

Market Imperfections

(Welch, Chapter 11)

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Did you bring your calculator? Did you read these notes and the chapter ahead of time?

Maintained Assumptions

In this chapter, we relax the one remaining assumption:

- ▶ **We no longer assume perfect markets.**
⇒ We can now have differences in opinion, taxes, transaction costs, or big sellers/buyers.
- ▶ With this chapter, we are actually completing all basic topics. Everything else will be (thick) gravy that elaborates on the details.

How perfect is the market for Intel Corp equity shares?

In a perfect market, is the expected borrowing rate equal to the expected savings (lending) rate?

In a perfect market, is the quoted borrowing rate equal to the quoted savings (lending) rate?

What happens to borrowing and lending interest rates if everybody does not share the same information/opinion?

What happens to borrowing and lending interest rates if there is only one seller (bank)? Or if there is only one buyer (firm borrowing)?

What happens to borrowing and lending interest rates if there are transaction costs to lending?

What happens to borrowing and lending interest rates if there are taxes?

What happens to borrowing and lending interest rates if there is inflation?

Generically, what can happen to borrowing and lending interest rates if the financial market is not perfect?

In a perfect market, can the value of an object depend on its owner?

In an imperfect market, can the value of an object depend on its owner?

Example: A project costs \$950 and returns \$1,000. What is the project's expected rate of return?

If the market were perfect, what would you do if the economy-wide cost of capital $E(r)$ were 10%?

If the market were perfect, what would you do if the economy-wide cost of capital $E(r)$ were 1%?

What should you do if your project costs \$950 and returns \$1,000; and if your alternative investment opportunities provide you with a rate of return $E(r)$ of 1%, but your cost of capital is 10%?

What is the value of this project?

The Plague (Consequence #2)

- ▶ The project value is no longer unique. It depends on whether you have money or not—**i.e., the project value depends on who you are.**
 - ▶ If you have no money, the project is worth $\$1,000/1.10 \approx \909 .
 - ▶ If you have a ton of money, the project is worth $\$1,000/1.01 \approx \990 .
 - ▶ If you have between \$0 and \$950 in wealth, the project is worth somewhere between \$909 and \$990.).
- ▶ Dependence of project value on who owns it is what we tried to avoid—like the plague.
 - ▶ If project value depends on who owns it, then what can finance tell you about the world? That projects cost whatever they may cost?

What Perfect Markets Bought Us

- ▶ Identical interest rates (perfect markets) mean that project values do not depend on how much wealth the project owners have.
- ▶ Identical interest rates (perfect market) guarantee that there is a unique project value, at which the project can be bought or sold. Otherwise, projects can take on a range of feasible values.
- ▶ Strictly speaking, with one exception (tax-adjustment formulas), every formula in finance has been derived and is known to work, only in perfect markets.
 - ▶ Think of perfect-market assumptions as the equivalent of assuming that acceleration in freefall is at a rate of 9.81 m/s^2 . Actually, this is never actually true, either—it is just an approximation. For some purposes, it is good enough. For others, it is not. You must be the judge in your own application.
 - ▶ Market imperfections are at the core of *Entrepreneurial Finance*. Small, privately held firms do not face near-perfect financial markets, the same way that large, publicly traded firms do.

Is the value of an object always its price (what you can sell the object for)?

What is one key underlying concept in determining how much you should trust a valuation? What should you ask yourself?

Are the following markets perfect? How unique is the project value to its holder?

- ▶ Municipal Securities?
- ▶ Houses?
- ▶ Airline Tickets?
- ▶ Funeral Services?
- ▶ Jewelry? Engagement rings?
- ▶ Children?
- ▶ Marriage?
- ▶ Suicide?
- ▶ Schizophrenic Choices?

In a perfect market, can one arms-length deal be better than another?

In an imperfect market, can one arms-length deal be better than another?

If there is no deal, isn't this bad news for buyers and sellers?

Opinions and Disagreements

- ▶ Without uncertainty, there are no information differences.
- ▶ With uncertainty, there need not be information differences.
 - ▶ For example, roulette has no information differences, but high uncertainty.
- ▶ Opinions = Differences in information or information interpretation.
 - ▶ Irrational differences of opinion.
 - ▶ Rational differences: Inside Information or knowledge of own behavior. (agency, customer, etc.)
- ▶ With uncertainty, in the real world, firms with a lot of uncertainty tend to suffer
 - ▶ higher default premium (not expected! perfect mkt)
 - ▶ payment of more risk premium (though mild for bonds). (perfect mkt)
 - ▶ imperfect market premia: information premium here.
 - ▶ imperfect market premia: X-costs and liquidity premium
 - ▶ (maybe even specific skills/buyers: market premium.)

Small firms suffer a full syndrome, not just one symptom \Rightarrow Difficult to sort out real-world spreads into determinants.

