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Reverse Mortgage Line of Credit Investment Retirement Strategy

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ABSTRACT

Under the premise of a possibility of a shortfall in retirement income, the reverse mortgage line of credit (RM-LOC) could offer a possible solution. When shortfalls appear, a reverse mortgage can be used to supplement retirement income without imposing potential severe financial consequences in the future. Additionally, the line of credit option on a reverse mortgage can be utilized to time withdrawals from a portfolio consisting entirely of stocks or a mix of stocks and bonds. The RM-LOC investment strategy utilizes withdrawals from one's portfolio after periods of upticks in the equity markets. But after down periods within the equity market, portfolio withdrawals would be forgone and the line of credit from the reverse mortgage is utilized. Within the RM-LOC strategy after the market reverses, the line of credit is repaid. The analysis shows that over several sample test periods dating from 1960, this strategy improves portfolio performance and the availability of discretionary cash flows for retirees.

KEYWORDS

Reverse Mortgage; Retirement; Line of Credit

Many retirees or those anticipating retirement often own their own homes. It is typically paid off and thus can be used as a source of funds either through a home equity loan, home equity line of credit (HE-LOC), the outright sale of the property, or a reverse mortgage (RM). For instance with the HE-LOC, the homeowner can withdraw funds as needed, but any funds withdrawn must be repaid with interest sometime in the future. The home equity loan, although similar, is usually used for a lump sum payout with periodic repayments (usually monthly) over a fixed period. With the sale of the home, the homeowners receive a lump sum of cash, but they are faced with a major decision on where to live—apartment, downsized home, or moving to a locale that offers cheaper housing options. Although the reverse mortgage offers various options for withdrawing funds, the focus of this paper is the line of credit (RM-LOC). Like the HE-LOC, the RM-LOC permits the homeowners to withdraw funds as needed. Where it differs from the HE-LOC, the RM-LOC funds do not have to be repaid until the owners vacate the property or pass away. Additionally under the RM-LOC, the homeowner can remain in the home regardless of when the funds are repaid. Our analysis shows an additional advantage of using this RM-LOC is that it can be used to offset downturns in the equity market that would negatively affect a portfolio consisting of equity and debt investments that are being used for discretionary retirement funding.

Literature Review

The primary purpose for the creation of the reverse mortgage was to give lower-income homeowners with a minimum age of 62, an opportunity to convert the equity in their homes into monthly checks and/or lines of credit while remaining in their home. Several academic and practitioner studies focus on reverse mortgages. For instance, Chatterjee (2016) finds support for several generalities: few homeowners participate in reverse mortgages; participants are likely to be over 67 years of age; and homeowners with long-term care insurance are less likely to have to depend on reverse mortgages to help with cash flow needs. Surprisingly, participants are risk-adverse and from the two highest quartiles of net worth.

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Chatterjee also notes that financial advisors are beginning to propose adding funds from a reverse mortgage to a diversified portfolio to leverage their capital investment accounts to sustain current consumption levels. Other needs include having adequate funding for unanticipated medical and long-term care costs.

Although the reverse mortgage was designed for lower-income individuals as a means of helping them remain in their homes, some qualified borrowers in the upper-income quartiles are now using reverse mortgages as an investment strategy to avoid liquidating stock portfolios during downturns in equity markets. This type of investment strategy is advocated by Salter, Pfeiffer, and Evensky (2012). Using Monte Carlo simulations with various withdrawal rates of 4, 5, and 6 percent; a home value of $250,000; and a diversified portfolio value of $500,000 within an inclusive investment strategy, they find support for using a reverse mortgage. Their risk management strategy improves portfolio survival rates by a significant amount by mitigating the effects of market volatility (i.e., the risk of having to sell investments within depreciated equity markets). They focus on utilizing the RM-LOC funds during bear markets with repayment during bull markets. A stumbling block to incorporating this analysis in real-time is knowing when the bear and bull markets start and stop. Also, their findings relied on the home equity conversion mortgage (HECM) Saver option which is no longer available.[1]

Pfau (2017) reinforces the potential benefits of this RM-LOC investment strategy to minimize the effects of equity market downturns on one's portfolio.[2] Similarly, Sacks and Sacks (2012) test three reverse mortgage investment strategies. Their third strategy, using the RM-LOC to supplement drawdowns of a portfolio during down markets, is similar to this analysis, but without the periodic repayment of the RM-LOC. The general conclusion from their analysis is that an active investment strategy utilizing the RM-LOC produces substantially greater cash flow survival probabilities (i.e., there is less chance of running out of funds during the 30-year retirement analysis). These benefits of the RM-LOC strategy are especially prominent during a volatile stock market and/or a low-interest debt market. Without adding an RM-LOC to their investment portfolio, their analysis using various earnings models show a high probability of outliving one's funds. An increasing life expectancy adds to the importance of using the reverse mortgage for reserve funding.

Rasmussen, Megbolugbe, and Morgan (1997) suggest that the low usage of reverse mortgages is counterintuitive. Figure 1 shows the number of reverse mortgage originations by year. Rasmussen et. al., further note that approximately 80% of older homeowners could benefit from taking out a reverse mortgage loan. Nakajima and Telyukova (2017) reinforce the advantages of using reverse mortgages for their original purpose, i.e., permitting older homeowners to use the equity in their home to pay expenses and continue to live in their home. They also reinforce the small number of market participants by documenting that only 1.9% of eligible homeowners had reverse mortgages in 2013. Key factors cited for this low usage include inheritance considerations and the high closing costs associated with reverse mortgages. But their research indicates an average welfare gain of $1,770 per borrower for participants of reverse mortgages. Researchers, Apgar and Zhu (2005), reinforce the fact that home equity represents the largest single asset class owned by most individuals age 65 or older. Thus, a reverse mortgage offers an opportunity for many financially struggling senior homeowners to remain in their current home. There is also the option of using the equity value built up in their current home to downsize and guarantee the opportunity to live out their lives in their new home. This assumes they can fulfill the reverse mortgage requirements of proper upkeep of the home and timely payment of insurance and taxes.

News reports are also becoming more favorable towards reverse mortgages. For instance, about 93% of reverse mortgage media coverage was either positive or neutral in the second half of 2016, according to data compiled from the PR NewsWire monitoring service and the National Reverse Mortgage Lenders Association. Of the more than 5,000 news stories about reverse mortgages in 2016, only 4.2% conveyed negative comments. Leading magazines have also run favorable articles on reverse mortgages such as Forbes and Money.[3] A nationally syndicated PBS personal finance program, WealthTrack, also dedicated an episode to the new academic thinking around reverse mortgages and retirement.[4] Jason Oliva highlights ten must-

read reverse mortgage financial articles which are practitioner-focused.[5]

The reverse mortgage, officially called the home equity conversion mortgage (HECM), was initially authorized by the Housing and Community Development Act of 1987.[6] Reverse mortgage (RM) and HECM are used interchangeably within this manuscript. One of the unique requirements within this Act for obtaining a reverse mortgage is to obtain financial counseling. An overview of HECM counseling protocol is available from the National Reverse Mortgage Lenders Association (NRMLA).[7] Information provided include a pre-counseling information packet (Preparing for Your Counseling Session); the National Council on Aging (NCOA) booklet "Use Your Home to Stay at Home – A Guide for Homeowners Who Need Help Now"; a checklist of discussion points focused on reverse mortgage alternatives; and a list of FAQ. The mandatory counseling component of the HECM reverse mortgage has also received some attention in the literature. For instance, are the requirements to become a certified HECM counselor adequate in terms of identifying all the alternative funding options or providing a sufficient assessment of potential fraud? Rose (2009) outlines an option that is typically overlooked, i.e., the intrafamily sale and leaseback. But since this is a complex financial maneuver involving detailed record-keeping over the life of the loan, it is a viable alternative for only a small segment of the potential reverse mortgage clientele.[8] Seay, et al., (2014) discusses the lack of fraud awareness of HECM counselors. But the type of fraud highlighted occurs only within refinancing HECMs and HECM for purchase transactions which are not relevant to the discussion of the reverse mortgage line of credit option applied to an investment strategy.

Comparison of Traditional and Reverse Mortgage Lines of Credit

Since the retiree has already purchased a home before retirement, we assume familiarity with a traditional mortgage. So before outlining our investment strategy, we review the reverse mortgage line of credit by comparing it to a home equity loan and line of credit.[9] With this knowledge, retirees can make more informed decisions concerning the implications of borrowing against the equity within their home, selling their home, or spending down the home's equity value through a reverse mortgage. Although both the home equity loan and an equity line of credit involve borrowing a sum of funds using the home as collateral, the perspectives of the participants are vastly different. The home equity loan involves a lump sum of funds, whereas the equity line of credits entails a fixed amount of funds that can be withdrawn as needed.

To calculate the available cash flows to each product, three factors are needed: (1) the desired amount to be borrowed through the equity loan or line of credit, (2) the interest rate charged by the lender, and (3) the period for the loan. To determine the amount of funds eligible to be borrowed or withdrawn, all types of mortgage products rely on the underlying value of the property as collateral for the loan. However the equity loan and line of credit are based, not on the underlying value of the home directly, but on the equity value the homeowner has established in the property (i.e., the amount of equity relative to any underlying loans against the property). This equity position is highly correlated to the interest rate charged. The bigger the equity position, the lower the risk to the lender, and thus the lower the interest rate charged all other things equal.

