

FINANCIAL SERVICE IN CLOUD COMPUTING

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I. BRIEFING

CLOUD COMPUTING HAS BEEN CONSIDERED AS ONE OF THE MOST IMPORTANT TECHNOLOGIES TO DRIVE THE NEXT GENERATION INTERNET REVOLUTION SINCE 2006. THIS PAPER STUDIES THE CLOUD COMPUTING IN A DIFFERENT PROSPECT, FINANCIAL SERVICES, TO ANALYZE THE IMPACT OF CLOUD COMPUTING IN TRADITIONAL FINANCIAL SERVICES, NOTABLY THE MUTUAL FUNDS AND LOANS. BY INVESTIGATING THE CHALLENGES IN EXISTING PRODUCTS AND STARTUPS IN THIS FIELD, WE DEMONSTRATE HUGE OPPORTUNITIES IN LEVERAGING CLOUD COMPUTING IN FINANCIAL SERVICE WHICH COULD EFFECTIVELY IMPROVE THE MONEY EFFICIENCY AND SIGNIFICANTLY REDUCE THE RISK.

II. FUND

A. Some brief info of Paypal and Yu E Bao.

Paypal and YuEBao all get started with the on line payment vehicle and be backed by a big platform. Followings are the companies related to them.

	<i>PayPal Fund</i>	<i>Yu E Bao</i>
<i>Payment vehicle</i>	<i>Paypal</i>	<i>Alipay</i>
<i>Attached company</i>	<i>Ebay</i>	<i>Alibaba</i>

Paypal was established in year 1998, and launched its money market product in year 1999. Paypal's fund grows very fast in year 2005-2007, in line with the increase of the US market interest rate, to the peak 4%. And the peak fund size in year 2007 is around \$1B, which is about 2.2% of the annual transaction volume. In the end of year 2010, the total Paypal MMF account was 1.6m, and the average account balance was around \$300. However, Paypal closed its fund in year 2011 due to the decrease of the dividend rate in accordance with the Fed's quantitative easing policy. At the time of its closing, the interest rate was only 0.04%, which even cannot afford the fund expenses. Even in its peak time, the fund size of Paypal is still similar with the mid-cap money market fund size in the US market. Its market share is small.

As for YuEBao, it started in year 2004 with the development of Alibaba. In June 2013, it launched its money market fund product, cooperated with Tian Hong Fund Management Firm. Its highest annualized dividend rate is 7%, now is down to ~4%. The fund size is booming fast, fund size as at July 2014 reaches \$94B, which is about 40% of the total money market fund size in China. The average account balance is around \$940, which is also higher than that of Paypal's MMF.

	Paypal	Yu E Bao
Started year	1998	2004
Money market fund-starting year	1999	2013.6
Money market fund size (peak)	USD 1B (2007)	USD 30B(2013) USD 94B (2014.7)
Annual transaction volume	USD 46B (2007)	USD 473B(2013)
Conversion rate of money market fund	2.2%	6.4%
Highest dividend rate (annualized)	4%	7%
No. of accounts	1.6m (2010)	100m+ (2014.7)
Avg account balance	USD 300 (2010)	USD 940

B. Why Paypal failed in its money market fund?

- Paypal's market share in on-line payment is 7% in year 2007 and 10% in year 2010

As showed in the table, in US, credit cards' penetration rate is very high and the usage is quite convenient. And the credit card clearing systems, like Visa, Master, etc, also did good job to make sure their card is widely accepted in all kinds of retailing channels, including the on-line

US Online Retail Purchase Volume Share, by Payment Method, 2007-2013 (% of total)

	2007	2008	2009	2010	2011	2012	2013
Credit cards	59%	55%	52%	49%	46%	43%	40%
Debit cards	26%	27%	28%	29%	29%	30%	30%
E-mail payments	7%	9%	9%	9%	10%	10%	10%
Prepaid cards	4%	4%	5%	7%	9%	11%	13%
Private-label cards	3%	4%	5%	5%	6%	6%	7%
Bill Me Later	1%	1%	1%	1%	1%	1%	1%

Note: numbers may not add up to 100% due to rounding

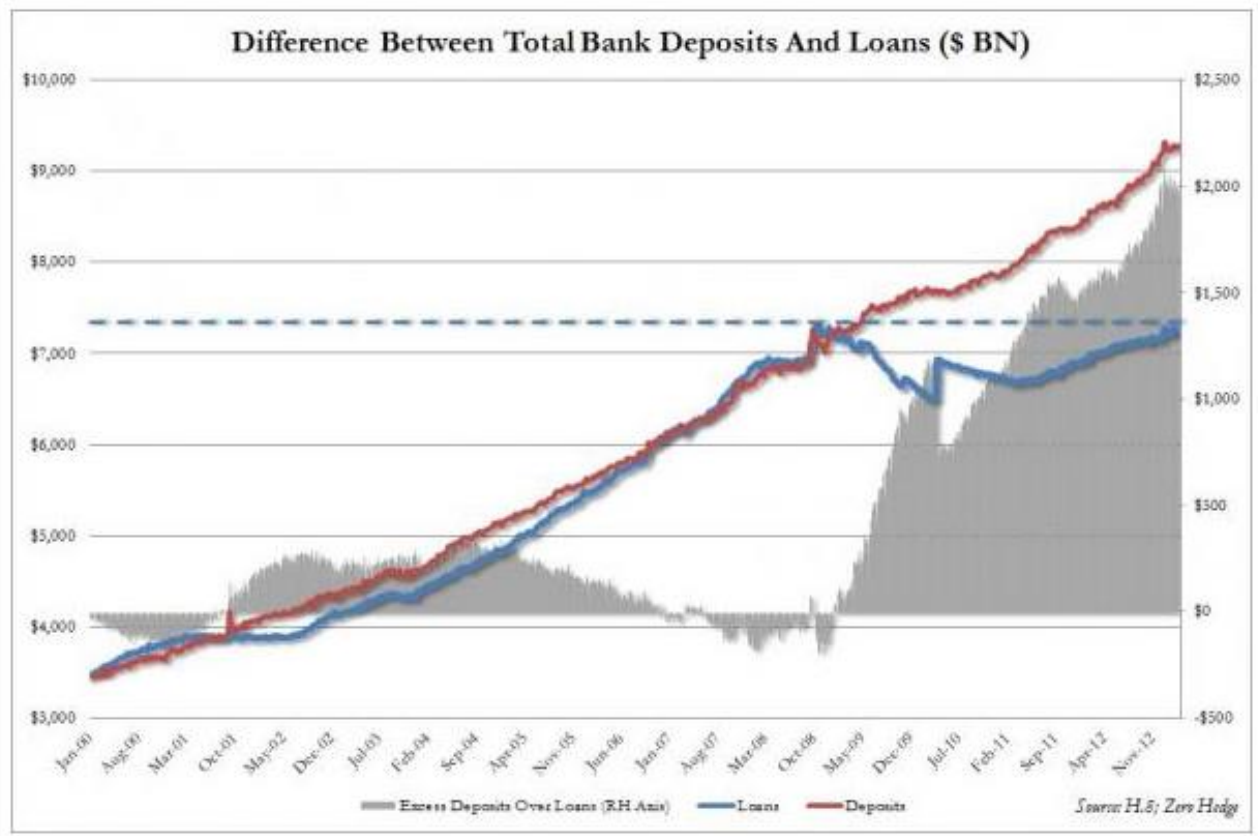
Source: Javelin Strategy & Research, "Online Retail Payments Forecast" as cited by Internet Retailer, January 2009