- ▶ Market imperfections can create higher/differential expected rates of return, like risk-aversion, too. The default premium does not.

Opinions and Disagreements (Cont'd)

Do not confuse this (imperfect-market) discussion about differences in expected rates with (perfect-market) differences in promised rates.

- ▶ For example, almost all entrepreneurs believe that they will succeed—an opinion. But they are also overconfident, and thus objectively often bad risks. The fact that they have to pay higher quoted (promised) costs of capital thus may often reflect default risk, not just market imperfections.
- ▶ Most of the yield spread of corporate bonds is due to higher default probability.
 - ▶ For example, Boston Celtics = 9.4%, whereas Treasury = 5.6%. The 3.8% difference is *not* primarily an expected rate of return that is higher. On average (over many firms like the Celtics), such bonds will probably pay around 6%.

What mechanisms can mitigate the disagreement market imperfection?

Transaction Costs

- ▶ Try to think of *roundtrip* transaction costs.
- ▶ When you buy a house, the seller pays the realtor agents a commission, nowadays about 5% of the value of the house. (There is another 1% in various transaction costs.)
 - ▶ This does not mean that, as a buyer, you are not implicitly paying for this, too. If the seller did not have to pay this commission, the seller would accept a lower price.
 - ▶ In terms of value-at-risk, i.e., as a fraction of the equity that is your own given standard 80% financing, this transaction cost eats up more than 25% of your equity investment the moment you close.

What does it cost to sell a \$1 million in Intel Corp shares?

How do you take care of transaction costs in NPV?

What is a liquidity premium?

Liquidity Premium: An extra expected rate of return to induce you to hold something that will be tough to resell if/when you are in a hurry.

- ▶ Strangely, the liquidity premium, which should be of second order importance, seems to be very important. Witness for example the Russian crisis or LTCM. The liquidity premium seems to have a strong interaction with economy-wide financial slack and aggregate borrowing.
- ▶ Perhaps most money on WS comes from liquidity provision. (Same for wholesalers and ordinary retail stores.)
- ▶ If you run a fund, make some of your money through liquidity provision—but do not go overboard, or you will end up bankrupt.

The Tax Code

Taxes are a very sad part of life. They are worse if you have to pay them, rather than just argue about them.

Uncle Sam has a very intricate set of tax rules, and these rules become more complex every year. Any details I would teach would surely be outdated within 5 years. Yet, fortunately, the principles have stayed the same for as long as I have been alive, and they are pretty similar in every OECD country.

The most important tax principles are

- ▶ Earned Income $\xrightarrow{\text{Deductions}}$ Taxable Income $\xrightarrow{\text{Rate Tables}}$ After-Tax Income
- ▶ Example: \$50,000 in Ordinary Income. \$10,000 home mortgage deduction. Taxable income = \$40,000.
- ▶ Tax rate tables are mostly progressive, so more income pays proportionally more taxes. (This is not true across income categories, though. A high-capital-income person often pays less than a low-ordinary-labor-come person.)
- ▶ Tax rates change every year. For example, in 2011, a single paid 10% on income up to \$8,500; 15% for income between \$8,501 and \$34,500; but 35% on income of \$379,151 or more. (Look them up, please.)
- ▶ There are many, many wiggles. If you earn less than \$25,000, you usually pay no taxes. In fact, 46% of all tax filers did not owe **any** federal taxes in 2009.
- ▶ Corporations and individuals are treated roughly similar, except interest costs and losses are easier to deduct for corporations.

What is the value of an additional \$1 in mortgage interest deduction?

As economists, do you care about the average or the marginal tax rate?

Tax Categories: Would you rather get a dollar of income as Ordinary Income, as Dividends, as Interest, or as Capital Gains?

Obscenely many other taxes

Numerous other taxes: AMT, state, local, sales, inheritance, social security, medicare, property, etc.

Compared to other OECD countries, the US is a low-tax domicile only for very wealthy and modestly poor individuals.

- ▶ Wealthy individuals in the U.S. have an unusually low tax rate. In fairness, though, the US taxes all world-wide income (unlike other countries, where the super-wealthy can escape taxes by moving to Luxembourg or Switzerland or the Caymans; this is still possible in the U.S. but it is much more difficult.)
- ▶ Just under 50% of U.S. taxpayers pay zero federal income tax. Most also pay zero state income tax. They do pay SS, Medicare, and other taxes.

The rest of us from the 50th to the 95th percentile of wealth holders (not income earners) have to make up most of the tax revenue.

BUT if you want to have a military, medicare, social security, then schooling and police/jails/justice, someone's gotta pay for it. (Other government expenses are tiny.)

Say you are in the 35% marginal tax bracket. If on \$100 of investment, you/l earn \$10 in interest, how much do you have in post-tax interest? (Or use current rates)

If you/I can buy bonds that pay tax-exempt interest, what interest rate would those have to pay to leave you indifferent?