With a reverse mortgage, the borrower owns the home (or pays off a small balance owed as part of the reverse mortgage process) and thus has a 100% equity position. Similar to the equity loan and line of credit, the homeowners in the reverse mortgage borrow against that equity position, but a cap on the line of credit is based on the ages of the borrowers. Since the sum of these expected payouts received are charged against this equity value over the term of the reverse mortgage, the qualifying amount eligible for withdrawal is much less than the qualifying amount for a typical mortgage product.[10]

The amount eligible for withdrawal under the reverse mortgage contract depends on the value of the home, the underlying mortgage interest rate, and the age of the borrowers.[11] These latter two features determine the HECM Principal Limit Factors (PLFs), which in turn determines the Maximum Claim Amount (MCA) allowable for withdrawals.[12] For instance using the PFL tables, a 70-year-old borrower in a 5% interest rate environment would be

assigned a PLF of 46.5%. This percentile decreases as interest rates increase. For the same 70-year-old borrower at 6%, the qualifying percentage drops to 41.5%. PLFs also decrease the earlier the reverse mortgage is taken. At age 65, the percentage drops to 43.0% and 37.8% for the 5% and 6% interest rates respectively. These factor rates are used to protect the lender against the fluctuations both within the housing market and the interest rate levels over time. Table 1 shows a range of qualifying percentages across a variety of ages and interest rates. In the complete table, interest rates range from a low of 3% to a high of 18.875% in one-eighth increments (0.125%). Thus, the borrowing base is based on the age of the borrower, property value, and the interest rate at the time of origination, less any costs folded into the loan. Many borrowers will finance their closing costs, reverse mortgage origination fee, and the initial mortgage insurance premium (MIP). This Remaining Principal Limit is the amount that the borrowers have access to and from which any outstanding liens on the property must be paid at closing. Although not shown in the select PLFs shown in Table 1, the actual range of PLFs start from a low of 6.8% at age 62 with an 18.875% mortgage rate to a high of 75.0% at age 99 and a 3% mortgage rate.[13]

The MCA is calculated by multiplying the representative PLF times the minimum of the property's appraised value at the time of loan application, its sale price, or the national FHA loan-limit currently set at $765,600. When borrowing as a couple, the non-borrowing spouse can continue living in the home after the principal borrower passes away if all of the following conditions are met: (1) continue making timely tax and insurance payments, (2) continue maintaining the property under the terms and conditions of the HECM, (3) be legally married to the borrowing spouse when the reverse mortgage originally closed, (4) lived in the property as a principal residence throughout the HECM, and (5) be able to obtain title to the property within 90 days of the death of the principal borrower.

The interest rates charged for the regular and reverse mortgage products should be similar if they were for the same term, again assuming all else equal. One factor influencing the upward pressure on the reverse mortgage rates is the increased risk to the lender of the homeowners outliving the equity built into the loan.[14] Reverse mortgages also tend to have larger origination fees, which the lender sometimes absorb into the offered rate. The lower loan to value ratio (i.e., lower loan amount versus the equity being used as collateral) and the shorter term to maturity associated with the RM-LOC help negate the differential in rates.

The term for the loan is based on the time frame the borrower wishes to use to repay the home equity loan. Although the most common terms for the traditional mortgage is 15 and 30 years of monthly payments, the home equity loan typically is over a shorter term ranging from 5 to 10 years. The traditional line of credit is more open-ended. There is a set draw period (i.e., the time in which the borrower can withdraw funds), followed by a conversion to an installment loan (at a fixed maturity, typically 10 years) at the prevailing home equity loan rate. Whereas, the term of the reverse mortgage is based on the age of the homeowners and the borrowing option undertaken. There are no required payments for the reverse mortgage until the homeowners vacate their home or pass away. Unlike the traditional mortgage but similar to a home equity loan or LOC, the reverse mortgage borrowers are receiving funds. The reverse mortgage is not recommended for less than 5 years due to the high upfront costs.

The income requirements to qualify for a reverse mortgage are less than a typical mortgage. Before 2011, there were no income requirements and few credit standards. With the uncertainty of appreciating home values and increasing default rates, HEMC regulations were changed in 2013. Underwriters now must check the applicant credit to protect their investment and to make sure that the borrowers have the cash flow to maintain the home at a satisfactory level, as well as, meet future tax and insurance requirements associated with the house. Similar to the traditional mortgage process, lenders require borrowing standards based on credit scores, income, other assets, monthly living expenses, and verification of the applicant's credit history. Also, the lender validates the timely payment of real estate taxes, hazard and flood insurance premiums.[15]

Although the key qualifier is the value of the underlying property, there are six other requirements for a reverse mortgage (HECM).[16]

1. The minimum age for the classified borrower is 62.[17]
2. The property must be owned outright or with a small balance owed that can be paid off by rolling this balance into the principal amount from which the monthly cash outflows are based.
3. The property must be the primary residence of the homeowner. The criterion used is that at least one of the homeowners must live in the home at least 183 days out of the year.
4. Since this is a federal program, the participants must not be delinquent or have defaulted on any federal debt contracts. This includes suspensions, debarments, or excluded participation from other FHA programs.
5. The property must meet be either a single-family home, a 1 to 4 unit home, a HUD-approved condominium or a manufactured home that meets FHA requirements. There is a cap on the base amount the factoring value can be applied against regardless of the value of your home or your age which is currently set a $679,650.
6. All applicants must meet with a certified HECM counselor to make sure the applicants understand the benefits, as well as, the risks associated with undertaking a reverse mortgage.[18]

There are several benefits to a reverse mortgage. Primarily, homeowners get to stay in their homes. This assumes that the homeowners have enough funds to keep the home in good condition, as well as, keep both property insurance and property taxes current. Failure to maintain the home to the standards required or to pay insurance and property taxes void the mortgage contract and requires repayment. A second added benefit is that the payouts made to the homeowner are tax-free. In many cases, the interest on the reverse mortgage may be eligible for a tax deduction when the loan is repaid.

A third benefit is a non-recourse clause which states that the homeowner or their heirs cannot be charged more than the value of the home at settlement. Fourth, Social Security and Medicare entitlements are not affected by the amount of the payouts, but Medicaid and other need-based government assistance can be affected depending on the amount of the payouts during any particular month. To remain eligible for Medicaid or other need-based programs, the homeowner needs to ensure that the funds withdrawn in any one month do not surpass the programs' eligibility limits. The final benefit is that there are no restrictions on how you spend your money.

Reverse Mortgage Payout and Payoff Options

Reverse Mortgage Payout Options

There are several cash flow options for payouts within the reverse mortgage structure.

The most common option and the focus of this paper is the **Line of Credit** (RM-LOC).[19] This option allows for unscheduled payments or installments. The homeowners can draw out funds at any time until the line of credit is exhausted. This option adds flexibility to the borrowers so that money is withdrawn only as needed. The second option is the **Tenure Payout** in which the homeowner receives fixed monthly payments for as long as at least one borrower lives and continues to occupy the property as a principal residence. The third option is the **Term Payout**, where the fixed monthly cash-flows are paid out for a specified number of months. The longer the term of the loan, the smaller the payments to the borrower. The next two options are modifications of the first three options. The **Modified Tenure/Line of Credit** is a combination of line of credit and scheduled monthly payments for as long as you remain in the home. The **Modified Term/Line of Credit** is a combination of line of credit plus monthly payments for a fixed period of months selected by the borrower. There also exists a **Single Disbursement Lump Sum** option, which permits the smallest draw against the equity value of the home and as the name signifies is a one-time payout. This is the only option that permits a fixed-rate loan. All other options use an adjustable-rate on either a monthly or yearly basis.[20] The final option is the **For Purchase** option used when the borrower wishes to use the reverse mortgage to downsize and purchase a new home.

Unique to the reverse mortgage, the unused portion of the mortgage principal under the line of credit options can grow over time and it has nothing to do with the home's value. This rate of growth equals the loan's interest rate calculated monthly. Thus, the funds available for borrowing can continue to grow over time provided they are not withdrawn. For example, assume the available funds on a line of credit with a 5% interest rate at the

beginning of the month equals $135,500 and none of the funds are withdrawn. The available balance will increase to $136,064.58 (i.e., 135,500 + 135,500 * 0.05/12) after just one month. The idea behind the growth of principal is that you both borrow the money and accrue interest or you do not borrow the funds and then the line of credit grows by the same amount as the borrower who borrowed those funds. The reverse mortgage has no fixed maturity date. The maturity date is based on the borrowers moving out of the property or their passing. Thus, the payout can only be estimated by the lender based upon actuary tables constructed from the age of the homeowner(s) and the underlying interest rate.

Reverse Mortgage Payoff Options

Just as important as knowing what a mortgage or home equity loan is, it is equally important to know what they are not. Neither a mortgage (traditional and reverse), the equity loan, nor the line of credit transfers the title of the home to the lender. The lender simply adds a lien to this title. Similar to any other secured loan, the property is used as collateral to protect the lender against default. With a traditional mortgage and home equity loan, the borrower is obligated to make monthly payments until the loan is repaid. Failure to abide by the terms of the underlying contact could result in foreclosure proceedings to be started by the lender. Only when a qualifying event occurs is the forced payoff of the full balance due triggered within the reverse mortgage. Any unpaid interest charges and payouts received by the homeowner are added to the principal that needs to be repaid, therefore the outstanding balance is much larger than the initial borrowing amount.

