

Would banks buy daytime fed funds?

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Everyday, an average of more than \$400 billion flows through Fedwire, the large dollar wire transfer system run by the Federal Reserve.¹ The wire transfers composing this flow of funds routinely cause many banks to overdraft their accounts at the Fed during the day.² In fact, many banks frequently incur these "daylight overdrafts" in amounts which exceed their capital. Aggregated across all banks, daylight overdrafts on Fedwire and other wire systems sum to an incredible \$70-80 billion each day. These overdrafts are important because they represent substantial credit risk to the Fed for Fedwire daylight overdrafts, and to receiving banks for daylight overdrafts on other wire transfer systems.³

This paper considers what might happen to the fed funds markets if the limits or "caps" on Fedwire daylight overdrafts (DODs) were significantly lowered.⁴ Currently, caps are not very restrictive and banks are finding relatively inexpensive ways to reduce DODs (e.g., by adjusting the timing of various intraday inflows and outflows, substituting various term fed fund instruments for overnight fed funds, etc.). However, if caps become restrictive and alternative ways to lower DODs become too expensive, the current fed funds markets would probably be supplemented. Two alternatives, a separate intraday fed funds market and a separate overnight fed funds market with 24-hour maturities, might develop to allow participants to balance their intraday funding positions with their overnight positions.⁵ These two innovations could be operationally feasible, would reduce DODs and associated risks, and would maintain the efficiency and usefulness of the large dollar wire transfer systems. Finally, the paper discusses the likely effect of an intraday funds market on corporate customers.

Background

Over the last ten years, systemwide DODs and related types of overdrafts have grown quickly, causing the Board of Governors to become concerned about the associated risks. To reduce these risks, the Board issued a policy statement that allows most banks to set their

DOD caps if they perform a self-analysis of their ability to control their DODs.⁶ To do this, banks rate their own creditworthiness, credit policies, and operational controls according to the Board's guidelines. For any given bank, its self-assessment rating is combined with its adjusted primary capital to obtain a voluntary daily cap on the bank's DODs ranging from 0 to 300%, and an average bi-weekly cap ranging from 0 to 250% of the bank's adjusted primary capital.⁷ Based on this self-assessment, relatively nonrestrictive caps came into effect on March 27, 1986, to allow banks to become accustomed to controlling DODs. The Board's policy is not meant to condone DODs below the cap, and in fact the Board has stated its intention to lower caps over time.⁸

The fed funds problem

Overnight fed funds transactions are a significant cause of DODs at many large banks. This is because most large banks borrow overnight fed funds from many different lenders as a regular source of funding and to meet their required reserves.⁹ These funds are returned early the next morning, which adds to large borrowing banks' DODs until these banks re-borrow overnight funds later in the day. Large banks in states that restrict branching are especially affected because such banks have limited deposit-gathering abilities and rely more heavily on overnight fed funds purchased.

With tight enough caps, some large banks would need to obtain additional funds during the day in order to remain within their caps and to continue business as usual. This could be accomplished by switching from overnight to continuing contract or term fed funds,¹⁰ by borrowing extra overnight funds in the morning and reselling them in the afternoon, or by

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selling liquid securities in the morning and buying similar securities in the afternoon.¹¹ Such methods create an artificial intraday funds instrument. These banks might prefer to purchase an actual intraday instrument. At least one bank has already drafted a contract to sell intraday funds. Alternatively, large banks could lower their DODs by delaying fed fund repayments or purchasing overnight fed funds earlier in the day. Taken to its logical conclusion, a market for 24-hour fed funds would develop.

Intraday fed funds market

An intraday fed funds market would be an efficient way to redistribute daytime funds, at a price, from banks that have relatively little need for these funds to banks that have a greater need. A typical intraday funds transaction would involve funds moving from lender to borrower in the morning (e.g., at 9:00 AM) and returning later in the day (e.g., at 4:00 PM). The specific times for each transaction could vary. If caps became tight enough and an intraday fed funds market were to develop, this market would likely be a competitive, over-the-counter market.

