USING PRIVATE MORTGAGE INSURANCE WHEN YOU HAVE THE 20% DOWN PAYMENT

John B. White, Ph.D.
Professor of Finance
United States Coast Guard Academy
john.b.white@uscga.edu
860-941-5784

ABSTRACT

Private mortgage insurance (PMI) is required on conventional mortgage loans when the down payment is less than 20% of the home's purchase price. The common wisdom suggests that private mortgage insurance is a waste of money and should be used only if assembling a 20% down payment is impossible. However, this common wisdom ignores the return that funds would earn if invested instead of being used for a 20% down payment. This study examines the returns resulting from making a down payment of less than 20% and investing the difference. The results indicate that in many cases, it is financially advantageous to make a down payment of less than 20%, pay the PMI, and invest the balance.

Key words: Private mortgage insurance (PMI), Home mortgages, Home financing, Down payments

INTRODUCTION

If you look at lists of "How to Buy a House," nearly all will advise the buyer to accumulate a down payment fund equal to 20% of the anticipated home's purchase price. The goal here is to avoid paying private mortgage insurance, which would be required on a conventional loan with a loan-to-value ratio greater than 80%. Mortgages with a down payment of less than 20% have proven to have a higher probability of default, and therefore the buyer is generally required to purchase private mortgage insurance (PMI). The annual cost of PMI can range from 0.5% to 1.0% of the mortgage loan. On a $200,000 house with a 5% ($10,000) down payment, the annual PMI would be between $950 and $1900, or anywhere from an additional $79 to $158 a month. And these payments continue until the loan-to-value is below 80%.

PMI is most often viewed as money thrown into a pit, which is why buyers are encouraged to avoid it if at all possible. Other than an aggressive saving plan to accumulate a down payment, buyers are encouraged to explore other sources to augment their down payment. Private loans and gifts from relatives are a common source.

Another down payment source is what is referred to as a piggyback loan. With a piggyback loan, the buyer finances 80% of the home's value with a conventional mortgage, and then borrows the balance required in a second loan that "piggybacks" on the original mortgage. Since the mortgage is 80% of the home's value, no PMI is required, which is a real advantage. Another is that most piggyback loans require only interest payments on the loan. This means that at the termination of the loan, the principle must be repaid or refinanced. A downside of piggyback loans is their rates a usually tied to the prime rate, which means the rate (and associated payment) may vary (Murad 2015). This implies that the decision on a piggyback loan versus PMI comes down to a comparison of the expected payments.

What is absent from the discussion is should a buyer who has the ability to make a 20% down payment consider putting less down and pay the PMI? This question essentially asks, "What is the opportunity cost of the funds used in the down payment?" Obviously, the opportunity cost of this money is the return that they could have earned if those funds had been invested rather than being included in the down payment. Viewed in this context, the PMI can be considered the incremental cost that permits you to continue to earn interest income on the funds that could have been your down payment. To be complete, a comparison of rates of return should be conducted on an after-tax basis. However, PMI premiums are not tax deductible under the current tax regime. In addition, down payments usually are withdrawn from savings accounts where the interest earned is taxable. Since neither has a tax advantage over the other, this analysis is done on a pre-tax basis.

This analysis calculates the cost of the PMI as an interest expense on the amount of the mortgage loan in in excess of 80%. To meet the 80% loan-to-value ratio, a

$200,000 house would require a down payment of $40,000 and a $160,000 mortgage. However, if the down payment is only $10,000 (5%), the mortgage is $190,000. The PMI can be considered the additional cost on $30,000 of the mortgage. The question for the homebuyer is what they can expect to earn on the money not invested in the house.

ASPECTS OF PRIVATE MORTGAGE IINSURANCE

The real requirement for private mortgage insurance comes not from the mortgage company but rather from securitization requirements of Freddie Mac and Fannie Mae. These federal agencies are not allowed to buy any mortgage with a loan-to-value ratio of less than 80%, unless those mortgages contain specified "credit enhancements," the most common of which is PMI. Conventional mortgage borrowers are required to pay the PMI monthly until the loan-to-value ratio is 80%. Once the loan-to-value ratio is 80%, the borrower may request the cancellation of their PMI (Fannie Mae, 2017). The PMI must be cancelled once the loan-to-value ratio reaches 78%.

