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Equity Issues with Asymmetric Information and the Austrian Financial Market Stabilization Scheme

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1 Introduction

Since 2007, the world has witnessed one of the most severe economic downturns in recent history. By October 2008, the situation has gotten so precarious that the Austrian government deemed it necessary to introduce a stabilization scheme for financial markets. Among other instruments, this scheme allowed the minister of finance to improve certain banks' equity ratios by providing equity-like capital, so called participation capital: Similar to preferred stock, holders of such securities participate in a firm's losses, but receive a preferred dividend if the bank generates profits. In order to avoid competitive distortions in the financial markets, the European Commission stipulated a rather pricey preferred dividend of about 9.3 percent p.a. for state-issued capital. However, if a bank managed to raise at least 30 percent of the new funds from private parties – under equal conditions as the state –, the state's dividend would be adjusted to the market rate.

This clause of the stabilization scheme created an interesting situation: As the pecking order theory of the capital structure suggests, banks should be reluctant to issue equity, as it carries high adverse selection costs. Only banks in financial distress would be expected to issue equity-like securities such as participation certificates. However, with the provision in place that banks receive a discount on participation capital previously raised from the state, which is contingent solely on the fact that they issue certificates to private investors, some of the adverse selection costs should be covered by the discount. Thus, the costs associated with asymmetric information are somewhat mitigated and not only the worst of the pack, but also better banks would be able to raise additional capital profitably.

The purpose of this thesis is to illustrate this effect of the stabilization scheme. This is done in three parts: Part one presents the pecking order theory of the capital structure as proposed by Myers (1984) and Myers and Majluf (1984). Empirical studies on said theory will also be presented, as well as models that extend the standard pecking order model. Part two

explores the events surrounding the introduction of the Austrian financial market stabilization scheme and presents the terms relevant to the subject at hand. Part three presents a numerical example that highlights the effect described above.

2 The Pecking Order Theory of the Capital Structure

2.1 The Standard Pecking Order Theory

2.1.1 Importance within Capital Structure Theory

Capital structure theories seek to explain the market forces that determine the relative proportion of securities – equity, debt and hybrid capital – employed to finance a company's assets and operations, or – conversely – how changes in the capital structure influence a company's value.

Modern capital structure theories are based on the fundamental theorem put forward by Franco Modigliani and Merton Miller in 1958, which stated that the capital structure is irrelevant in the absence of „market frictions“: e.g. taxes, bankruptcy costs, transaction costs, agency costs, or asymmetric information. (Modigliani & Miller, 1958) This insight provided a starting point for capital structure theories, as it suggests possible factors that could give a reason why financing decisions *do* matter. Broadly speaking, two competing theories regarding the capital structure of a firm have been proposed: the trade-off theory and the pecking order theory (Fama & French, 2002). Trade-off theories establish an optimum debt/equity ratio: firms seek to maximize firm value by balancing the costs and benefits of either financing instrument. These costs and benefits occur due to the market frictions. The pecking-order theory on the other hand does not imply an optimum in the capital structure, as internal equity is preferred to debt but debt is preferred to external equity. Rather, “changes in debt ratios are driven by the need for external funds, not by an attempt to reach an optimal capital structure.” (Shyam-Sunder & Myers, 1999)

As Miller (1977) noted in address to the American Finance Association, which later was published as “Debt and Taxes”, the prevalent theory of the capital structure – following the publication of the 1958 Modigliani-Miller paper – was the static trade-off model between tax-benefits of debt financing and bankruptcy costs associated with debt: this

model predicts that companies seek to find an optimum between minimizing the costs of taxes, which decrease with an increasing debt level (as interest payments decrease profits), and expected bankruptcy costs, which increase with an increasing debt level (as the risk that a company will not be able to service its interest payments increases). In the same address, Miller heavily criticized said theory by comparing the costs of taxes and bankruptcy to a horse and rabbit stew – one horse to one rabbit. According to him, if the trade-off model were correct, debt levels should be much higher than they actually were, as taxes yielded high costs, especially in relation to the relatively miniscule expected bankruptcy costs.

Six years later, also in an address to the American Finance Association later published as “The Capital Structure Puzzle” (1984), Myers criticized the trade-off model on similar grounds as Miller and subsequently proposed his solution to the capital structure problem: the pecking order theory. His model was inspired by a set of stylized empirical facts, which suggested the following trends in a firm’s capital structure choices:

1. Firms prefer internal finance.
2. They adapt their target dividend payout ratio to their investment opportunities, although dividends are sticky and target payout ratios are only gradually adjusted to shifts in the extent of valuable investment opportunities.
3. Sticky dividend policies, plus unpredictable fluctuations in profitability and investment opportunities, mean that internally-generated cash flow may be more or less than investment outlays. If it is less, the firm first draws down its cash balance or marketable securities portfolio. If it is more, the firm first pays off debt or invests in cash or marketable securities. If the surplus persists, it may gradually increase its target payout ratio.
4. If external finance is required, firms issue the safest security first. That is, they start with debt, then possibly hybrid securities such as convertible bonds, then perhaps equity as a last resort. In this story, there is no well-defined target debt-equity mix, because there are two kinds of equity, internal and external, one at the top of the pecking order and one at the bottom. Each firm’s observed debt ratio reflects its cumulative requirements for external finance. (Myers, 1984, p. 581)

These findings were not new at that point but lacked a theoretical foundation. Together with Majluf, Myers presented a paper that explained

these stylized facts by considering costs incurred through asymmetric information.

2.1.2 The Model

The costs of asymmetric information were most notably explained by Akerlof's paper „The Market for Lemons“.(Akerlof, 1970) Akerlof gave the example of the used car market, where the sellers knew whether the car they were trying to sell was good or bad (a lemon), while buyers only knew the probability that any randomly chosen car was good or bad. A rational buyer – knowing that the car he was considering was a lemon with a probability greater than zero – would not be willing to pay the price of a good car. Thus, owners of good cars would not be willing to sell at all. To give a numerical example, we might posit that good cars are worth 100 while lemons are worth 50. If we assume that any given car might be good or bad with equal probability, a rational agent would be willing to pay $50\% * 100 + 50\% * 50 = 75$, even less if he is risk averse. Owners of a car worth 100 would not be willing to sell for 75, while owners of lemons would be more than willing to sell for 75. Thus, by merely offering her good car for 75, a person would signal that it was in fact a bad one; if we assume that no person would sell her car below the “real” value, only bad cars would be sold. As rational buyers anticipate this, all cars that are put up for sale would be priced at 50.

Myers and Majluf (1984) applied this phenomenon to the assets of a firm and developed a three period model: A company that already has an asset in place has a valuable investment opportunity. This investment opportunity cannot be postponed, i.e. if the company does not invest at $t=0$, the opportunity disappears. The company also is not able to finance a share of the investment only. Management acts in the interest of the old shareholders and all or parts of the project would have to be financed by issuing additional equity to new shareholders. When asymmetric information is ignored, the company would always issue and invest, as its net present value (NPV) is positive. However, as issuing equity sends a negative signal about the asset in place and the investment opportunity new

equity will be underpriced. Thus, the company might pass up on the investment if the discount on equity the old shareholders have to give the new shareholders in order to successfully raise the required amount exceeds the value of the investment that belongs to the old shareholders.

To summarize, the model is based on the following assumptions:

1. At $t = -1$ information between management and investors is symmetric. At $t = 0$ management receives additional information. At $t = 1$, this information becomes public. Investors are aware of the information asymmetry. Conveying information would be costly.
2. The firm has an existing asset in place. Its value at $t = -1$ is the expected future value $\tilde{A} = E(\tilde{A})$. At $t = 0$, management learns about the realization of $\tilde{A}$, a . At $t = 1$, a becomes public knowledge.
3. In addition to its asset the firm has financial slack S on hand, which includes cash, marketable securities and tolerance for risk-free debt. The amount of slack available to the firm is public knowledge.
4. The company has an investment opportunity with a positive net present value, which cannot be deferred and cannot be taken partially. It requires an investment of I , where $I > S$, i.e. investing in the project requires issuing equity of $E = I - S$. At $t = -1$, the publicly known net present value of this investment opportunity is $E(\tilde{B})$. At $t = 0$, management learns about the realized value of $\tilde{B}$, b . At $t = 1$ this information becomes public.
5. Neither a nor b can be negative. The asset in place is non-negative due to limited liability. b cannot be negative because otherwise it is discarded.
6. The market prices all public information efficiently, i.e. prices are formed based on expected future values. Investors are assumed to be risk neutral. Future values are not discounted for the time value of money in this model, as this would not change the results significantly.
7. Issuing equity (or other securities) does not produce transaction costs.