Although some people may view the risks associated with DODs and intraday fed funds as identical because DODs and intraday fed funds are both intraday extensions of credit, it can be argued that substantial differences would exist. With DODs, the Fed accepts significant credit risk. In addition, since the bulk of the dollar value of DODs is caused by relatively few banks, this risk is poorly diversified. Further, the Fed receives no compensation either for accepting this credit risk or for eliminating the systemic risk from DODs by guaranteeing immediate and final funds over Fedwire. Moreover, individual private lenders are likely to be more adept at short term credit evaluation than Federal Reserve banks.

Credit extensions generated by an intraday fed funds market would differ in several respects from credit extensions generated by DODs at the Fed. First, the explicit pricing of intraday fed funds would permit a more efficient allocation of daytime reserve account balances than currently exists. Second, the intraday fed funds interest rate would be generated by the market, which would free the Fed of the need to identify an appropriate intraday

rate to achieve such an allocation. Third, a significant reduction in credit risk from intraday credit exposures between banks and the Fed would occur because the intraday interest rate would give banks and corporations an economic incentive to rearrange the timing of their wire transfers. However, shifting a portion of the Fed's intraday exposure to the private banking system would create systematic risk that does not exist with DODs at the Fed. Fourth, intraday fed fund exposures would be spread across more banks with more capital, so aggregate intraday credit risk would be more diversified than under the current system. Finally, an intraday market would give the banking system additional flexibility in managing unexpected shifts in daytime balances.

If caps become restrictive enough and intraday funds become the least expensive means to remain within these caps, bankers will face the administrative problem of making intraday funds operationally feasible. Several ways in which bankers could overcome this problem include timing standardization, priority messages, bilateral contracts, and two-tiered pricing (See Box).

Intraday supply and demand

Many banks should be willing to supply funds to an intraday funds market, for the following reasons. First, many banks consistently have positive daytime balances in their accounts at the Fed. Since overnight fed funds are returned early in the morning, banks that currently sell overnight funds could also generally sell a similar amount of intraday funds. Typically, these banks would not lose any overnight investment opportunities, since repayment of intraday funds would be received before the end of the day. Second, to the extent that many of these banks have relatively few corporate customers, these banks may not need to hold funds during the day for unexpected corporate wire transfers. Third, extending intraday credit to large borrowing banks would represent a new opportunity for many banks to increase their interest revenues. Last, adjusting operations to supplement overnight fed funds sold with intraday fed funds sold should be relatively simple, especially for the many banks that sell all of their overnight fed funds to one or a few correspondent banks.

An operational viewpoint

Operations

For an intraday market to function, funds must move in time to have the desired daylight overdraft effect. Intraday funds would be sent over Fedwire if the Fedwire DOD portion of a bank's cap were binding, and could be sent over either CHIPS or Fedwire if the CHIPS portion were binding.

With such a market, some banks may develop real time posting and monitoring capabilities to gain information in a timely fashion. These capabilities would help banks decide when to borrow or sell in the intraday market, as well as when to charge and indirectly credit corporate accounts for intraday balances. Banks would develop billing procedures for intraday charges and credits. In addition, banks would write agreements specifying terms, such as penalties or additional interest charges due if receipt of funds were late because of unexpected computer downtime or for other reasons.

One can envision the development of a fed funds market where large banks would become over-the-counter dealers for intraday funds. Banks could set up and use various timing arrangements for moving these funds. For example, the timing of borrowing and repayment could be negotiated between the buyer and seller every time a transaction occurs. Such flexibility would be helpful in adjusting to day-to-day variances, unexpected inflows or outflows, and DOD forecasting errors. Alternatively, a buyer and seller could negotiate a timing standard, and use it until either party seeks a change. This would eliminate the need to negotiate timing every time a transaction occurs. A third option could be for an industry group to recommend common times for both borrowing and repayment. In addition to eliminating the cost of renegotiating the timing of each transaction, this timing standardization alternative could increase liquidity and volume in the intraday mar-

ket. Currently, standardization of risk facilitates securitization of assets such as residential mortgages. Standardization also facilitates liquidity in the secondary T-bill market. These timing arrangements would obviously be most useful for decisions planned in advance. Of course, other timing arrangements would also be feasible, and a bank would use alternatives as it deemed appropriate.