The loan-to-value ratio will obviously decline over time as payments are made. Any appreciation in the value of the home will also reduce the ratio. The mortgage lender usually requires a new professional appraisal of the home if the borrower is trying to establish a new property valuation, as this is the denominator in the loan-to-value ratio. The cancelation of the PMI assumes the borrower has had no payments more than 30-days late in the last year, or 60-days late in the past two years. Late payments can make PMI more difficult to cancel, even once the normal cancellation requirements have been met (Fannie Mae, 2017).

The level of the PMI payment depends on the loan-to-value ratio and the applicant's credit score, as both of these figures effect the risk of default. The closer the down payment is to the 20% figure, the lower the PMI. Likewise, the higher the credit score, the lower the PMI (Freddie Mac, 2015). Table 1 demonstrates how the monthly PMI payment on a 30-year mortgage at 4% for a $200,000 house varies with the amount financed and the buyer's credit rating. The PMI figures are from the HSH's PMI Calculator (HTH, 2014). As Table 1 in Appendix A indicates, a larger down payment can compensate for a lower credit rating. This suggests that insurers perceive that more risk is associated with a smaller down payment than a poor credit history.

LITERATURE REVIEW

Much of the discussion concerning private mortgage insurance, especially in the popular press, seems to center on why it should be avoided and how it can be avoided. Dave Ramsey, a popular financial advisor, suggests a potential home buyer save enough to make a 20% down payment to avoid PMI. He states that PMI is "an extra cost that doesn't go toward paying off your mortgage…" (Ramsey 2017). Another writer echoes these sentiments, stating PMI can be a significant amount of your monthly payment but provides very little in return. Unlike most insurance, where your premium payment protects you from some risk, your mortgage insurance protects the lender in the event of your default (Curtis, 2016).

If you lack the funds for a conventional 20% down payment, one way to avoid paying PMI is to use a piggyback loan. A piggyback loan is essentially a second loan (in addition to the mortgage) on the house to fund a 20% down payment (Murad, 2015). These loans are similar to home equity loans, having a variable rate and requiring an interest only payment. Piggyback loans generally carry a higher interest rate than conventional mortgages. However, it may be less costly to make the payment associated with this higher interest rate than to pay the PMI premium on the entire mortgage. In addition, the piggyback loan terminates automatically when it is paid off, while removing the PMI payment is more complex (Simon, 2006).

Eckles, Halek, and Wells (2006) also address the question of home buyers that lack the requisite 20% down payment. Using a 10% down payment, they compare standard monthly PMI payments with a single, upfront PMI payment as well as with the payments required on a piggyback loan of 10%. Not surprisingly, they find that that the optimal mortgage policy depends on interest rates. A piggyback loan is the best option for buyers that qualify for this additional level of debt. For those that cannot qualify for a piggyback loan, monthly PMI payments are better if your plan is to own the house for less than five years. If your ownership horizon exceeds five years, then the single PMI premium payment is more advantageous. This analysis is extended by Hatem, Paul and Wells (2009) by including the tax deductibility of PMI payments. Using the 15% marginal tax rate employed by the earlier study, they found that the monthly PMI payment was more advantageous than the 10% down-10% piggyback loan. The tax deductibility of PMI payments recently expired, making these results moot when deciding on a down payment strategy for buying a home (Koreto, 2018). (It is a popular deduction, however, and could possibly be restored in the future. A bill was recently introduced in Congress to make the tax deductibility of PMI payments a permanent feature of the IRS tax code (Mortgage Insurance …, 2018).)

METHODOLOGY AND ANALYSIS

All of these studies assume that the home buyer lacks sufficient funds for a down payment and is forced to into private mortgage insurance or a piggyback loan. Just because a buyer has the cash to make a 20% down payment is no reason that they are required to do so. It also does not mean that they SHOULD do so. Making a significant down payment allows the buyer to avoid PMI expenses, and these PMI charges essentially raise the cost of the loan. But this avoidance of these PMI expenses also comes at a cost. The money used in the down payment is no longer available as an interest earning asset. Assuming that you have the funds for a 20% down payment, a more prudent approach to financing the house is to compare the interest cost of the PMI with the interest that the down payment funds could earn if not used to purchase the house.

This study views the PMI as a cost of the lower down payment rather than merely a penalty for not having sufficient funds to cover a 20% down payment. As a cost, it should be compared to the corresponding revenues associated with the transaction. The question then becomes: What is the effect of the PMI payment on the cost of the

mortgage?