8. Management acts in the interest of existing shareholders.
9. Shareholders are assumed to be passive, i.e. they do not buy or sell at $t=0$. If equity is issued, they do not increase their holdings, i.e. the newly issued equity is bought by new investors.

Myers and Majluf summarized their model's distribution of information with respect to time in the following table:

	Date	$t=-1$	$t=0$	$t=1$
Information available to:	Management	Distribution of $\tilde{A}, \tilde{B}; S$	$a, b; S$	$a, b; S_{t1}$ or 0
	Market	Distribution of $\tilde{A}, \tilde{B}; S$	Distribution of $\tilde{A}, \tilde{B}; S; E=0$ or $E=I-S$	$a, b; S_{t1}$ or 0

Information is symmetric in the periods $t=-1$ and $t=1$. In between, investors know less than management. However, they are aware of this asymmetry and can observe whether stock is issued. Thus, management's issuing decision acts as a signal.

To exemplify the mechanism behind their model, Myers and Majluf give the following numerical example: A company might be in good or bad shape, with equal probability. If they are in good shape, their asset a is worth 150 and their investment opportunity b has a net present value of 20. If they are in bad shape their asset a is worth 50 and their investment opportunity b has a NPV of 10. They have no financial slack, i.e. $S=0$, and the investment opportunity requires 100, i.e. $I = E = 100$. Let P denote the market capitalization of a company if it does not issue stock, P^* if it does. The two possible states of a company can be summarized as follows:

State of the company	good	bad
Asset in place a	150	50
Investment opportunity (NPV) b	20	10

Following the logic that a company should invest in any project that has a positive NPV, any company – good or bad – should issue and invest, as the investment opportunity has a positive NPV in either state. If all companies did follow this strategy, the results would be as follows: Both kinds of company would be priced at

$$P^* = \tilde{A} + \tilde{B} = 50\% * (150 + 50) + 50\% * (20 + 10) = 115 .$$

At $t=0$, the *actual value* of the firm, which only management is aware of, is $V = a + b + E = 270$ for good firms and $V=160$ for bad firms. The *market value*, which is the same for both companies, as the market cannot differentiate between them, is $MV = P^* + E = 115 + 100 = 215$.

After an issue, the old shareholders own P^*/MV while the new shareholders own E/MV . Thus, if all companies issue and invest, the actual value distribution at $t=0$ and $t=1$ between old and new shareholders would be as follows:

State of the company	good	bad
Old shareholders	144.42	85.58
New shareholders	125.58	74.42
Total	270	160

Considering that the new equity is issued at 100, we see immediately that buying equity of a good firm gives new shareholders an additional 25.58 at the expense of old shareholders, while new shareholders of a bad company overpay by 25.58, which benefits the old shareholders. Yet, knowing this, would management acting in the interest of old shareholders actually issue equity? From the old shareholders point of view, which we

assume is the one that matters to management, a payoff table would look like this:

State of the company		good	bad
Payoff to old investors if the firm ...	... issues equity	144.42	85.58
	... does not issue equity	150	60

It is immediately obvious that old shareholders of a good company would be better off if management did not issue equity. Thus, management would not issue additional equity and pass up the investment opportunity. With the market being aware of this reasoning, an equity issue would become a signal for a company being in a bad state. Thus, the existing equity of issuing companies would be correctly priced at 60 while the equity of non-issuing companies would be priced at 150.

It would be clear ex ante that good companies pass up on their investment opportunities. At $t=-1$, the equilibrium market price would be $P^e = \tilde{A} + 50\% b_{\text{bad}} = 50\% * (150 + 50) + 50\% 10 = 105$. 10 are lost because the market is aware that good investment opportunities will be passed up.

The extent to which asymmetric information impacts the issuing decision obviously depends on the relative values of the asset and the investment opportunity in the various states. It is conceivable that the relative difference between a good and a bad company is small enough that both companies would issue stock in equilibrium. The same result might occur if the investment opportunity's value is big enough relative to the value of the existing assets: Not issuing equity, i.e. passing on the investment opportunity, would be more costly than the costs associated with asymmetric information. Generally speaking, the crucial factors in the management's issuing decision are the difference between the value of outstanding equity at $t=0$ E_0 (when the issuing decision is made) and of old equity at $t=1$ E_1 (when investors learn about the real value of the firm) in relation to $\tilde{B}$. Management will issue and invest if $E_1 - E_0 = \Delta E < \tilde{B}$.

Information asymmetries directly explain why companies would be inclined to keep financial slack: In the example given, management would want to have slack of $S=100$, as this would let them finance the project without bearing any signaling costs by issuing equity. Thus, with enough slack at hand to finance the project, the value of the firm at $t=-1$ increases to 115, as all positive NPV projects can be undertaken without issuing equity.

What the model cannot explain entirely is the role of risky debt and dividend policies. If we relax the assumption that equity has to be issued in order to proceed with the project and also allow for other securities, we see that management will also issue and invest if $D_1 - D_0 = \Delta D < \bar{B}$. However, as Myers and Majluf explain, option-pricing theory predicts that while ΔD and ΔE will share the same sign (i.e. just like equity, risky debt will be overvalued and vice versa), the absolute value of ΔD will always be lower than that of ΔE . More intuitively, the preference for debt is apparent if one considers that debt constitutes a claim to a fixed amount that is senior to claims of equity, i.e. if a debt investor is wrong about the value of a firm due to asymmetric information, her mistake will be less costly than with equity. This implies, however, that within the framework of the model, firms would *always* prefer debt to equity (if they decide to issue any security at all), i.e. firms would never issue equity at all. Information asymmetries regarding the value of a company alone cannot explain equity issuance. Explaining this requires a boundary for debt other than asymmetric information about the value of the firm (such as agency costs – as proposed by Jensen and Meckling (1976)). Alternatively, Myers (1984, p. FN 13) and Myers and Majluf (1984, p. 32) refer to Giammarino and Neave (1982) who proposed a model where asymmetric information exists with regard to the company's risk instead of the company's value. In such cases, they argue, the pecking order is reversed, i.e. equity dominates debt. Halov and Heider (2004) pursued this intuition and found evidence that asymmetric information about risk might function as a boundary for issuing debt (see 2.3 below).

2.2 Empirical Evidence

Shyam-Sunder and Myers (1999) criticized existing empirical work on capital structure theories: While studies usually confirm static trade-off theories, they posited that they would not return negative results even if other factors, such as those predicted by the pecking order theory, were actually driving financing decisions, i.e. “the static trade-off hypothesis will *appear* to work when financing follows the pecking order.” (Shyam-Sunder & Myers, 1999, p. 221) Thus, they propose a test that would be able to reject the pecking order theory: First, they define the “funds flow deficit”, which is given as

$$DEF_t = DIV_t + X_t + \Delta W_t + R_t - C_t$$

where

- C_t = operating cash flows, after interest and taxes,
- DIV_t = dividend payments,
- X_t = capital expenditures,
- ΔW_t = net increase in working capital,
- R_t = current portion of long-term debt at start of period,
- ΔD_t = debt issued/retired.

In order to support the pecking order hypothesis, testing

$$\Delta D_{it} = a + b_{PO}DEF_{it} + e_{it}$$

should produce $a = 0$ and $b_{PO} = 1$. Running the regression on a sample of 157 continuously reporting, mature firms from 1971 to 1989 returns a coefficient of 0.72 ($R^2 = 0.72$ (Shyam-Sunder & Myers, 1999, p. 238), lending support to the pecking order theory as a first-order approximation. Frank and Goyal (2003, p. 218) commented that this result was “attractive and influential,” while Halov and Heider (2004, p. 1) objected, “[...] these firms should face little asymmetric information in capital markets.”

