Vanguard

Vanguard research | Financial planning perspectives March 2022

A "BETR" approach to Roth conversions

Investors typically decide whether to convert to a Roth IRA from a traditional IRA by comparing their current and expected future marginal tax rates. The rule of thumb has been that higher future tax rates make a conversion more desirable, while lower ones make it less so. (Given that future tax rates are uncertain for many reasons, many investors may want to diversify this tax risk through partial conversions.) We describe a break-even tax rate (BETR) that yields a more accurate view of what future tax rate would make an investor indifferent to a conversion. We also present a case study that shows how investors can calculate their own BETR.

Use the BETR to weigh merits of a Roth conversion.

Assessing the current tax rate and the expected future tax rate is a good first step. A BETR analysis, however, offers a more complete way to think about the issue. We illustrate how finding the BETR can reveal when a Roth conversion could be beneficial even if your tax rate declines in the future.

Pay Roth conversion taxes from a taxable account.

A Roth conversion can be very attractive if you can liquidate assets held in a taxable account to pay the conversion income tax. In effect, the conversion allows more dollars to be placed within a tax-advantaged account. This option becomes even more attractive if the liquidated assets are tax-inefficient or the investment horizon is long.

Consider nontaxable basis and future backdoor Roth IRA contributions.

The higher the proportion of basis in a traditional IRA, the lower the BETR—and this makes a Roth conversion appealing even if you expect to be subject to a lower tax rate when you draw down the account.[1] In addition, a conversion could make future backdoor Roth IRA contributions possible.

Note: Throughout this paper, we discuss only the federal tax consequences of the strategies described. State laws vary widely and may differ from federal tax laws. Tax discussions are based on current rules and regulations in effect as of the writing of this paper and are subject to change at any time. Investors should consult with their tax advisor before engaging in any transaction that may have tax consequences.

1 Basis in an IRA is nontaxable at Roth conversion. It is made up of contributions that were not tax-deductible in the year they were made. In this paper, we use the terms "basis," "nontaxable basis," and "after-tax basis" interchangeably.

Future tax rate expectations are only one factor in the conversion decision

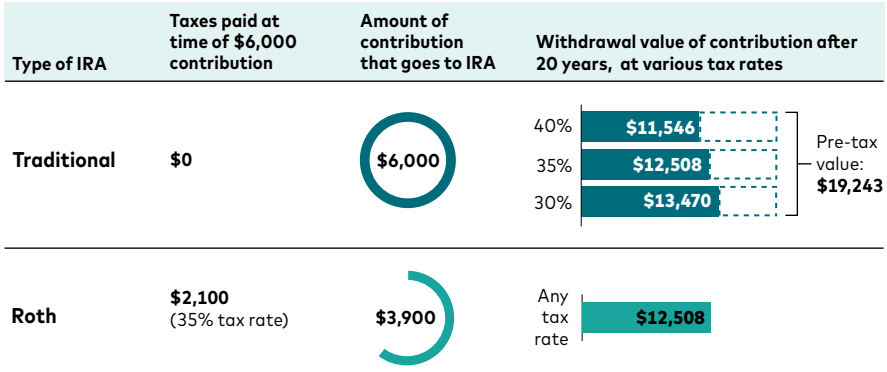
The decisive factor for investors who are considering doing a Roth conversion has typically been current versus future tax rate expectations.[2] **Figure 1** illustrates the conventional way of comparing a Roth and a traditional IRA. When the marginal tax rate stays the same, the Roth and the traditional IRA will generate the same after-tax withdrawal values, even though Roth taxes are paid at the time of contribution (as contributions are made with after-tax dollars) and traditional IRA taxes are paid at the time of withdrawal. Because future qualified withdrawals from a Roth IRA aren't subject to income tax, the withdrawal value of a Roth IRA remains unchanged whether the tax rate goes up or down. With a traditional IRA, on the other hand, a different future tax rate affects the amount of taxes incurred by a withdrawal, since such taxes are paid at the time funds are withdrawn. Thus, a higher future tax rate would make a Roth IRA more attractive, while a lower future tax rate would make a traditional IRA more appealing.

The break-even tax rate (BETR) is the future tax rate at which the after-tax withdrawal value would be the same in both the no-conversion and the conversion scenario.

FIGURE 1.

The withdrawal value of a contribution to a traditional IRA varies with an investor's future tax rate

Comparing a $6,000 contribution in traditional and Roth IRAs



Notes: Our calculations assume a 6% annual return, a 35% current marginal income tax rate, and a 20-year investment horizon. This hypothetical illustration does not represent the return on any particular investment and the rate of return is not guaranteed.

Source: Vanguard.

2 Please note that tax expectations relate to the overall federal tax landscape as well as your personal tax rate. You should consider your future marginal tax rate, not future income, when thinking about Roth conversions. Because tax brackets may be wide and filing status may change, changes in future income may or may not affect your future marginal tax rate.

It is this analysis that leads to the general principle that if you expect your tax rate to be higher in the future, a Roth conversion makes sense, while if you expect your tax rate to be lower, it's better to maintain the traditional IRA.[3] Moreover, because future tax rates are inherently uncertain, partial conversions will give you the tax-diversification benefits of holding both types of IRAs. (In fact, most investors will benefit from tax diversification by holding taxable, tax-deferred, and Roth accounts.)