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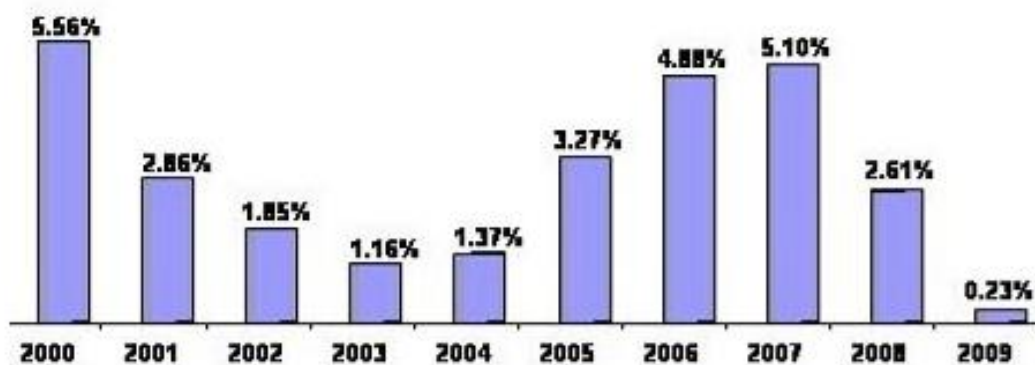
www.eMarketer.com

shopping. So, before the year of 2009, the credit card's purchase volume covers over 50% of total only retailing payment. Paypal as the E-mail payments is only 7% of the market share. So, Paypal is only a supplement payment channel in US. The customers' reliance to Paypal is quite limited. So, if Paypal cannot provide much better interest rate, the customer will not put his money in Paypal, because it's not his mostly used payment method.

From the table below, the total deposit in US is around 6,000B. Since Paypal's MMF money is just like the unused deposit, we would like to see how big impact the Paypal's 1B MMF to the total deposit market. The penetration rate is around 0.017%. That figure also tell us why Paypal cannot play a big role in the MMF, coz the size is too limited, and for this kind of fund, size is the king. The bigger the fund size, the easier to afford the management expenses of the team, and then more likely to provide more attractive clause to the customers.



- US' traditional retail banking system is much more developed, and Paypal cannot establish too much advantage in this area.



First, let's take a look at the average interest rate of Paypal MMF from 200-2009.

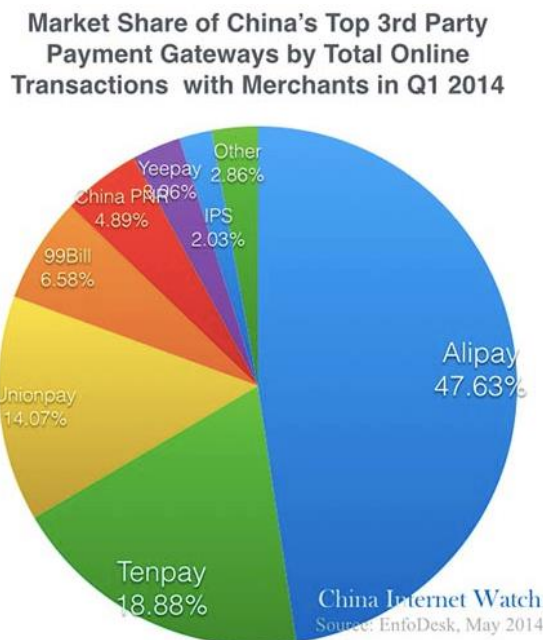
We can see in the above table, from year 2005-2007, the interest rate of Paypal MMF is quite high at 3.27%~5.10%. From the beginning of year 2008, the interest rate crashed along with Fed's Quantitative Easing Policy, to 0.23% in 2009, and even lower 0.04% in 2011.

At the same time, the customers of Paypal MMF can easily transfer his money to his banking account to enjoy some other financial products with higher return rate. Of course, as a rational investor, you will not keep the money in Paypal any more, and will seek better product then.

C. Why Yu E Bao is so successful in China?

- Alipay's market share in on-line payment is 49%

Comparing the position of Paypal in US' online payment, Alipay plays more important role in Chinese online payment market. In Q1 2014, the total online payment is around \$321B, among which 48% of the payments are made through Alipay, that is around \$150B in one quarter. What a big slice! Assume the on line shopping growth is around 30%, the estimated total payment volume through Alipay would reach \$671B (1). This big market share means lots of people use Alipay quite frequently in their life and it's a very important money transferring system. So, they would like to put some money in this pool, without considering the interest rate, coz this is their daily shopping usage.



