Why banks prefer leverage?

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Introduction

The aim of this article is to study the implications of the new banking regulations for banks. We restrict our analysis to capital regulation. Even though the new banking regulations entail much more than updated capital regulation, increasing the quality and amount of equity in banks lies at the heart of the new regulations.

We start with a brief overview of the actual capital structure in banks. We then proceed with a detailed and structured discussion of why banks prefer debt as compared to equity. The benefits of debt are used to identify and quantify the effects of the capital regulation on banks.

Capital structure in the banking sector

Before turning to the implications of the new capital regulation for banks, it may be useful to take a quick look at the capital structure in banks. Banks have historically had a high share of leverage in their capital structure. On average, Swedish banks have had equity-to-asset ratios close to 4% (see Figure 1).[2] This means that a bank loan of 100 units has on average been financed by 96 units of debt and 4 units of equity, implying a ratio of debt to capital equal to 24. Note also that the capital adequacy ratio, defined as the regulatory capital divided by risk-weighted assets, has been around 10%, that is 2 perentage points higher than the regulatory minimum. Without this voluntary buffer, the leverage ratio could have been even higher.

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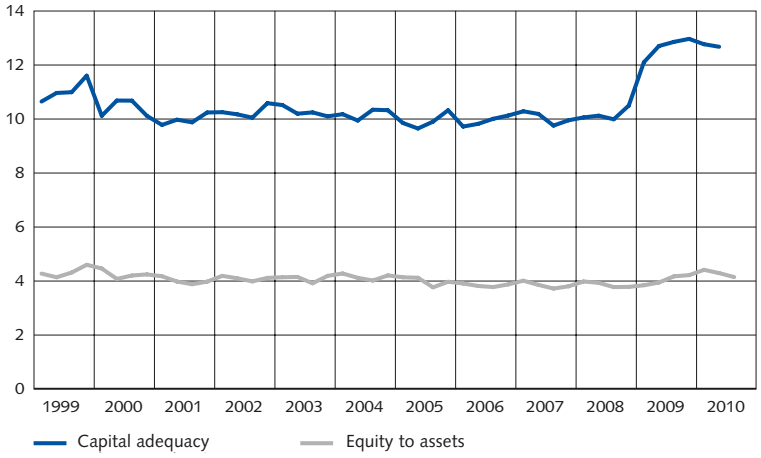
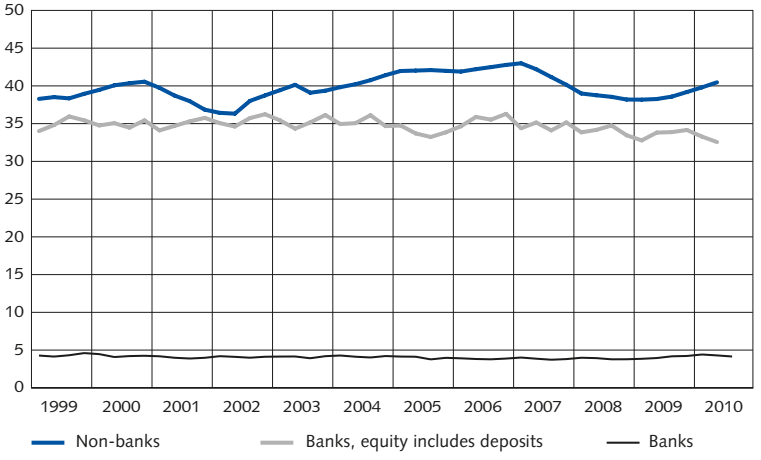
[2] Swedish banks are rather representative even for international banks. This ratio is similar for UK and US banks (see Haldane et al. 2009). Note also that the share of equity financing in banks have not always been that low. For instance, in 1880s banks in the US and UK had capital ratios equal to 24% and 16%, respectively (see Haldane et al. 2009).