This type of analysis, however, tells only part of the story. While Vanguard research generally supports this rule of thumb, there are situations where a Roth conversion may be beneficial even if your future marginal tax rate is lower than your current one. Sometimes, in fact, conversion may be attractive even if the decrease is a substantial one.

The BETR gives you a single figure to use when making the conversion decision.

The key to evaluating these situations is to calculate the BETR, a rate that takes into account assets outside the IRA, as well as the IRA's basis. With this approach, you compare your future expected marginal tax rate with a break-even tax rate; in a sense, your decision hinges upon a single figure. If your future tax rate is at the BETR, conversion wouldn't make a difference; if it's below the BETR, conversion would make you worse off; and if it's above it, conversion is probably the better option. Simply put, the BETR shows how far your tax rate would have to fall to make conversion undesirable.

Our analysis considers three situations in which the BETR is lower than the current marginal tax rate:

1. When the conversion tax is paid from a taxable account. (In such a case, the longer the investment horizon, the lower the BETR.)
2. When the traditional IRA includes nontaxable basis.
3. When the conversion of the traditional IRA opens the "back door" to future Roth contributions.

Please note that these situations aren't mutually exclusive. For example, an investor who plans to pay the conversion tax from a taxable account can also plan to make backdoor Roth contributions in the future.

3 You may also want to consider other benefits of a Roth IRA over a traditional IRA, including its lack of lifetime required minimum distributions (RMDs), and the ability to access contributions and converted dollars (after the five-year holding period) without incurring income tax or penalties. The absence of RMDs also lowers your taxable income—and this may be favorable for other taxable-income-based factors. For example, you may be able to avoid higher Medicare premiums and taxation of Social Security benefits.

Paying Roth conversion taxes from a taxable account gives you a head start

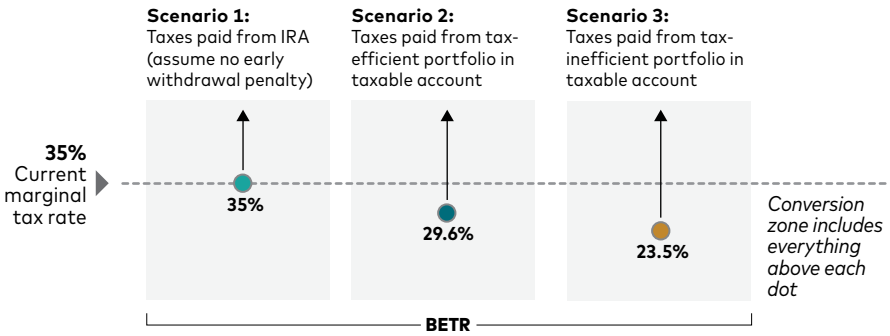
A Roth conversion can be very appealing if you're able to liquidate assets from a taxable account to pay the conversion tax (see Bruno and Jaconetti, 2011), because it means that the full value of the IRA can move to a tax-advantaged account. Essentially, paying conversion taxes from a taxable account lets you move some of your savings (the amount of the conversion taxes) from a taxable account to a Roth account. Thus, conversion can still be beneficial even if your future tax rate is lower than your current one.

To shift the full value of the IRA into a tax-advantaged account, pay conversion taxes with assets from a taxable account.

The three scenarios shown in **Figure 2** differ only in the account from which Roth conversion taxes are paid. Each assumes a 35% current marginal tax rate. In Scenario 1, conversion taxes are withheld and paid from the IRA (we assume that no tax penalties are incurred for early withdrawal).[4] In Scenarios 2 and 3, these taxes are not withheld during conversion. Instead, they are paid separately, from either a tax-efficient portfolio in a taxable account (Scenario 2) or a tax-inefficient portfolio in a taxable account (Scenario 3).[5]

FIGURE 2.

How the conversion taxes are paid affects the BETR



Notes: Our calculations assume a 6% annual return, a 35% ordinary income tax rate, an 18.8% dividend tax rate, an 18.8% long-term capital gains tax rate, a 2% dividend yield, 0% basis, and a 20-year investment horizon. For Scenarios 2 and 3, our calculations also assume that no additional tax liability is incurred when liquidating assets in a taxable account to pay the conversion taxes. This hypothetical illustration does not represent the return on any particular investment and the rate of return is not guaranteed.

Source: Vanguard.

4 An equivalent way to think about this scenario is that you pay the conversion taxes using money that you would otherwise contribute to a tax-advantaged account such as an IRA or 401(k).

5 We define a tax-efficient portfolio in a taxable account as a portfolio where capital gains are deferred until the account is liquidated (at which time capital gains are taxed at the assumed long-term capital gains tax rate). Dividends are taxed annually at the assumed dividend tax rate. We define a tax-inefficient portfolio in a taxable account as a portfolio where the entire annual investment return is taxed annually at the assumed ordinary income tax rate.