Using the same testing model as Shyam-Sunder and Myers, Frank and Goyal (2003) tried to replicate the results on a broader sample. Running

the test on a sample of 768 continuously reporting firms during the same timeframe as Shyam-Sunder and Myers, they manage to reproduce the results with a coefficient of 0.75 ($R^2 = 0.71$). However, Frank and Goyal note that while the pecking order theory does not actually require a balanced panel for its test, considering continuously reporting firms only produces a bias towards larger firms, whose “book value of assets is almost twice that of the broader population of firms. These firms also issue significantly higher amounts of debt and significantly lower amounts of equity.” (Frank & Goyal, 2003, p. 233) Running a regression on the whole, unbalanced panel produces a coefficient of only 0.28 ($R^2 = 0.14$). Using data from another time-period (1990-1998) produces low coefficients as well, for balanced panels (0.33) as well as unbalanced ones (0.15). When grouping firms for size, smaller firms returned significantly lower coefficients (0.17 from 1971-1989, 0.09 from 1990-1998) than medium (0.43/0.16) or large firms (0.75/0.68). This is a bad result for the standard pecking order model, as asymmetric information is usually expected to be indirectly related to firm size, i.e. small firm’s equity should be more affected by adverse selection costs and thus be more likely to issue equity. The same intuition can be applied to high growth firms, who returned equally surprising results with a coefficient of only 0.13. Frank and Goyal concluded, “many aspects of the evidence posed serious problems for the pecking order.” (Frank & Goyal, 2003, p. 241)

Helwege and Liang (1996) find similar problems when testing young firms for pecking order behavior. They compiled a sample of 367 firms that completed an IPO in 1983 and analyzed their financing behavior between 1984 and 1992. Tracking firms after they completed an IPO appears to have the following advantages:

- Growth is fast while free cash flows are small. Thus, if the pecking order is correct, firms are more likely to acquire outside capital, which produces more opportunities for testing.

- Firms are less likely to issue risk-free or low-risk debt, as their cash flows are very small and/or risky. This makes the advantages of debt over equity less severe, according to pecking order theory.
- Firms should exhibit larger information asymmetries due to their short track record.

Helwege and Liang test two predictions of the pecking order theory, using a logit model and a multinomial logit model respectively: First they tested the negative relationship between changes in internal funds and external financing predicted by the pecking order model. The second test analyzes the financing choice given external financing: Given a choice between public debt, private debt and equity, firms are assumed to move up in the pecking order hierarchy with increasing risk and down the hierarchy with increasing asymmetric information. A third test is undertaken where the decision to raise funds and the choice between different securities is not independent: here they use a “multinomial logit with four nodes: issue public debt, issue private debt, issue equity, or do not issue any securities. The variables affecting the decision to obtain external funds (e.g. the deficit) and those affecting the type of security (risk and asymmetric information variables) are combined in this multinomial logit estimation.”(Helwege & Liang, 1996, p. 439) In all their tests, Helwege and Liang find little support for the pecking order theory: A projected increase in the financing deficit did not seem to drive the decision to acquire external financing. Also, the financing decision did not correspond well to the pecking order theory’s predictions: “The most common source of external financing was private debt, but private debt offerings declined over the period. Firms that issued public bonds and public equity, however, were the fastest growing, most profitable firms.”(Helwege & Liang, 1996, p. 456)

Fama and French (2002) directly compare predictions of the trade-off and the pecking order model regarding dividend policies and debt levels by running regression tests. Fama and French maintain that the pecking order model beats the trade-off model with regards to their predictions about debt levels: Profitable firms were found to have lower debt levels (contrary

to the predictions of the trade-off model, where firms are assumed to use leverage as tax shields). However, they also point out one important anomalous finding in their tests: Like Frank and Goyal, they find that smaller firms are usually less levered and that the “least-levered [firms] make large net new issues of stock [...], even though they appear to have low-risk debt capacity. This is not proper pecking order behavior.” (Fama & French, 2002, p. 28)

Thus, empirical evidence is mixed at best for the standard pecking order theory. Extensions of the standard model have been brought forward to alleviate or explain some anomalies in the empirical results.

2.3 Extensions to the Model

Myers and Majluf’s standard pecking order model has been extended in order to relax some implicit or explicit unrealistic assumptions. Some models support the standard pecking order, while others come up with different results to varying degrees. To give an overview, the following models, which are either similar to or based on Myers and Majluf’s model, will be presented:

- a. Korajczyk et. al. (1992) add a dynamic component to the degree of asymmetric information as well as the value of the project. Accordingly, a company can time their equity issue in order to minimize asymmetric information costs.
- b. Krasker (1986) relaxes the assumption that the investment project is “all or nothing”, i.e., firms can choose the size of their investment and their equity issue. He shows that this has no significant impact on the general implications of the pecking order but allows to making predictions regarding the relationship between size of the equity issue and value.
- c. Narayanan (1988) does not presuppose the existence of an asset. He shows that some bad firms might issue and invest in projects with a negative NPV (because being overvalued makes it profitable for old

shareholders to do so) and that risky debt reduces this problem, thus also establishing the standard pecking order of capital.

- d. Heinkel and Zechner (1990) build on Narayanan's model and analyze the effects of issuing preferred shares within a similar framework.
- e. Halov and Heider (2004) regard the standard pecking order as the result of a special case where information asymmetry exists about the value but not about the risk of a firm. They consider the polar opposite situation and conjecture that equity is preferred to debt if information is asymmetric concerning risk but not concerning value. They build a more general framework where asymmetric information about risk is also considered and find empirical support, thereby also explaining many of empirical problems of the standard pecking order model.
- f. Brennan and Kraus (1987) relax the implicit assumption that firms can only issue debt or equity and allow for more complex financing strategies, such as issuing equity and retiring debt simultaneously. They analyze under what conditions such financing strategies may costlessly reveal the firms status.

ad a.) Explicitly building on the model by Myers and Majluf, Korajczyk et al. (1992) add a dynamic component to the standard pecking order model: in their model they relax Myers and Majluf's implicit assumption that the degree of asymmetric information is static over time. Instead, the degree of asymmetric information is fluctuating: While some events decrease the information gap (e.g. shareholder meetings), it increases afterwards as time passes. Thus, the firm can decrease their asymmetric information costs by issuing equity close to such events. Additionally, contrary to Myers and Majluf, the project *can* be postponed. However, postponing the project (and the equity issue) is costly, "either because the project being financed could lose value if postponed (for instance because a competitor enters the market first), or because the firm may have to adopt a higher cost source of interim financing." (Korajczyk, Lucas, & McDonald, 1992, p. 398)

The model assumes that the true value of asset a is revealed at regular intervals. In between these information releases at $t=i$, managers of *some* firms receive private information regarding changes in the value of the asset, creating information asymmetries: either their asset's value has increased to $a_i + \tau$ (for good companies) or decreased to $a_i - \tau$ (for bad companies), with equal probability. Thus, there are managers who know they preside over good firms, managers who know they preside over bad firms and managers who do not know for themselves. Over time, the fraction of managers who receive private information increases, hence the information gap increases over time and issuing equity becomes less attractive for good firms. It is also assumed that "projects arrive randomly, at a constant aggregate rate q ." (Korajczyk, Lucas, & McDonald, 1992, p. 400) These projects might evaporate at any time with probability δdt , thus making postponing them costly.

Korajczyk et al. conjecture and later prove the following equilibrium of issuing policies in their model:

- Good firms issue equity after their next information release in order to avoid the information asymmetry costs.
- Bad firms issue as soon as an investment opportunity arrives.
- Uninformed manager's issue decision changes over time: If the investment opportunity presents itself early on they are more likely to issue and invest, as the information gap is still relatively small and issuing equity is relatively cheap in case they are good companies. Later on they prefer to wait to learn about the quality of their asset before making a decision whether to issue and invest or not.

In addition, they show how their model suggests that equity price drops increase over time after information has been released. Thus, they make the following testable predictions and cite relevant empirical studies:

- Equity issues are more frequent immediately after information has been released than before information is released. They cite various empirical studies that support this.