Figure 1. Capital adequacy and equity-to-asset ratios in Swedish banks
Per cent



An even more suggestive picture appears when one compares capital structures in banks with those in non-banks (see Figure 2). On average, non-banks have equity-to-capital ratios close to 40%. This means that banks use a leverage ratio that is 16 times the one used in non-banks. One might argue that the leverage ratio in banks is high due to deposits. This is, however, incorrect: even after excluding deposits from the amount of debt, banks tend to be more leveraged than non-banks.

Figure 2. Equity-to-asset ratio in Swedish banks compared to non-banks
Per cent



Benefits of debt

Given the high leverage ratios in banks, it is natural to ask what the benefits of leverage are compared to equity financing in banks. Below we first

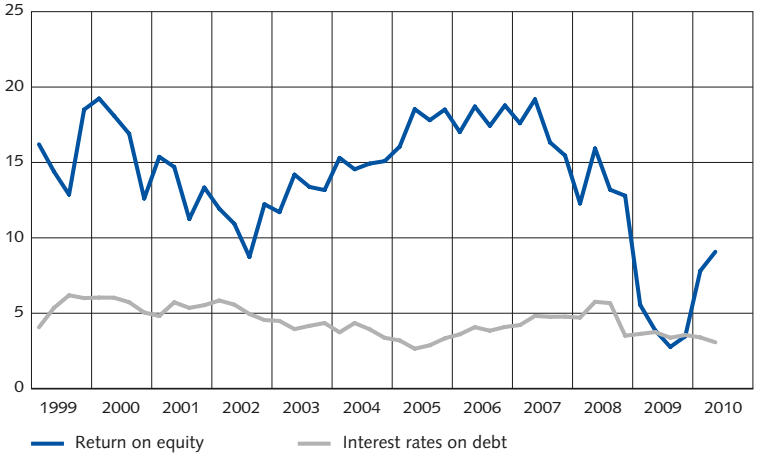
list and discuss the popular arguments made in favour of debt as compared to equity financing in banks. We then proceed with more structured arguments.

DEBT IS CHEAPER THAN EQUITY

A popular argument raised in favour of debt is that debt is cheaper than equity: the interest rates on debt are usually much lower than the required rates of return on equity. When one looks at the historical data, the cost of equity (measured in ROE) has been on average 9-10 percentage points higher than the cost of debt for the Swedish banks (see Figure 3).

A major problem with this argument is that it completely ignores the reasons why some rates of return are higher than others. When debt holders calculate their required rates of return, they take into account risks related to their investments. So do the equity holders. Therefore, the only reason why the equity holders demand a higher rate of return is because their claim is riskier than that of the debt holders.

Figure 3. Cost of equity and debt for Swedish banks
Per cent



But what is it that makes equity holders bear more risk compared to debt holders? To understand this, it is useful to think about equity holders as well as debt holders as a group of investors who together own an entity. This group of investors is entitled to the total cash flow that is generated by the entity. The risk that this group of investors must bear is determined by the magnitude and nature of this total cash flow. Entities that generate a low and uncertain cash flow are clearly more risky and hence less valuable than entities that generate a high and certain cash flow.

Importantly, this total level of risk has nothing to do with the way investors, as a group, share this risk among each other. If the entire entity were only financed by one investor, the total risk would be borne solely by that investor and the required rate of return would reflect the total risk. If the entire entity were financed by more than one investor, the total risk would still be the same, but it would be shared among many investors. The rules that determine how this risk is shared among various investors also determine the riskiness of every individual claim.

In the light of this discussion it is clear that the capital structure only determines how the total risk is borne by different claimants. Debt is a claim that is designed so that in general it assumes a very limited share of the total risk compared to equity. Thus, as banks increase the share of relatively safe leverage in their capital structure, they effectively shift a larger fraction of total risk to the equity holders. Even if a bank uses more "cheaper" forms of financing, their total financing costs will not decrease because the total risk has not changed.