When conversion taxes are paid from the IRA, the BETR is the same as the current marginal tax rate. If you pay the conversion taxes from a tax-efficient portfolio in a taxable account, however, as in Scenario 2, the BETR drops to 29.6%. As long as the future marginal tax rate is above that figure, conversion may be beneficial.

The BETR falls even further when a tax-inefficient portfolio in a taxable account is liquidated, as in Scenario 3, where the rate drops to 23.5% (see **Appendix A** for the BETR calculation for this scenario). Another benefit here is that the portfolio earnings are now sheltered in a tax-advantaged Roth rather than an account that is taxed at a high rate.[6]

BETR is lower than the current marginal tax rate in almost all simulations of future potential market returns

Scenarios 2 and 3 in Figure 2 show two hypothetical examples of calculating the BETR. In the real world, however, the resulting BETR would likely fall somewhere between these two results. This is because a taxable account portfolio is probably not as tax-efficient as Scenario 2—or as tax-inefficient as Scenario 3. Furthermore, the BETR can vary depending on returns over time, dividend yield, and any necessary rebalancing.

Figure 3, shown on pages 6 and 7, calculates the BETR for two types of portfolios across two income tax rates by simulating future returns using the Vanguard Capital Markets Model® (VCMM). **Figure 3a** shows the distribution of BETR for a 60% stock/40% bond portfolio held by a household with a current tax rate of 35%. The BETR varies across potential market scenarios, but all 10,000 potential scenarios have a BETR lower than 35%. In fact, the median BETR is only 26.5%.

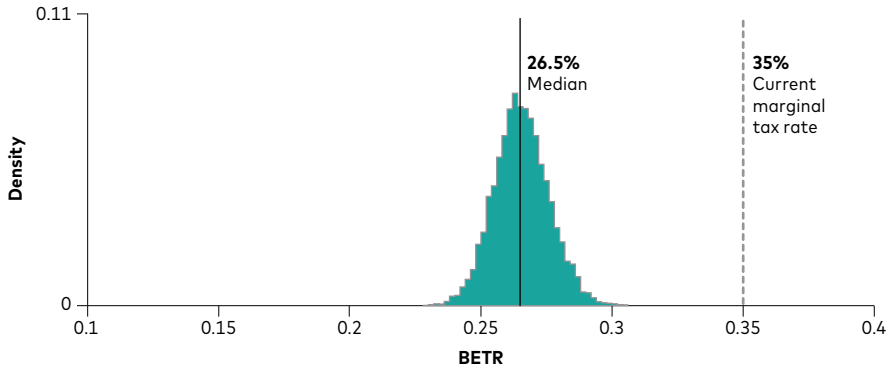
Many investors use asset location—putting stocks in a taxable account and bonds in a tax-advantaged account such as an IRA or 401(k)—to improve overall tax efficiency. It's not uncommon for such investors to have taxable portfolios that consist of stocks only. **Figure 3b** shows the distribution of BETR for a 100% stock portfolio. The median BETR is 27.9%, compared with a current tax rate of 35%. Even with a more tax-efficient portfolio, it may make sense to do a Roth conversion by paying the conversion tax using taxable account money. This is true even if the tax rate is lower in the future.

6 The BETRs for Scenarios 2 and 3 assume that you do not incur additional tax liability when liquidating assets in a taxable account to pay the conversion taxes. If, however, liquidating those assets creates a realized taxable gain, the BETRs would be higher.

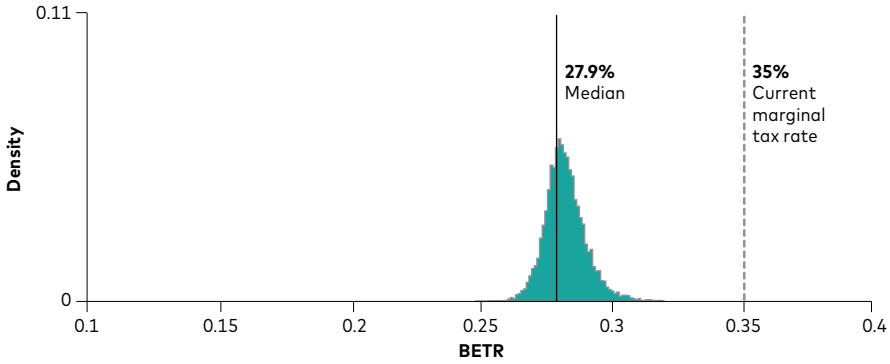
FIGURE 3.

Distribution of BETR in future simulations for different portfolios and different tax rates

a. 60% stock/40% bond portfolio owned by a 35% current marginal tax rate household



b. 100% stock portfolio owned by a 35% current marginal tax rate household



Notes: Potential market returns (both price and income returns) of stocks and bonds are calculated using the Vanguard Capital Markets Model (VCMM); simulations are as of December 31, 2020. Our calculations assume a 60% stock/40% bond portfolio that is rebalanced annually (Figure 3a) and a 100% stock portfolio (Figure 3b). They also assume a 35% ordinary income tax rate, an 18.8% dividend tax rate, an 18.8% long-term capital gains tax rate, 0% basis, and a 20-year investment horizon.