Qualifying events include selling the house; transferring the title of the property to someone else; the borrower(s) pass away; the borrower(s) reside elsewhere for longer than 12 months; the borrower(s) fail to pay property taxes, insurance premiums, or other mandatory obligations on a timely basis; or the borrower(s) fail to maintain the home. This 12-month grace period permits the homeowner(s) who must seek long-term medical care, the option of returning to their home. Note that each year the servicer of the loan will require an Annual Occupancy Certificate to certify occupancy over the past 12 months. Insurance coverage must be maintained at the same amount required at the closing of the loan in both amounts and coverage (i.e., hazard, wind, flood, condo, etc.).

There are two pay-off options within the reverse mortgage. The first option is to sell the house and use the proceeds to pay off the loan balance. This can be done by either the homeowners, their heirs, or the lending institution depending upon how the reverse mortgage was underwritten. If the home sale generates more cash than what is needed to pay off the loan, the excess funds are kept by the homeowners or the homeowner's estate. For example, if the survivors owe $150,000 on the loan, but sell the house for $200,000 they get to keep the extra $50,000. But if there is a shortfall between the selling price and the amount owed, the survivors exercise the "non-recourse" clause of the mortgage. Thus, they are not responsible for this difference. Using the same example, if $150,000 is owed, but the home is sold for only $125,000, the shortfall of $25,000 is forgiven. Thus, one of the key benefits of the reverse mortgage is that you cannot be charged more than the value of the home at settlement. The second option is to repay the loan through other means and keep the house. The payoff window is approximately 6 months after the underlying property is no longer considered the primary residence due to moving or death. The borrowers or their heirs must decide between the two options during this 6-month window.

Costs

Since all mortgage products rely on the underlying value of the property for collateral against the loan, they require that the property be appraised to determine the amount of the loan the property will support. Under both mortgages (regular and reverse), the borrower may not be required to pay the total closing costs at settlement. These closing costs, including such things as a credit report, recording fees, and title commitment, can typically be rolled into the mortgage. This reduces the net funds available. Typically, a home equity line of credit has minimal closing costs, but this is not the case with the line of credit within the reverse mortgage options, which has the same closing costs as

Table 1. HECM principal limit factors (PLFs).

	Interest rates							
Age	3%	4%	5%	6%	7%	8%	9%	10%
62	0.524	0.470	0.410	0.357	0.312	0.272	0.238	0.209
63	0.530	0.477	0.416	0.364	0.319	0.279	0.245	0.215
64	0.536	0.483	0.423	0.371	0.326	0.286	0.252	0.222
65	0.542	0.490	**0.430**	**0.378**	0.333	0.294	0.259	0.229
66	0.549	0.497	0.438	0.386	0.341	0.301	0.267	0.236
67	0.556	0.504	0.445	0.394	0.349	0.309	0.274	0.244
68	0.562	0.511	0.453	0.402	0.357	0.317	0.282	0.252
69	0.569	0.518	0.461	0.410	0.365	0.326	0.291	0.260
70	0.576	0.522	**0.465**	**0.415**	0.370	0.330	0.296	0.265
71	0.583	0.522	0.465	0.415	0.370	0.331	0.296	0.265
72	0.588	0.524	0.467	0.416	0.372	0.332	0.298	0.267
73	0.595	0.532	0.475	0.425	0.381	0.342	0.307	0.276
74	0.602	0.539	0.483	0.434	0.390	0.350	0.315	0.284
75	0.609	0.547	0.492	0.443	0.400	0.360	0.326	0.294
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
84	0.676	0.625	0.579	0.536	0.497	0.461	0.428	0.398
85	0.685	0.636	0.591	0.549	0.511	0.476	0.444	0.414
86	0.694	0.647	0.603	0.563	0.526	0.491	0.459	0.430
87	0.703	0.658	0.616	0.577	0.540	0.507	0.476	0.447
88	0.711	0.667	0.626	0.589	0.553	0.520	0.490	0.461
89	0.721	0.679	0.640	0.603	0.569	0.537	0.508	0.480
90	0.730	0.691	0.653	0.618	0.586	0.555	0.526	0.499
91	0.740	0.703	0.667	0.634	0.603	0.573	0.546	0.519
92	0.750	0.715	0.682	0.650	0.620	0.592	0.566	0.540

Note: PLFs increase with age as shown within each column and decrease with interest rates as shown within each row.
Source: HUD.GOV: HECM Principal Limit Factors on or after 10/2/2017.
https://www.hud.gov/program_offices/housing/sfh/hecm.

any of the other reverse mortgage options. See Table 2 for a sample of typical closing costs.

Either type of mortgage can be insured against default. Within the traditional mortgage, mortgage insurance is required until a minimum of 20% equity stake is accumulated by the borrower. This mortgage insurance protects the lender against the borrower failing to make timely payments of interest and principal. With the reverse mortgage, the benefits of the mortgage insurance are used to protect the lender and the federal government (i.e., the U.S. Department of Housing and Urban Development—HUD, the federal agency that has oversight of the HECM). Financing this insurance within a reverse mortgage is through both an initial mortgage insurance premium (MIP) and a MIP paid monthly throughout the life of the reverse mortgage. Reverse mortgage default is defined as the failure of the borrower to make timely payments for taxes and insurance, as well as, maintain the property in good condition. A traditional equity line of credit does not require monthly mortgage insurance.

The initial MIP is the fee that is paid directly to HUD at the closing of the loan to insure that specific loan within the HECM program. The MIP is used to support three FHA guarantees: (1) the homeowners cannot "outlive" the reverse mortgage (i.e., the homeowner will never be forced out of their home unless there is a default as described previously); (2) the homeowners or heirs cannot be personally liable if the balance of the loan exceeds the value of the home at the time of sale (i.e., the nonrecourse clause); and (3) the FHA is forced to take over the loan if the lender becomes financially troubled. The initial MIP is fixed at 2% of the loan amount.

The types of fees on a reverse mortgage are similar to those found on a traditional Federal Housing Administration (FHA) mortgage. Although both types of mortgages start with an origination fee, the reverse mortgage fee is typically much larger. This origination fee is compensation to the lender for processing the loan. For a reverse mortgage the maximum fee permitted is calculated as the greater of $2,500 or the calculated rate. For example, if the claim amount is $100,000, the origination fee is $2,500 (i.e., the maximum of $2,500 versus $2,000 [0.02*100000]). The 2% fee is the percentage charge on loan amounts less than or equal to $200,000. If the value of the home is greater than $200,000, limits are 2% of the first $200,000 of home value plus 1% of the remaining balance but capped at $6,000. For example if the claim is for $500,000, the

Table 2. Sample closing costs.

Sample costs	Closing costs	Description
$2080	Title service costs	Title search, title insurance, and possibly other title services, typically undertaken by a title insurance firm. Required by institutional/commercial lenders and often by the real estate contract.
$200	Recording fees	Charged by a governmental entity for entering an official record of the change of ownership of the property. Required by the government for recording the deed.
$100	Document or transaction stamps or taxes	Charged by a governmental entity as an excise tax upon the transaction. Required by law.
$200	Survey fee	For a survey of the lot or land and all structures on it, paid by either party, to confirm lot size and dimensions and check for encroachments. Required by institutional and commercial lenders.
$250	Inspection fee	Charged by licensed home, pest, or other inspectors. Some lenders require inspections (such as termite inspection) to verify that the property is in good condition, which is necessary to assure that the property will retain the necessary collateral value to secure the mortgage loan.
$470	Miscellaneous fees	Document delivery fee/Notary fee/Endorsement fee/Credit reports/Flood certification
$35	Monthly servicing fee	Paid to the lender for servicing the loan
Out of pocket at time of closing		
$400	Appraisal fee	Charged by a licensed professional Appraiser. Many lenders require that an appraisal be performed as a condition of the mortgage loan. The purpose of this appraisal is to verify that the sale price of the property (upon which the underwriting of the loan is based) is equal to or less than the fair market value of the property.
$125	Counseling fee	Mandatory counseling with a third-party HECM counselor approved by the U.S. Department of Housing and Urban Development
	Attorney fee	Recommended to use an attorney at closing

Source: See nerdwallet at https://www.nerdwallet.com/article/mortgages/closing-costs-mortgage-fees-explained.

origination fee would equal the maximum fee of $6,000 (i.e. $4,000 on the first $200,000 [0.02*200000] plus $3,000 on the next $300,000 [0.01*300000] which exceeds the cap).[21]

There is also a monthly servicing fee, which is compensation to the lender for monthly statements, disbursing loan proceeds, and making sure all the requirements are met. This is a modest fee that is capped at $35/month. On both the traditional mortgage and the reverse mortgage, the service fee can be rolled into the interest rate charged. With the reverse mortgage, these fees could instead be amortized and rolled into the payoff amount. This option would reduce the net amount of the funds available to the homeowner. A counseling fee is a special cost for reverse mortgage applicants. The counselors are tasked with educating the borrowers about reverse mortgages as well as determining if there are any other types of financing they may qualify for.