The reasoning above is a simplified version of a very famous theorem in finance, called the Modigliani-Miller theorem. For more detailed information about this theorem, please see the Appendix.

DEBT HELPS TO MAXIMIZE ROE

Another popular argument raised in favour of debt stipulates that debt as opposed to equity is an essential part of the banks' business because it helps to increase shareholder value via a higher return on equity, ROE.

This argument has two parts: (i) the relationship between leverage and ROE, and (ii) the relationship between ROE and shareholder value.

The first part of the claim is true only under certain special circumstances. ROE can be rewritten in terms of return on assets, ROA[3]:

$$ROE = \frac{ROA*A - r*D}{E} = ROA + \frac{D}{E}(ROA - r)$$

From this equation it follows that an increase in leverage ratio[4], D/E, can increase ROE only if ROA is higher than the after-tax interest rate on debt, *r*. Therefore, higher leverage increases ROE in good times, but decreases ROE in bad times.

Of course, banks expect the return on assets to be on average higher than their interest rate on debt. Thus, it is true that a higher leverage ratio leads to a higher *expected* ROE. This leads to the second part of the

[3] Return on assets, ROA, is defined so that it does not depend on the capital structure. This means the net income ignores the interest payments. This way of presenting ROE is taken from Admati et al. 2010.

[4] Note that the amount of total assets is kept fixed.

claim: would shareholders prefer higher or lower *expected* ROE provided that the change in ROE comes from the pure changes in the capital structure?

Recall from the previous section that required rates of return are determined by the underlying risks. As the leverage increases, two things happen simultaneously: the expected ROE increases, but the share of total risk which is borne by the equity holders also increases. In the end, these effects balance each other so that the shareholder value remains unaffected. For an illustrative example, see the Appendix.

DEBT PROVIDES A TAX SHIELD

A relatively uncontroversial benefit of debt is related to taxes. The claim is that debt is preferable to equity because interest rate expenses can be deducted from the taxable income while dividends are not tax deductible.

The issue of taxes has two sides: the magnitude of benefits and the distribution of benefits.

As for the magnitude, Table 1 illustrates the tax effects stemming from increased equity financing on the total cost of financing. As banks substitute tax-favoured debt with equity, banks lose value due to the reduced tax shield. Taking the average interest rate on debt to be 7% and the tax rate on profits to be 30%, the changes in the weighted average cost of financing due to taxes are relatively modest. In an extreme case, banks that increase their equity-to-asset ratio by 10 percentage points (say from 4% to 14%), would experience an increased cost of funding by 21 basis points. This cost would fall by half if we were to use a more realistic 3.5% interest rate on debt.

It is important to note that the calculation presented above is likely to over- rather than underestimate the tax shield. It ignores the fact that banks have other opportunities to shield taxes, and that banks do not always have positive profits.

A completely separate issue is whether this lost tax shield is a legitimate cost to banks from the social point of view. Banks might indeed gain from this subsidy, but since this subsidy comes at the expense of the lost government revenue, this is just a wealth transfer from the government to banks and not a true cost to society. Therefore, even though the reduced tax shield might lead to an increased cost to the banks, the tax argument cannot be used against capital regulation.

DEBT HAS GOVERNMENT GUARANTEES

The most prominent explanation of why banks use so much leverage compared to equity is based on government guarantees.

To make the argument clear, let us first ask an intriguing question: what hinders non-banks from taking up as much leverage as banks do? Arguably, they also face a positive gap between the cost of equity and debt, want to make use of valuable tax shields and might also wish to cheer up their shareholders by maximizing the expected ROE.

One of the reasons why non-banks do not use a high leverage ratio is related to financial distress. The costs of financial distress are usually associated with the costs of default, such as various legal fees and the value lost during liquidation in the bankruptcy process. But financial distress can be very costly even if there is no actual default or bankruptcy. A highly levered firm is risky for various stakeholders. As a result, a levered firm finds it more difficult to sell its products, get inputs from suppliers and attract employees than an unlevered firm.