IMPORTANT: The projections and other information generated by the Vanguard Capital Markets Model® (VCMM) regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from VCMM derived from 10,000 simulations for each modeled asset class. Simulations are as of December 31, 2020. Results from the model may vary with each use and over time. For more information on VCMM, see Appendix B.

Source: Vanguard.

(Continued on page 7)

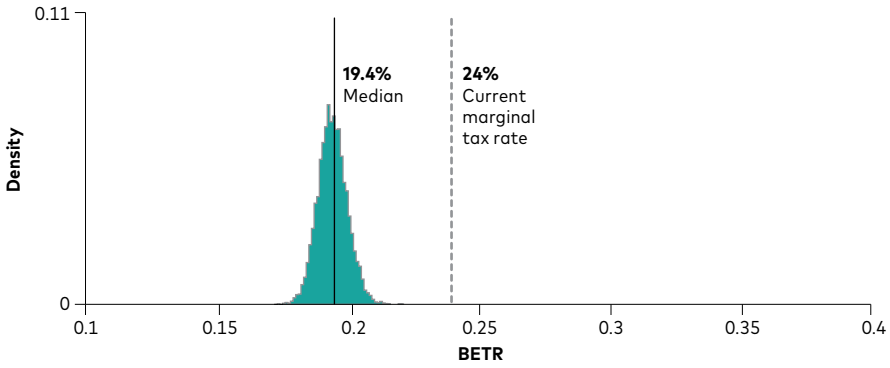
Figures 3c and **3d** show the same type of information as the first two panels show, but this time the information is for households with a bit less income. For these households, we assume a 24% ordinary income tax rate and a 15% dividend and long-term capital gains tax rate. Using these assumptions, we find that the median BETR is 19.4% for a 60% stock/40% bond portfolio and 20.0% for a 100% stock portfolio.

For the tax year 2022, a single filer with a taxable income of $150,000 is in the 24% ordinary income tax bracket and a single filer with a taxable income of $50,000 is in the 22% ordinary income tax bracket. Since the median BETRs are below 22%, this means that single filer with $150,000 taxable income now and expects to have $50,000 annual taxable income at retirement should still consider doing a Roth conversion if they pay the conversion tax with assets from a taxable account!

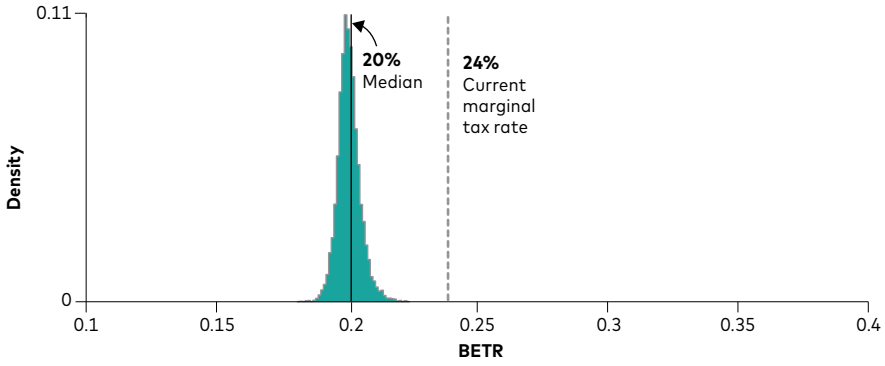
FIGURE 3. (CONTINUED FROM PAGE 6)

Distribution of BETR in future simulations for different portfolios and different tax rates

c. 60% stock/40% bond portfolio owned by a 24% current marginal tax rate household



d. 100% stock portfolio owned by a 24% current marginal tax rate household



Notes: Potential market returns (both price and income returns) of stocks and bonds are calculated using the Vanguard Capital Markets Model (VCMM); simulations are as of December 31, 2020. Our calculations assume a portfolio with an asset allocation of 60% stocks and 40% bonds that is rebalanced annually (Figure 3c) and a portfolio with an asset allocation of 100% stock (Figure 3d). They also assume a 24% ordinary income tax rate, a 15.0% dividend tax rate, a 15.0% long-term capital gains tax rate, 0% basis, and a 20-year investment horizon.

Source: Vanguard.

Case study: How to calculate BETR using your own assumptions

Jill is your client. She is currently in the 35% marginal tax bracket. She is considering a Roth conversion of $100,000. She doesn't plan to withdraw this money before she retires in 20 years, at which point she expects to be in the 24% tax bracket. Should she do the Roth conversion? The conventional wisdom would say she shouldn't. Let's calculate the BETR.

You can use your preferred rate of return assumption, but let's say that you expect the $100,000 to triple in value to $300,000 in the 20 years. In the Roth conversion case, Jill has to pay $35,000 ($100,000 * 35%) additional taxes now from her taxable account. You need to calculate the after-tax value of that $35,000 after 20 years. Again, you can use your preferred rate of return assumption (as long as this rate is lower than the one you first calculated) to account for the annual tax drag on the interest and/or dividend income and capital gains. Let's say you expect the $35,000 to double to $70,000 after taxes.