Line of Credit Reverse Mortgage Investment Strategy

Our analysis sets three assumptions for our retiree: (1) age 65 years; (2) portfolio worth $500,000; and (3) owns a house without a mortgage worth $500,000 that qualifies for a reverse mortgage. The investment strategy with RM-LOC follows two simple withdrawal rules. First, after a month in which the equity market increases (as measured by the S&P 500 index), retirees withdraw funds from their portfolio. Second, after a month in which the equity market declines, withdrawals are taken from the RM-LOC. Once the equity market reverses, then the line of credit and the accumulated interest is repaid. Note that under a reverse mortgage there is no obligation to repay the line of credit or interest until the death of the mortgagee or the selling of the house.

Although prior research typically assumes a constant withdrawal amount, our analysis relies on a 0.4167% monthly rate (i.e., 5 percent annually). Our withdrawals are subjected to a maximization rule, i.e., the withdrawal amount will be the larger of 0.4167% of the original portfolio or the current balance in the portfolio. With our initial portfolio of $500,000, the minimum withdrawal each month is $2,083.33. This maximizes the amount of withdrawal each month. Utilizing a constant percentage helps eliminate sequence risk.

The analysis covers six historical periods (1/1960-12/1989, 1/1970-12/1999, 1/1980-12/2009, 1/1990-12/2019, 1/2000-12/2019, and 1/2005-12/2019) under five portfolio scenarios. Within each period, the initial line of credit is calculated as the product of the home value ($500,000) and the principal loading factor (PLF) determined by the mortgage interest rate existing at the beginning of each period and the age of the mortgagee. Therefore, the initial RM-LOC changes within each scenario even though the age of our retiree is set at 65 since

Table 3. Differences between the adjustable reverse mortgage rate and their proxies.

	Libor	Treasuries				Prime
	1 month	1 year	6 month	1 year constant maturity	10 year constant maturity	
Average	1.88%	2.12%	2.19%	1.94%	0.52%	−0.90%
Std Dev	0.86%	0.67%	0.68%	0.77%	1.09%	0.74%
Max	3.93%	3.97%	4.11%	3.94%	2.81%	1.18%
Min	−0.56%	0.30%	0.65%	−0.17%	−1.89%	−2.40%
Correlation	95.99%	96.25%	96.30%	96.03%	85.48%	95.42%

Note all statistics are calculated against the Reverse Mortgage ARM (1/1989 through 12/2019).
Source: Adjustable rate HECM Mortgages: https://www.hud.gov/program_offices/housing/rmra/oe/rpts/hecmsfsnap/hecmsfsnap. Libor: Macrotrends: https://www.macrotrends.net/1433/historical-libor-rates-chart. Treasuries and Prime rates: Federal Reserve Economic Data, St. Louis Federal Reserve: https://fred.stlouisfed.org.

the initial interest rate is time-dependent. Since we are trying to determine the merits of this investment strategy going forward, the analysis uses the latest HECM Principal Limit Factor Tables (effective on or after October 2, 2017) even though all of the scenarios are initiated before 2017. The use of historical data gives a representative analysis across various interest and equity market conditions.

The initial interest rate for the most recent scenario (1/2005-12/2019) is based on the ARM for the HECM loans provided by HUD.[22] Historical adjustable reverse mortgage rates are recorded from 1989 onward. For all periods before 1989, the base interest rate utilized for the adjustable-rate mortgage rate is the U.S. Treasury Note Constant Maturity 1-year Yield (H15T1Y).[23] Alternatives for this base rate when the adjustable reverse mortgage rate is not available include 1-month LIBOR, 1-year Treasury Bills, 6-month Treasury Bills, 10-year constant maturity Treasuries, and the Prime rate. All six proxies are highly correlated with the adjustable reverse mortgage rates as shown in Table 3. Figure 2 shows how closely all six potential proxies move with the adjustable reverse mortgage rate. The average difference between the proxies and the adjustable-rate ranged from a low of 0.52% (standard deviation 1.09%) for the 10-year constant maturity Treasury to 2.19% (standard deviation 0.68%) for the 6-month Treasury Bill. Each of the proxies generates similar results within our analysis with the Prime rate showing the most variability. Table 3 shows the means, standard deviation, minimum, and maximum differences between the proxies and the adjustable reverse mortgage rates. Margins above the base rate of 0.5%, 1%, and 1.5% are also tested to gauge the merit of the RM-LOC option for less creditworthy retirees. The average margin added to adjustable-rate mortgages over 2005 through 2018 period was 1.29%.[24]

Within each of the six periods, five different portfolios are analyzed: an all-stock portfolio; a 60% stock and 40% debt portfolio with and without portfolio rebalancing; and a 40% stock and 60% debt portfolio with and without portfolio rebalancing. Our proxy for the stock portfolio utilizes the S&P 500 index, while the debt portfolio utilizes a 50/50% mix between AAA and BBB corporate bonds with maturities of 20 years or longer.[25] To illustrate the investment process, we start the discussion with the all-stock portfolio during our most recent test period (1/2005-12/2019). Our all-stock portfolio starts with $500,000 invested in an S&P 500 index fund.

Without the RM-LOC option, the first withdrawal in January 2005 of $2,083.33 is taken from this portfolio. With the RM-LOC option, the first withdrawal is taken from the RM-LOC and not the portfolio since there was a drop in the market during the previous month of 2.53% (i.e., the S&P 500 dropped from 1211.92 on December 1, 2004, to 1181.27 on January 2, 2005). As noted previously, we utilize a 5% annual withdrawal (0.4167% monthly) of the larger of the original portfolio balance of $500,000 or the current portfolio balance to maximize our withdrawals. Our initial RM-LOC is $232,350 based on an initial interest rate of 4% (i.e., the actual ARM rate of 4.01% is rounded to the nearest eighth of a percent). The PLF for a 4% mortgage rate and a 65-year-old retiree is 49%. Therefore, the initial RM-LOC is calculated as the home value times the $PLF_{4\%,65}$ less the adjustment for additional financing costs ($500,000 x 0.49 − $12,650). The additional financing costs include mortgage closing costs[26] of $3,300; an origination fee of $4,450 (origination fee rule: 2% of first $200,000 financed plus 1% of next $200,000 with a maximum upper bound of $600,000. Based on a financing amount of $245,000 ($500,000 x 0.49), the calculation is 0.02 x $200,000 + 0.01 x

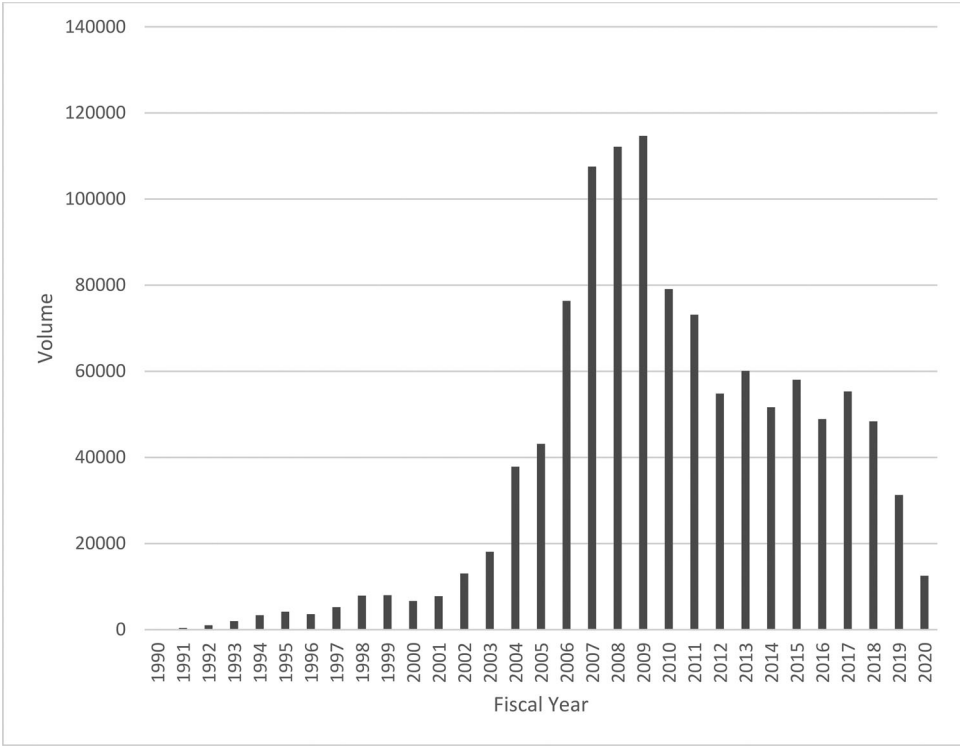

Figure 1. Reverse mortgage originations by year.
Source: https://www.nrmlaonline.org/2020/02/03/annual-hecm-endorsement-chart.