(1) The on line payment volume in Q4 2013 is around \$142B.

And at the same time, if we compare YuEBao's balance to the total deposit level in China, the ratio should be around 0.58%. The Chinese total deposit is around \$16T, among which 47% of

the deposit is the personal deposit, and 53% is the corporate deposit. So, if we compare YuEBao to the total person deposit balance, the penetration rate is around 1.23%. The penetration rate is still low, but it's already an excellent performance for a 1 year's new product. And most important, YuEBao's MMF is around 40% of the total MMF size, which means a lot to the product.

- YuEBao as a new sale channel of money market product is much more efficient than the traditional sales channels.

	YuEBao	Traditional MMF
Minimum Subscription requirement	RMB0.01	RMB 1,000
Annual Trustee fee	0.08%	0.1%
Annual management fee	0.3%	0.33%
Dividend payment schedule	Daily	Mostly Weekly
Redemption	T+0	T+0, T+x

There is higher entry barrier for the traditional MMF. It required minimum subscription amount at RMB 1,000, however, YuEBao's requirement is quite low, it's only RMB0.01. The annual fee (trustee fee and management fee) in YuEBao is only 0.38%, which is 12% lower than tradition's 0.43%. And also the dividend can be get by daily, so the investor can enjoy the compounding of the dividend. The redemption in YuEBao is also quite flexible in T+0.

Why YuEBao can offer such good offerings to the customers? It's because the internet. Internet improved the efficiency significantly. It lowered the transaction cost and also lowered the labor cost of the company. There is no retail branches, no services provided face by face and no paper certification needed for any of the transactions. For those commercial banks, which is the typical MMF's sales channel, there are lots of branches in their system, with multiple layers, and the decision making mechanism is slow and the serving cost is high, because they need to pay all the labors, the rental fee of the branches, as well as the IT system's maintenance fee.

- Non market oriented interest rate is also an important factor for YuEBao's success

In China, the interest rate is highly regulated, which provides a big interest gap between the deposit and the loan. So, the commercial banks would like to focus more on the corporate customers, instead of its individual customers, because the corporate customers can bring more profit through the corporate loans and some other business. In accordance, the service to the small individual customers are quite limited. If your deposit balance is too small, you cannot get any service on investment from the commercial banks. That's why YuEBao can developed so fast. YuEBao's customers are mainly some individual customers with low deposit balance, who also spend lots of time on Taobao to find the good deal or cheap product there. Someday, Taobao told them that your money can enjoy an investment opportunity to earn an annual interest rate at 7%, without sacrificing any liquidity requirement. All these customers are excited with this good product, because, if they deposit these money in the commercial banks, they can only get 0.35% annual interest rate.

D. The challenges/potential risks for YuEBao

- Alipay's market share decreases significant
 - In the past several years, with the development of the online shopping market, there are more and more convenient online payment channel comes out. And also in the tide of mobile, Wechat speaks loudly in Chinese market, including its mobile payment. So, if the market share of Alipay decreased, it's really hard for it to grow its YuEBao smoothly.
- With the development of interest rate liberalization, commercial banks may focus more on the retail banking.
 - Interest rate liberalization will come someday. With the development of YuEBao and other similar online fund products, the liberalization may come earlier, because these kinds of the products is actually push the market interest rate to the market balance level.
 - Once the interest rate liberalization comes, the commercial banks' competition will much more intensive than before. They will put more eyes on the individual customers in the future, because the cooperate customers will have much more bargaining powers to get better interest rate. And the money made from the cooperate customers will become less than before. In contrast, individual customer will have less bargaining power and if the service is good, it will earn more money from this sector, just like the situation in US. Under this situation, YuEBao's competitive advantage will also decreased a lot.
- It should build a healthy balance sheet to overcome the money market's easing policy in the future
 - In the year 2011, Paypal closed its MMF due to the lower interest rate. But at the same time, some of the commercial banks' MMF still goes healthy, because the commercial banks can manage the MMF without charging any management fee. The commercial banks' have other profit earning mechanisms, so, for this kind of MMF, it can allow its losing making and just to maintain the customers. For Paypal, it's hard for it to take this strategy, because, it doesn't have strong interest-bearing asset to make money for it. It cannot afford the loss making on this kind of MMF.
 - In China, some day, the interest rate of MMF may also not that attractive, due to the easing policy. YuEBao may encounter same situation with Paypal's MMF, competing with other commercial banks' MMF. If YuEBao would like to compete with them and still stay in better position, it should consider to build a healthy balance sheet, that is to get some interest earning assets to make sure it's YuEBao is competitive even when other competitors' charge no management fees.