Reducing arrival uncertainty

With more restrictive DOD caps, bankers would want more certainty regarding when their funds would arrive over Fedwire. In fact, they would hesitate to buy or sell intraday funds until their uncertainty is sufficiently decreased. Therefore, an intraday funds market would likely require more timely Fedwire transfers than are now needed. Currently, arrival of funds could be delayed due to computer outages, long computer queues, human errors at either the sending bank or the Fed, or an array of other reasons. Under current operating rules, Fedwire does not make any guarantee about when funds will arrive at the receiving bank. Fedwire only guarantees that upon arrival, funds will be immediately and irrevocably available. Some combination of the following three approaches or other innovations should help minimize delays and decrease bankers' uncertainty regarding arrival times of Fedwire transfers.

One approach, development of "priority" Fedwire messages, might reduce this uncertainty by providing a separate, and on average a shorter queue time for high priority transfers than currently exists for Fedwire. Priority Fedwire messages would likely require sending and receiving banks to install additional hardware beyond that currently used for Fedwire messages. Although banks seem fairly satisfied with the timeliness of Fedwire transfers at present, if banks were to develop a strong enough

need for shorter queues, such a demand could be satisfied. Since banks' demand curve for Fedwire transfers appears to be relatively inelastic,* the price of priority Fedwire messages would probably have to be significantly above that of other Fedwire transfers to avoid having nearly all Fedwire messages eventually shift to priority messages.

A second approach to reducing the uncertainty regarding arrival times could be for the Fed to offer a new service which would allow banks to prearrange Fedwire transfers. Prearranged transfers could reduce the uncertainty by eliminating the risk that the sending bank would unintentionally cause a delay. This service could accommodate fed funds transfers or other Fedwire transactions and could be especially useful for repetitive transfers. The Fed's liability for this new service could be exactly as it currently is for Fedwire transfers. Alternatively, the Fed could guarantee the arrival time for DOD monitoring purposes only, with little additional liability, in order to stimulate development of an intraday funds market and reduce DODs. In either case, prearranged transfers would be sent even if the sending bank had computer outages or other operational problems. If funds were not sent by the Fed on time, or alternatively if funds did not arrive on time, the Fed could take this

into account in monitoring a bank's DODs and imposing moral suasion costs or other charges.

A third approach could be a two-tiered pricing system which could discriminate between intraday funds returned in time to be lent out to another borrower, and those returned too late. (Two-tiered pricing could also be applied to overnight funds and full-day funds.) If a bank returned intraday funds too late for the intraday seller to lend those funds out overnight, the intraday borrower would have to pay the overnight rate plus some further penalty, in addition to the intraday rate. In that case, the seller would be compensated if the lateness unexpectedly forced it to buy overnight funds in the market. More realistically, the penalties might be added if the funds were not returned by a pre-arranged time negotiated in advance between the two banks. A bank seeking to avoid these penalties but facing uncertainty regarding arrival time could aim to have the funds arrive slightly before the specified time, with very little loss in usefulness of these funds.

*Reichert, Strauss, and Merris (1985). p. 227. In their model of Fedwire transaction volume, price changes were not statistically significant in explaining variations in volume. They concluded that demand for Fedwire was inelastic.

Intraday supply and demand would be determined by: 1) Banks' accuracy in forecasting DODs; 2) The shadow price of DODs, which includes an intraday interest rate as well as expected moral suasion costs imposed by the Fed; 3) The aggregate shortage of intraday funds relative to caps; 4) Aggregate unused cap capacity; 5) The value of any other intraday opportunities, or the costs of alternative means of reducing DODs; 6) The extent to which an intraday funds market gains market acceptance and 7) The transaction costs of trading intraday funds. Demand for intraday funds is currently zero because caps are so high and because less expensive means of staying within caps are still available. Therefore, a

market for daytime funds has not yet developed in the industry.

Three groups of banks could participate in an intraday market.¹² Before any intraday funds trading occurs, Group 1 banks will generally have positive daytime Fed balances. Group 2 banks will generally incur DODs but will remain within their caps. Group 3 banks will frequently incur DODs in excess of their caps. Group 1 banks would be potential sellers of intraday funds, while Group 3 banks would be potential buyers. Group 2 banks could be sellers, buyers, or neither. If caps are reduced further after an intraday funds market develops, demand for intraday funds would increase, because borrowers would need more intraday funds to remain within their increasingly re-

strictive caps (see Figure 1). In addition, the supply of intraday funds would decrease, though only slightly, because most intraday funds would be supplied by unaffected Group 1 banks, and comparatively few intraday funds would be from Group 2 banks facing more restrictive caps. Since demand would increase and supply would decrease, further reducing caps would cause the intraday interest rate to rise.