In aggregate, the Roth conversion case produces $230,000 ($300,000 in Roth IRA – $70,000 foregone after-tax value in taxable account). The no-conversion case produces $300,000 in a traditional IRA account. Therefore, the BETR is the future tax rate on that $300,000, held in the traditional IRA account, at which the after-tax amount equals the $230,000 achieved in the conversion case. Solving for BETR, we get 23.3%. And there is our answer: Since 24% is higher than 23.3%, Jill should consider the Roth conversion. The ending value produced by the Roth conversion is $230,000, which is higher than the no-conversion result of $228,000 ($300,000 * [1 – 24%]).

Should Jill do the Roth conversion? Conventional method versus BETR

Jill is considering a Roth conversion of $100,000. Her marginal tax rate is 35% now and will be 24% when she retires in 20 years.

After 20 years . . .

If Jill . . .	She will pay this much in tax now . . .	Her initial balance will have . . .	Her withdrawal value will be reduced by . . .	And her final after-tax withdrawal value will be . . .
Stays in a traditional IRA	$0	Tripled: **$300,000**	**$72,000** (At 24% tax rate)	**$228,000** ($300,000 * [1 – 24%])
Converts to a Roth IRA	$35,000	Tripled: **$300,000**	**$70,000** (Foregone conversion-tax value doubled)	**$230,000** ($300,000 – $70,000)

The **conventional method** says that Jill **may not want to convert now** since her future tax rate will be lower than her current one.

BETR: 23.3% ($300,000 * [1 – BETR] = $230,000)
BETR is that future tax rate on $300,000 in the traditional IRA account such that the after-tax amount is equal to the $230,000 in the conversion case.

The **BETR method** says that Jill **may want to do the Roth conversion** since the future tax rate of 24% is higher than the break-even tax rate of 23.3%.

Notes: The case study is intended merely to provide readers with a sense of how they can use their own assumptions to calculate BETR—and how calculating the BETR can affect their understanding of their options. The study is for illustration purposes only and the resulting recommendations only apply for the rate of return assumed here, which is hypothetical in nature and does not reflect actual investment results. Our calculations assume a current ordinary income tax rate of 35%, a future ordinary income tax rate of 24%, and a 20-year investment horizon. We also assume that the IRA balance will triple in 20 years before taxes and that the foregone value in the taxable account would double in 20 years after accounting for all taxes on interest/dividends and capital gains.

Source: Vanguard.

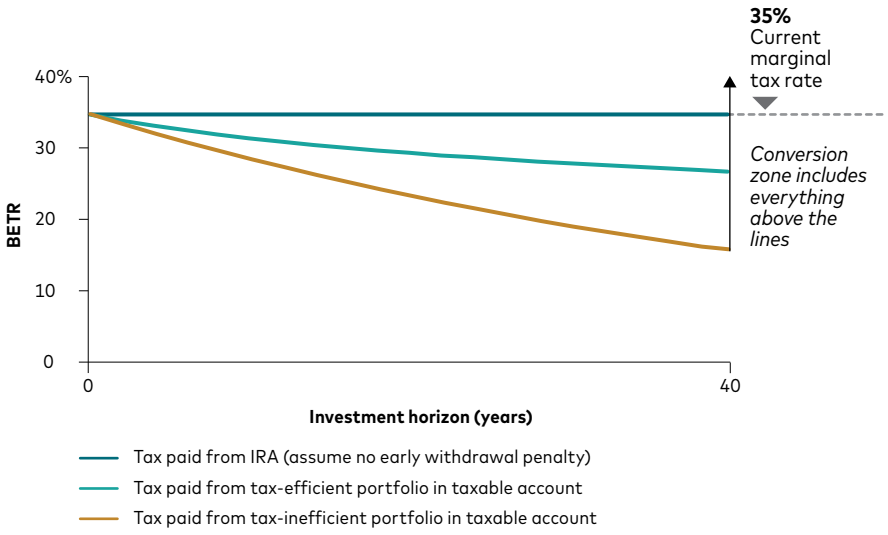
A long investment horizon boosts the appeal of paying conversion taxes from a taxable account

When you have a long investment horizon, paying conversion taxes from a taxable account becomes even more attractive. **Figure 4** shows that the BETR when paying Roth conversion taxes from a taxable account declines as the investment horizon increases. That's because shifting money from a taxable to a tax-free account shields its future returns from annual taxation. In other words, the investor accepts a tax liability today to avoid future taxation on the compounded growth of those dollars.

The longer the investment horizon, the stronger the appeal of conversion—and of paying conversion taxes from a taxable account.

FIGURE 4.

As the investment horizon grows, so do the benefits of a Roth conversion



Notes: Our calculations assume a 6% annual return, a 35% ordinary income tax rate, an 18.8% dividend tax rate, an 18.8% long-term capital gains tax rate, a 2% dividend yield, and 0% basis. Rate of return is not guaranteed.

Source: Vanguard.

When it comes to conversion, basis makes a difference

When traditional IRAs are converted to Roth IRAs, it is only the pre-tax balance of the IRA that is subject to income taxation. If the IRA was funded entirely with pre-tax contributions, the entire account balance is fully taxable when converted. However, many investors have IRAs that were funded with after-tax contributions (meaning an income tax deduction was not made in the year of contribution).[7] In these cases, only the investment earnings would be subject to taxation upon liquidation.