III. LOAN

A. Traditional Loan

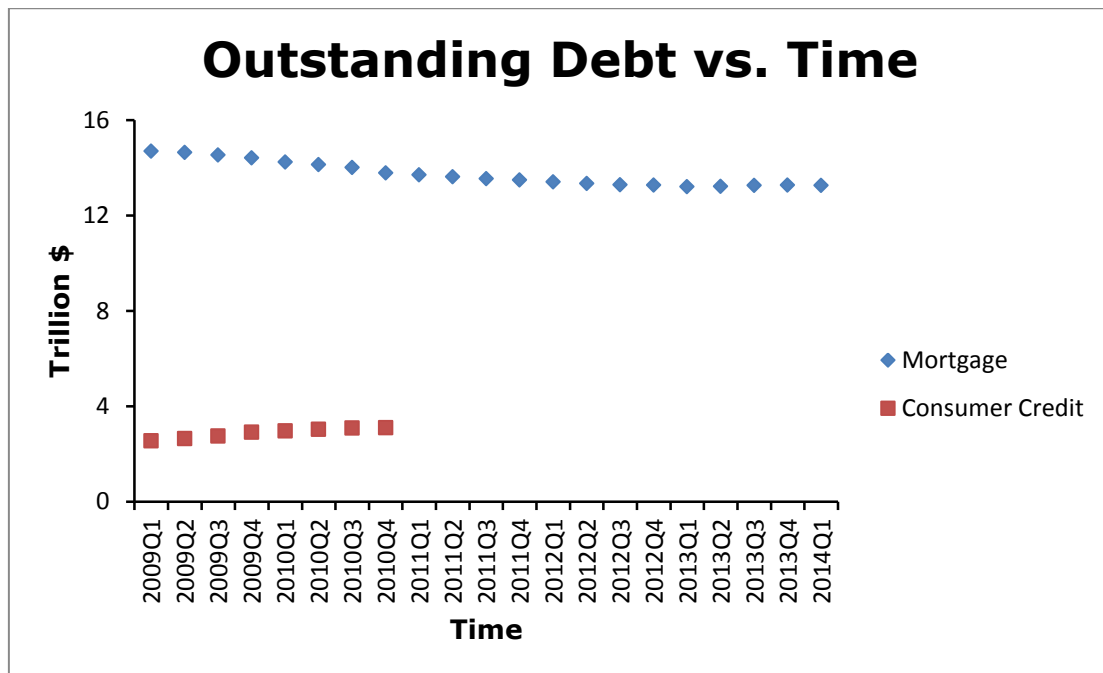
For many people, the process to obtain a student loan, auto loan, personal loan, business loan, or mortgage can be long and painful. In the United States the rate limiting step to purchase a house is often the process to secure a mortgage from a lender. Loans have historically been a very lucrative business for banks, credit unions, federal government, and other types of financial institutions. In 2012, Wells Fargo, the United States leader in mortgages and 4th largest US bank by assets made half of its 21 billion dollars' worth of revenue from mortgages. (20)

To many individuals in industries outside of finance the importance of loans for the annual revenue stream can be a surprise. The origination and underwriting fees associated with the creation of a new or refinanced mortgage make up a substantial part of this revenue. If the bank chooses to continue to own the loan after it has been created they continue to make revenue from the collection of interest on the principle loan amount. The amount of interest the bank receives is front loaded in the beginning of the loan due to the amortization schedule. Depending on the interest rate and the term of the loan, the payment the borrower makes on a typical 30 year fixed loan is mostly interest the first 10 years. At the end of loan repayment, the total amount of interest paid can even exceed the total amount of money initially lent. Banks do not always choose to continue to own the loan after the origination, in which case the loans can be securitized and sold to other investors. The selling of securitized loan to other investors represents an additional opportunity for the creator of the loan to obtain revenue. (22)

Current market size and growth rate of traditional loans

The lending and credit market is enormous in the United States. For mortgages alone there is 13.2 trillion dollars of outstanding debt. There is also an additional 3.1 trillion of consumer credit which only includes the buying habits of individuals. The 3.1 trillion can be split into three distinct categories: student loans (1.3 trillion), motor vehicle loans (0.9 trillion), and other outstanding lines of credit (0.9 trillion, i.e. credit cards). Of the 13.2 trillion for mortgage, 93% is held by major financial institutions, federal agencies, or mortgage pools or trusts. Individuals and other holders have underwritten the remaining 7% or just under one trillion dollars worth of mortgages. Of the consumer credit a slightly higher 95% is held by depository institutions, finance companies, credit unions or the federal government. In the consumer credit market, a mere 1.3% or 42 billion dollars is held by other nonfinancial entities. (21)

Year on year, the total amount of mortgage debt has been decreasing since a high in the 2nd quarter of 2008 (14.8 trillion) before the financial crisis when the real estate market was at a peak. In the past two years the total mortgage debt has remained between 13.7 and 13.2 trillion dollars. The total amount of consumer credit follows an opposite trend steadily increasing on average 1.8% year on year from 2.5 trillion in 2009 to where it currently sits at 3.1 trillion. (21)



Typical procedure to obtain a personal loan

The process for an individual to obtain a mortgage typically begins with a visit to a local bank/credit union branch or a phone call to obtain “pre-approval”. A very simple questionnaire and an estimate of the total amount to be lent completes this process within an hour. Many first time home buyers incorrectly assume after the pre-approval process that the remainder of the mortgage process will not be a problem. After the preapproval the lender requires more “official” data to be collected beginning with an official credit check to obtain the credit history of the applicant. After passing the credit check, all questions the applicant was asked during the preapproval process are required to be answered with official documented evidence. As a mortgage is a loan with real estate as collateral, the value of the real estate must also be assessed and appraised. This whole standardized process exists so that the lender can quantify the risk involved in the financial transaction of underwriting the mortgage.

The mortgage processes typically takes between 30 to 60 days over which an abundance of requirements must be fulfilled and documented. In the wake of the financial crisis the federal government increased requirements to insure the mortgage for a borrower which many attribute as a leading cause for this longer period of time to obtain the loan. However, going through the process one cannot help but wonder with the advances in computers and the internet why, even with stricter lending requirements one cannot hear “yes” or “no” in a shorter period of time. If the lender was attempting to personalize the lending process it would make sense why technological optimization could be a challenge. However, many find the process to be entirely impersonal as the documents gathered are all utilized in an attempt to reduce the applicant and their mortgage into a concise quantitative rating which can then be securitized and traded.

Average "Days To Close" A Purchase Now 42 Days



Reference #11

Gaps in the traditional loan model

As detailed above the traditional process to acquire a loan leaves much to be desired for the borrower. Hours can be spent attempt to get ahold of a loan officer located in a call center in some far away state. With an enormous amount of personal data such as banking now online it seems logical that one could link the history from their financial institution to their loan application and a majority of the collection of evidence required to corroborate their credit history automated. The more restricted federal requirements in the wake of the financial crisis could be utilized to quickly and clearly show an applicant what is required of them to improve their credit to either obtain any or better financing. On top of all of this if the time to complete the process could be shortened it has the potential to reduce costs for the lender and help the borrower get what they want faster.

