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## Will IT Technologies and Globalisation Change the Mechanism of Money Creation?<sup>1</sup>

### Abstract

*Objectives:* The article addresses the question about whether IT technologies and the ongoing globalisation are likely to impact the money creation mechanism.

*Research Design & Methods:* For this purpose, the article reviews the experiences of free banking, the endeavours to promote the bitcoin as a new currency, the discussions on digital currencies issued by central banks, the experiences with Eurodollar market, and the emergence of imbalances in the TARGET2 (the Eurozone payment system).

*Findings:* The analysis leads to two general findings. The first one is that cryptocurrencies are unlikely to replace the existing monetary system. The second one is that the increasing globalisation creates the need for the most important central banks to expand their role as international lenders of last resort.

*Implication / Recommendations:* One implication of the main findings of the paper is that cryptocurrencies will have to go through a long evolution before they might have a chance to become an integral part of the monetary systems instead of being purely speculative assets. The other implication is that the experiences with the TARGET2 system revealed the ECB's large potential to prevent sudden halts in international trade.

*Contribution / Value Added:* The article's added value with regard to the existing literature is highlighting that the main reason why the deposit money created by commercial banks (making the bulk of money supply today) will not be replaced by cryptocurrencies stems mainly from the fact that the latter cannot be allocated in an economically rational way. The other contribution is underscoring that the TARGET2 imbalances reflected the positive role played by the ECB in alleviating the consequences of the global banking crisis of 2007-2009 and the Eurozone debt crisis of 2010-2012.

*Article classification:* research article

*Keywords:* money creation, bitcoin, central bank, digital currencies, Eurodollar market, Target 2 imbalances

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## Introduction

The goal of this paper is to investigate whether the emergence of the IT technologies and the advancing globalisation are likely to change the existing mechanism of money creation. The paper offers two general conclusions.

The first one is that the recently expressed hopes for cryptocurrencies and CBDC (central bank digital currencies) to substitute the recent forms of money do not sufficiently take into account the problem of the efficient money allocation. At present, this condition is met only by deposit money created by commercial banks. The second conclusion, illustrated by the functioning of the Eurodollar market and the Eurozone payment system (TARGET2), is that the efficient functioning of the global monetary system needs the most important central banks to play the role of international lenders of last resort.

The paper is organised as follows. Section 2 points out that, contrary to what is commonly believed, money is created not by central banks, but by commercial ones. Section 3 explains why cryptocurrencies in their present form should be treated as speculative assets used widely (due to their anonymity) for illicit operations rather than as genuine money. Section 4 discusses why, as far as electronic money is concerned, the only rational option for central banks is to issue cash substitutes as a means of payment rather than deposit money. Section 5 underlines that also the international currencies, such as the US dollar, are created by commercial banks. Section 6 underscores the role of the European Central Bank (ECB) in shielding Eurozone debtor countries from a much deeper financial crisis than that which they actually suffered. Section 7 draws lessons from the analysed experiences. Section 8 is a concluding part.

## How is money created?

The vast majority of money supply comes in the form of deposit money, which originates from commercial banks' lending activity (McLeay et.

al., 2014)<sup>2</sup>. Perhaps the best way to illustrate this fact is to recall how money was created in the free banking era, when there was no central bank in the United States (Sanches, 2016; Marszałek, 2014).

Money creation results from commercial banks monetising the streams of future loan repayments by borrowers. Nonetheless, from the technical point of view, commercial banks create money *out of thin air*, just by means of entering the same amounts (the loan and the deposit) on both sides of their balance sheets. James Tobin aptly described it as *fountain pen money*, since in his time the deposit money was created with the stroke of a pen (Tobin, 1963).

During the period of free banking, the banknotes and the deposits issued by commercial banks were trusted, because they were redeemable (on demand) into gold at a fixed parity and the government accepted them for tax payments. Today, deposit money is trusted, because it is redeemable into banknotes having the status of a legal tender.

Why was inflation relatively stable during the free banking era despite the absence of a central bank in the United States? The reason was that 19<sup>th</sup>-century banks extended almost exclusively short-term self-liquidating working capital loans, which financed mainly firms' running stocks (Gorton, 1993). In such an environment, the quantity of money increased in line with the supply of goods and services, which had an inflation-stabilising effect. That is why the Real Bills Doctrine, dominating at that time, reflected reality to a large extent.