This study will examine a hypothetical buyer of a $200,000 house, to be financed with a 30-year mortgage at 4%. To avoid paying PMI, the buyer would need a 20% down payment, or $40,000. This analysis assumes the buyer has the $40,000 for the down payment. If the entire $40,000 is used for the down payment, then no PMI is required, but the buyer no longer has those funds in invest. Alternatively, if the buyer makes a $10,000 down payment (5%) and has a credit rating of 750, the monthly PMI payment will be $93.42 for the first 94 months (when the loan-to-value ratio falls to 80%).

The cost associated with PMI can be analyzed from several perspectives. Using the terminology from economics, the PMI can be viewed from an average cost perspective as well as a marginal cost perspective. The first is to evaluate the effect of the PMI payment on the overall average cost of the mortgage loan. If a down payment of only $10,000 is made on a $200,000 house, a PMI payment of $93.42 per month (assuming a credit score of 750) will also be required, making the total payment $1000.52. The buyer will be required to make this payment for 94 months, at which time the loan balance will have declined to 80%, and, the PMI can be cancelled. The payment then falls to $907.10 for the remaining 266 months of the loan. By paying more than $1000.52 for 94 months and $907.10 for 266 months, the average cost of this mortgage loan to the borrower is 4.33%. However, they have $30,000 available to invest. If they can earn a return in excess of the actual average coast of the mortgage (including the PMI payment), then it is to their financial advantage to minimize their down payment and pay the PMI.

An alternative method to examine this situation is to view the $190,000 mortgage at 4% for 30 years as two distinct loans. The first loan is the standard $160,000 loan that will require a monthly payment of $763.86. The second loan, the $30,000 balance, can be viewed as the incremental loan, and its accompanying cost as the marginal cost of the second loan. Its payment would be $143.22 in the absence of the PMI payment. However, a PMI payment of $93.42 will be required for the first 94 months of the loan, making the total payment $236.64. The cost of a $30,000 30-year loan with 94 monthly payments of $236.64 and 266 payments of $143.22 is actually 6.32%. This marginal cost (or incremental cost) of the additional $30,000 borrowed more closely reflects the true cost the home buyer should consider. The extra $30,000 borrowed comes at a cost of 6.32%. If they can expect to earn more than 6.32% on their $30,000, then they should minimize their down payment and pay the PMI. However, if they expect to earn less than 6.32%, then they should include their $30,000 in their down payment and avoid the PMI.

The optimal down payment can be determined from a terminal wealth perspective. Which option yields the largest balance in 30 years:

a. Making a minimal down payments (which will require higher monthly loan payments plus PMI payments for some period) and investing the amount NOT used for the down payment for 360 months, or;

b. Making a 20% down payment (with lower accompanying monthly payments than the option above) and investing the difference in the monthly payments for 360 months?

In the earlier example, a $200,000 house with a $190,000 30-year mortgage (5% down payment) at 4% would require a monthly payment of $1000.52 ($907.10 + $93.42) for 94 months, after which, the PMI can be cancelled and the payment falls to $907.10 for the balance of the loan. Alternatively, a 20% down payment would require a $160,000 mortgage, with a monthly payment of $763.86 and no PMI. This is a monthly payment difference of $236.66 for the first 94 months, after which, the payment difference falls to $143.24 for the remaining life of the loan. If this payment differential were invested by the buyer, will these deposits accumulate to more than the $30,000 (withheld from the down payment) would grow into? The two investment streams will be evaluated to determine what rate of return that makes the two investment streams equivalent.

RESULTS

The initial analysis examined the effect of the PMI premiums on the cost of the loan. As expected, the loan costs increased with the PMI in every case. The average cost of the loan was highest the lower the down payment and the lower the credit score. For instance, a 4% 30-year mortgage had an average cost of 4.05% when the down payment was 15% and the credit score was 750. When the down payment was only 5% and the credit score was 670, that same 4% 30-year mortgage had an average cost of 4.82%. These results are shown in Table 2 in Appendix A.

The marginal cost of the mortgage followed a similar pattern, but the difference between the stated mortgage rate and the marginal rate was more pronounced. A higher down payment (15%) paired with a higher credit score (750) produced a marginal cost of 4.91% for the 4% 30-year mortgage. If the down payment falls to 5% and the credit score declines to 670, then incorporating the PMI payments into the 4%, 30-year loan $30,000 has a marginal cost of 10.51%. These results are also in Table 2. This same pattern was repeated as the stated mortgage rate increased to 5.5% and 7%.