In addition to financial distress, there are two other reasons why non-banks do not use a high leverage ratio. The first is the so-called risk-shifting problem. As leverage increases, managers that act in the interests of shareholders have strong incentives to invest in projects that actually tend to decrease the total value of the firm. The reason why managers undertake these projects is that the equity owners pocket most of the gains in the event of success, while the losses in the event of failure are borne mainly by debt holders. Any actual benefit of risk-shifting for shareholders is, however, only illusory. In a rational world, debt holders will foresee the potential for risk-shifting and will demand an ex ante compensation for it. Ultimately, it is the shareholders who bear the full cost of risk-shifting.

The other reason is the so-called debt overhang problem. In the presence of a large, risky debt, firms might be unable to finance projects that would actually increase their total value. The reason is that most of the investment gains would go to the existing investors, especially to the debt holders, leaving the new investors without a required rate of return.

The costs of financial distress together with the problems of risk-shifting and debt overhang are the main reasons why the owners of non-banks are reluctant to make full use of the tax and other benefits of debt mentioned in the previous section. For banks, these leverage costs must be significantly smaller to justify an extremely high leverage ratio.

It is hard to see why these costs would be smaller for banks given the traditional maturity mismatch and hard-to-value assets in the banking sector. History has illustrated that even the slightest misperception of the bank's profitability might trigger a run on a highly levered bank. Given the illiquid nature of bank loans, such a run would be extremely costly and would probably lead to bankruptcy. Therefore, these costs usually tend to be larger rather than smaller for banks.

The reason why banks do lever up despite the seemingly high costs of leverage has to do with government guarantees. Banks, unlike non-banks, play a central role in the functioning of the entire economy. A crisis in the banking sector is likely to cause a crisis in the real economy, leading to various social-economic problems. A government cannot therefore refuse to bail out systemically-important banks. This means that governments provide explicit and implicit guarantees for banks' creditors who in turn will require a lower rate of return.[5]

Profit-oriented banks will exploit the implicit guarantees in two ways. First, they will increase the proportion of financing covered by these implicit guarantees. Secondly, they will also engage in risk-shifting activities. When extremely risky loans succeed, the banks' equity owners will pocket the gain; when they fail, the costs to equity owners will be limited to the amount of equity. It is the government who would step in to save the bank creditors, eliminating or reducing the usual market discipline of bank creditors.

How realistic is this argument of risk-shifting and government guarantees? Would not the government take steps to prevent this? Indeed, the problem of risk-shifting is nothing new to the regulators. The real challenge, however, has been to deal with it. As illustrated by the recent crisis, banks tend to find various ways to circumvent the regulations. Excessive reliance on short-term debt as well as securitize-and-buy-back types of arrangement are good examples of how banks got around the regulations. In the first case, the costs of refinancing risks were effectively transferred to the government and in the second case, larger risks could be undertaken without contributing enough equity.

One of the aims of the new banking regulations is to prevent banks from shifting various risks to the government.[6] By demanding more and better-quality equity, the new capital regulation limit banks' ability to rely excessively on subsidized debt. Even though the reduction of subsidized debt in the banking sector increases costs to banks, it is not a cost from the social point of view. These government guarantees can be viewed in exactly the same way as the tax benefits associated with debt.

How large are the increased costs to banks from the reduction of subsidized debt? This clearly depends on the magnitude of government subsidy in bank debt. One way to calculate this subsidy is to use a capital asset pricing model (CAPM) that relates the required rate of return to the

[5] By and large, all forms of financing sources have a certain degree of explicit and implicit guarantees. These guarantees are likely to be largest for more senior claims such as deposits and secured funding and lowest for more junior claims, just above the common equity.

[6] The overarching goal of any regulation should be to increase general welfare. By limiting banks' ability to risk-shift, welfare is increased not only due to the lower probability of a financial crisis, but also due to limiting the resources devoted to projects that have negative net present value.

magnitude (measured as beta) and price of the risk (measured as risk premium). The discount in this framework would depend on two parameters: (i) a fall in the magnitude of risk in debt due to government guarantees and (ii) the magnitude of risk premium.