The main reason why the Federal Reserve System was established in 1913 was that during financial crises (the especially painful one took place in 1907) commercial banks were incapable of mustering sufficient liquid reserves to meet deposit withdrawals, which resulted in runs on banks and their bankruptcies.

<sup>2</sup> The paper does not discuss the problem of *helicopter money* (money financing of budget deficit) as this concept still lacks institutional solutions which would effectively shield an economy from inflation risk (Turner, 2016).

Before the Federal Reserve was founded, the supply of banks' liquid reserves – in the form of the so-called *specie certificates* – reflected the amount of gold coins (specie) deposited by banks at clearing houses. During a crisis, the clearing houses issued extra reserves through extending the so-called *loan certificates* to member banks, but their volume had to be fairly small, since they were not a legal tender (Gorton & Tallman, 2016; Moen & Tallman, 2013). The solution to this problem was to establish a central bank endowed with an unlimited capacity to issue liquid reserves. This became possible as the government assigned the status of a legal tender to the liquid reserves issued by the Fed.

The developments that led to the establishment of the Federal Reserve System illustrate that to manage the payment system and play the role of lenders of last resort during crises is among the most important functions of central banks.

### **Did bitcoin have a chance to become money?**

The flagship Fintech innovations comprise the blockchain technology, and bitcoin intended to become a new global currency.

Initially, bitcoin and other cryptocurrencies attracted a great deal of popular interest as a result of the timing of their launch. Satoshi Nakamoto published his paper (2009) – a kind of manifesto on the need for a ground-breaking reform of the monetary system – when central banks had launched their quantitative easing programmes, which were erroneously interpreted as a massive 'money printing,' while in reality what the central banks actually increased was not the money supply, but liquid reserves during a particularly painful global banking crisis (Sławiński, 2016).

Nakamoto proposed to disrupt not only the central banks (since in his view they tended to 'debase money'), but also the commercial ones, since he considered them too risky due to the fractional reserve system (Nakamoto, 2009).

Commercial banks were indeed responsible for the global banking crisis of 2007-2009. However, its principal cause was not the fractional reserve system as such, but, rather, the banks' irresponsible lending policies resulting from excessively liberalised banking regulations and lax supervision due to the effective lobbying efforts on the part of large international financial institutions (Lall, 2012, 2015).

Bitcoin was intended to become a digital equivalent of the gold standard, hence the 21 million coins cap imposed on its issuance (Soderberg, 2018). The assumption behind it was that – under the gold standard – money was stable, because the supply of gold was limited. Such a reasoning is so simplistic that it is, in fact, wrong. Under the gold standard, there were two sources of price stability. First, commercial banks at that time (as mentioned above) extended predominantly short-term self-liquidating working capital loans. Second, due to a lucky coincidence, the global supply of gold (from new discoveries) grew more or less in line with the global GDP and the volume of transactions (Cassel, 1936). Moreover, the absence of exchange-rate risk facilitated a constant 'recycling' of capital from surplus to deficit countries. This ensured a uniform rate of growth of gold reserves and money supply in all countries participating in the gold standard system.

In this way, the limit on bitcoin issuance became an incentive for speculation rather than a factor that stabilised its value. Instead of being a stable currency, bitcoin became a highly speculative asset. Its volatility exceeds the volatility of exchange rates and S&P 500 index several-fold, which makes its role as money simply inconceivable (Danielsson, 2018)<sup>3</sup>.

The general conceptual flaw inherent in the bitcoin project is its disregard of the fact that any monetary system is based on social agreement. Society empowers the authorities to organise an

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<sup>3</sup> The proposals to issue stable coins with fixed exchange rate to the dollar (Al-Naji et al., 2018) are not a proper solution as these coins are not legal tenders and they are widely used (due to their anonymity) for illicit transactions (Eichengreen, 2019).

efficient monetary system. Trust in public institutions cannot be substituted for trust in a specific technology (Dodd, 2017). Additionally, had the fiat money been replaced by cryptocurrencies, it would have constituted an unfair misappropriation of seigniorage by private money issuers.