What is the current tax-exempt interest rate?

Tax-exempt municipals pay 5% per year. Taxables pay 10% per year. What do we know about the “marginal investor”?

Municipals pay 5% per year. Taxables pay 5% per year.
What do we know about the “marginal investor”?

Municipals pay 5% per year. Taxables pay 7.5% per year.
What do we know about the “marginal investor”?

Which bond is better for you if your tax rate is higher than the marginal investor? Lower than the marginal investor?

What is today's marginal investor's tax rate?

The Marginal Investor Construct

- ▶ The marginal investor is a useful construct, because it allows you to directly extract the tax rate that is used in the market's pricing of taxable bonds.
- ▶ If there are many tax-exempt institutions, this marginal tax rate in the economy is low.
- ▶ If there are few tax-exempt institutions and many highly taxed investors, this marginal tax rate may approach the highest personal tax rate.
- ▶ The marginal tax rate is useful for you personally when you decide where to put your money—taxables or munis.

Do corporations ultimately pay taxes?

Does it make sense both to have a (home mortgage or student) loan and to keep money in a savings account?

Not usually. You are usually better off paying off your loans—and, of course, when it comes to credit card with their high interest rates, the answer is even more obvious. Some people argue about the tax advantages of the mortgage or student loan, but this is wrong. The rest of this page tries to explain this.

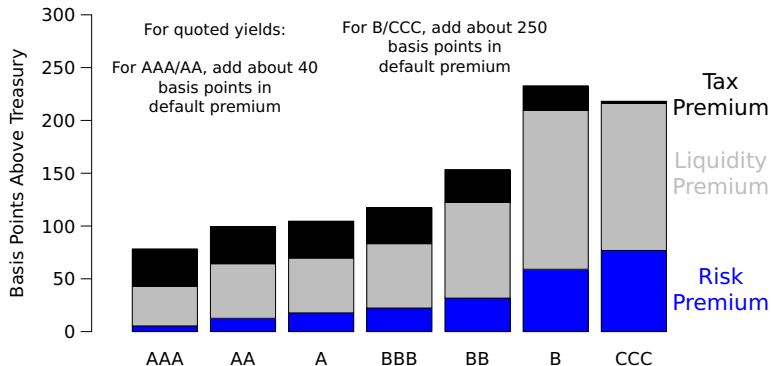
Presume that your tax rate is τ , so you will be left with $(1 - \tau)$. For simplicity, $\tau = 33\%$. You are buying a house for \$100,000 and found a \$100,000 mortgage that has only interest payment of 6% per year. As you know, mortgage interest is tax-deductible. In addition, assume you also have \$100,000 of cash in the bank, which earns 5.1% per year.

So, being tax deductible, the \$6,000 from-pretax-income interest obligation is the same to you as a from-post-tax interest obligation of \$4,000. [Why? Presume you make \$30,000. At a 33% tax rate, you have \$20,000 left. You pay \$4,000 post-tax to leave you with \$16,000. Or, you pay \$6,000 pre-tax mortgage interest to leave you with \$24,000 taxable income. At a 33% tax rate, this also leaves you with \$16,000.]

- ▶ **Option 1:** Use the cash to pay off the mortgage. No more interest receipts or payments.
- ▶ **Option 2:** Pay \$6,000 in mortgage interest, equivalent to \$4,000 in post-tax interest. Yippieh: you are taking advantage of the mortgage deduction now, which you did not do in option 1. But, you also receive \$5,100 from your treasury bonds, and pay 33% tax (\$1,700) on the interest receipts. So, you now have net interest income flows of $-\$4,000 + \$3,400 = -\$600$.

Which option do you prefer?

Typical Market Imperfections and Premia in Bonds



Source: DeJong and Driessen, 2005.

Can you speculate about premia for equity shares?

I give up. With taxes and inflation, life is just too difficult.
What shall I do?

Can the nominal rate of return on a bond be negative?

Can the real rate of return on a bond be negative?

Can the real after-tax rate of return on a bond be negative?

What is the real after-tax rate of return on Treasury bills today?

You should do this with the prevailing rates instead of the example below.

- ▶ You pay taxes on the nominal amount in your taxable account. (This does not apply to pension funds or your 401-K!)
- ▶ At 3.5% nominal interest, you are left with $(\$103.50 - \$3.50 \cdot 40\%) = \$102.10$ nominal dollars at the end of the period.
- ▶ The inflation rate is about 2%. So, you are left with about zero.
- ▶ Can the real rate of return can be negative? Yes!
- ▶ This situation (tax on nominal [not real] net returns) is usually worse for the real rate in high interest rate periods.

You can also note how we have a second-order effect here. To get investors to hold taxable bonds in low-inflation periods is easier.