the point of view of the individual bank are also an additional cost, were not imposed on Eurodollar deposits.

Fourth, many foreign banks collecting Eurodollar deposits were subject to less stringent capital requirements than US banks.

For all these reasons, the Eurodollar market grew rapidly.

## 1.4 THE SIZE AND EVOLUTION OF EURODOLLAR BANKING

By the eighties, eurodollars had surpassed certificates of deposits as a source of funds for US banks. But what is the size and the evolution of the Eurodollar market? Hard data are very difficult to come by, but an estimate as of 2010 is as follows:

Table 2: Eurodollar banking and the US banking sector, 2010, \$bns

1	Total onshore assets	14,487	Total onshore liabilities	12,747
2	Total eurodollar assets	4,867	Total eurodollar liabilities	4,108
3	Of which: on US residents	2,143	Of which: to US residents	1,491
4	Total onshore + eurodollar	19,354	Total onshore + eurodollar	16,855
5	Eurodollar banking assets as % of total dollar banking assets	25.1	Eurodollar banking liabilities as % of total dollar banking liabilities	24.4
6	Eurodollar on US residents as % of total eurodollar (round-trips)	44.0	Eurodollar to US residents as % of total eurodollar (round-trips)	36.3

All assets and liabilities are vis-à-vis non banks

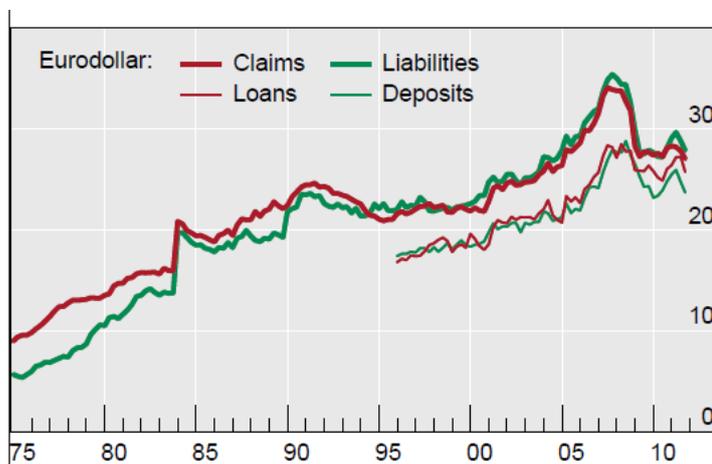
Source: Dong He and Robert McCauley: "[Eurodollar banking and currency Internationalization](#)", *Bank for International Settlements Quarterly Review*, June 2012

Note that in this table all assets and liabilities are vis-à-vis non-banks: hence inter-bank transactions are netted out. Thus, in 2010 eurodollar liabilities to non-banks were about 24 percent of total dollar liabilities; and about the same for assets (row 5). Hence, eurodollar banking was about one quarter of total dollar banking.

Figure 1 shows the evolution over time of total eurodollar asstes and liabilities vis-à-vis non-banks as a share of total dollar banking assets and liabilities, respectively. Thus, it corresponds to row 5 of Table 2: it shows the size of the Eurodollar market as a percentage of the total size of the US banking sector . Note the very fast growth of the Eurodollar market until 1990, when the FED removed the reserve requirement on large denominated domestic deposits, thus effectively removing a tax on intermediation by the US banking system. Then note the increase starting at around 2000, up to more than 30 percent, until the financial crisis of 2007-8, when the proportion of offshore banking declined again to

approximately 25 percent in 2010. (the jump in 1983 is due to the inclusion of Caribbean banks in the statistics).

Figure 1: Eurodollar banking as a share of global banking



Source: Dong He and Robert McCauley: “[Eurodollar banking and currency Internationalization](#)”, *Bank for International Settlements Quarterly Review*, June 2012, based on FED and BIS data

## 1.5 TYPES OF TRANSACTIONS IN THE EURODOLLAR MARKET

There are three types of transactions in the Eurodollar market

1. Pure offshore transactions. Both sides of the transaction are non US residents. As an example, a Middle East central bank deposits \$10 mln in a UK bank, that lends the money to a German company. This transaction does not show up in the capital or current account of the US, the country of the currency of denomination of the deposits transacted. This is an example of a creation of Eurodollars that has nothing to do with the current account deficit of the US (see Friedman’s point above)

2. Pure round-trip transactions. Here both the sides of the transaction are US residents: thus, funds get out of the US and then get back to it. As a first example: a US resident makes a deposit of \$10 mln in a Caribbean branch of a US bank in order to get a higher interest rate. A US bank then borrows \$10 mln from this branch, as a cheaper source of funds than federal funds.