The weakness of the claims that cryptocurrencies constitute an alternative monetary system is illustrated by the fact that they could make an efficient monetary system only if they played a role of liquid reserves in a system containing commercial banks extending loans denominated in cryptocurrencies and a central bank conducting monetary policy and playing the role of the lender of last resort (Danielsson, 2018)

### **Will it be easy for central banks to issue electronic cash?**

In some countries, especially in Scandinavian ones, cash has been on a steady retreat. On this wave of popular sentiment, in 2017 the Bank of Sweden announced its preparations for issuing a CBDC – central bank digital currency (Sveriges Riksbank, 2017). Yet, at the same time, the central banks of Denmark and Finland decided not to undertake such preparations (Grym et al., 2017; Gurtler et al., 2017), which suggests that issuing CBDC is a more difficult challenge than it might appear at first.

Central banks should not create deposit money. It should be created by commercial banks, since this guarantees its rational allocation to those who are efficient enough to repay the loans. In the past, central banks usually evolved from large commercial banks, but they gave up their commercial activities in order to properly fulfill their role of lenders of last resort (Bordo, 2014, 2017). Nowadays, central banks do not extend commercial loans. Hence, they do not have capabilities to allocate the newly created deposit money.

One might consider it rational for central banks to hold households' and firms' deposits, i.e. the money originally created by commercial banks. Such a change would give households and

small firms direct access to the central bank's real-time payment system.

Still, this would not be a good idea. Opening up such a possibility for households would pose a challenge similar in nature to that faced by narrow banking (Goodhart, 2009). In peaceful times, households would keep their deposits with commercial banks as the latter ones would offer a higher interest and a wider range of services than those available at a central bank. However, during a recession, an increasing uncertainty would trigger a massive deposit flight from commercial banks to the central bank (Callesen, 2017). This would force central banks to supply commercial banks with ample liquidity in order to save them from liquidating a large portion of their assets, which might cause turmoil on financial markets. Moreover, if several central banks decided to hold household deposits, the increased uncertainty on international financial markets might trigger massive deposit flights, e.g. to the Swiss National Bank (Gurtler et al., 2017).

If it is not rational to allow the general public to deposit money with central banks, it seems obvious that the latter should at least be able to issue electronic cash. In fact, even this is not as simple as it might seem. The problem is that cash in circulation is not recorded in any personalised ledgers – the central bank balance sheet shows only the item termed “cash in circulation.” However, electronic cash cannot exist without being individually recorded in a ledger (Grym et al., 2017). That is why the Riksbank announced that it would issue not electronic cash, but a digital *complement to cash* (Sveriges Riksbank, 2017). It will likely be a contactless payment card offering access to instant settlements within the Riksbank's payment system while protecting its owners' anonymity and privacy.

### **Who is creating international currency – commercial or central banks?**

A bank in any given country, e.g. a UK-based one, can extend loans and create deposit money

denominated in foreign currencies, e.g. in US dollars, as long as it has a *nostro* account in an American correspondent bank, which will process the payments in US dollars as ordered by the British bank and its customers.

This is how the Eurodollar market emerged in London in the 1960s<sup>4</sup>, when the British banks started to extend loans denominated in US dollars during the global shortage of international liquidity in the wake of World War II. At that time, the increased global demand for the US dollar was due to the successive surcharge taxes imposed on capital outflow from the United States (Fieleke, 1971).

Since then, US dollar deposits have been created by large foreign banks not only in the UK. Today, a substantial share of the US dollar global supply results from dollar-denominated lending by non-American banks outside the United States. In 2012, approximately 30% of US dollar deposits were held by such banks (He & McCauley, 2012). In 2015, the aggregate amount of dollar-denominated loans extended by non-American banks outside the United States amounted to US\$ 3.7 trillion (McCauley, McGuire & Sushko, 2015).

How is it possible for non-American banks to create and hold US dollar-denominated deposits? As was the case with the British banks in the 1960s, all they need is to have a *nostro* account at an American correspondent bank giving them indirect access to Fedwire (the Federal Reserve payment system). This is enough to secure the executing of US dollar payments ordered by the customers and to enable them to draw dollar-denominated cash from their bank accounts.