In the example presented in Table 1, an average investor in bank debt will require an interest rate that is 100 basis points lower due to the government guarantees.[7] This result can be obtained from the realistic parameter values: bank debt has the true beta of 0.25, the debt, given that there are government guarantees, is risk free and the risk premium is 4%.

Are these effects large or small? To interpret the results correctly note that the equity-to-asset ratio rather than the capital adequacy ratio is used in the Table below. To obtain the changes in the capital adequacy ratio, the increase in the equity-to-asset ratio must be multiplied by the ratio of total assets to risk-weighted assets. For Swedish banks, this ratio was 2.5 in 2009. Therefore, an increase of 2 percentage points in the equity-to-asset ratio translates into an increase of 5 percentage points in the capital adequacy ratio, which is well above the new Basel standards. This means that the increased cost of financing to banks due to the capital regulations would be no more than 6-7 basis points.

Table 1. The increased costs of financing due to taxes and government guarantees

Changes in the cost of financing in basis points			
Increase in E/A	Tax effects	Guarantees	Guarantees and tax
2%	4.2	2.0	6.2
4%	8.4	4.0	12.4
6%	12.6	6.0	18.6
8%	16.8	8.0	24.8
10%	21.0	10.0	31.0

Notes: Interest rate on debt is 7%, tax rate is 30% and the government implicit guarantee to debt is 1%. The cost of financing is measured as the weighted average cost of capital, E/A is a proportion of equity in the financing structure

OTHER CONSIDERATIONS

In addition to the benefits of debt discussed previously, there are other arguments why debt might be preferable to equity. These include the disciplining role of debt, information sensitivity and the amount of equity capital in the economy. Even though none of these arguments can explain why banks prefer more leverage than non-banks, they do suggest some additional sources of costs to banks due to the new regulations.

Leverage as opposed to equity is considered as an important disciplining device for managers. This claim is based on the understanding

[7] An alternative method of calculating this discount is to use credit ratings that separate government guarantees from the banks' internal financial strength. This method would give a discount of between 100-150 basis points.

that debt is a hard claim: it can force firms to bankruptcy, while equity cannot. Since bankruptcy is costly for managers, managers of leveraged firms have more incentives to act in the best interests of the owners. The weakness of this argument is that debt is a very crude disciplining device. Provided that other disciplining mechanisms are available to shareholders, such as compensation packages and the board of directors, it is not really clear why debt should play this role.

Another reason why debt might be preferable is based on asymmetric information. The new banking regulation might force banks to raise additional equity with the help of new rather than old investors. Due to asymmetric information problems, new investors are likely to require a premium over and above the risk-premium. Importantly, this discount is smaller for debt since debt is a safer claim than equity. This is a valid argument, but the effects are hard to quantify. Furthermore, with a relatively long transition period, banks can increase their equity with retained earnings which would eliminate these costs entirely.

The limited size of equity capital in aggregate is also sometimes mentioned as a reason why increasing equity financing might be costly. The claim is that the equity markets might be unable to accommodate massive equity issues by banks, unless significant discounts were offered.

While this is a legitimate concern, there are two conditions that must be fulfilled to make this effect substantial. The first condition is that professional investors, such as hedge funds, cannot arbitrage away factors that are unrelated to the fundamentals. One would think that in the presence of excess returns in the equity markets, professional investors would make use of these advantages until these excess returns are eliminated. The second condition is that non-banks themselves would not act as arbitragers by substituting equity with debt. For instance, if equity becomes relatively more expensive compared to debt, firms could add value by buying back some of their equity and issuing debt instead.