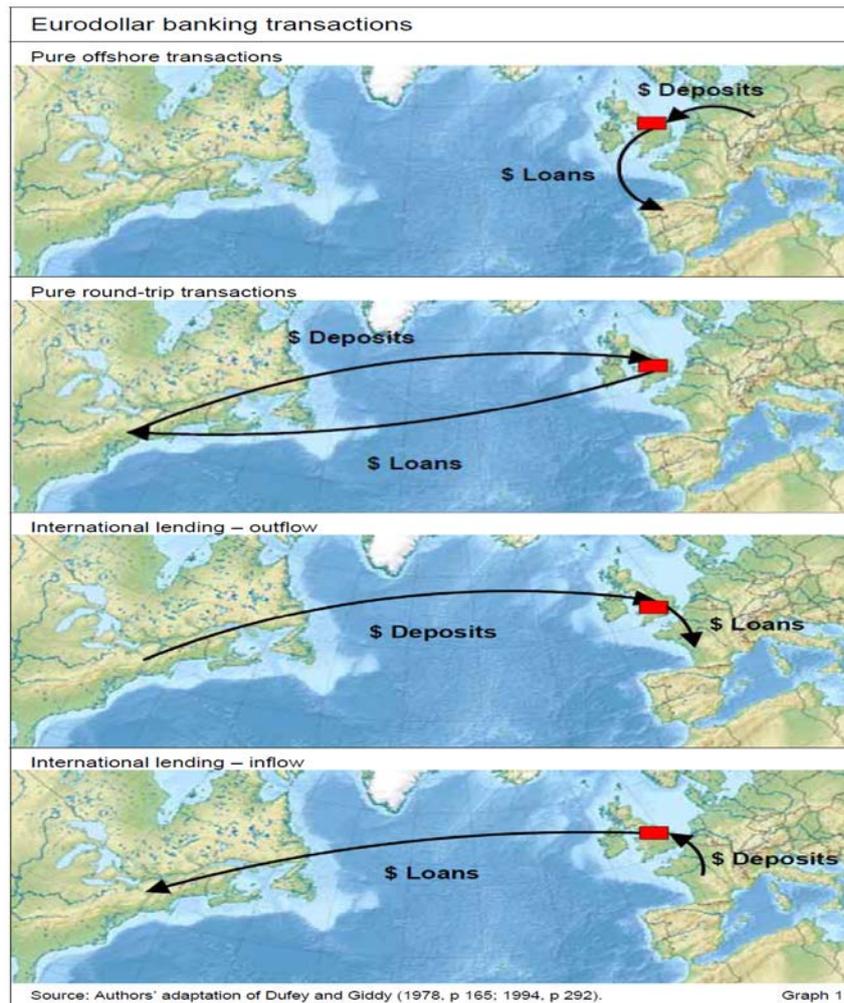
A second example is typical of what happened just before the financial crisis. European banks borrowed from US residents (i.e., increased Eurodollar deposits held by US residents) in order to buy US, dollar denominated, risky asset-backed securities based on the US housing market. This too was motivated by regulatory arbitrage: European banks investing in US asset backed securities were subject to lower capital requirements, hence they could offer a higher remuneration on their deposits and leverage the investment more. We will see that this was one of the root causes of the financial crisis.

In all these cases there are gross flows through the US capital account, but again no net flow.

3. International lending (or: cross-border flows).

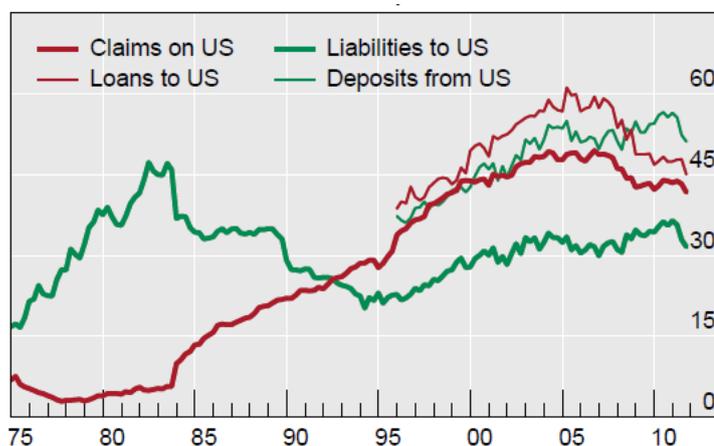
In this case, the two ends of the transaction are one a US resident and one a non-US resident. Thus, funds flow from the Eurodollar system to a US resident (a net flow of funds into the US) or viceversa (a net flow of funds out of the US). This transaction would then register in the capital or current account of the US.