An intraday fed funds market appears to be operationally feasible (See Box). Such a market would provide an effective way for banks to remain within their caps even if caps were significantly reduced, because an intraday funds market would improve the intraday allocation of funds among banks' reserve account balances. This market could reduce systemwide daylight exposures and associated risks as well as the exposures from specific large banks. Finally, an intraday funds market would keep payments system efficiency intact.

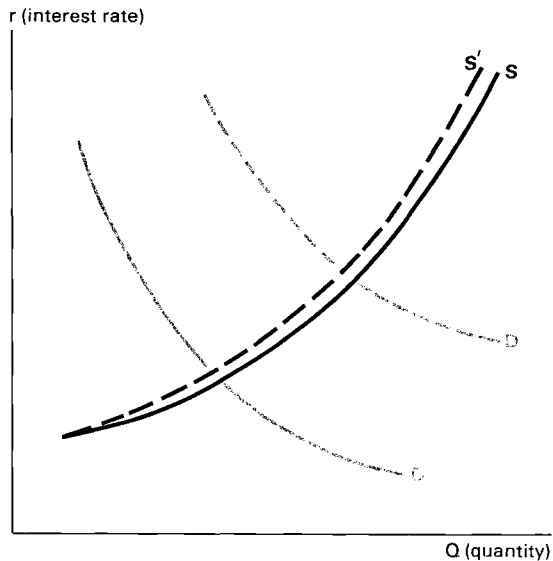
Full-day fed funds

Another approach to lowering DODs by better aligning banks' daytime positions with their overnight positions is 24-hour or full-day fed funds. Since many aspects of full-day funds are similar to those already discussed for intraday funds, the discussion here will be brief.

Full-day funds could eliminate most or all of the DODs currently caused by repaying overnight funds, even if banks found it too costly to guarantee that the actual duration exactly met the contractual 24-hour maturity. If the return of full-day funds coincided exactly with the receipt of new funds for the next full day, the fed-funds-caused DODs would be completely eliminated. If the seller was late in providing funds, the actual duration of the loan would be slightly under 24 hours. Even so, such funds could be used effectively to eliminate most of these DODs, as long as any window between receiving and repaying such funds occurred outside peak DOD hours. The exact time could vary for each transaction and each pair of banks could decide how to handle late receipts of funds. Full-day funds could be especially useful for banks that would otherwise buy similar amounts of intraday and overnight fed funds from the same sellers.

If large banks switched their borrowing from overnight funds to 24-hour funds, they

Figure 1
Effects of the intraday funds market
as caps are reduced



would effectively eliminate the DODs they now incur from repaying overnight funds. Conversely, if lenders of overnight funds switched to lending 24-hour funds, they would no longer have these funds during the day. This would lower lenders' daytime balances to their (still positive) overnight levels, all else constant.

Full-day funds would provide a more stable funding source and investment opportunity than would an artificial 24-hour instrument formed by combining overnight and intraday funds. In addition, full-day funds would require only half as many transfers, which would reduce transaction costs and the frequency of arrival uncertainty. As explained in the box, arrival uncertainty is the uncertainty regarding exactly what time funds will arrive. Full-day fed funds would also decrease the frequency of funding/investment decisions and reallocate the distribution of daytime funds throughout the banking system. This would reduce risk to the Federal Reserve because intraday exposures from large banks and throughout the system would be significantly reduced.

Once these markets became operational, full-day funds could be used for one day or they could be rolled over. If used for one day, they would be a new financial instrument. If used for more than one day, they would be equivalent to rollover or continuing contract fed funds, except that the first and last days would

now be 24-hour days. In either case, full-day funds would fit easily with current instruments from operational and trading viewpoints. In addition, banks would use the same methods to reduce their uncertainty regarding when full-day funds would be received as they would for intraday funds (See Box).