It is hard to see why these two conditions would hold in the current situation. There might be substantial limits to arbitrage in times of crisis, but not in normal times. Furthermore, it is hard to argue that there is or has been a shortage of risk capital. If at all, the argument is usually made in the opposite direction by claiming that the amount of capital has been too excessive to find risky investment opportunities.

Concluding remarks

We argue that the costs of the capital regulation for banks stem from taxes and government guarantees. Other costs related to various imperfections in the capital market might also arise, but are less likely. Reduced

tax shields and government guarantees are private costs to banks, but do not represent costs from the social point of view. All in all, the analysis indicates that the social as well as the private costs of equity financing in banks are small. Provided that there are substantial benefits from the higher equity financing in terms of the lower probability and costs of future financial crises, this implies a strong case for the higher capital requirements for banks.

Appendix: Modigliani-Miller theorem

The Modigliani-Miller theorem (1958) is perhaps the most important theorem in finance. Using non-arbitrage conditions, Modigliani and Miller (MM) showed that the value of the firm is not affected by its financing policy. The direct implication of this result is that various capital structure decisions, such as the proportion of equity in relation to the proportion of debt or the mix between short-term and long-term debt, are irrelevant under some conditions.

An easy way to understand the irrelevance theorem is to think in terms of risk and return. Since it is the asset side that determines the riskiness of the firm, the total cost of financing must be determined by the nature of total assets. The way a capital structure divides this risk between different investors should therefore have no consequences for the total value of the firm.

Like any theorem in science, the results of the MM theorem are obtained under some restrictive assumptions. Even though some of these assumptions are clearly at odds with reality, the MM theorem is an extremely powerful tool in understanding reality. The reason is that it presents a useful starting point for analysing any financing decision. The MM theorem pushes the analysis in the right direction: knowing the circumstance under which the financing decisions do not matter also tells us the circumstance under which they might matter.

There are two assumptions behind MM.[8] The first is the so-called "**perfect markets**" assumption, which means that equity or debt issuances are fairly priced. The second is the so-called "**exogenous total cash flow**" assumption, which means that the total cash flow to all the firm's claimants is unaffected by the firm's financing choices. Both of these assumptions might fail under certain circumstances, breaking the irrelevance theorem.

The **perfect market** assumption is satisfied if markets are complete (i.e. any claim can be replicated), competitive and strong-form efficient, that is, all the private and public information is reflected in prices.

[8] See Titman (2002) for a similar way of dividing the assumptions.

It is the last assumption that fails most often in real life. Managers usually know more about the underlying investment opportunities than outsiders, which introduces a wedge between external and internal financing (e.g. retained earnings). This in turn means that the value-maximizing firms tend to follow a pecking order. They rely first on internal sources, then on safe debt, risky debt and finally equity, which is the most information-sensitive claim.

The fact that markets are not strong-form efficient gives rise to the demand side for capital, as explained previously. However, the supply of investors' capital has so far played no role. If markets are complete and competitive, the supply of investors' capital is perfectly elastic at a price that reflects the fundamental value of future cash flows. This renders no role for investors' tastes and market timing.

However, even market completeness and competitiveness might be questioned in real life. It is well known that markets can be hot and cold, especially for junior claims such as equity and junk bonds. It is also clear that markets are not necessarily complete. Investors cannot necessarily undo all the financing choices of the firm to obtain their desired pattern of cash flows.

The **exogenous cash flow** assumption is satisfied if there is no asymmetric tax treatment, no cost of financial distress, no transaction or agency costs. All these assumptions are likely to fail in real life.

Taxes usually make debt financing cheaper than equity financing. Since interest rate payments are tax deductible while dividend payments are not, the total cash flows to all investors are no longer independent of the capital structure.

Debt has the potential to increase the total cash flows also in the absence of taxes. Leverage is considered as a disciplining device for managers. Since debt can force firms to bankruptcy, which is costly for managers, managers of leveraged firms have more incentives to act in the best interests of the firms' investors.