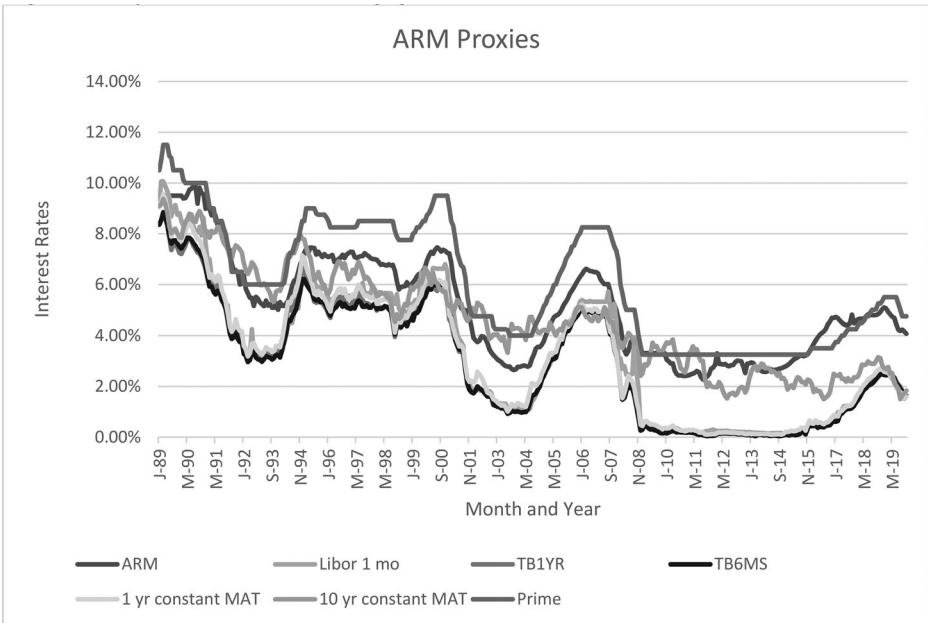

Figure 2. Adjustable reverse mortgage rate proxies.
Source: For adjustable rates for HECM mortgages: https://www.hud.gov/program_offices/housing/rmra/oe/rpts/hecmsfsnap/hecmsfsnap.
For Treasuries and Prime rates: Federal Reserve Economic Data: https://fred.stlouisfed.org.
For LIBOR: Macrotrends Data: https://www.macrotrends.net/1433/historical-libor-rates-chart.

$45,000); and a MIP initial payment of $4,900 (MIP initial payment rule: 2% of the claim amount or 0.02 x $245,000) for a total of $12,650. Withdrawal decision rules with sample calculations for withdrawals, LOC, PLF, and Financed Costs are shown in Table 4.

The withdrawal during the first month of $2,083.33 plus borrowing fees reduce the LOC to $230,092.56. The extra fees include the borrowing interest expense of $42.27 associated with financing the closing, origination, and initial MIP fees ($12,650

Table 4. Sample calculations—Withdrawals, LOC, PLF, and financed costs.

Withdrawal Rule for No LOC option:
➢Withdraw 5%/12 x MAX(Portfolio Balance$_0$ or Portfolio Balance$_t$)
Withdrawal Rule for LOC Option:
➢If the equity market increased during the month:
Withdraw funds from the portfolio
5%/12 x MAX(Portfolio Balance$_0$ or Portfolio Balance$_t$) + Repayments
➢If the equity market decreased during the month:
Withdraw funds $2,083.33 (i.e., $500,000 x 5%/12) from the LOC

Date	No LOC examples	LOC examples
1/2005	0.05/12 x Max(500,000, 500,000) = $2083.33	Down Market, therefore $2083.33
2/2005	0.05/12 x Max(500,000, 485,271.43) = $2083.33	Up Market, therefore 0.05/12 x Max(500,000, 487,354.77) = $2083.33
2/2006	0.05/12 x Max(500000, 499,526.48) = $2083.33	2nd consecutive Up Market, therefore 0.05/12 x Max (500,000, 515,099.79) 14,742.30 = $16,888.55

Where the repayments are previously unpaid LOC withdrawals plus interest.

Initial LOC equals PLF x Home Value − Financed Costs therefore the LOC = 0.49 x 500,000 − 12,650 = $232,350
PLF for mortgagee age 65 with a home value of $500,000 equals 49.0%
Financed Costs = mortgage closing costs + origination fee + initial MIP
**Mortgage closing costs*: $3,300 (average of typical closing costs)*
**Origination fee*: $4,450 (2% of first $200,000 financed plus 1% of next $200,000 with a maximum upper bound of $600,000. Based on a financed amount of $245,000 ($500,000 x 0.49), the calculation is 0.02 x $200,000 + 0.01 x $45,000)*
**Initial MIP*: $4,900 (2% of the financed amount or 0.02 x $245,000)*

* 0.0401/12) for the month, plus the monthly MIP of $96.81 (i.e., the monthly charge times the outstanding balance: 1/12 * 0.005 * $232,350) and the monthly servicing fee of $35. In month 2, the index increases. Therefore, the withdrawal is taken from the portfolio, but the payback will not occur until the second consecutive monthly index increase. All borrowing plus interest costs are carried forward. Two consecutive monthly increases do not occur until February 2006. At this time, the normal withdrawal will come out of the portfolio along with enough funds to replenish the LOC. A sample of the cash flows is shown in Table 4.

During this test period, the average monthly return for the S&P 500 index is 0.63% (7.79% annually) with a monthly standard deviation of 3.99%. The wide swings in the monthly returns from the S&P 500 range from a high of 10.77% occurring on 10/1/2011 through a low of -16.94% on 10/1/2008. During this same period, ARM rates for reverse mortgages averaged 3.91% (1.20% standard deviation; 6.61% maximum; and 2.27% minimum).[27] The all-stock portfolio analysis shows a slight overall benefit to the RM-LOC option versus not using an RM-LOC. Although the RM-LOC opportunity shows a slight reduction in the total withdrawals ($5,789) when compared to the no RM-LOC option, it more than makes up this deficit with a higher ending portfolio balance differential ($20,153). The net gain is $14,364. Of the 180 months within this analysis period, the RM-LOC option generated positive cash flows in 174 months. Scenarios showing interest rates increases due to a higher lender's margin reveal slightly lower net gains of $14,127, $13,890, and $13,653 for the 0.5, 1, and 1.5 percent margin increases, respectively. Thus, higher ARM rates decrease the advantage of the RM-LOC option.

The second scenario utilizes a portfolio consisting of 60% equity and 40% debt with portfolio rebalancing. The rebalancing criteria are based on the balance of the equity account. If the balance drops below 55% or exceeds 65% of the total portfolio's value, the portfolio is rebalanced to the original 60% equity/40% debt mix.[28] Using the same period (1/2005-12/2019), gains for the RM-LOC option was slightly lower at $6,749, $6,544, $6,339 and $6,133 for the base case and 0.5, 1, and 1.5 percent add on margins. The number of positive monthly differentials favor RM-LOC at over 96% in all four interest

Table 5. Investment gains/loses using the reverse mortgage LOC investment strategy all stock 1/2005–12/2019.

	ARM	SPX		Borrowing					Repayment			Withdrawals			Portfolio		
Date	Base yield	Value	Change	Amount	Interest	Total	Balance amount	Balance interest	Principal	Interest	Total	w/ LOC	w/o LOC	(LOC)	w/ LOC	w/o LOC	Gain
1/1/2005	**4.01%**	1181.27	−2.53%	**$2,083.33**	**$6.96**	$2,090.30	$2,090.30	$0.00	$0.00	$0.00	$0.00	$0.00	**$2,083.33**	**$230,092.56**	$487,354.77	$485,271.43	**$2,083.33**
2/1/2005	4.19%	1203.6	1.89%	$0.00	$0.00	$0.00	$2,090.30	$7.31	$0.00	$0.00	$0.00	$2,083.33	$2,083.33	$229,917.48	$494,484.07	$492,361.35	**$2,122.72**
3/1/2005	4.35%	1180.59	−1.91%	$2,083.33	$7.55	$2,090.89	$4,181.18	$22.71	$0.00	$0.00	$0.00	$0.00	$2,083.33	$227,657.49	$485,030.69	$480,865.23	**$4,165.47**
4/1/2005	4.56%	1156.85	−2.01%	$2,083.33	$7.92	$2,091.25	$6,272.44	$31.77	$0.00	$0.00	$0.00	$0.00	$2,083.33	$225,396.21	$475,277.41	$469,112.37	**$6,165.04**
5/1/2005	4.71%	1191.5	3.00%	$0.00	$0.00	$0.00	$6,272.44	$24.63	$0.00	$0.00	$0.00	$2,083.33	$2,083.33	$225,217.61	$487,429.61	$481,079.92	**$6,349.69**
6/1/2005	4.77%	1191.33	−0.01%	$2,083.33	$8.28	$2,091.62	$8,364.05	$41.54	$0.00	$0.00	$0.00	$0.00	$2,083.33	$222,955.14	$487,360.05	$478,927.93	**$8,432.12**
7/1/2005	4.81%	1234.18	3.60%	$0.00	$0.00	$0.00	$8,364.05	$33.54	$0.00	$0.00	$0.00	$2,083.33	$2,083.33	$222,776.52	$502,806.22	$494,070.81	**$8,735.41**
8/1/2005	4.90%	1220.33	−1.12%	$2,095.03	$8.55	$2,103.58	$10,467.63	$51.29	$0.00	$0.00	$0.00	$0.00	$2,083.33	$220,502.02	$497,163.68	$486,442.96	**$10,720.71**
9/1/2005	5.05%	1228.81	0.69%	$0.00	$0.00	$0.00	$10,467.63	$44.05	$0.00	$0.00	$0.00	$2,083.33	$2,083.33	$220,321.90	$498,535.15	$487,739.93	**$10,795.21**
10/1/2005	5.22%	1207.01	−1.77%	$2,083.33	$9.06	$2,092.39	$12,560.03	$63.69	$0.00	$0.00	$0.00	$0.00	$2,083.33	$218,056.75	$489,690.74	$477,003.71	**$12,687.03**
11/1/2005	5.33%	1249.48	3.52%	$0.00	$0.00	$0.00	$12,560.03	$55.76	$0.00	$0.00	$0.00	$2,083.33	$2,083.33	$217,874.73	$504,837.72	$491,704.28	**$13,133.44**
12/1/2005	5.48%	1248.29	−0.10%	$2,103.49	$9.60	$2,113.10	$14,673.12	$76.60	$0.00	$0.00	$0.00	$0.00	$2,083.33	$215,587.70	$504,356.93	$489,152.67	**$15,204.26**
1/1/2006	5.66%	1280.08	2.55%	$0.00	$0.00	$0.00	$14,673.12	$69.18	$0.00	$0.00	$0.00	$2,101.49	$2,083.33	$215,403.23	$515,099.79	$499,526.48	**$15,573.31**
2/1/2006	5.77%	1280.66	0.05%	$0.00	$0.00	$0.00	$0.00	$0.00	**$14,673.12**	**$69.18**	**$14,742.30**	$16,888.55	$2,083.33	$229,890.78	$498,444.66	$497,669.51	**$775.15**
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
5/1/2019	4.73%	2752.06	−6.58%	$2,192.22	$8.65	$2,200.87	$2,200.87	$0.00	$0.00	$0.00	$0.00	$0.00	$2,114.31	$175,314.27	$491,525.32	$471,943.32	**$19,582.00**
6/1/2019	4.69%	2941.76	6.89%	$0.00	$0.00	$0.00	$2,200.87	$8.60	$0.00	$0.00	$0.00	$2,083.33	$2,083.33	$175,160.32	$523,322.92	$502,391.13	**$20,931.80**
7/1/2019	4.45%	2980.38	1.31%	$0.00	$0.00	$0.00	$0.00	$0.00	$2,200.87	$8.60	$2,209.47	$4,389.98	$2,093.30	$177,209.67	$525,803.23	$506,893.32	**$18,909.91**
8/1/2019	4.23%	2926.46	−1.81%	$2,190.85	$7.73	$2,198.57	$2,198.57	$0.00	$0.00	$0.00	$0.00	$0.00	$2,112.06	$174,868.54	$516,290.58	$495,610.73	**$20,679.85**
9/1/2019	4.18%	2976.74	1.72%	$0.00	$0.00	$0.00	$2,198.57	$7.66	$0.00	$0.00	$0.00	$2,151.21	$2,083.33	$174,719.71	$523,009.84	$502,042.56	**$20,967.28**
10/1/2019	4.23%	3037.56	2.04%	$0.00	$0.00	$0.00	$0.00	$0.00	$2,198.57	$7.66	$2,206.24	$4,385.45	$2,091.84	$176,769.05	$529,310.40	$510,208.33	**$19,102.07**
11/1/2019	4.16%	3140.98	3.40%	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,205.46	$2,125.87	$176,619.65	$545,126.40	$525,453.55	**$19,672.85**
12/1/2019	4.07%	3230.78	2.86%	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,271.36	$2,189.39	$176,471.19	$558,440.10	$538,286.78	**$20,153.32**