B. Peer to Peer Loan

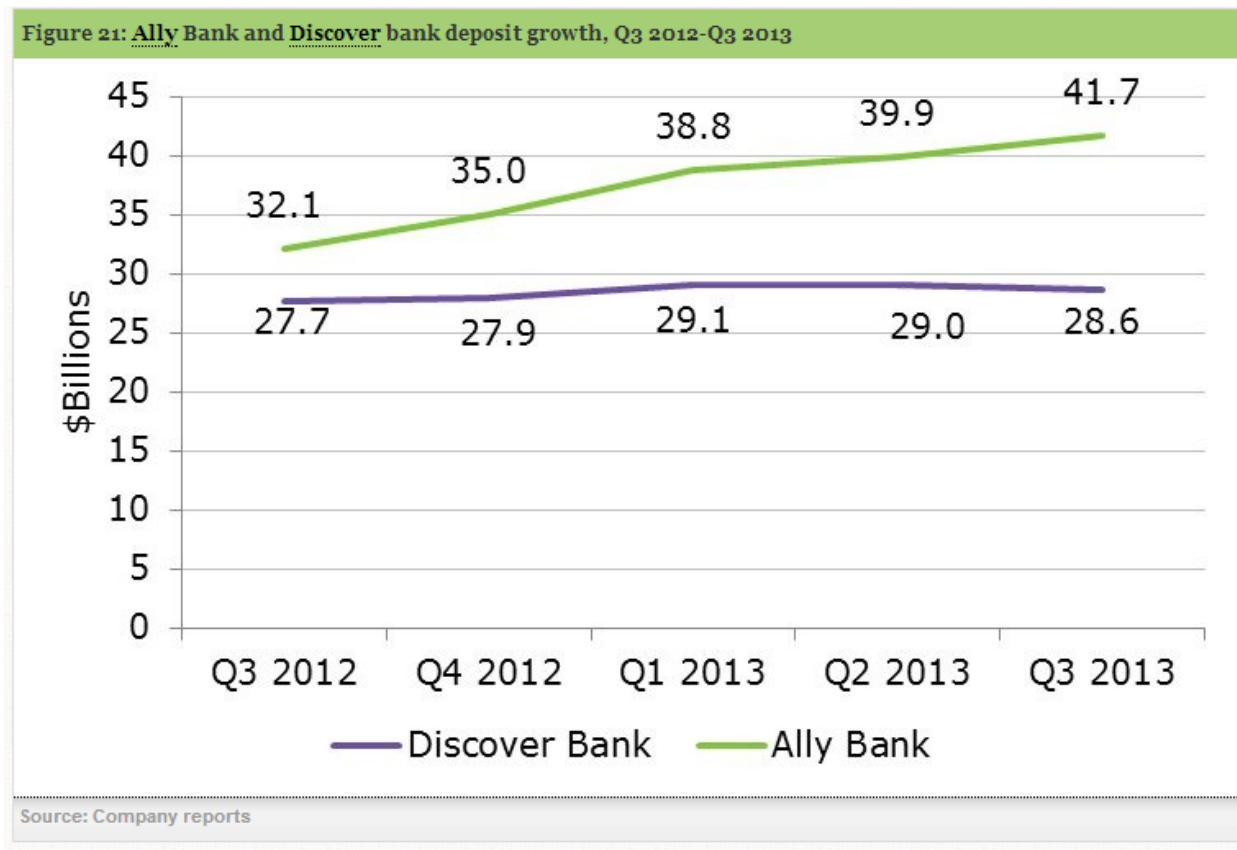
Shifting landscape to Online Banking

An interesting dynamic underlying the mechanics of lending is where the money a financial institution can lend to a borrower originates from. The amount of money a bank can lend is dependent upon the total deposits customers have placed at that institution and the reserve requirements regulators enforce. Thus, it is not a bank lending its own cash to borrowers, but a bank lending the money of its customers to borrowers from which the bank receives revenue. Some of this revenue is passed on through interest in, for example, a savings account which is the Bank's incentivizing customers to keep total deposits high and thus their lending capacity. An individual may not have enough money to purchase a home yet their savings could be pooled with other customers and utilized to help another borrower purchase a home.

The mechanics of how a bank has the money to create a loan often comes as a surprise to those removed from the financial industry. It begins to make one wonder if a bank can do that, why couldn't I? The bank has traditionally provided the financial intermediation required to bring cash from multiple parties together, vet the worthiness/riskiness of the borrower, and actually execute the creation and distribution of the loan. As discussed previously, a considerable amount of effort is involved in this coordination and evaluation phase, resulting in the typical process one experiences

today. For example, Wells Fargo has 270,000 employees which allow for all of this “offline”, face to face, and over the phone banking to occur. (17)

All large banks are in a similar position as Wells Fargo with this large overhead operating expense which reduces either profits the bank could make or interest that could be passed on to customers. To see the benefit of operating entirely online one must look no further than the interest given to customers with savings account at online banks. The average annual percentage yield at the end of January 2014 for the four largest banks was 0.01%. Ally Bank, which is entirely online, was able to offer their customers 0.87% annual percentage yield in that same time period. This reduction in overhead costs and subsequent transfer of savings to the customer has not gone unnoticed over the past two years as Ally Bank has increased its deposits by 30%. (17)



Reference #4

The new Peer to Peer model

Advances in computer and internet technology equip tech savvy entrepreneurs with the ability to connect borrowers and multiple lenders in a manner similar to a bank. This process is known as Peer to Peer (P2P) lending as the traditional financial intermediary has been cut out of the loan process. At the beginning of online P2P lending, websites offering this service acted less like a bank and more like a market place purely connecting lenders with borrowers and enabling transactions to occur. P2P facilitation companies enable a lender to get involved in a transaction with as little as \$25. The other service P2P websites provide is the assessment and vetting of the risk involved with lending to a potential borrower to inform the potential lenders.