Since intraday and 24-hour funds are tailored to slightly different needs, banks would have the most funding and investment opportunities, and daytime funds would be allocated most efficiently, if both intraday and full-day fed funds markets developed. Full-day funds would be an appropriate substitute for banks that buy overnight fed funds as a regular source of total funding. Intraday funds would be best used to fulfill remaining daytime needs, after shifts from overnight to full-day funds stabilize.

How much could intraday and full-day funds help?

Based on a 1981 survey of net fed funds purchased by banks with deposits in excess of \$1 billion, if an additional 24 percent of the dollar value of overnight fed funds purchased by all of these banks would shift from overnight to term fed funds, 81 percent of the dollar value of DODs at these banks would have been eliminated.¹³ Similar results would have occurred if 24 percent of overnight total fed funds had been supplemented by intraday funds or had been converted from overnight to full-day funds. Since only 25 percent of the dollar value of fed funds in 1984 were estimated to be continuing contract or term, rearranging another 24 percent would still allow about 50 percent of overnight fed funds to remain un-supplemented.¹⁴

DODs could become a larger concern for small banks if overnight fed funds shifted to full-day funds, or were supplemented by intraday funds. Since such shifting would allow the buyer rather than the seller to hold the funds during the day, some sellers might incur DODs and find their caps becoming restrictive. A seller could alleviate this problem by rearranging a smaller portion of its overnight fed funds sold.

Impact on corporations

With an explicit intraday interest charge, banks and corporations would probably de-

velop real time posting and monitoring capabilities (at least for large transactions) to gain needed information on daytime positions.¹⁵ Recently, the Board approved a proposal to require a standard format for third-party payment information over Fedwire.¹⁶ This would allow banks automatically to credit corporate accounts and to better monitor corporate intraday balances.

If large banks and corporations improve their posting and monitoring capabilities, and if an intraday fed funds market develops, then many banks will likely pass some of their explicit intraday revenues (or costs) to corporations having positive (or negative) daytime balances. This would cause three changes for corporations, as follows.

Change #1: Many banks currently sweep funds from a corporation's demand deposit account into an overnight repurchase agreement (repo) automatically at the end of each day and back again each morning—since banks are prohibited from paying interest on demand deposits. However, if caps become restrictive enough to cause an intraday funds market to develop, the intraday rate (i) will become positive. Assuming the full-day rate (f) remains unchanged, which would be necessary if term rates (e.g., 7-day, 3-month, 1-year, etc.) were to remain unchanged,¹⁷ then the overnight rate (o), which is the rate a corporation receives as interest on its repo, would fall according to the equation: $(1 + f) = (1 + i)(1 + o)$.¹⁸ Currently, the intraday rate equals zero ($i = 0$), so the full-day rate equals the overnight rate ($f = o$).

Since overnight repos would no longer earn explicit interest at rate (f), banks might give corporations free services or other indirect credits for holding daytime compensating balances in the form of demand deposits. These indirect credits would accrue at a rate below (i) due to the variance of demand deposit balances and thus the lower usefulness of these funds to banks. Therefore, corporations' explicit interest revenues from repos should fall, but their indirect credits should rise to partially offset this fall. A corporation could invest in full-day repos instead of overnight repos to keep explicit interest revenues on its repos the same, but these funds would then not be held in the corporation's demand deposit account.

Change #2: Charging and crediting corporations for daytime balances would motivate corporations to reallocate their intraday funds

among their banks and to consider through which banks they wish to send and receive wired funds. Since the exact rates banks would use to charge or indirectly credit corporations for daytime balances would vary across banks, corporations would have larger daytime overdrafts at banks that pass on relatively small intraday charges, and higher positive balances at banks that give relatively high indirect credits. Subject to receiving adequate service, corporations would reallocate their intraday funds and intraday overdrafts in order to maximize profits (or minimize costs). These changes would re-distribute intraday funds to banks that have a greater need for them, and would decrease DODs systemwide, but would not affect the overall level of intraday funds in the banking system.

Change #3: If an intraday market develops, corporations may choose to delay certain of their wire transfers. In general, corporations would send funds from banks where they have positive daytime balances, so the choice of a sending bank would change. This decision would be part of deciding what level of daytime funds to hold at each of a corporation's banks. Corporate transfers would be delayed only when it was convenient and cost effective to do so, and when the corporation did not have sufficient daytime balances at any of its banks to cover these transfers. Money managers would compare the intraday interest expense, or lower interest revenue, with the urgency for sending a particular wire transfer. Urgent transfers would be sent when needed. Other transfers could be sent later in the day, and arrangements would be made to alter the timing of future transfers to be most efficient.