Note: Initial LOC $232,350; Base rate 1/2005–12/2019: 5/1 ARM—Reverse Mortgage ARM Rate; Market Proxy: SPX—S&P 500 Stock Index; All Stock Portfolio with reverse mortgage line of credit (w/LOC) and without (w/o LOC).

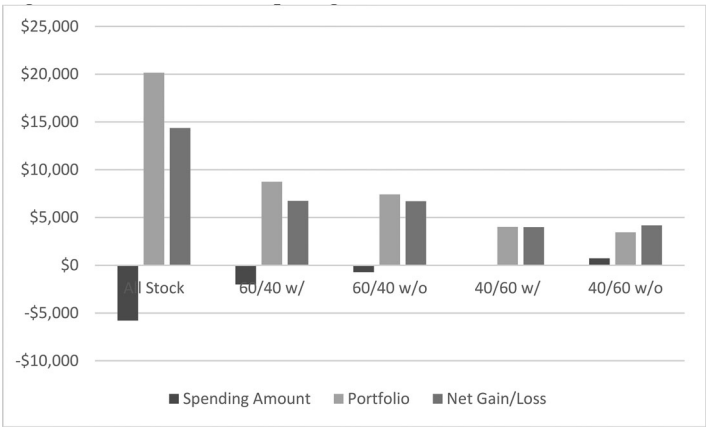

Figure 3. Gains/losses comparing the LOC and the no LOC scenarios: 1/2005–12/2019.
Note: Positive values indicate a gain to the LOC Investment Strategy versus the non-LOC Investment Strategy. All five scenarios favor the LOC Investment Strategy based on superior ending portfolio values.

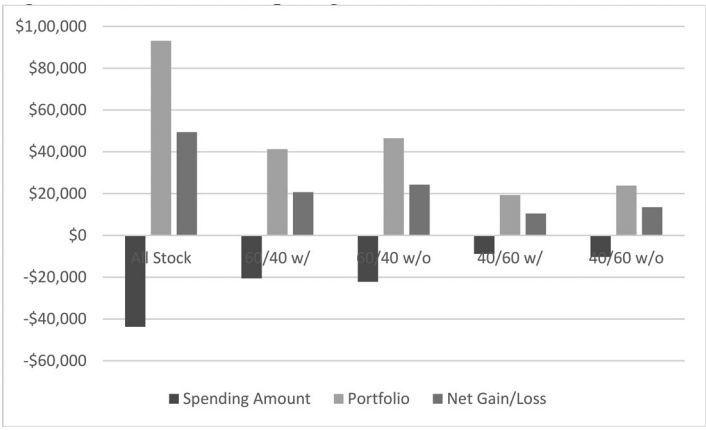

Figure 4. Gains/losses comparing the LOC and the no LOC scenarios: 1/2000–12/2019.
Note: Positive values indicate a gain to the LOC Investment Strategy versus the non-LOC Investment Strategy. All five scenarios favor the LOC Investment Strategy based on superior withdrawals and ending portfolio values, except for the all-stock analysis where the withdrawal values were lower.

rate environments. Again the net gain occurs since that the value gained by the ending portfolio exceeds the slight losses from the withdrawal differentials. The 60% equity/40% debt portfolio without rebalancing also favored the RM-LOC strategy, but at a slightly lower level. The net gains for the RM-LOC strategy are $6,702, $6,501, $6,300 and $6,098 for the base case and the 0.5, 1, and 1.5 percent add on margins respectively. The number of positive differential months for all four interest rate cases is 100%. The fourth and fifth scenarios utilize a lower equity level and a higher debt component (i.e., 40% equity and 60% debt within the portfolios with and without rebalancing). In this interest rate environment, the RM-LOC option did slightly worse than the 60/40 mix. The net gain in the RM-LOC option with rebalancing shows lower advantage levels of $3,992, $3,805, $3,617, and $3,430 for the base case and 0.5, 1 and 1.5 percent add on margins respectively. The net gain in the RM-LOC option without rebalancing shows relatively the same levels of advantages ($4,184. $3,999, $3,814 and $3,629 for the base case and 0.5, 1 and 1.5 percent add on margins respectively). See Figures 3 for a summary of the performance differential of the RM-LOC versus the no RM-LOC options during the 1/2005-12/2019 period.

All five of the different portfolio options (all stock, 60% equity/40% debt with and without rebalancing, and 40% equity/60% debt with and without rebalancing) are analyzed over the other five test periods to gain some insight into the performance of the RM-LOC investment option within different equity market and interest rate environments. As a gage of the investment environment within each period, the total monthly return from the stock market (as proxied by the S&P 500) was annualized.[29] A similar calculation was undertaken for the debt

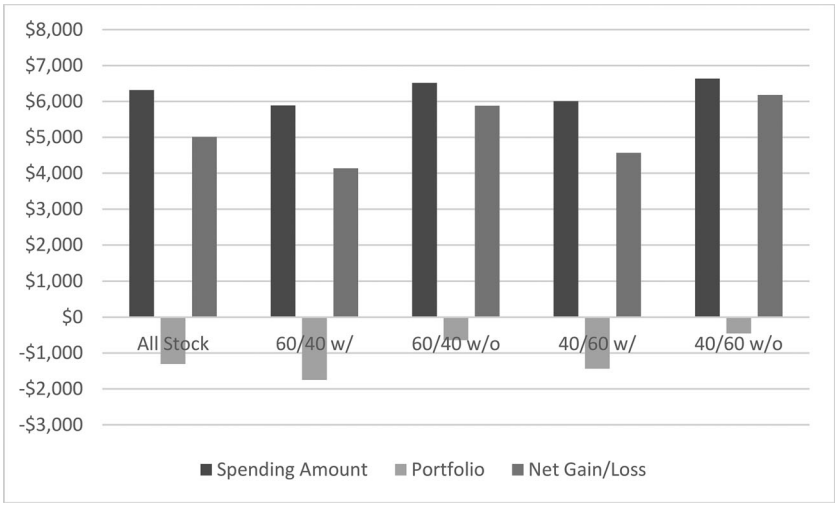

Figure 5. Gains/losses comparing the LOC and the no LOC scenarios: 1/1990–12/2019.
Note: Positive values indicate a gain to the LOC Investment Strategy versus the non-LOC Investment Strategy. All scenarios favor the LOC Investment Strategy, except the all-stock portfolio.