One advantage of P2P lending is, unlike a bank which hires a staff to make lending decisions; an individual lender in a P2P environment has the ability to choose where they loan their

funds. A bank does act as a cushion for its customers, having a wider customer base enables them to loan to a diverse portfolio over which risk can be distributed and shared so that one's savings are not compromised. With this increased risk in P2P lending comes increased reward for the lender. Instead of getting 0.01% on money in a savings account, a lender can get an interest rate closer to what the borrower is actually being charged. In addition to increased interest to the lender for the increased risk the online nature of P2P corporations results in lower overhead costs. The figure below quantifies the estimated cost for Wells Fargo to generate a loan compared to Lending Club which is the largest United States P2P company with 200 employees.

Operating Expense Ratios

		
Yearly operating expenses	\$28.3 billion	\$99.1 million (est.)
Outstanding loans	\$502.5 billion	\$4.8 billion (est.)
Operating expense ratio	5.63%	2.08%

Source: Latest SEC filings
(reference 5)

Another interesting advantage of P2P lending is the ability to offer lower interest rates for borrowers than available traditionally while providing the lenders with a higher interest rate on their money. Large financial institutions benefit from streamlined assessment of risk and loan processing. In the P2P loan, it is up to the individual to assess risk and occasionally agree to the terms of the loan. Some P2P corporations use a reverse auction for borrowers enabling the lower interest rates. Other P2P sites use different or novel assessment of credit worthiness and risk enabling a borrower which may seem risky by conventional assessment methods to secure lower interest rates which can be a more personalized approach to risk assessment. (19) The benefits of P2P lending have not gone unnoticed. Since 2009, Lending Club has seen exponential month on month growth of issued loans.

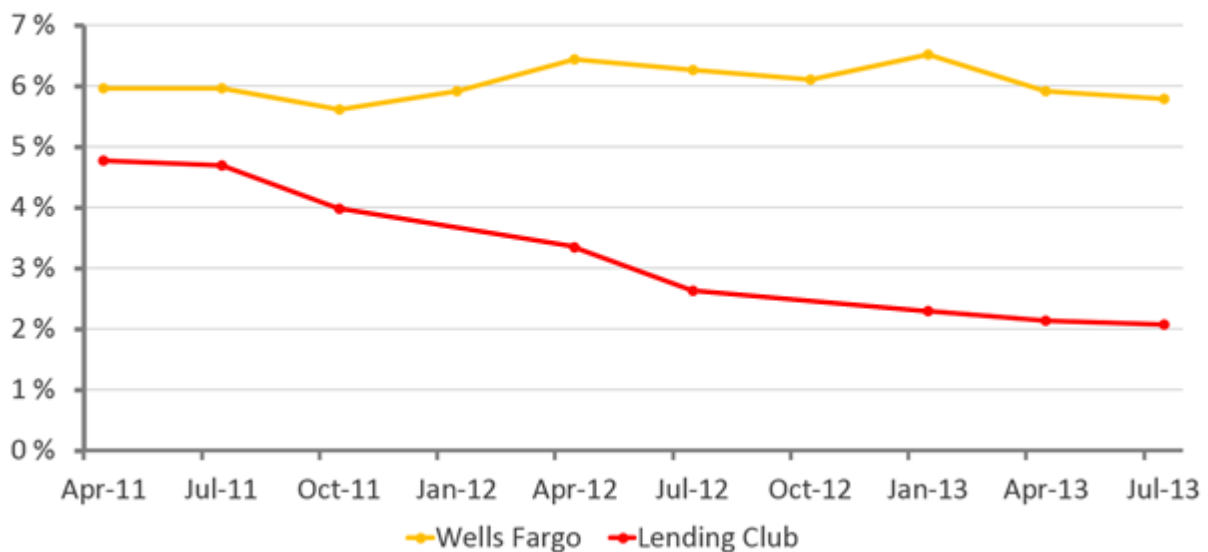
Total Issued Loans in USD for Lending Club



(Reference #12)

Combining the issued loans per month with the historical operating expense at Lending Club one can see the economies of scale benefit from the increased business. As Lending club is a virtual lender, many of their processes are automated and they are able to scale with the increased business. The figure below shows the operating expense ratio over time for Wells Fargo versus the Lending Club. With increased business The Lending Club is able to provide better service for more customers and as it has halved their expense ratio pass on even more benefit to its customers.

Wells Fargo vs. Lending Club Operating Expense Ratios 2011-2013



(Reference #12)

As P2P lending has increased in popularity it has also and began to capture more attention from the general public and thus more regulation. The mortgage industry is highly regulated by ten federal laws, five federal enforcement agencies, and more than 45 state laws or licensing boards (14). One of the first major regulations applied to P2P providers was to securitize the loans so that they could be traded. This had a negative impact on providers at first, however the fact that many of these loans can now be traded and thus are more liquid is even more appealing for lenders to participate. Not all regulations are enforced, which decreases the work required to create a loan however prohibit the loans from qualifying from industry standard protections such as insurance from the government on defaults.

C. Loan Revolution

The P2P loan revolution has begun. Start-ups have laid out the framework for the online lending business. The exponential increase in customer base even with increased regulation speaks to the potential and health of the industry. The sheer size of the lending industry in the United States is exciting given the efficiencies P2P lending can bring to the traditional business model.

IV. CLOUD COMPUTING IN FINANCIAL SERVICES

Cloud computing (cf. http://en.wikipedia.org/wiki/Cloud_computing), one of the hottest IT technologies in 21 centuries, is the delivery of computing as a service rather than a product, whereby shared resources, software, and information are provided to computers and other devices as a utility over a network.

The word “Bank” comes from the Italian word “Banco”, for the earliest known state deposit bank, Banco di San Giorgio (Bank of St. George), which is the one on a desk in the street founded in 1407 at Genoa, Italy (cf. <http://en.wikipedia.org/wiki/Bank>). With the developing of modern IT technologies, in the era of cloud computing, the new “Banco”, the new “desk”, will be the cloud. Financial institutions must use the model of Cloud Computing for their transformation to a new paradigm.

In this section, we will discuss the advantage of cloud computing, and how we can leverage the cloud computing concepts and technologies in financial services to make the money work better.