Figure 2: Types of transactions in the eurodollar market



Source: Dong He and Robert McCauley: “[Eurodollar banking and currency Internationalization](#)”, *Bank for International Settlements Quarterly Review*, June 2012

Figure 3: Positions against US non-bank residents as a share of total eurodollar positions



Source: Dong He and Robert McCauley: [“Eurodollar banking and currency Internationalization”](#), *Bank for International Settlements Quarterly Review*, June 2012, based on FED and BIS data

Figure 3 shows the behavior over time of row 6 of Table 2, i.e. Eurodollar banks’ claims on US non- bank residents (in what follows, we will omit the “non-bank” specification), as percentage of total Eurodollar claims (red line), and Eurodollar banks’ liabilities to US residents, as percentage of total Eurodollar liabilities (green line). When both the red line and the green line are 0, this means that all transactions of the Eurodollar banks are with foreign residents: thus, all transactions are of the pure offshore type. If both the red and the green lines are at 100%, all transactions of the Eurodollar banks are with US residents: hence all transactions are pure round-trips.

In the middle, the pure round.-trips are given by the lower of the red and green line: if liabilities to us non banks are, say, 40% and claims on US non-banks are, say, 60%, then the Eurodollar deposits by US residents finance two thirds (40/60) of the Eurodollar loans to US residents. Pure offshore transactions are given by the complement to 100 of the higher of the two lines. In the example above, the claims of the Eurodollar banks on non-US residents are 40% of total Eurodollar claims; the Eurodollar deposits by non-US residents are 60%, hence two thirds of the liabilities of non-US residents, i.e. 40% of total Eurodollar liabilities, fund the 40% claims on non-US residents. The difference between the two lines is net flows between US and non-US residents intermediated by the Eurodollar banks.

The figure shows that, starting in the late nineties, round trip transactions increased, and so did net lending by the eurodollar banks to US non banks.

On the liability side, Eurodollar deposits by US residents were already large in the seventies, due to the combination of Regulation Q, the reserve requirement, and deposit insurance fees on US banks’ deposits. On the asset side, the figure shows the large increase in eurodollar loans to US residents as a percentage of total eurodollar loans up to the financial crisis: after approximately 2000, this is largely due to the investment by European bank into asset backed securities, as we discussed above.

So the graph clearly shows an increase in round-tripping transactions after 2000. This may seem counterintuitive, because by that date three important regulatory advantages for Eurodollar deposits had

disappeared: reserve requirements on large-denomination CDs and TDs had been eliminated and FDIC insurance assessments now had to be paid also on deposits at US branches of foreign banks. Also, Regulation Q's ceiling on interest rates on non-demand deposits had long disappeared.

But there was still one opportunity for regulatory arbitrage that spurred the growth of round tripping in the Eurodollar market: European banks outside the US borrowed dollars from US money market funds and other investors, to buy asset-backed securities. The reason was that European banks were subject to less stringent capital requirement on asset-backed securities than US banks. Thus, European banks could reach much higher leverage ratios, which of course would increase returns on equity as long as the price of asset backed securities increased, but caused widespread problems when they started falling.