Conclusion

If daylight overdraft caps are lowered enough, bankers would have strong incentives to develop means to reduce the uncertainty about when sizable wire transfers will arrive. These means could include timing standardization, priority Fedwire messages, prior agreements on when funds will move, two-tiered pricing, or other market innovations. When such means are developed, markets for intraday and full-day fed funds would develop.

Full-day funds would be most useful for banks that regularly buy overnight fed funds to

balance their own books and incur daylight overdrafts by repaying these overnight fed funds early the next morning. Intraday funds would be most useful for reallocating the remaining intraday balances in Fed accounts from banks with excess intraday funds to banks with restrictive caps.

It is possible that some minimum level of systemwide DODs is necessary and would remain even after corporations and banks rearrange as many funds transfers as is economically beneficial. This remaining level of DODs can be thought of as the lubricant needed for the payments machine to operate smoothly. If caps are tightened enough, a market for daytime funds would develop, corporate daytime balances would be priced, and the necessary lubricant and associated risks would be minimized. Systemwide intraday funds would be distributed in a more efficient sense with regard to lowering DODs and related risks at individual banks and throughout the system, while minimizing disruptions to the payments system.

¹ This number excludes book entry transfers. Banks transfer money through Fedwire electronically, via debits and credits to banks' accounts at the Federal Reserve.

² In this paper, "bank" refers to any entity which has direct access to a large dollar wire transfer system such as Fedwire or CHIPS.

³ For the interested reader, several papers present more detailed overviews of daylight overdrafts and their associated risks. See for example E. J. Stevens (1984), Richard L. Smoot (1985), and David L. Mengle (1985).

⁴ In this paper, "DODs" refer to Fedwire funds daylight overdrafts. DODs equate to a negative daytime balance in a bank's account at the Fed, after certain technical adjustments and ignoring U.S. Government securities transactions.

⁵ This paper addresses what could happen if caps are tightened enough. The paper is not meant to address the likely impact of current proposals which the Board of Governors has published for public comment.

⁶ Policy Statement Regarding Risks on Large-Dollar Wire Transfer Systems, Federal Register, Vol. 50, No. 99, Docket No. R-0515, May 22, 1985.

⁷ For an overview of the Board of Governors' DOD policy and many ways in which banks might reduce their DODs, see Stevens (1986).

⁸ Board of Governors, "Reduction of Payments System Risk: A Manual for Depository Institutions." (undated) p. c-3.

⁹ On average, nationwide, banks with assets over \$1 billion obtained 6.9% of their total funding from net overnight fed funds purchased (including repurchase agreements). Banks under \$300 million were net sellers on average (Sheshunoff, 1986). In this paper, fed fund sales or purchases refer to net sales or net purchases.

¹⁰ Continuing contract fed funds are overnight funds rolled over day to day until either party seeks a change. The borrowed amount can vary each day, and the net change in amount, plus interest, is sent daily. Rollover fed funds are for one amount over an unspecified number of days. Funds are only sent at the initial borrowing and final repayment. Term funds are rollover funds with a specified maturity. Repayment for these three instruments is early in the morning on the final day.

¹¹ The author benefited on these points by discussions with Allen Berger at the Federal Reserve Board.

¹² For simplicity, this paragraph assumes DOD buffers are zero, which means DOD caps = DOD targets.

¹³ Humphrey (1984), pp. 86-89. The survey included fed funds and repos. These DODs include overdrafts caused by purchasing U.S. government securities, although this type of overdraft is not currently included in the calculation of Fedwire funds DODs.

¹⁴ op. cit. (Humphrey, 1984).

¹⁵ Although this section focuses on corporations, the same ideas also apply to other large customers of banks.

¹⁶ "Format for Wire Transfer of Funds," (Federal Reserve Docket No. R-0575), published for comment on June 6, 1986, approved on November 24, 1986, and effective as of April 3, 1989.

¹⁷ This assumes a flat term structure of interest rates and that all else is constant in order to isolate and identify the effects of *i* becoming positive.

¹⁸ For simplicity, I assume zero transaction costs here.

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