A. Financial Resource in Cloud

One of the original ideas of cloud computing is resource aggregation and re-allocation. People around the world can contribute their spare computing resources (e.g. CPUs, RAMs) for some projects which require incredibly large amount of computing resources.

Folding@home (cf. <http://folding.stanford.edu/>), a distributed computing project first launched in 2000 for instance, is designed for scientific researchers to take complicated tasks that would normally require hundreds of hours of expensive processing time on individual supercomputers, split these tasks up into thousands or even millions of tiny parts, and then distribute those parts to millions of consumer computers all around the world. Each computer processes its own small part and uploads the results, which are then combined with the results from all of the other computers.

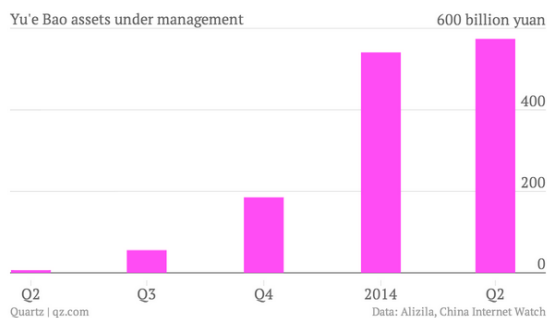
The idea of aggregating small resources for large project could also be leveraged in the financial world. Small investors usually are often excluded from some large financial products. One typical example is the stock of Berkshire Hathaway Inc in NYSE:



Not only for the Berkshire Hathaway stock, in many cases, good financial products (e.g. steady performance, high return rate) has a high fence for buy-in. In addition, individual investor with small amount of money are in an unequal position which is hard to negotiate with large financial institutions. A natural solution from Cloud Computing is to aggregate the small resources (i.e. money from small investors) into a big one and complete (i.e. buy-in, invest, etc) some large financial activities.

In 2013, things are changing in China when the traditional financial services meet the Internet, the Cloud. With the modern IT technologies to transfer the money in Internet in a secure way (e.g. Alipay Trust Network), Alibaba launches a financial product named Yu'e Bao which allows small investors to put whatever amount of money they like, aggregates these money and invest for good financial assets repurchase agreements with big financial institutions.

In 2014 Q2, the assets of Yu'e Bao is approaching 600 billion yuan, for more than 100 million users with a small amount of money per user in average, ~5000 yuan per user. On one side, the investors now can invest a very small amount of money, even one cent; while on the other side, some high-fences financial products with high return rate are open to them.



The cloud of money should be well-organized and have the following features:

1. **Simple and easy management**, as easy as 1-click for the user to participate the investment or redeem the money back. It also has no fence to transfer money from the cloud to other systems (e.g. checking/saving bank accounts).
2. **Steady and attractive performance**, the performance of money cloud should be steady and attractive in order to maintain a sizable resource pool for investments.
3. **Secure and privacy**, the money flow of the cloud (i.e. internal/inbound/outbound) should be secured and the privacy of individual users should be guarded.

By aggregating small money into big as a well-organized cloud, there are more and better opportunities to invest. The fences are gone, the market is open, the revolution happens.

B. Financial Products in Cloud

In early days, the financial activities happened offline mostly. Investors need to go to local financial institutions to purchase or redeem financial products. There are several disadvantages for these offline activities:

- **High cost**
The investors need to visit the local financial institutions in person, and there might be one or more layers of agents when purchasing a financial products which results very high commission fee that could lower the derived capital gain.

The table below shows the commission fee of some financial products from different Chinese Banks (cf. <http://alturl.com/6daoa> for detail reports):

Bank Name	Financial Product Name	Return Rate	Commission Fee
China Construction Bank	乾元－共享型	34 days 3.65%	0.05%
Agricultural Bank of China	安心得利	62 days 3.7%	0.05% + 0.25%
China Merchants Bank	安心回报之岁月流金425号	32 days 3.6%	0.4%
Bank of China	中银平稳收益理财计划BJ	361 days 4.45%	0.5%
Industrial Bank	天天万利宝	35 days 4%－4.1%	0.7%

It would be cheaper for the investors to get rid of multiple layers of sales agents and purchase the financial products directly.

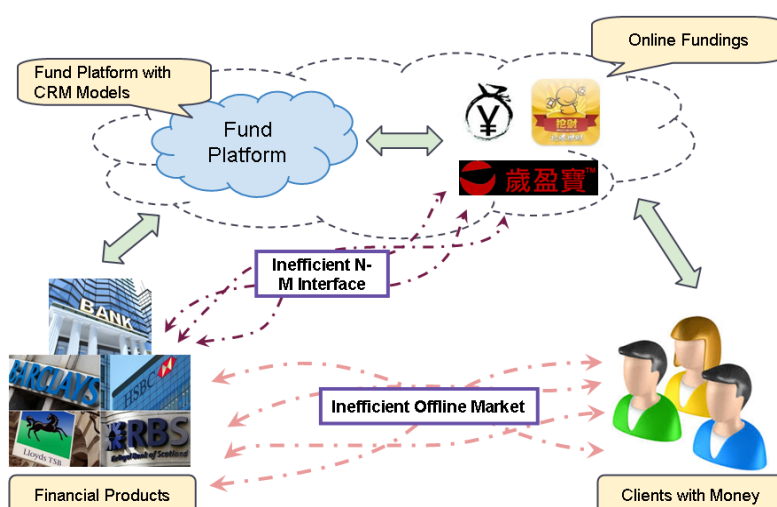
- **Inefficiency**

The offline money operation in different financial products in a bank or between banks is not efficient. It may take hours to days for the money transfer so the investors may miss the timing for important invest opportunities.

- **Lack competition**

Due to the time and transportation cost, it is hard for investors to visit different financial institutions and negotiate for the best product purchase. The lack information and competition will put the investors in an unequal position, and even worse, to make an unwise decision under the persuasion from local sales.

All these inadequates won't be a concern when the money and activities are happening in the Cloud. The financial cloud includes not only the money from individual investors, but also different products/services from financial institutions.