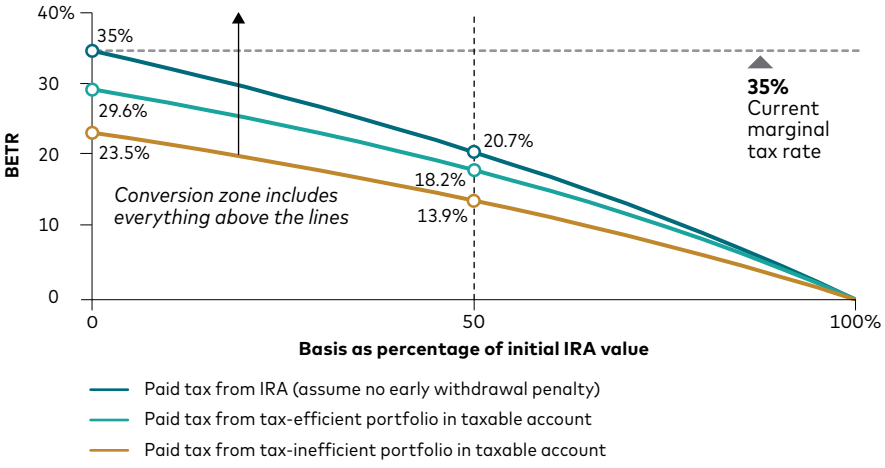
The greater the taxable basis, the lower the BETR.

Figure 5 builds on Figure 2. Instead of assuming 0% basis (where the IRA is fully funded with deductible contributions and the entire pre-tax balance is taxed upon withdrawal), here we plot out the BETR with respect to the proportion of basis. We find that the greater the extent of basis, the lower the BETR—and the more advantageous conversion becomes. To the extent the IRA has nontaxable basis, the BETR would be incrementally lower (as illustrated by the declining slope of each line making the case for conversion all the more compelling.

As Figure 5 shows, at 0% basis, the BETRs are the same as those in Figure 2 (35%, 29.6%, and 23.5%, depending on how the conversion tax is paid). But if the investor's traditional IRA includes nondeductible contributions, with 50% of the balance coming from nondeductible contributions and 50% coming from tax-deferred earnings, the BETRs drop.

FIGURE 5.

As the proportion of basis increases, Roth conversion becomes more appealing



Notes: Our calculations assume a 6% annual return, a 35% ordinary income tax rate, an 18.8% dividend tax rate, an 18.8% long-term capital gains tax rate, a 2% dividend yield, and a 20-year investment horizon. Rate of return is not guaranteed.

Source: Vanguard.

7 Taxpayers use IRS Form 8606 to track nondeductible IRA contributions when filing their federal taxes.

In this case, if the conversion tax is paid from the IRA, the BETR drops to 20.7%. If the conversion tax is paid from a taxable account, the BETR is even lower—18.2% or 13.9%, depending on the tax efficiency of the portfolio in the taxable account. You can think about the example this way: If you convert, half of the amount going into the IRA is subject to taxation at your current marginal tax rate, and then every additional dollar of return is tax-free; if you do not convert, every additional dollar of return is subject to tax at your future ordinary income tax rate.

Using this framework as a guide, investors with nontaxable basis would generally favor converting to a Roth.[8] If they were to ignore the benefit of nontaxable basis, however—or use the future-versus-current tax rate rule of thumb as their sole guideline—they would likely discount the merits of a Roth conversion out of hand.

A "backdoor Roth" is a two-step process that allows you to fund a Roth IRA indirectly.

BETR gets lower when conversion opens a back door[9]

Investors whose income makes them ineligible to make Roth contributions can do so through a two-step process that's commonly called a "backdoor Roth" or a "contribute-and-convert" strategy.[10] With this method, they fund a nondeductible traditional IRA contribution and then convert to a Roth.[11]

The backdoor strategy can be rather seamless for investors who have no other traditional IRAs. Those who do have other traditional IRAs, however, should bear one fact in mind: These accounts must be aggregated for the purpose of determining taxable conversion basis, even if only one of them is being converted.

Investors who have traditional IRAs may shun a Roth conversion—and thus forgo any opportunity to fund a backdoor Roth—because of the conversion tax liability. If the investor expects to make backdoor Roth contributions in the future, however, the BETR declines. As with our discussion of basis in the previous section, we are exploring strategies to make all future earnings escape future taxation, even if it means accelerating a current tax liability. By paying taxes now and avoiding taxes on a larger balance later, investors may increase their after-tax wealth.

8 When a traditional IRA has a mixture of pre-tax and after-tax balance—and the investor has a 401(k) that accepts incoming transfers via rollovers from IRAs—it may be possible to separate out the basis and cause the BETR to drop to 0%. To do this, you would move the pre-tax amount in the IRA to your 401(k), leaving only basis in your IRA. The traditional IRA would then be composed entirely of basis—and the BETR for the subsequent conversion would be 0%. Please consult a tax advisor if you are considering such an approach.