Milton Friedman offered perhaps the best summary of the reasons why US dollars can be created by foreign banks: “Euro-dollars, like

‘Chicago dollars,’ are mostly the product of the bookkeeper’s pen” (Friedman, 1971).

The emergence of the Eurodollar market was among the most important factors which increased the supply of international liquidity. The supply of the US dollars created in the Eurodollar market made it possible to overcome the global liquidity shortage, which limited the need to issue the SDRs in the 1970s<sup>5</sup>.

Until the Chinese renminbi ascends to the status of an international currency, which could take a long time (Prasad, 2018), the international monetary system will remain dominated by the US dollar and the euro. This creates the need for the Federal Reserve System and the European Central Bank to play the role of international lenders of last resort. The global financial crisis of 2007-2009 illustrated that both central banks were attempting to stand this challenge.

What facilitates the Federal Reserve to be a global lender of last resort is that many large foreign banks (mainly European ones) are among its prime dealers (Reinhart, 2011). Thus, during the recent global banking crisis of 2007-2009, they could borrow dollar liquidity directly from the Federal Reserve (Shin, 2012). The striking illustration of the Federal Reserve playing the role of the international lender of last resort was the US\$ 600 billion liquidity swap lines that it extended in 2008 to the European Central Bank, which enabled European banks to replenish their dollar liabilities (Broz, 2015).

The ECB, in turn, was fulfilling the role of the international lender of last resort within the Eurozone, which was illustrated by the experiences with the TARGET2 imbalances.

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<sup>4</sup> The origin of the term ‘Eurodollar market’ comes from London, i.e. was conceived of in Europe. While nowadays large banks in other financial centres (e.g. in Hong Kong) are also extending US dollar-denominated loans, the market for such loans is still referred to as Eurodollar market.

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<sup>5</sup> The chances for SDRs to become a widely used international currency are, in fact, small, since there is only marginal private sector demand for SDRs as a currency used in foreign trade or for settling transactions on financial markets (Eichengreen, 2017)

## What do TARGET2 imbalances tell us about money creation in a monetary union?

After the outbreak of the Eurozone sovereign debt crisis in 2010, the so-called TARGET2<sup>6</sup> imbalances attracted a considerable attention of economists and the media. The term ‘imbalances’ refers to the cumulated national central banks’ (NCBs) claims or liabilities against the ECB. Some German economists raised the alarm that the peripheral Eurozone countries were ‘printing money’ to finance their trade deficits and compensate capital flight instead of launching bold economic adjustment efforts. Furthermore, these economists requested that the Bundesbank’s claims against the Eurosystem should be repaid or at least collateralised with marketable assets (Sinn & Wollmershauser, 2012).

Discussing the validity of these claims offers an opportunity to emphasise certain important issues related to money creation in a monetary union, where the common currency is shared by a number of sovereign states.

To begin with, there is nothing peculiar about the fact that most of the Eurozone money was created in peripheral countries. The establishment of the Eurozone and the resulting substantial fall in interest rates in peripheral countries produced unsustainable credit booms in their economies. Spanish, Irish, and Portuguese importers chose to take loans from their domestic commercial banks in order to finance imports from, e.g., Germany or the Netherlands. Thus, the deposit money created in the peripheral countries’ commercial banks was transferred to exporters in the core countries, which was why German companies did not have to borrow heavily from their local

banks in order to replenish their money stocks (Kuzin & Schobert, 2015).

Where did banks – e.g. in Spain – obtain liquid reserves to execute payments conducted by the Spanish importers towards German exporters? They were borrowing them on the Eurozone interbank money market. It was easy, because before the outbreak of the global banking crisis of 2007-2009, banks in the Eurozone creditor countries had been re-lending payments received from exporters on the Eurozone interbank money market. This kept liquid reserves returning from banks in Eurozone surplus countries to banks in peripheral economies. As a result, the stocks of banks’ liquid reserves both in creditor and debtor countries were small and stable in spite of very large trade deficits in e.g. Spain and sizeable trade surpluses in Germany. This was possible as liquid reserves were being continuously ‘recycled’ from the surplus to the deficit countries.