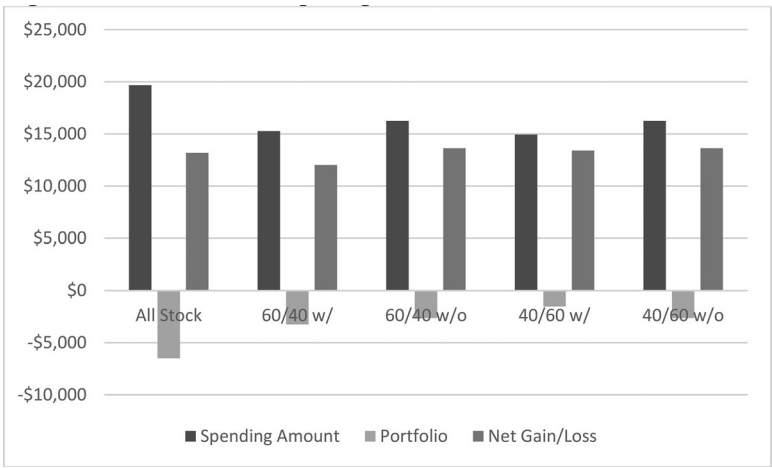

Figure 6. Gains/losses comparing the LOC and the no LOC scenarios: 1/1980–12/2009.
Note: Positive values indicate a gain to the LOC Investment Strategy versus the non-LOC Investment Strategy. All five scenarios favor the LOC Investment Strategy with the dominate factor being higher withdrawals versus lower ending portfolio values.

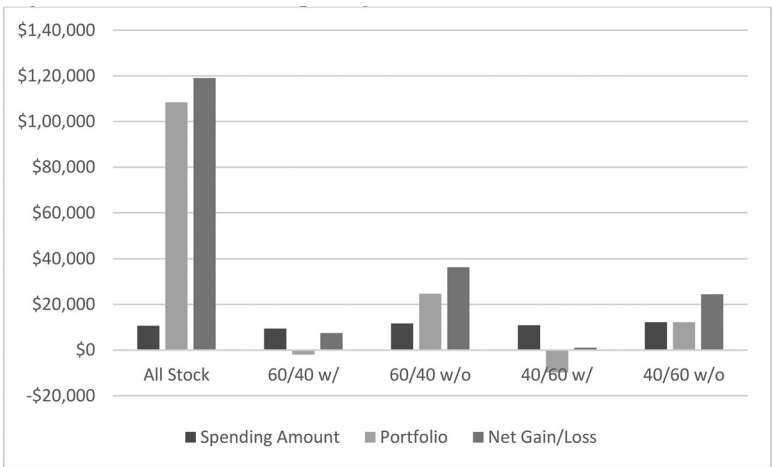

Figure 7. Gains/losses comparing the LOC and the no LOC scenarios: 1/1970–12/1999.
Note: Positive values indicate a gain to the LOC Investment Strategy versus the non-LOC Investment Strategy. All five scenarios favor the LOC Investment Strategy with dominance in both the withdrawals and the ending portfolio values.

Table 5. Average returns.

Average	AAA	BBB	Debt[b]	Stock[a]	60/40	40/60
1/1960–12/1989	8.19%	9.26%	8.73%	7.05%	5.47%	3.84%
1/1970–12/1999	9.10%	10.21%	9.65%	10.45%	6.14%	4.38%
1/1980–12/2009	8.35%	9.47%	8.91%	9.02%	5.65%	4.02%
1/1990–12/2019	5.91%	6.86%	6.39%	8.42%	4.11%	2.98%
1/2000–12/2019	5.00%	6.05%	5.53%	5.01%	3.48%	2.46%
1/2005–12/2019	4.51%	5.58%	5.04%	7.52%	3.28%	2.39%
Standard Deviation	**AAA**	**BBB**	**Debt[b]**	**Stock[a]**	**60/40**	**40/60**
1/1960–12/1989	2.90%	3.30%	3.10%	14.93%	2.56%	2.89%
1/1970–12/1999	2.06%	2.41%	2.23%	15.32%	2.18%	2.77%
1/1980–12/2009	2.59%	2.86%	2.71%	15.45%	2.42%	2.89%
1/1990–12/2019	1.68%	1.65%	1.66%	14.18%	1.87%	2.51%
1/2000–12/2019	1.19%	1.28%	1.22%	14.47%	1.69%	2.46%
1/2005–12/2019	0.82%	1.05%	0.92%	13.78%	1.59%	2.35%

Note: Annualized average returns.
[a]Stock portfolio proxy is the S&P 500.
b[b]Debt portfolio proxy is a 50%/50% mix of Moody's seasoned Aaa and Baa corporate bond yields.

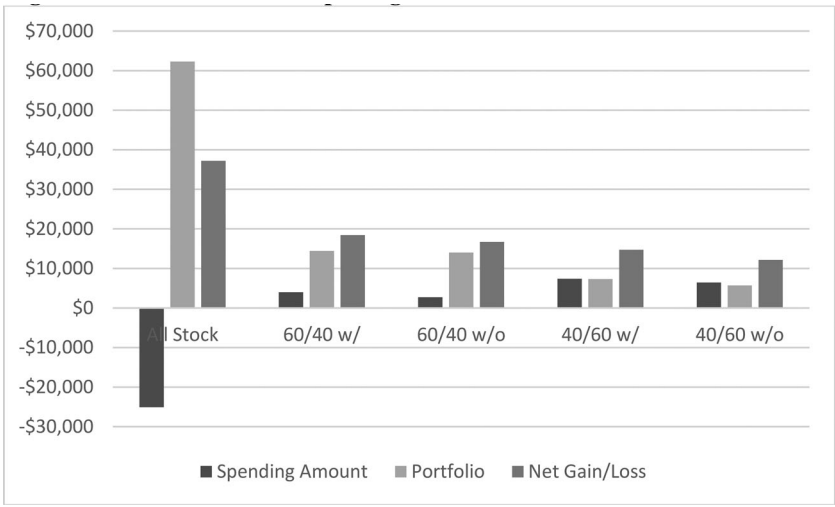

Figure 8. Gains/losses comparing the LOC and the no LOC scenarios: 1/1960–12/1989.
Note: Positive values indicate a gain to the LOC Investment Strategy versus the non-LOC Investment Strategy. All five scenarios favor the LOC Investment Strategy with dominance in both the withdrawals and the ending portfolio values.

portfolio. The average returns in the 1/1960-12/1989 period are 7.05% and 8.73% respectively for the stock and debt indices. For the 60/40 and 40/60 mixed portfolios, the average returns are 5.47% and 3.84% respectively. The average return and standard deviations during all six time periods are recorded in Table 6. Interestingly, the average return for debt dominated equity in two of the test periods (1/1960-12/1989 and 1/2000-12/2019). The advantages of the RM-LOC strategies versus the no RM-LOC strategy are illustrated in Figures 3 through 8. In all scenarios, RM-LOC produced greater net cash flows.

Several factors are ignored within our analysis since they only strengthen the case for the RM-LOC option, but would add unnecessary complications to the analysis. For instance, the RM-LOC grows if unused which adds potential greater long-run security. But since our analysis includes repayment of the RM-LOC, our RM-LOC is never depleted. Similarly, the size of RM-LOC is dependent on the value of the underlying home. Home values are location-specific, i.e., homeowners in high valued home markets would have a larger RM-LOC versus low valued housing locals, again adding potential security.[30] This can only add to the advantages of the RM-LOC investment strategy. Even if the withdrawal rule is modified to utilize the maximum of either the original portfolio amount, the current portfolio balance, or the RM-LOC, the potential for larger withdrawals would only come into play when the RM-LOC was larger than the original balance. This cannot occur under the current regulations with our assumed portfolio of $500,000. The maximum reverse loan limit is set on a house valuation

of $679,650 times the age and rate specific PLF to determine the RM-LOC. Housing prices could potentially factor into the analysis with much smaller portfolio balances or PLFs in very low-interest rate environments for retirees in their 90 s.

The tax effect of the cash flows could also influence the analysis, but again the impact should be minor. The withdrawals from the RM-LOC are not taxable, while the withdrawals from the portfolio would be impacted by both capital gain taxes and ordinary income taxes. But since the RM-LOC is replenished periodically from portfolio funds, the portfolio withdrawals are similar with a slight difference due to monthly timing. Thus, there should be little overall effect. Additionally, trading costs are not incorporated into the analysis. There is no cost to the RM-LOC withdrawals and as was mentioned previously the withdrawals for the portfolio under the no RM-LOC and the RM-LOC options should have a similar number of transactions with the RM-LOC option slightly less. Again, strengthening the case for the RM-LOC option. Finally, the advantage of the RM-LOC option can only materialize if the reported gains are greater than the initial cost of undertaking the reverse mortgage which might not be the case for investors with small portfolios.

Conclusion

The key benefit of a reverse mortgage is that it allows an elderly borrower/homeowner to stay in their home. But this assumes that the homeowner has enough funds to keep the home in good condition, keep property insurance current, and pays any property taxes. Failure to maintain the home to the standards required or to pay insurance and property taxes void the mortgage contract and requires repayment of any borrowed funds. An added benefit is that the payouts to the homeowner are tax-free. The interest on the reverse mortgage may also be tax-deductible when the loan is repaid, but that is subject to the existing tax code at the time of the repayment. Finally, by repaying the RM-LOC periodically, the retiree can take full advantage of any appreciation in the value of the underlying house. Besides guaranteeing a lifetime place to live, the reverse mortgage has merit for helping to manage one's portfolio against the fluctuations of the equity and debt markets. However, the up-front costs associated with the reverse mortgage add to the implied costs of this investment strategy and will only work for retirees with large portfolios.