The second question examined what would yield a higher terminal wealth, investing the funds NOT used for the down payment, or investing the difference between the higher monthly payment associated with the PMI and the lower payment that accompanied a 20% down payment. The interest rate that creates the equivalent terminal wealth is the marginal cost of the additional amount borrowed. In the example previously used, a $200.000 housed financed with a $190,000 loan implies down payment that is $30,000 less than a 20% down payment. The 4%, 30-year mortgage comes with 360 monthly payments of $143.22, plus a PMI payment of an additional $93.42 for the first 94 months. Using the $30,000 as the cash inflow, and 94 cash outflows of $236.64 ($143.22+$93.42) followed by 266 cash outflows of $143.22, the internal rate of return is 6.32%, the marginal cost of the loan.

In this instance, if the home buyer can earn more than the marginal interest cost (6.32%), a 5% down payment will leave $30,000 available to invest. Using a 7% return, the $30,000 will grow to $243,495 in 360 months. If a 20% down payment is made and the buyer can earn 7%, then saving $236.64 per month for 94 months followed by saving $143.22 for the next 266 months will yield $229,469. However, a return less than the marginal interest cost reverses these results. At 5%, the $30,000 grows to only $134,032, while the monthly savings of $236.64 for 94 months followed by 266 months deposits of $143.22 yields $151,613 in 30 years.

CONCLUSIONS

The purpose of this study was to examine the conventional real estate wisdom that private mortgage insurance should be avoided if at all possible. However, if the PMI payments are viewed as a cost of the loan, then PMI should be avoided only in those cases where it is advantageous to do so. It is not an "always or never" decision.

As Table 2 shows, the marginal cost of PMI is higher when credit scores are low, down payments are low, and interest rates are high. There are situations where it is easy to imagine that it may be advantageous to use a down payment of less than 20%. For instance, if your credit score is 750, and you can get a 4% mortgage, it is not unreasonable to assume that you could earn a return in excess of 6.4%. In that case, you should use a 5% to 10% down payment. However, if you expect to earn 6.4% and the mortgage rate is 5.5%, then a 15% down payment is your best option. If mortgage rates are at 7%, then your best option is a 20% down payment, even if you think you can earn an 8% return.

It should be noted that this study confines itself to the comparison of financial costs and revenues. There are behavioral tendencies that make over-ride a financial advantage. For instance, there is a value to liquidity for some home buyers that may make a smaller down payment more attractive. They fear that there may be hidden repairs required by their new home, and they want to be in a position to pay for those repairs. Other buyers may have an aversion to debt, and therefore would want to minimize the mortgage on their new home. These buyers would make the largest down payment possible and consider the foregone return those funds could earn as secondary. For home buyers that ascribe to neither of these behavioral tendencies, this study provides a useful framework for analysis.

While much of the discussion on private mortgage insurance centers on how to avoid it if you lack the requisite 20% down payment, this study has examined when it is advantageous to use a down payment less than 20%, even when you have sufficient funds to do so. Too often, the PMI is viewed as the penalty for employing a down payment of less than 20%. As such, it becomes a cost to be avoided. However, if the PMI is viewed as the cost of borrowing an amount in excess of 80% of the house's value, then the question becomes one of the opportunity cost of the funds involved.

REFERENCES

Curtis, Glenn (2016), "Private Mortgage Insurance: Avoid It for These 6 Reasons," *Investopedia,* http://www.investopedia.com/articles/pf/07/avoid_pmi.asp, accessed Aug 9, 2017.

Eckles, David L., Martin Halek, and William H. Wells, (2006), "Making the Mortgage Insurance Purchase Decision," *Journal of Financial Planning*, September, 2006, Vol 19 (9), pp 66-73.

Fannie Mae (2017), "Termination of Conventional Mortgage Insurance," *2017 Servicing Guide,* https://www.fanniemae.com/content/guide/svc081617.pdf, accessed Aug 25, 2017.

Freddie Mac (2015), "The FYI on PMI, *Home Ownership,* http://www.freddiemac.com/blog/homeownership/20150420_1_fyi_on_pmi.html, accessed Aug 10, 2017.