The problem with increasing TARGET2 imbalances (cumulated NCBs’ claims and liabilities to the ECB) emerged during the global financial crisis of 2007-2009, when commercial banks suffered steep losses and ceased to trust one another, which froze the interbank money market. Consequently, e.g. Spanish banks were no longer able to borrow liquid reserves on the interbank money market and had to turn to their NCB (Banco de Espana) instead.

Banco de Espana, being actually a merely operational branch of the ECB, had to extend such loans as otherwise there would be a rise in market interest rate above the level set by the ECB. Then, Spanish commercial banks were transferring the liquid reserves, which they borrowed from the Banco de Espana to, e.g., German exporters’ banks. Without an operational interbank money market, the latter were not re-lending these reserves to other commercial banks through interbank money market. They were depositing them with the Bundesbank instead. The outcome was an increase in Banco de Espana liabilities and Bundesbank claims against the Eurosystem.

<sup>6</sup> Initially, the TARGET (Trans-European Automated Real-Time Gross Settlement Express Transfer) system was created to constitute a platform for cross-border payments within the Eurozone (Handig et al., 2012). Then, it was transformed into TARGET2, i.e. the common payments system for banks in the Eurozone and in some other EU countries which (like Poland) participate in the system.

An analogous situation emerged in 2010-2012, during the sovereign debt crisis, which triggered capital flight from the Eurozone creditor to debtor countries. Why did this capital flight increase TARGET2 imbalances? The reason was that commercial banks in the debtor countries had to have enough liquid reserves to execute payments related to capital flight.

For example, if an international company decided to move its deposits from an Italian bank to a German bank, the Italian bank would have to borrow liquid reserves from Banca d'Italia to transfer them to the German bank, and the latter would deposit them with the Bundesbank. This way the capital flight from the Eurozone debtor to creditor countries would produce a sharp rise of TARGET2 imbalances.

In fact, the rise in TARGET2 imbalances did not mean that the Bundesbank or the Nederlandse Bank were extending loans to the Eurozone debtor countries' central banks. The payments were flowing in reverse order. The NCBs in debtor countries were extending liquidity loans to their commercial banks, enabling them to execute payments related to capital flight to the creditor countries. Banks in the creditor countries were depositing this liquid reserves with their NCBs, e.g. the Bundesbank or the Nederlandsche Bank.

As the NCBs are only the ECB's regional branches, the balancing item for Banca d'Italia liquidity loans extended to Italian banks was its growing liabilities against the ECB. In the case of Bundesbank, the balancing item for its cumulating liabilities (resulting from bulging liquid reserves of German commercial banks) came in the form of increasing claims against the ECB.

In 2012, in order to neutralise the risk of a Eurozone breakup, the ECB announced the OMT (Outright Monetary Transactions) programme, which ended the Eurozone sovereign debt crisis. The risk of a Eurozone breakup subsided. The interbank money market started to operate again. Banks' liquid reserves were being again recycled from the creditor to the debtor

countries. This brought a gradual shrinkage of the TARGET2 imbalances<sup>7</sup>.

All in all, the TARGET 2 imbalances were not a symptom of a *stealth bailout* of the Eurozone debtor countries (Sinn & Wollmershauser, 2012), but an accounting reflection (in operationally decentralised system of Eurozone central banks) that the ECB was successfully fulfilling its role of the lender of last resort within the monetary union. In 2007-2009, the liquidity loans extended by the ECB allowed commercial banks in Eurozone debtor countries to continue credit and money creation, which was necessary to finance imports after the stoppage of capital inflows from the Eurozone core countries. This saved the Eurozone debtor countries from sudden stops, which were very common during the Asian crises in the late 1990s. In 2010-2012, the ECB's loans allowed commercial banks in Eurozone debtor countries to stay liquid despite capital flight to the Eurozone creditor countries, which otherwise might put at risk the mere existence of the European monetary union.

## Discussion

The modern monetary system is the outcome of a long evolutionary process and some of its crucial elements have not changed much. Money is still created by commercial banks. Central banks still manage the payment system and provide commercial banks with needed reserves.