Notes

1. HECM is a reverse mortgage program insured by the U.S. Federal Government and available only through an FHA-approved lender. The HECM Saver Program was introduced by the FHA in 2010 to provide more affordable options for borrowers who found the closing costs and mortgage insurance rates on the HECM Standard prohibitive. The mortgage insurance premium offered on the HECM Saver was the key differentiator at just 0.01 percent of the loan amount. The premium on the HECM Standard was 2 percent. In September 2013, HUD eliminated the HECM Saver and Standard options and began offering a single product.
2. See Wade Pfau, "Using Reverse Mortgages in a Responsible Retirement Income Plan." Retirement Researcher. 2/27/2017. https://retirementresearcher.com/using-reverse-mortgages-responsible-retirement-income-plan/. This discussion is a small part of his book: How Much Can I Spend In Retirement? From McLean Asset Management Corporation. 2017.
3. See for example Forbes (A Look Back at 2015: The 5 Most Important Retirement Planning Changes for 2016, by Jamie Hopkins: https://www.forbes.com/sites/jamiehopkins/2015/12/30/a-look-back-at-2015-the-5-most-important-retirement-planning-changes-for-2016/#140aaae69041); and Time Money (A surprising suggestion for retirement income: http://time.com/money/4517423/retirement-income-reverse-mortgage-surprising-suggestion/).
4. See a replay of the video at http://reversemortgagedaily.com/2017/04/09/pbs-program-takes-deep-dive-into-reverse-mortgages/) link to video https://www.youtube.com/watch?v=ELoUT8x5QpY&feature=youtu.be.
5. See http://reversemortgagedaily.com/2017/01/04/must-read-reverse-mortgage-financial-planning-articles-you-need-this-year/. The titles of these 10 articles are (1) Reverse Mortgages Will Change Retirement Planning in 2016; (2) Former Skeptics, These Financial Planners Now Accept Reverse Mortgages; (3) Why Financial Advisors Must Accept Reverse Mortgages in Retirement Planning; (4) Financial Planning Talking Points Every Reverse Mortgage Lender Should Know; (5) Advisers Get Crash Course on Reverse Mortgage Financial Planning Strategies; (6) New Social Security Rules Play Into Reverse Mortgage Retirement Strengths; (7) Reverse Mortgages Are the Epitome of Retirement Planning Efficiency; (8) Why One Financial Planner Launched His Own Reverse Mortgage Business; (9) New Rule Offers Opportunities for Reverse Mortgage, Financial Planner

Relationships; and (10) Why This AARP Columnist Changed Her Mind on Reverse Mortgages.

6. A historical summary of the reverse mortgage market can be found in Guerin (2012) and HUD (2008).
7. See https://www.nrmlaonline.org/2019/06/10/complying-with-fhas-hecm-counseling-guidelines-frequently-asked-questions.
8. See HECM Protocol Chapter 1. Introduction to Reverse Mortgage Counseling Overview on their roles and responsibilities (pages 1–4 through 1–10) at https://www.nrmlaonline.org/2019/06/10/complying-with-fhas-hecm-counseling-guidelines-frequently-asked-questions.
9. Although many types of mortgage products exist such as fixed-rate mortgages, interest-only mortgages with a balloon payment at maturity, and adjustable-rate mortgages, the focus of this paper is on the line of credit (LOC). RM-LOC is the best reverse mortgage option for use with an investment strategy.
10. The key information on reverse mortgages is taken from the "Essential Reverse Mortgage Factsheet" (http://www.reversemortgage.net/reverse-mortgage-guide/).
11. Monthly interest and insurance premiums (MIPs) can also be added to be financed with a reverse mortgage, but are not typically done for LOC option.
12. See http://www.hud.gov/offices/hsg/sfh/hecm/hecmhomelenders.cfm for the complete PLF tables.
13. Currently three PLF tables exist: a general table, a special table, and a consolidated table. The general table provides PLFs for borrowers between that age of 62 and 99 matched with interest rates between 3% and 18.875% in one-eighth increments. The special table uses the same interest rate span, but for ages ranging from 18 through 61. This is for eligible borrowers with non-borrowing spouses below the age of 62, who are eligible to defer the due-and-payable clause upon the death of the borrower. The PLFs in the special table are much lower than the general table since the lender is at greater risk of the survivor outliving the equity value of the home. For instance, at 55, the PLFs drop to 35.5% and 30.2% at interest rates of 5% and 6% respectively. The consolidated table just combines the two previous tables.
14. Average mortgage rates in 2016 complied by Freddie Mac were 3.65%, 2.93%, and 2.87% for 30-year, 15-year, and 5/1 adjustable rates respectively. All the rates assume with 0.5% in points. (See http://www.freddiemac.com/pmms/pmms30.htm for an additional historical listing of rates back to 1980). The lowest reverse mortgage rates offered in 2016 averaged 4.25% with $0 paid in origination fees and 3.1% with $4,500 paid in origination fees for fixed rates and adjustable rates respectively. The reverse mortgage rates were tied to the closing costs the lender was willing to absorb. (See https://www.mtgprofessor.com/news/historical-reverse-mortgage-market-rates.html for a listing of historical reverse mortgage rates).
15. Moulton et al. (2015) recommend the necessary changes needed in the HECM Program to lessen the risk of default. Many of these recommendations are now a part of the HECM Program such as incorporating minimum credit scores for approval, limiting the funds that can be withdrawn in the first month, and escrowing tax and insurance funds for weaker applicants to ensure timely payments. See HUD's Reverse Mortgage Insurance Program: Home Equity Conversion Mortgages 2017 for more information on the changes to the program since 2000 (p. 20). https://fas.org/sgp/crs/misc/R44128.pdf.
16. AARP (2013) finds borrowers chose the line of credit about 66% of the time as referenced in Nakajima (2012).
17. Assuming a couple is applying for the reverse mortgage, the spouse can be less than 62 but the funding is determined by the age of the younger spouse. The older the couple, the more cash is available to withdraw. If the non-borrowing spouse is less than 62, than there is a significant reduction to the principal limit factors (PLF) which reduces the amount of funds available.
18. This counseling is used to explain the financial implications of undertaking a reverse mortgage including the borrowers' obligations, costs, and repayment. Alternative options for securing funds, which may be less costly and/or less risky, must also be discussed. See NRMLA, the National Reverse Mortgage Lenders Association, at www.reversemortgage.org for more details and the HUD website for additional information: http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/hecm/hecmabou.
19. See HUD's website for more information: http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/hecm/hecmabou.
20. The yearly adjustable mortgage rate is capped at 2% per year and 5% lifetime. The monthly adjustable mortgage rate is capped at 10% per month and 10% lifetime. https://www.aag.com/reverse-mortgage/interest-rates/.
21. The orientation fee can be waived and the costs incorporated into the interest rate charged at the discretion of the lender. The lowest past rates and fees are available from "The Mortgage Professor" (http://themortgageprofessor.refinancetfz.com/).
22. See https://www.hud.gov/program_offices/housing/rmra/oe/rpts/hecmsfsnap/hecmsfsnap for a historical listing of all HECM reverse mortgage interest rates.
23. An index published by the Federal Reserve Board based on the monthly average yield of a range of Treasury securities, all adjusted to the equivalent of a one-year maturity. Yields on Treasury securities at constant maturity are determined by the U.S. Treasury from the daily yield curve. That is based on the closing market-bid yields on actively traded Treasury securities in the over-the-counter market. Data was downloaded from

the FRED Economic Data, Economic Research—Federal Reserve Bank of St. Louis at https://fred.stlouisfed.org/series/DGS1.

24. 5/1 year adjustable rate mortgage margins over the period 1/2005 through 2/2019 averaged 1.29% with a standard deviation of 1.25% (Maximum 3.64%). Source: https://fred.stlouisfed.org/search/?st=mortgage&t=mortgage&et=&nasw=0&pageID=2.
25. Interest rate levels for the Debt Portfolio were obtained from Moody's, Moody's Seasoned Aaa and Baa Corporate Bond Yield [AAA and BAA], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/AAA and https://fred.stlouisfed.org/series/BAA, April 2, 2019. The S&P 500 closing values were obtained from Yahoo Finance at https://finance.yahoo.com/quote/%5EGSPC/history?period1=-315687600&period2=1554177600&interval=1mo&filter=history&frequency=1mo].
26. Closing costs are outlined in Table 2. For our analysis, we use the following assumptions: $1,980 title insurance; $100 title search fee; $50 document delivery fee; $125 notary fee; $100 document fees; $150 inspection fee; $200 recording fee; $225 endorsement fee; $50 credit report; $100 pest inspection; $200 survey; and $20 flood certification.
27. See endnote 21.
28. This rebalancing rule is similar to other LOC analyses such as Salter, Pfeiffer, and Evensky (2012).
29. Annualized return calculation equals (ending value/beginning value)$^{(1/HP)}$ – 1, where the holding period is the number of years within the scenario.
30. For instance, see "Home Prices in the 100 Largest Metro Areas." Kiplinger (January 2019) https://www.kiplinger.com/tool/real-estate/T010-S003-home-prices-in-100-top-u-s-metro-areas/index.php.

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