But debt can also reduce total cash flows. A highly-levered firm is likely to be perceived as risky by various stakeholders. As a result, it will find it more difficult to sell its products, get inputs from suppliers and attract employees than it would with a lower level of leverage. A high level of risky debt also leads to conflicts of interest between shareholders and debt holders, which also reduces the firm's value.

A stylized example

An entrepreneur has an investment project, which requires 1 unit of investment capital today. The cash flow that the project generates in the next period depends on the state of the economy: 3.15 units in a state of boom

and 1.05 units in a state of bust. The states occur with equal probabilities. The risk-free interest rate is 5%. The investment of 1 unit to the stock market index would generate 2.8 units in a state of boom and 0 units in a state of bust. These assumptions are summarized in the table below.

	BOOM	BUST	Expected
Cash flow to firm	3.15	1.05	2.1
Cash flow from stock market	2.8	0	1.4
Return	180%	-100%	40%
Investment needed	1		
Risk-free interest rate	5%		

How should the entrepreneur finance the project to maximize the value to himself? Let us consider two options: pure equity financing and pure debt financing.

Equity financing

The entrepreneur could sell a stake in the firm to outside investors. Since the funds required to undertake the investment project are equal to 1 unit, the stake sold to the new equity holders must be worth 1 unit. In order to calculate the percentage of the firm that must be sold to the outside investors, we must know the value of the entire firm which is given by the magnitude and nature of the cash flows. How much would any person be willing to pay today to obtain the cash flow in the next period as outlined above?

PRICING BY ARBITRAGE

One way to obtain the value of the cash flows generated by the firm is to replicate the firm's cash flows using the portfolio of stocks and risk-free bonds. An investment of A units in stocks and B units in bonds today would generate 2.8*A+1.05*B in the boom and 1.05*B in the bust. To replicate the firm's cash flows, A and B must be 0.75 and 1 respectively (see the Table below). Two assets that have exactly the same cash flows must

REPLICATING PORTFOLIO	BOOM	BUST
Invest in stocks A	A*2.8	0
Invest in risk-free bonds B	B*1.05	B*1.05
Replication portfolio	A*2.8+B*1.05	B*1.05
Value if A=0.75 and B=1	3.15	1.05
Cash flow to be replicated	3.15	1.05

also have exactly the same value on an arbitrage-free market. Therefore, the value of the firm's cash flows is 0.75+1=1.75.

Given the total value of the firm, it is easy to calculate the fraction that must be sold to the outside investors. This fraction is equal to 1/1.75 or approximately 57.1%. The expected cash flow to new investors is 1.2 units, implying a rate of return equal to 20%. The expected cash flow and value to the entrepreneur are 0.9 and 0.75 units, respectively.

DEBT FINANCING

Alternatively, the entrepreneur could borrow all the money from the debt markets. The debt would be risk-free since the cash flows in all the states from the firm would be enough to make the debt payments. The cash flows to the entrepreneur would be as presented in the Table below. Note that the entrepreneur now obtains much higher expected cash flows than before with the equity financing (1.05 compared with 0.9), but the variation in the cash flows has also increased.

PURE EQUITY	BOOM	BUST	Expected
Cash flow to firm	3.15	1.05	2.10
New investors (57.1%)	1.80	0.60	1.20
Entrepreneur (42.9%)	1.35	0.45	0.90
DEBT FINANCING			
Cash flow to firm	3.15	1.05	2.10
Dept payment	1.05	1.05	1.05
Cash flow to entrepreneur	2.10	0.00	1.05

To find out how the entrepreneur values these cash flows, we can use the same replicating portfolio and non-arbitrage technique as before. It can be easily shown that the cash flows to the entrepreneur in the case of debt financing can be replicated by the investment to stocks equal to 0.75.

We can conclude that the value of the cash flows to the entrepreneur does not depend on whether debt or outside equity is used to finance the project. The result can easily be generalized to any combination of debt and equity financing, including risky debt. Note also that no specific asset-pricing model was needed to obtain this result.

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