The contemporary monetary system works fairly effectively. Nakamoto's assertion (2009) that it should be dismantled, because central banks tend to debase money and commercial banks are inherently risky (due to the fractional reserve system), blatantly contradicts the reality. Central banks have been very effective in stabilising

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<sup>7</sup> Since the launching of the ECB's QE in March 2015, TARGET2 imbalances started to cumulate again, but this time it did not reflect an accumulation of risks within the Eurozone, but, rather, resulted mainly from the decentralised method of buying securities by the NCBs (Gros, 2017; Eisenschmidt et al., 2017).



inflation, especially after gaining independence in the 1980s and the 1990s. The global banking crisis was not caused by the system of fractional reserves, but resulted mainly from crony capitalism. The main cause of the crisis was that large international banks were capable of effectively lobbying for excessive relaxation of bank regulations and supervision (Sławiński & Hausner, 2018).

The inefficiencies of the banking system are to be found in the operation of the payment system. Household transactions are still cleared in a slow and costly way, with cross-border payments being especially expensive. Even so, the blockchain technology and bitcoin cannot fix these distortions. In contrast to the other Fintech innovations (such as PayPal, Venmo, Alipay, WeChat, M-Pesa, or Paytm), the blockchain technology and cryptocurrencies do not represent a genuine innovation even in the payment system (Roubini, 2018). Payments through the blockchain were slow and expensive, which was one of the reasons why a number of central banks have decided not to use this technology when issuing electronic cash (Grym et al., 2017; Gurtler et al., 2017; Soderberg, 2018).

As far as the globalisation is concerned, it does not change the process of money creation by much. International currencies are created by commercial banks as well. One example is the operation of the Eurodollar market. A considerable proportion of US dollars is created outside the United States by non-American banks. Large commercial banks in a given country can extend loans and create deposits denominated in US dollar or euros as long as their reputation permits them to open a *nostro* account in American or Eurozone correspondent banks.

The Eurozone monetary system does not really differ from a domestic one. Deposit money is created by commercial banks and the central bank (ECB) issues liquid reserves needed for interbank settlements. The EU member states' NCBs are, in fact, only ECB's regional branches, similar to the district Federal Reserve banks in the United States.

The difference is that when a common currency is shared by a number of sovereign states and there is a risk of a monetary union breakup, the creditor countries' central banks' claims can be perceived as a part of their foreign exchange reserves and the debtor countries' central banks liabilities can be perceived as a part of their official foreign debt. This is the reason why the Eurozone creditor countries' assertions that their central banks claims should be at least collateralised with marketable assets are justifiable. The problem could be solved through using as such collateral the assets which were purchased by the Eurozone NCBs under the ECB's QE programme (Cecchetti & Schoenholtz, 2018; Hristov et al., 2018; De Grauwe et al., 2017; Whittaker, 2016).

## Concluding remarks

From the historical perspective, innovations and globalisation have both been always shaping the monetary systems. The gold standard was a product of the 19<sup>th</sup>-century globalisation. The breakthrough payment innovation of the 19<sup>th</sup> century was the net-clearing system, which enabled smooth and cheap interbank settlements (Rolnick et al., 1998). This started the evolution towards the contemporary monetary system with monetary base – created by the central bank – and deposit money created by commercial banks.

The existing monetary system is the product of a long evolution, adjusting it to the evolving needs of the economy. The system contains three kinds of institutions which are needed to make it effective. Commercial banks are necessary for economically rational credit and money allocation. Central banks are indispensable for safeguarding price and financial stability. Governments are giving money the status of a legal tender and provide its holders with legal protection. Such a system is not likely to be easily replaced by a completely different one (e.g. cryptocurrencies). Nonetheless, it can be improved (Borio, 2019).

IT technologies are already improving the efficiency of existing payment systems. They make

it possible to accelerate scoring within financial institutions. Hopefully, Fintech innovations will make it possible to reduce the costs of financial intermediation, which has been disappointingly stable for so many decades (Phillipon, 2016).

The challenge posed by globalisation is the growing need for the most important central banks to play the role of international lenders of last resort. The Federal Reserve was fulfilling such a role during the recent global financial crisis by providing large quantities of dollar liquidity directly to individual foreign banks, which are its prime dealers, and indirectly through foreign exchange swaps extended to the ECB and some other central banks. The ECB, in turn, played the role of the lender of last resort within the Eurozone, which saved it from sudden stops in 2007-2009 and a possible breakup in 2012.

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