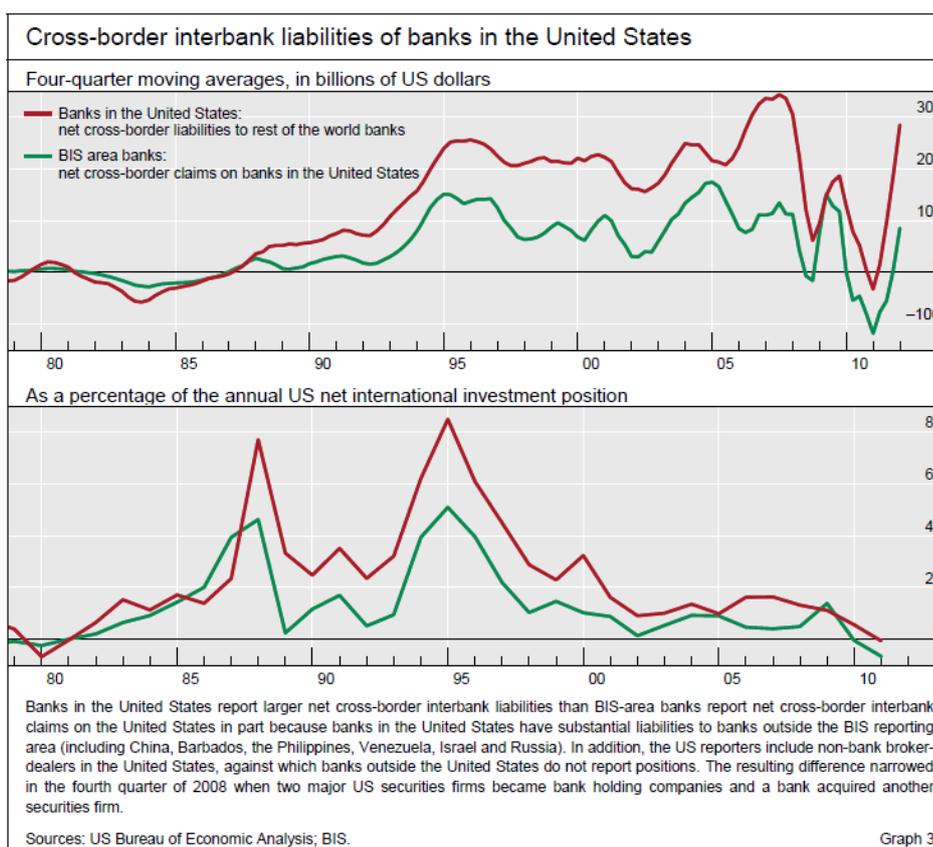
What about the size of cross-border flows, the third type of transactions? Most of these flows are between banks, so to have an idea of these flows we can look at the size of the net cross border liabilities of US banks to non-US banks, or, equivalently, we can look to non-US bank claims on US banks. There are two measures of this, by the FED and by the Bank of International Settlements. They differ slightly, but not significantly. The behavior over time is in Figure 4. As one would expect, net cross border liabilities of US banks turned positive when the US net investment position turned negative in 1986. Then they kept increasing, particularly in the few years up to 2007, as US banks borrowed abroad (especially from their foreign affiliates) to finance the housing market boom. However, the size of these flows is much smaller (a maximum of \$300 bn, just before the financial crisis) relative to the size of the round trip operations we documented above.

Thus, we draw two main conclusions:

1. The eurodollar market has intermediated funds mostly between borrowers and lenders outside the United States (pure offshore transactions) and to a lesser extent between borrowers and lenders within the United States (round-trip transactions), but little between borrowers in the United States and lenders abroad, or viceversa.

2. There has been a large increase of round-tripping and of cross-border lending to US banks in the years before the financial crisis, both of which have been used to do regulatory arbitrage to fuel the housing market boom in the US.

Figure 4: Cross-border interbank liabilities of banks in the United States



Source: Dong He and Robert McCauley: “[Eurodollar banking and currency Internationalization](#)”, *Bank for International Settlements Quarterly Review*, June 2012, based on FED and BIS data

## 1.6 EURODOLLARS AND THE FEDERAL FUNDS MARKET

In the United States, Eurodollars and fed funds are regulated similarly. Fed funds, according to [Regulation D](#), are exempt from reserve requirements.<sup>2</sup> Although the Fed can impose reserve requirements on net Eurodollar deposits of U.S.-based banks, it has imposed a zero [reserve requirement](#) since 1990, making the treatment of Eurodollars effectively the same as fed funds. As a result, U.S.-based banks consider funding through fed funds and Eurodollars to be close substitutes. An important difference, however, is that fed funds can only be lent by depository institutions, government-

<sup>2</sup> This subsection is taken verbatim from Marco Cipriani and Julia Gouny: “[The Eurodollar market in the United States](#)”, *Liberty Street Economics*, May 27, 2015

sponsored enterprises, and a few other eligible entities, whereas a broader set of institutions can invest in Eurodollar deposits.

Since Eurodollars and fed funds are close substitutes as funding sources, their rates as calculated from brokered transactions data normally track each other closely.

The Fed monitors and analyzes the Eurodollar market as an important overnight funding market for U.S.-based banks. The Fed has traditionally collected fed funds data from U.S.-based brokers and started collecting Eurodollar data from the same brokers in 2010. According to these data, the overnight brokered Eurodollar market is around three to four times larger than the overnight brokered fed funds market. The average daily volume of Eurodollars borrowed overnight through the brokers in 2014 was about \$140 billion, and, with the exception of quarter ends, the amount is fairly stable from day to day.

## 1.7 REFERENCES

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