- The price drop associated with an equity issue announcement will increase over time from the last information release, which is consistent with empirical studies.

ad b.) Krasker (1986) relaxes the assumption that the investment opportunity cannot be undertaken partially. In his model, the firm can choose to reduce the size of a necessary equity issue by only financing a part of the project. Krasker introduces a proceeds function, which measures the income derived from an issue of any given size. He then shows that there are cases where this proceeds function is bounded, i.e. there is a maximum amount of money a firm can raise by issuing equity, irrespective of the total size of the issue, as one unit of proceeds beyond this maximum would increase firm value by less than one unit – which goes against the interest of old shareholders. As Krasker points out, intuition suggests that this should be the case for firms whose prospects are poor. However, according to the model, “the opposite is true. [...] equity rationing *must* prevail if the firm’s investment opportunities are known to be ‘sufficiently good’ [...]” (Krasker, 1986, p. 94)

Krasker draws two important conclusions from his model:

- Underinvestment must occur even if companies are able to partially invest in projects, confirming the standard pecking order theory without the – often unrealistic – “all or nothing” restriction.
- Poor firms are less likely to engage in equity rationing and thus price drops when an equity issue is announced should increase with the size of the issue.

ad c.) Narayanan (1988) constructs a model where no asset is in place. This allows him to consider cases such as start-ups, spin-offs of established companies, and mature firms with little private information. In Myers and Majluf’s model, this led to a corner solution, where any firm issued and invested, regardless of type. Narayanan’s model does not produce this result as asymmetric information stems from differences in firm-specific factors that are known only by insiders, such as quality of management, corporate

culture, etc.; these factors concerning firm quality are expressed in a vector variable. Each company has an investment project, where the value depends on the quality of the firm, which results in some projects having a negative net present value; contrary to Myers and Majluf, these projects are not automatically discarded.

If companies are only allowed to raise funds by issuing equity, Narayanan shows that under the conditions outlined in his model at least some companies with a negative-NPV project (“lemon companies”) will issue and invest: Investors cannot differentiate them from good companies, thus overvaluing them. Because they are overvalued, they can still afford to lose some money in their negative investment project while being better off than without an equity issue. Thus, the ex-ante value of *all* firms is reduced due to overinvestment in NPV-negative investment projects.

If, however, firms are able to issue risky debt, at least *some* lemon companies will be excluded from the market: Debt constitutes a fixed claim and thus the threat of bankruptcy is higher for lemons if they are financed through debt. There will still be lemons that profit from issuing debt because they are overvalued. However, some firms are bad enough that they will only issue and invest equity but never debt. Thus, in order to exclude said companies, good firms will only issue debt. For the worst firms, issuing equity is the only remaining option, but doing so would instantly identify them. This excludes them from the market and thereby raises the ex-ante value of all the other companies, because fewer investments with a negative NPV are undertaken.

Narayanan’s model also predicts the standard pecking order in financing a firm’s operations and a fall in stock price if equity is issued. Yet, contrary to Myers and Majluf – where debt is issued as it is less prone to undervaluation – debt is used in order to exclude the most severely overvalued (i.e. the worst) firms in the market, which reduces welfare loss through overinvestment and thereby raises the ex-ante values of firms.

ad d.) Heinkel and Zechner (1990) extend the idea by Narayanan: Their model is very similar to his; however, *before* the investment opportunity arises and information asymmetry occurs, management can issue securities without facing adverse selection costs. Given this possibility, firms will choose a capital structure that avoids adverse selection costs when they arise. They basically use Narayanan's model, where overinvestment occurs but extend it for another period where management as well as the market know the distribution of good and bad projects. Thus, at t_0 information is symmetric and all firms are entirely equity financed but may choose to issue a certain amount of debt and pay a dividend with the proceeds. At t_1 they receive a private signal and an investment opportunity (which might have a negative net present value), where external capital is required. At t_2 the truth comes out and information is symmetric again. If firms remain entirely equity financed at $t=0$, Heinkel and Zechner obtain the same result as Narayanan: Firms lose ex-ante value, as some firms overinvest. However, firms can issue debt and pay a dividend equal to the proceeds, thereby creating an underinvestment incentive, as debt constitutes a fixed claim that has to be settled at $t=2$, which will not be possible for firms who have invested in a bad project. Therefore, firms will choose a debt level at $t=0$ that creates underinvestment incentives equal to the expected overinvestment incentives projected for $t=1$. At $t=1$, bad firms will regret having chosen the debt, but ex-ante, firm value will increase for firms who issue debt at $t=0$. Contrary to the pecking order model, this effect creates an optimum debt level, as firms try to balance the effects of over- and underinvestment incentives.

Introducing preferred stock to the model creates an additional overinvestment incentive: This version of the model assumes that preferred stock is outstanding, which pays a dividend at $t=1$ but can be in arrear, which allows the firm to invest the preferred dividend instead of paying it. Equity holders would reap the benefits of the project but preferred stock holders would carry a significant portion of the project's downside potential. Thus, firms with outstanding preferred stock have an additional

overinvestment incentive, which can be balanced through additional debt, as above.

Adding taxes to the model, debt is issued for two reasons: balancing the overinvestment incentives and creating tax shields. Of course, the positive effect of tax shields is also bounded by underinvestment problems. Yet, as they demonstrated before, issuing preferred shares creates additional overinvestment incentives and thus room for additional debt and tax shields. Alternatively, preferred stock could be used to make room for debt in order to avoid adverse selection costs of an equity issue. Heinkel and Zechner note that their model predicts preferred stock issues as a signal for growth opportunities and that “firms with very low or no growth opportunities do not issue preferred shares.” (Heinkel & Zechner, 1990, p. 20)

ad e.) Halov and Heider (2004) build on Giammarino and Neave’s (1982) intuition (mentioned Myers and Majluf’s (1984) and Myers (1984)) that debt might carry an adverse selection cost if there is asymmetric information regarding risk. In order to illustrate this, they give the following example: Again, two types of firms operate in the market. There are no existing assets in place, but all firms have an investment opportunity that requires $I = 100$ of outside capital. If successful, the type A firm’s project returns 400, a type B firm’s project 300. If the project fails, nothing is returned in either case. Any given type of firm occurs equally often. At first, it is assumed that both firm’s projects succeed with a probability of 50%. Thus, a type A firm’s net present value is $NPV_A = 50\% * 400 - 100 = 100$; while a type B firm’s net present value is $NPV_B = 50\% * 300 - 100 = 50$. It is assumed that risk is diversifiable; the time value of money is ignored.

If the market *can* differentiate between type A and B firms (i.e. no asymmetric information), both firms will be charged a 100% risk premium on their debt repayment, as both firms fail with a probability of 50%. Debt repayment F will be 200 for each firm, as $200 * 50\% = 100 = I$. If equity is issued, a type A firm will have to sell 50% of its stock as $50\% * 50\% * 400$

$= 100 = I$; a type B firm has to sell 66,67% as $66,67\% * 50\% * 300 = 100 = I$. Either way, both firms retain their NPV. As expected by Modigliani and Miller (1958), the financing structure is irrelevant without asymmetric information (and other frictions).

If the market *cannot* differentiate between firm types, both firms will have to sell 57,14% of their equity as $50\% * (57,14\% * (400 * 50\%) + 57,14\% * (300 * 50\%)) = 100 = I$. If we compare this with the numbers above, a type A firm will have to sell 7.14% more of their stock than with symmetric information while the type B firm sells less than before. Debt on the other hand does not carry any adverse selection cost: As investors know that both firms have a 50% chance of failing, debt repayments will still amount to 200: $50\% * (200 * 50\%) + 50 * (200 * 50\%) = 100$. Thus, firms (i.e. type A firms) prefer debt to equity, which is in line with Myers and Majluf's standard pecking order. The results for both cases are summarized in the following table (assuming the project is successful).