9 This backdoor Roth strategy is based on current rules and regulations in effect as of the writing of this paper. If the Build Back Better Act were to pass and become law, the backdoor Roth contribution may no longer be possible.

10 In 2022, Roth eligibility is fully phased out for those filing as married filing jointly whose modified adjusted gross income exceeds $214,000 and for those filing as single, head of household, or married filing separately whose income exceeds $144,000.

11 Assuming that the transactions are completed in close enough succession to prevent the account from accruing earnings, investors are unlikely to incur conversion tax.

Figure 6 offers a two-part framework for assessing the conversion option. **Figure 6a** presents a set of options in the form of a decision tree. Option A shows a scenario where an investor makes not only an initial conversion (with conversion taxes paid from the IRA), but also annual backdoor Roth contributions (in the year of the conversion and all subsequent years). With the other options, an investor would not do a conversion but instead would make annual contributions to either a nondeductible IRA (Option B) or a taxable account (Options C and D).

Paying taxes now can increase your after-tax wealth later.

Figure 6b shows the BETRs we get when we compare the Roth conversion option (Option A) with each of the no-conversion options (Options B, C, and D), calculated assuming a 20-year investment horizon and annual contributions of $6,000.[12] Conversion becomes more advantageous when coupled with future backdoor Roth contributions. An investor whose future marginal tax rate is 23.7% would be indifferent between Option A and Option B. Thus, if your future marginal tax rate is above 23.7%, you may achieve higher after-tax wealth by choosing option A. If your future marginal tax rate is below 23.7%, you may achieve higher after-tax wealth by choosing Option B.

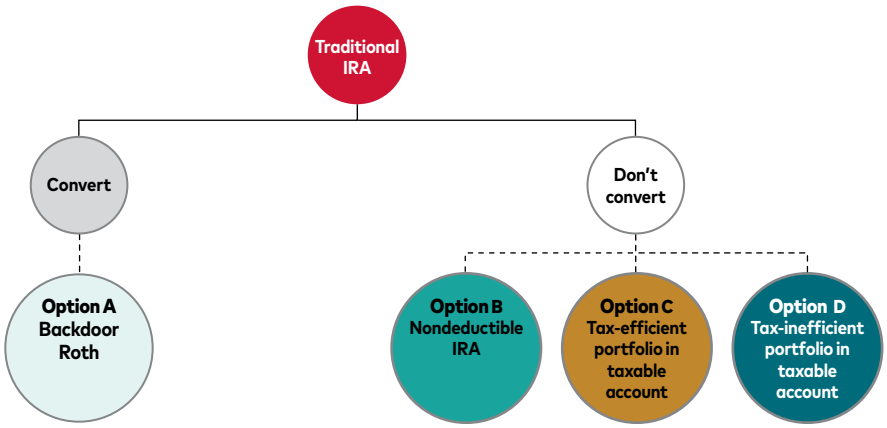
The BETR drops even further when you're choosing between Option A (conversion; backdoor method used for future contributions) and Option D (no conversion; futures savings put into a tax-inefficient portfolio in a taxable account). The benefit here lies in the tax-free growth offered by the Roth: Each dollar of return is a dollar that is not subject to income taxation.

12 You must have earned income to make any IRA contribution, as in Option A and Option B.

FIGURE 6

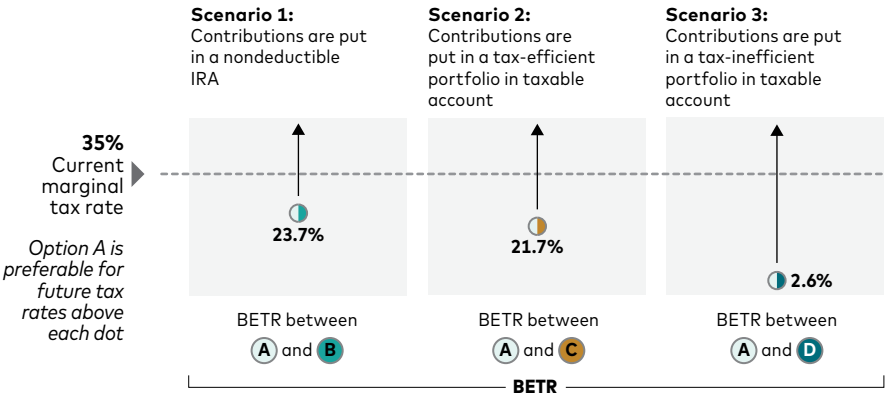
Using BETR to assess conversion options—taking future contributions into account

a. Decision tree for Roth conversion and future annual $6,000 contributions



Future backdoor Roth contributions make conversion even more attractive.

b. If an investor plans to make backdoor Roth contributions in the future, conversion gains appeal



Notes: An investor can, of course, choose to save the future contributions in a nondeductible IRA or taxable account after completing an initial Roth conversion—but as these choices are inferior to the backdoor Roth, they are not shown in the decision tree. The calculations shown in Figure 6b assume a 6% annual return, a 35% ordinary income tax rate, an 18.8% dividend tax rate, an 18.8% long-term capital gains tax rate, a 2% dividend yield, 0% basis, and a 20-year investment horizon. We further assume a $75,000 initial traditional IRA balance and $6,000 annual future contributions, and that the conversion tax will be paid from the IRA. Rate of return is not guaranteed .