Hatem, John. Chris Paul, and William H. Wells (2009), "Making the Mortgage Insurance Purchase Decision When Premiums are Tax Deductible." *Journal of Financial Planning: Between the Issues*, https://www.onefpa.org/journal/Pages/Making%20the%20Mortgage%20Insurance%20Purchase%20Decision%20When%20Premiums%20are%20Tax%20Deductible.aspx, January 2009, accessed Sept 1, 2017.

HTH (2014), PMI Calculator, https://www.hsh.com/calc-pmi.html, accessed Aug 23, 2017.

Mortgage Insurance Tax Deduction Act of 2017, H.R. 109, 115th Congress, (January 3, 2018)

Murad, Andrea (2015), "The Piggyback Loan: Are 2 Mortgages Better Than1?" *Money Matters,* https://www.trulia.com/blog/the-piggyback-loan-are-2-mortgages-better-than-1/, Sep 16, 2015, accessed Aug 15, 2017.

Ramsey, Dave, "How to Buy a House," https://www.daveramsey.com/blog/how-to-buy-a-house, accessed Aug 9, 2017.

Simon, Ruth (2006), "What to Do If you Can't Put 20% Down; Appeal of Piggyback Loans Fades for Some Home Buyers; Return to Mortgage Insurance," *The Wall Street Journal* (Eastern edition), December 20, 2006, p. D1.

Appendix A

Table 1

Monthly PMI payment on a 4%, 30-year mortgage on a $200,000 house

Credit rating	Mortgage amount $ 190,000	$ 180,000	$ 170,000
Over 760	$ 64.92	$ 45.00	$ 26.92
740 - 759	$ 93.42	$ 61.50	$ 28.33
720 - 739	$ 115.58	$ 75.00	$ 32.58
700 - 719	$ 137.75	$ 90.00	$ 38.25
680 - 699	$ 171.00	$ 102.00	$ 45.33
660 - 679	$ 224.83	$ 150.00	$ 58.08
640 - 659	$ 237.50	$ 157.50	$ 60.92
620 - 639	$ 254.92	$ 165.00	$ 63.75

Table 2

$200K house				
4% Mortgage		$190K (95%)	$180K (90%)	$170K (85%)
Payment (w/o PMI)		$907.09	$859.35	$811.61
Credit score				
750	PMI	$93.42	$61.50	$28.33
	Months to 80%	94	69	39
	Average cost	4.334%	4.176%	4.051%
	Marginal cost	6.321%	5.733%	4.914%
710	PMI	$137.75	$90.00	$38.25
	Months to 80%	94	69	39
	Average cost	4.496%	4.259%	4.068%
	Marginal cost	7.608%	6.663%	5.264%
670	PMI	$224.83	$150.00	58.08%
	Months to 80%	94	69	39
	Average cost	4.823%	4.436%	4.104%
	Marginal cost	10.513%	8.940%	6.018%

$200K house				
5.5% Mortgage		$190K (95%)	$180K (90%)	$170K (85%)
Payment (w/o PMI)		$1,078.80	$1,022.02	$965.24
Credit score				
750	PMI	$93.42	$61.50	$28.33
	Months to 80%	111	84	49
	Average cost	5.893%	5.718%	5.566%
	Marginal cost	7.696%	7.121%	6.188%
710	PMI	$137.75	$90.00	$38.25
	Months to 80%	111	84	49
	Average cost	6.084%	5.820%	5.590%
	Marginal cost	9.169%	8.264%	6.649%
670	PMI	$224.83	$150.00	58.08%
	Months to 80%	111	84	49
	Average cost	6.648%	6.039%	5.637%
	Marginal cost	12.404%	11.029%	7.654%

Table 2 (cont)

7% Mortgage		$190K (95%)	$180K (90%)	$170K (85%)
Payment (w/o PMI)		$1,264.07	$1,197.54	$1,131.01
Credit score				
750	PMI	$93.42	$61.50	$28.33
	Months to 80%	130	101	61
	Average cost	7.449%	7.261%	7.085%
	Marginal cost	10.064%	9.569%	8.563%
710	PMI	$137.75	$90.00	$38.25
	Months to 80%	130	101	61
	Average cost	7.667%	7.383%	7.115%
	Marginal cost	11.689%	10.913%	9.175%
670	PMI	$224.83	$150.00	58.08%
	Months to 80%	130	101	61
	Average cost	8.104%	7.646%	7.175%
	Marginal cost	15.124%	14.098%	10.514%