Type	A		B	
Information	Symmetric	Asymmetric	Symmetric	Asymmetric
Cost of Debt	200	200	200	200
Cost of Equity	200	228.57	200	171.43

However, a slight alteration of the assumptions changes the results dramatically: If we assume that type B firms are successful with a probability of 66.67% instead of 50% their NPV changes to $2/3 * 300 = 100$, which is the same as the type A firm's NPV. Risk, however, is different between the firms now. Under full information, both firms will have to sell half of their stock as equity in order to raise the necessary funds: $50\% * 50\% * 400 = 100 = I$, or $50\% * 66.67\% * 300 = 100 = I$; for type A or type B firms respectively. This means that bad firms have to sell less equity than in the example above, where they were less likely to succeed. Type A firms, again, will pay 200 for debt. Type B firms however will only pay 150 for their debt as $150 * 66.67 = 100 = I$.

If we assume investors to be unable to differentiate between firms again, both firms would still have to sell half their stock in order to raise the necessary funds as

$$50\% * (50\% * 400) + 50\% * (66.67\% * 300) = 100 = I.$$

However, debt repayment would be $D=171.43$ for both firms:

$$50\% * (50 * D) + 50\% * (66.67\% * D) = 100 = I.$$

Thus, type B firms would overpay 21.43 for their debt, while the type A firms underpay. Again, we can summarize the costs of capital as follows (again under the condition that the projects are successful):

Type	A		B	
Information	Symmetric	Asymmetric	Symmetric	Asymmetric
Cost of Debt	200	171.43	150	171.43
Cost of Equity	200	200	150	150

In this case, type B firms will want to issue equity while type A firms will want to issue debt. Investors are aware that they are not fully informed about the firm's risk and therefore will not buy debt. As expected, asymmetric information concerning risk has flipped the pecking order upside down.

(Of course, this example only illustrates the *direct* adverse selection costs of respective securities. In both cases, both firms will issue the security that does not incur such costs – although one of them will do so only reluctantly. There will be no indirect costs due to either underinvestment, as there is no asset in place, or overinvestment, as both projects have a positive NPV.)

Halov and Heider build on the empirical model proposed by Shyam-Sunder and Myers (1999). As explained above, Shyam-Sunder and Myers ran a pooled panel regression between the difference in debt ΔD and the financing deficit DEF,

$$\Delta D_{it} = a + bDEF_{it} + \varepsilon$$

expecting a being 0 and b being large. Halov and Heider on the other hand expect b to be high only for firms without asymmetric information regarding risk. Thus, they group firms into deciles according to their asymmetric information about risk and run regressions for each decile individually. As they expect the decile with the highest degree of asymmetric information about risk to mostly issue equity, they also test for equity issues. Thus they run the following regressions for each decile n :

$$\Delta D_{it} = a_n + b_n^D DEF_{it} + \varepsilon \text{ and}$$

$$\Delta E_{it} = a_n + b_n^E DEF_{it} + \varepsilon.$$

According to their reasoning, they expect the financing deficit coefficients for debt to decrease with each decile, i.e. $b_1^D > b_2^D > \dots > b_{10}^D$, while the financing deficit coefficient for equity should increase with each decile: $b_1^E < b_2^E < \dots < b_{10}^E$.

In order to rank the firms, Halov and Heider rely on the recent volatility of assets as a proxy for asymmetric information about risk. Running the test on their whole sample, they obtain a coefficient of 0.375 ($R^2 = 0.36$), which is slightly larger than that of Frank and Goyal ($b = 0.28$ and $R^2 = 0.14$), but much smaller than that of Shyam-Sundars and Myers ($b = 0.75$, $R^2 = 0.68$). However, running the test on the lowest decile only, their results are much in line with the standard pecking order, obtaining a coefficient of 0.87 ($R^2 = 0.85$). Their results for all deciles (Figure 1) lend much support to their general pecking order theory, as the debt coefficient is clearly decreasing along the deciles while the equity coefficient is increasing.

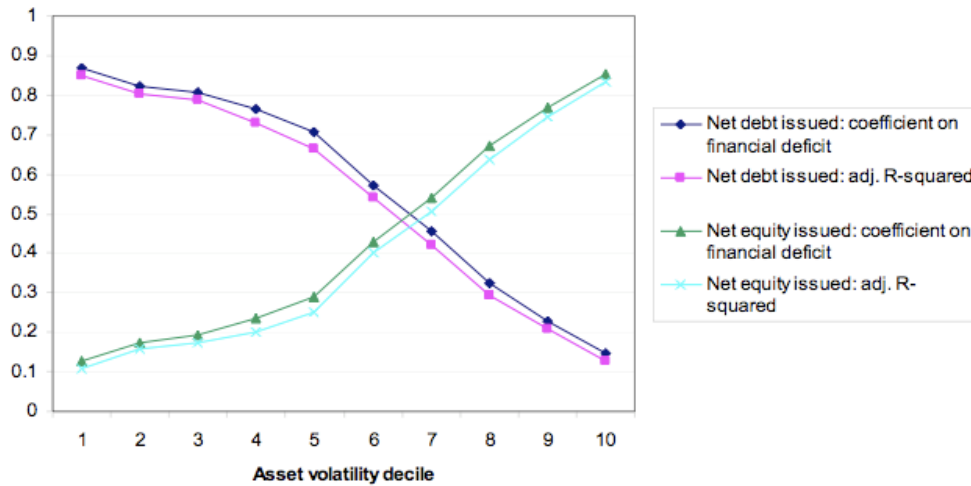


Figure 1: Empirical results of Halov and Heider (2004)

ad f.) Brennan and Kraus (1987) criticize the pecking order model because it neglects securities other than equity and debt (such as convertible bonds) and does not allow for more complex financing strategies. They build a model that does not only allow firms to issue a specific security, but also issue or retire different securities simultaneously. For example, a firm might issue equity and use parts of the proceeds to pay off debt. Such financing strategies, which are costless, may be used to signal the prospects of a company.

In order to analyze the properties of financing strategies that allow costless signaling, Brennan and Kraus build the following model: Z , which is public knowledge, is a set of all feasible financing strategies available in a given economy. T is a set of all possible firm types (with regards to future payoffs) in a given economy. The true, privately known value of a specific financing strategy z issued by a specific firm t is $V(z,t)$. The price for the securities that are issued using this strategy is $P(z)$. Brennan and Kraus also assume that management acts in their (existing) shareholder's interest, thus if outside capital is raised in order to finance an investment of I , management of a firm t seeks to choose a financing strategy $z^*(t)$ so that $P(z^*) - V(z^*,t)$ is maximized. Under these assumptions, Brennan and Kraus show that if a certain financing strategy is chosen at all, it will be chosen by firm type t^* where $V(z^*,t^*)$ is the lowest possible value and equal to I . Therefore, the firm type t^* can be inferred by outside investors, who will

therefore price the set of securities correctly, i.e. $P(z) = V(Z^*, t^*) = I$. They also show that such a financing strategy might exist.

In order to illustrate their findings, they give the following example (Brennan & Kraus, 1987, p. 1234f): Again, two firm types exist. At $t=0$, the distribution of earnings and types is public knowledge. While insiders know which type their firm belongs to, investors only know that any given firm can be good or bad with equal probability. All firms have 40 shares outstanding and debt of 100, which matures at $t=1$. Both firms have an asset in place, which has an expected value of 120 for $t=1$, i.e. their equity is priced 20 at $t=0$. They also have an investment opportunity, which requires investment of 10. If a firm decides to invest, their $t=1$ payouts and $t=0$ full-information valuations are as follows:

	Payoffs at $t=1$			Security values at $t=0$		
	$p=50\%$	$p=50\%$	EV	Debt	Equity	Total
Good firm	100	200	150	100	20	120
Bad firm	80	195	137.5	90	37.5	127.5

Brennan and Kraus conjecture the following worst-case financings: Good firms raise 110 in equity, pay off their debt and invest in the project. Bad firms issue equity worth 10 and invest in the project. Good firms are identified and therefore able to sell 110 shares for the full information value of 1 each; their outstanding equity will be valued at 40. Bad firms will sell 10.66 shares at the full information price of 0.938 per share, which means that outstanding equity will be valued at $(40/50.67) * 47.5 = 37.5$.