Source: Vanguard.

Conclusion

Our analysis shows how the Roth conversion decision can be both compelling and confusing for investors. While we do not advocate that all investors rush to convert their traditional IRAs to Roth IRAs, we do believe that Roth conversions can be more valuable than the conventional analysis suggests. The factors that can make conversion more attractive than is commonly realized are the ability to pay the conversion tax from assets in a taxable account; the extent of any nontaxable basis in the traditional IRA; and, for those who will have earned income, the opportunity to make annual backdoor Roth contributions in the future.

References

Bruno, Maria A., and Colleen M. Jaconetti, 2011. *The IRA Opportunity: To Roth or Not to Roth?* Valley Forge, Pa.: The Vanguard Group.

Weber, Stephen M., and Maria A. Bruno, 2014. *The Benefits of a "Backdoor" Roth*. Valley Forge, Pa.: The Vanguard Group.

Appendix A. Calculation of BETR when tax is paid from a tax-inefficient portfolio

We show the numerical calculation behind the 23.5% BETR for Scenario 3 in Figure 2, in which the conversion tax is paid from a tax-inefficient portfolio in a taxable account.

(1) Compute the after-tax value at the end of the 20-year investment horizon for the conversion and no-conversion cases. Assume an initial balance of $10,000 in the traditional IRA, an initial balance of $0 in the Roth IRA, and an annual return of 6%.[13]

Conversion

If we convert the entire balance, the $10,000 moves to a Roth IRA, which earns 6% annually for 20 years. In other words, we have:

$$\$10{,}000 * (1 + 6\%)^{20} = \$32{,}071$$

13 The assumption of $10,000 is to make calculation easier; the BETR does not change if we assume a different initial balance. Note, too, that the balance in the Roth makes no difference in the calculation.

The conversion tax is the current ordinary income tax rate multiplied by $10,000, or 35% * $10,000. This amount would have otherwise earned 6% annually for 20 years, with a 35% tax on earnings annually because it was from a tax-inefficient portfolio in a taxable account. At the end of the investment horizon, then, the after-tax value of 35% * $10,000 is

$$\mathbf{35\% * \$10{,}000 * [1 + (1 - 35\%) * 6\%]^{20} = \$7{,}523}$$

The total after-tax value at the end of the investment horizon for the conversion case is the final Roth IRA balance minus the forgone future value of the conversion tax, or

$$\mathbf{\$32{,}071 - \$7{,}523 = \$24{,}549}$$

No conversion

If we do not convert, the $10,000 balance earns 6% annually for 20 years tax-deferred. Then the entire balance is taxed at the future tax rate t_{Future}:

$$\mathbf{\$10{,}000 * (1 + 6\%)^{20} - t_{Future} * [\$10{,}000 * (1 + 6\%)^{20}] = (1 - t_{Future}) * \$32{,}071}$$

(2) Set the values of the two cases equal to each other. Since the BETR is the future tax rate at which the future after-tax value would be the same in the conversion and the no-conversion cases, BETR equals the future tax rate t_{Future} when we set the values of the two cases equal to each other.

$$\mathbf{\$24{,}549 = (1 - BETR) * \$32{,}071}$$

Solving for BETR, we get 23.5%.

Appendix B. Vanguard Capital Markets Model

Vanguard Capital Markets Model

The projections and other information generated by the Vanguard Capital Markets Model® (VCMM) regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. VCMM results will vary with each use and over time.

The VCMM projections are based on a statistical analysis of historical data. Future returns may behave differently from the historical patterns captured in the VCMM. More importantly, the VCMM may be underestimating extreme negative scenarios unobserved in the historical period on which the model estimation is based.

The VCMM is a proprietary financial simulation tool developed and maintained by Vanguard's primary investment research and advice teams. The model forecasts distributions of future returns for a wide array of broad asset classes. Those asset classes include U.S. and international equity markets, several maturities of the U.S. Treasury and corporate fixed income markets, international fixed income markets, U.S. money markets, commodities, and certain alternative investment strategies. The theoretical and empirical foundation for the VCMM is that the returns of various asset classes reflect the compensation investors require for bearing different types of systematic risk (beta). At the core of the model are estimates of the dynamic statistical relationship between risk factors and asset returns, obtained from statistical analysis based on available monthly financial and economic data from as early as 1960. Using a system of estimated equations, the model then applies a Monte Carlo simulation method to project the estimated interrelationships among risk factors and asset classes as well as uncertainty and randomness over time. The model generates a large set of simulated outcomes for each asset class over several time horizons. Forecasts are obtained by computing measures of central tendency in these simulations. Results produced by the tool will vary with each use and over time.

Authors

Boris C. Wong, Ph.D., WMCP®

Joel M. Dickson, Ph.D.

Acknowledgments: This paper is a revision of Vanguard research published in 2018 under the same title, written by Joel M. Dickson, Maria A. Bruno, and Boris C. Wong.

Connect with Vanguard®
vanguard.com

ISGBETR 032022