The figure above demonstrates a simple “life of investment” in financial cloud:

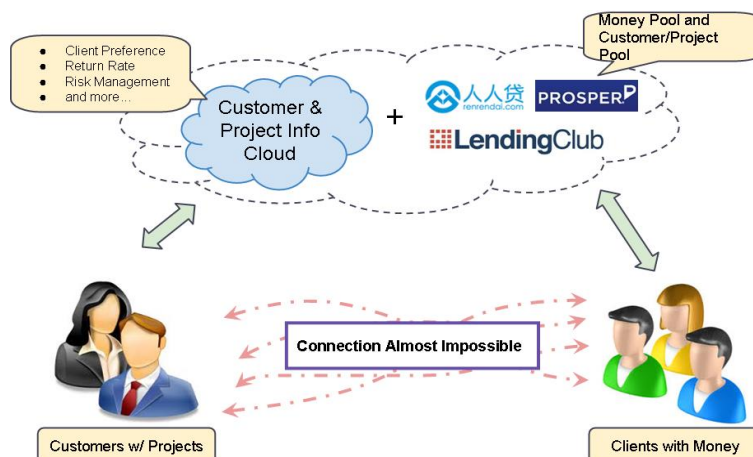
- Individual user put the money into cloud
- Individual user choose and access different financial products management services in the cloud, which offers various services to individual users (e.g.comparison of a collection of products from the backend platform, forecast and estimation, investment tracking, money management, etc.).
- Individual user investigates different financial products for sale from different financial institutions in the platform via the service in front, and decides which product to purchase, and invest the money from the cloud.
- The financial service site in the cloud (e.g. online fundings) talk to the platform, redirect the money and act as a third-party to issue the transaction directly between the user and the financial institutions.
- Individual user can also withdraw/redeem the investment through the same route via the financial service in cloud.

By aggregating different financial products in the cloud, it will provide users a better view and more choices. More competitions, more healthy the market would be. In addition, users don't need to visit local financial institutions in person, and the money are moving in the cloud in an efficient way, while there are no more multiple layers of agents between raw product and user, hence less cost.

C. More Financial Information in Cloud

We have discussed the user assets and financial products in the cloud, which makes the investment extremely simple, easy and efficient. However, there is another different type of financial activity missing in the financial cloud, which is loan.

Things will be different when the lender, borrower and the corresponding projects are all in the financial cloud:



- **Individual users are enabled to become a lender.**
Traditional lenders could only be financial institutions which makes them in a monopoly position. By putting money in the cloud as described in previous section “Financial Resource in Cloud”, individual users can become a lender. More money are available in the loan market and the game becomes more competitive.
- **Borrowers have more opportunities by providing transparent information.**

Borrowers can put their information (e.g. personal information such as credit score, company information such as asset/debt/equity, etc.) in the cloud, as well as the information of ongoing project which requires a loan (e.g. personal travel plan, company new product manufacturing, etc.).

With these transparent information in the cloud, borrowers have more visibilities and an extreme low cost for introducing his project to multiple potential borrowers at the same time.

- ***Lenders have more options, and customized fine-grained loan targets.***

Lenders have more options to match their money to certain borrowers and their projects in the cloud. Lenders can customize their loan targets in fine-grained preferences. For example:

- Personal age, annual income, credit score, country, etc.
- Company's assets, annual revenue, profit, balance status, etc.
- Project's cycle, roadmap, detail plan, revenue/profit forecast, etc.

With more information in the cloud, both borrowers and lenders can leverage IT technologies in the cloud to improve their benefits in the loan market:

- ***Better Targeting***

Lender can use machine learning technologies to analyze the performance of past loan investments in the cloud (assuming the projects are public in the cloud), and adjust his own loan targeting preference to achieve better return rate in the long term.

- ***Better Project/Product***

Borrower can use data mining to analyze other existing projects, to avoid over-competing in some hot field/industry. For example, if there are many Instant Messenger startup projects already proposed in the cloud, a smart borrower will probably not propose another IM product unless he is extreme-confident in the special/unique feature of his product.

Lender can also use data mining

- ***Risk Mitigation***

With statistics and forecast algorithms, lender can estimate the project by analyzing the borrower's information, past projects, other similar projects in the cloud:

- Chance of project failure or bad debt
- The market size and its growth rate
- The project revenue and return rate
- and more...

This could significantly reduce the investment risk of the lender, eliminate bad projects and keep the cloud ecosystem in a healthy state.

D. Challenges for Financial Cloud

In previous sections, we have discussed various benefits from the financial cloud. However, there are some new challenges. Some important ones are listed as follows:

- ***Trust of the cloud services***

The cloud services should be trust guaranteed in various aspects, including:

- Scalability, the financial cloud service needs to handle large amount of financial products queries, and ensure the investment/redemption transactions in

millions/billions level. This could be solved by the development IT technologies in Cloud Computing.

- Security, the asset in financial cloud should be secured: a) no imposter could make the operation or take the money out of the cloud; b) the cloud services should guarantee the money flows to the target (e.g. borrowers, a product offered by financial institution) as the users specified; c) the cloud services should have certain pledge in the real world just in case for any emergency (e.g. absconder).
- ***Trust of the Financial Products***
The financial products in the cloud should be certified offline, in order to avoid the potential loss for individual investors to purchase unknown financial products.
- ***Trust of the borrowers***
Borrowers in the cloud should be certified, as well as their proposed projects. It is important for the loan market to provide trustable information to lenders.
- ***Privacy***
It's good to have a public cloud with transparent information and more competitions. However, privacy of investors (e.g. lenders), borrowers and their projects are also very important. For example, the leak of detail plan for a borrower's project may result plagiarism which will seriously hurt the startup environment.

As a brief summary, when cloud computing meet financial products/services, the money will be put into a more open marketplace: a) fence are lower and small individual users can join the game; b) money flow are more efficient from offline-to-offline to online-to-online; c) cost are lower for both financial institutions and investors; d) the market is more competitive, and the decision will be social optimal when the market is transparent.

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