This set of strategies can only be the equilibrium outcome, if there is no incentive for either firm to deviate: If the good firm mimics the bad one by issuing 10.66 shares at 9.38 each, the old shareholder's payoff is $(40/50.68) * 50 = 39.46 < 40$. If the bad firm mimics the good one old shareholder's equity will be worth $(40/150) * 137.5 = 36.67 < 37.5$. The good firm does not mimic the bad one because their equity would be underpriced while the bad firm does not mimic the good one, as they would

have to retire their debt at 100 although it is only worth 90. Thus, neither firm has an incentive to deviate and good firms can reveal their state by issuing enough equity to retire their outstanding debt and invest in the project.

3 The Austrian Support Scheme for Financial Institutions

In late October 2008, the Austrian Parliament approved a support scheme for financial institutions, which aimed to stabilize its financial markets. Two laws were enacted in order to accomplish this: The “Interbankmarktstärkungsgesetz” (IBSG) initiated a clearing bank, which would raise money from financial institutions and appropriate those funds to banks that endured a liquidity shortage. This clearing bank was secured by guarantees of the state. The “Finanzmarktstabilitätsgesetz” (FinStaG) authorized the state to provide financial institutions with loans and capital. Both laws were authorized by the European Commission, which amended the legislative pieces in order to make them comply with standards concerning competitive advantages. The first part of this chapter gives a chronological overview and casual observations regarding the events surrounding the enactment of the support scheme. The second part gives a more detailed description of the scheme’s measures, especially with regard to recapitalization of banks.

3.1 Chronology of Events Surrounding the Support Scheme

Since 2007, financial institutions throughout the world have suffered a rapid decline in their stock prices. The crisis began in the United States, where a rapid decline in housing prices caused massive losses for financial institutions who held subprime mortgage papers: To give a few examples, from Oct. 5 2007 until July 3 2009 Citigroup Inc. went from 48.30 to 2.88; American International Group, Inc. from 1387.80 to 18.25; Lehman Brothers Holdings Inc. filed for chapter 11 bankruptcy protection on Sept. 14 2008. More broadly, the NYSE Financial Sector Index – which encompasses all financial institutions listed on the New York Stock

Exchange – went from 9710.65 on Oct. 5 2007 to 3778.02 on July 3 2009¹. In October of 2008, the United States government passed the Emergency Economic Stabilization Act, which enacted a program to purchase illiquid assets and increase equity of financial institutions – the Troubled Asset Relieve Program (or TARP). (House Committee on Financial Services, 2008)

Meanwhile, the financial crisis had spread around the world and started to affect Austrian Banks: By the end of September 2008, the two largest financial institutions listed in the ATX, Raiffeisen International Holding and Erste Group Bank, were trading in their low 20s, down from over 110 and 55 respectively a year ago². At that point, banks were still claiming that their situation was stable. On September 30 2008, Michael Ikrath, general secretary of the “Sparkassenverband” (part of Erste Group) told the Austrian financial newspaper “Wirtschaftsblatt”, that there were some problems but nothing to worry about (“[...]es gibt immer noch keinen Anlass zur Sorge”). A spokesperson for the Raiffeisen Zentralbanken AG (RZB) stated that his institute had no liquidity constraint but that refinancing was increasingly expensive (“Die RZB hat kein Liquiditätsproblem, allerdings wird die Refinanzierung teuer, diesem Trend können wir uns nicht entziehen.”). (Kreuzer, 2008a)

Two days later, Veit Sorger, president of the Austrian Industrialists’ Association, called for a stabilization scheme for Austrian Banks, similar to that in the United States. Scaling for Austria’s size, he suggested providing funds of about 16 billion Euros (APA, 2008a). On October 4 2008, the heads of states of France, Germany, Great Britain and Italy met in Paris to discuss measures against the financial crisis in Europe (DPA, 2008a). One week later, all heads of state of the Euro-zone met. While no agreement regarding measures on the European level was reached, states coordinated

¹ End of day stock and index price quotes retrieved from Google Finance. (n.d.). Retrieved 3. July 2009 from <http://finance.google.com>

² Stock price quotes retrieved from ecetra Internet Services AG. (n.d.). *brokerjet*. Retrieved 3. July 2009 from <http://www.brokerjet.at>

their individual stabilization schemes. It was also agreed that legislation would be reviewed by the European Commission in order to avoid competitive advantages of certain banks. (DPA, 2008b)

Austria's then Prime Minister, Dr. Alfred Gusenbauer, presented a general outline of the stabilization scheme on October 13 2008. He announced that the stabilization package would be endowed with 100 billion in funds: 15 billion would be available as loans and participation capital, 85 billion as a guarantee for loans in order to increase interbank lending. It is worth noting that many of the parties involved were still adamant that Austrian banks did not actually require such a stabilization package: Alfred Gusenbauer said, "Unsere Banken sind solide und verfügen über ausreichend Kapital. Wir sind der Meinung, dass man aber für die Krise noch besser gewappnet ist, wenn die Eigenkapitalbasis gestärkt werden kann." (Bundeskanzleramt Österreich, 2008) CEO of Erste Group Bank, Andreas Treichl, concurred: According to him, the stabilization scheme was not only intended to secure banks against interferences of the crisis, but would also help expansion in central and eastern Europe (APA, 2008b). His colleague of EZB, Walter Rothensteiner, also stressed that banks just needed a guarantee in order to facilitate interbank lending – implying that said guarantees would probably not become effective (APA, 2008c). Directors of the Austrian "Finanzmarktaufsicht" also stressed that Austrian banks were in good financial shape (APA, 2008b). While it cannot be ruled out that such an optimistic point of view is valid, it is obvious that banks would have an incentive to downplay the importance of the stabilization scheme.

In the following week, rumors (from sources within the parliament) surfaced, which suggested that banks were coordinating their actions in order to avoid sending a negative signal. Banks rejected such allegations and even publicly doubted whether they would take advantage of the proposed stabilization package at all: While Bank Austria and RZB both announced that they would want to use the services of the proposed clearing bank, both banks claimed that they did not consider using state-issued

equity. Volksbanken CEO Manfred Kunert was not willing to comment on future plans regarding the package, yet announced that his bank did not need any help offered in the scheme. Bawag board member Regine Prehofer announced that her bank was not interested in any kind of financial support; rather, her bank had enough liquid funds in order to provide some of them through the proposed clearing bank. Ikrath, spokesperson for Erste Group, acknowledged that his bank might be in need of recapitalization; yet, he emphasized that this need for additional capital emerged at least to some extent due to state-financed recapitalization of foreign competitors (APA, 2008d). Again, whether banks actually were in need of state-funds at that point or not cannot be said with certainty. Yet, it is clear that banks whose survival actually relied on money from the state would have an incentive to misrepresent their situation in order to avoid sending a bad signal to the market.

On October 26 2008, the Austrian parliament passed legislation concerning the stabilization scheme: Interbankmarktstärkungsgesetz (IBSG) und Finanzmarktstabilitätsgesetz (FinStaG). The same day, the first bank announced entering negotiations for state-funds: Kommunalkredit Austria AG, subsidiary of Österreichische Volksbanken AG (ÖVAG) and Dexia, which had already received state-funds from France and Belgium. Again, they cited subsidies paid to competitors as the cause for their need for state-funds. The Austrian federal state acquired 99.78 percent of the bank from ÖVAG and Dexia. Both had to convert their obligations Kommunalkredit had with them to participation shares, which contribute to the bank's equity (APA, 2008f). In the beginning of 2009, the Austrian state contributed another 372.5 million Euros participation capital.

On October 30, Erste Group Bank made the first move of Austria's major banks and announced that they had negotiated 2.7 billion Euros in state-funded participating certificates, with a preferred dividend of 8 percent p.a. Again, Treichl made clear that he regarded his bank's situation as solid; however, he regarded taking up the state's offer as necessary in order to be prepared for the hard economic times that lay ahead of the bank. Yet, it was

obvious that the bank would not manage to attain a 9 percent equity ratio – which is the international norm for banks, whereas the legal minimum is 4 percent – without taking external funds. Treichl also announced that his bank would pay a dividend within the quarter, although he did not comment on its size. The announcement led to a jump in the bank's stock value: Just before noon, each share increased by over 15% (Johann, 2008). This increase in stock price after equity-increasing funds have been accepted – from the state, no less – might seem surprising. However, given that the package became a necessity in the first place is a clear indication that such a deal could not be negotiated in the market place, i.e. the state overpaid for the participation certificates to the benefit of the shareholders. Apart from that, it could be argued that the market estimated a high probability of bankruptcy, which was avoided due to the new funds. Hence – under this assumption –, the increase in share price (or parts of it) would be the result of the probability of bankruptcy diminishing drastically. The same day, other banks that had previously precluded a direct state involvement through participating certificates, changed their strategy: Both RZB and ÖVAG announced that they would reevaluate the offer and would accept it if it was in the interest of their customers, shareholders and employees (Kreuzer, 2008b).

On November 11, Martin Rasinger, lobbyist for private minority shareholders, claimed that private investors would be interested in participating in the stabilization scheme (Himmelbauer, Wilhelm Rasinger: Auch Privatanleger wollen beim Banken-Hilfspaket einpringen, 2008a).

On November 12, Tilo Berlin, CEO of Hypo Group, announced that he would request 700 million of participation capital (Himmelbauer, 2008). On November 28, ÖVAG announced that they would apply for a billion Euros capital from state-funds in order to increase their equity ratio from 7.1 percent (Fercher, 2008). RZB also held a meeting of their shareholders on November 25, where they obtained approval of issuing up to two billion Euros in participating certificates to the Austrian state (RZB, 2009a). On December 4, Regina Prehofer of Bawag announced that they were analyzing

possibilities of obtaining capital from the state, also giving distortions of competition as a reason (Lechner, 2008). The Austrian government had previously announced that they were looking for a special solution in order to supply Bawag and Bank Austria with participating capital: Both banks are owned by foreigners – US fund Cerberus and Italian Unicredit Group; hence, the state considered provisions that guaranteed that the capital would not be passed through to the owners (Kreuzer, 2008c).

Meanwhile, the Austrian government held negotiations with the European Commission, who wanted to amend some of the terms (see below). After some delays, Austria and the EU reached an agreement on December 9 (Kreuzer, 2008d).

Erste Bank declared that they would try to raise capital from private investors at eight percent preferred dividend p.a. By March 4, they had managed to secure 540 million Euros participation capital from private investors (Kreuzer, 2009).

On March 18 2009, Alessandro Profumo, CEO of Bank Austria mother Unicredit Group was granted permission by his shareholders to raise up to four billion Euros in state issued capital. He announced that 2.7 of those four billions should be provided by the Austrian government. He also announced that he would also issue participation certificates to private investors, hoping to raise at least 30 percent of the whole package at eight percent p.a. preferred dividend, which would also reduce the rate of the state-supplied portion (Himmelbauer, 2009)

Eventually, by June 30, the day the stabilization scheme expired, the following banks had agreed to issue participation certificates to the state and private investors:

Bank	Participation Capital		Rating ³
	Total	Private	
Erste Group ⁴	~1.75 billion	540 million	S&P, M, F
RZB ⁵	2.5 billion	750 million	S&P, M
Bank Austria ⁶	up to 2.7 billion (estimated)	probably 30% or more	S&P, M
BAWAG P.S.K. ⁷	550 million	0 (for now)	M
ÖVAG ⁸	1 billion	0	M
Hypo Group Alpe Adria ⁹	900 million	0	M

As we saw, most banks that ended up taking funds provided by the state announced that they would not do so. Whether they genuinely changed their mind or whether they were trying to signal positive expectations – unconvincingly but cheaply – is impossible to say. Yet, it is clear that firms have an incentive to portray their situation better than it is, generally, but especially if a future equity issue is likely.

3.2 Terms of the Austrian Stabilization Scheme

The Austrian Stabilization Scheme is based on two bills enacted on October 26 2008, one ordinance (Verordnung), enacted by the minister of finance on October 30 2008, a decision by the European Commission declared on December 9 2008, and various changes made to other laws.

The main bills are the Interbankmarktstärkungsgesetz (IBSG) and the Finanzmarktstabilitätsgesetz (FinStaG). The IBSG allows the minister of finance to assume liability for loans made between banks, thereby reestablishing trust between financial institutes. The FinStaG, on the other hand, allows the state to directly provide capital to financial institutions.

³ S&P = Standard & Poor's, M = Moody's Investors Service, F = Fitch, Inc.

⁴ Erste Group (2009a), Erste Group (2009b).

⁵ RZB (2009b), RZB (2009c).

⁶ Bank Austria (2009a).

⁷ BAWAG P.S.K. (2009a), BAWAG P.S.K. (2009b)

⁸ ÖVAG (2009a), ÖVAG (2009b)

⁹ OTS (2008), Hypo Group Alpe Adria (2007)

The IBSG determines the relationship between a clearing bank and the state: The clearing bank is operated and owned by Austrian banks and acts as an agent for loans between their members. They provide all the capital that is loaned between participating banks, i.e. the state does not provide any funds. However, the state can temporarily assume liability for bad debt that results from such transactions. The maximum amount of loans the state can guarantee is 75 billion Euros. These provisions aim to facilitate interbank lending and thereby reducing the likeliness of short-term liquidity shortages (Republik Österreich, 2008, p. 1). The European Commission declared that the Austrian state was allowed to guarantee liabilities of the clearing bank. However, they maintained that banks are not allowed to refer to the state guarantee when conducting business; neither are they allowed to abuse the bank guarantee for highly competitive behavior. They also demanded that each financial institute's line of credit is limited based on objective criteria. (European Commission, 2009, p. 8)

The FinStaG provides an additional array of instruments to be used at the minister of finance's discretion: If the funds available through the clearing bank are not sufficient, the minister of finance can assume liability for the bank's outstanding debt or for securities of third parties in the possession of a bank. In addition, the state might provide loans or equity, participation capital and convertible bonds. In cases where these instruments are insufficient, banks can be socialized; however, only as a last resort, if great economic damage has to be expected otherwise. 15 billion Euros were allocated for such measures (Republik Österreich, 2008, p. 3f).

The minister of finance enacted an ordinance, which specified details of the stabilization scheme. However, these specifications were still rather vague: The preferred dividend rate for participation capital issued by the state would have to be set according to market terms ("marktkonform") based on objective parameters, so that they conform with type, maturity and risk of the instrument. Similarly, dividend payments were only allowed within reasonable limits ("angemessenem Ausmaß") (Molterer, 2008, p. 2f). Of course, these specifications left a wide range for interpretation. However,

Erste Group bank announced that they had reached agreement with the state that they would pay a preferred dividend of eight percent p.a. on participation capital provided by the state (Johann, 2008). Austrian Press Agency, APA, also reported that banks would be allowed to pay a dividend of up to 30 percent of their profits (APA, 2008e).

The European Commission provided more accurate specifications: Fundamentally sound banks are only allowed to pay dividends of up to 17.5 percent of their profits. Distressed banks are not allowed to pay any dividends at all. For fundamentally sound banks, equity-like securities that have an interest-component (e.g. preferred shares, participation capital or similar instruments) have to pay a dividend of 9.3 percent p.a. if they are paid back at par. Alternatively, they can pay a dividend of only 8 percent; then however, they have to be paid back at 10 percent over par. In order to give an incentive to pay back the funds as soon as possible, dividend should increase over time: in the sixth and seventh year, the dividend would increase by 0.5% each. In the eighth year it would increase by another 75 basis points. From the ninth year onwards, it would increase by one percent each year. However, dividends are capped at the 12-month Euribor plus 10%. In addition, the capital would have to be paid back at 50 percent over par after the tenth year. Distressed banks have to pay a dividend of over 10 percent p.a.

The European Commission summarized both payment schemes in the following table:

Period	1	2	3	4	5	6	7	8	9	10	11
Scheme 1: 9.3% preferred dividend, retirement at par											
Dividend	9.3	9.3	9.3	9.3	9.3	9.8	10.3	11.05	12.05	13.05	14.05
Markup										50	50
Avg. Yield	9.3	9.3	9.3	9.3	9.3	9.37	9.47	9.61	9.79	12.68	12.48
Scheme 1: 8% preferred dividend, retirement at 10% over par											
Dividend	8	8	8	8	8	8.5	9	9.75	10.75	11.75	12.75
Markup	10	10	10	10	10	10	10	10	10	50	50
Avg. Yield	18	12.7	10.99	10.15	9.65	9.38	9.25	9.21	9.25	11.56	11.37

Thus, the state would earn around 9.3 percent p.a. in dividend payments on participation capital, on average.

However, the European Commission made an exception from this rule: If a fundamentally sound bank raised more than 30 percent of their newly issued participation capital from private parties, of which no more than 10 percent are existing shareholders, the participation capital issued by the state would only have to promise a preferred dividend equal to that agreed upon with private parties. Under such conditions, the limit on dividend payments would be omitted as well. The European commission claimed that this would make it more likely that the dividends reflect competitive market rates and thus would mitigate the competitive advantage gained through capital provided by the state (European Commission, 2009, p. 20f). In addition, the European Commission decided that each bank may not receive more than 3 billion of participation capital (European Commission, 2009, p. 9f).

4 The Stabilization Scheme and Equity Issues

In chapter 2 we have seen how adverse selection costs might lead to underinvestment if a firm only has access to risky securities such as equity. In the third chapter the terms of the Austrian financial markets stabilization scheme were presented. In this part, we will show how certain legislative provisions might mitigate the underinvestment problem, i.e. given that firms only have access to equity or equity-like securities, the likelihood that good firms still issue and invest is increased.

As we saw above, the European Commission granted banks the possibility of paying a preferred dividend on state issued participation capital equal to the market rate, if at least 30 percent of the newly issued participation capital are provided by private investors. Given that the market rate is below the rate set by the European Commission, banks would receive a discount on their preferred dividends conditional on the issuance of equity. Simultaneously, better banks pay a premium on their privately issued participation capital due to asymmetric information. Thus, issuing equity has a cost and two benefits: Asymmetric information makes issuance costly, but the discount and the investment project benefit firm value.

A numerical example will illustrate the effects of the stabilization scheme on issuing decisions under asymmetric information. The example is very similar to that of Myers and Majluf; changes are made in order to demonstrate the effects of participation capital and of the relevant provision in the stabilization scheme. It is structured as follows:

- There are two types of banks: Both have an asset in place, a , and an investment opportunity, b . Any given bank belongs to either type with equal probability. Banks do not hold financial slack.
- There are three time periods: In period one, information about bank types and distribution are symmetric. In period two, management learns which type their bank belongs to and has to decide whether to issue securities and invest or pass up on the investment project. In period three, the economy ends and banks are liquidated.

- The investment project requires an investment of I and cannot be postponed. Both banks' investment opportunities have a positive net present value. For simplicity's sake, we assume that the bank may not take a partial stake in the project. Krasker (1986) shows that this is a valid simplification that does not change the results significantly.
- For either bank type, the cash flows derived from both the asset and the investment opportunity are uncertain at $t=0$. At $t=1$, the economy may either turn for the worse or improve. If it turns for the worse, both the existing asset and the investment opportunity (if taken) incur a loss for both types of banks. If it improves, both assets yield a profit for both banks. The losses incurred by a bad bank are higher than that of good bank, while the profits made by a good bank are higher than those of a bad bank.
- There is no asymmetric information about risk, i.e. following Halov and Heider's logic the standard pecking order theory applies to banks. This is consistent with their findings that "credit ratings reduce asymmetric information about risk" (Halov & Heider, 2004, p. 16), as all Austrian banks who took advantage of the stabilization package have a rating (see above). Intuition also suggests that a financial crisis leaves management equally in the dark about risk as their investors, i.e. information about risk is distributed symmetrically, as there is not a lot of information to begin with.
- Banks finance the project either through participation capital or not at all.
 - Any form of capital less risky than equity (e.g. debt) is omitted because the main reason for the stabilization scheme was that banks had to increase their equity ratio (see above). It is concluded that any chosen financing strategy may not decrease the equity ratio. Mixed financing strategies with a net increase in equity are omitted for simplicity.
 - Participation capital is always chosen over normal equity. While participation capital is not less risky than equity, it has

no disadvantage, but – in certain instances – has advantages as it might lead to a discounts on state issued participation capital, i.e. firms might be indifferent between equity and participation capital, or they might prefer the latter; they will never prefer equity. For simplicity's sake, we assume that firms always choose participation capital, even if they are indifferent.

- Existing assets are financed through debt, equity and participation capital. The latter is provided by the state and requires the payment of a preferred dividend of PD_{state} . Two cases are explored: In each, PD_{state} either is adjusted to market rates of newly issued participation shares, or not. Hence, it is assumed that banks have already decided to issue participation certificates to the state: Austrian public authorities have declared that the stabilization scheme was imperative (“zwingend notwendig” (European Commission, 2009, p. 9)) in order to avoid damages to the financial markets, implying that participation capital issued to the state was crucial to the survival of the bank and had already occurred at the time of the issue decision regarding participation certificates to private parties.
- Management acts in the interest of existing equity holders.
- Equity holders are assumed to be passive, i.e. they do not sell their shares before $t=1$, where they are liquidated.
- Equity holders do not buy newly issued participation certificates. The terms of the stabilization scheme only allow 1/3 of the private capital to be provided by existing shareholders, in order to be eligible for the discount (see above). Thus, this assumption is derived from the terms of the stabilization scheme.
- The market prices all securities according to their expected future payoff, based on publicly available information. The time value of money is neglected for simplicity.

For the numerical example, the following $t=1$ payoff values are given for the asset in place a and the investment opportunity b for each bank in each state:

Type of bank	Good $p=50\%$			Bad $p=50\%$		
State of the economy	Worsens $p=50\%$	Improves $p=50\%$	NPV	Worsens $p=50\%$	Improves $p=50\%$	NPV
a	260	480	70	150	400	-25
b	75	140	7,5	70	135	2.5
Total CF	335	620		220	535	

The project requires an investment of 100. Both banks have the following securities outstanding:

- 100 Debt, mature at $t=1$
- 100 worth of participation certificates, with a preferred dividend of 60 (due at $t=1$), owned by the state
- 100 (book value) of equity

Thus, if both banks do not invest at $t=0$, the $t=1$ payoffs and $t=-1$ value of all the respective securities would be as follows:

Type of firm	Good			Bad		
State of the economy	Worsens	Improves	V	Worsens	Improves	V
Debt	100	100	100	100	100	100
Participation Certificates (State)	80	170	125	25	170	97.5
Equity	80	210	145	25	130	77.5

Debt is senior to both equity and participation certificates. If the economy worsens, equity holders and the state bear the losses to equal parts. If it improves, the state receives 160 (face value and preferred dividend), while the equity holders receive the residual value. Management invests in the project if it increases the value of equity. Both investment projects have a positive net present value, so if securities are priced under full information, banks can be expected to issue and invest. Following Myers and Majluf, it might occur that adverse selection costs are so high that they exceed the

equity holder's share of the project's value. Thus, if information is asymmetric, the good firm should pass up the project, as financing is too expensive. In the following example, however, a special case is presented where the preferred dividend rate of state owned participation shares is adjusted to the market rate if the bank issues participation shares to private investors. This adjustment is big enough to offset the costs incurred through asymmetric information so that no underinvestment occurs.

If the bank issues participation certificates and subsequently incurs a loss, holders of certificates receive one third of the residual value. Banks set the preferred dividend PD so that investors can expect to break even:

$$50\% * (1/3) * (a_{\text{worse}} + b_{\text{worse}} - D) + 50\% * (100 + PD) = 100.$$

Under full information, good banks offer a preferred dividend of 21.67, bad banks of 60. If preferred dividends are not adjusted to the market rate, the following payoffs are realized at $t=1$:

Type of bank	Good			Bad		
State of the economy	Worsens	Improves	V	Worsens	Improves	V
Debt	100	100	100	100	100	100
Participation Certificates (State)	78.33	170	124.17	40	170	105
Participation Certificates (Private)	78.33	121.67	100	40	160	100
Equity	78.33	228.33	153.33	40	105	72.50

The expected value of their equity increases, so the good firm would invest. The bad firm would not invest, as the state's preferred dividend is too high. If the state's dividend is adjusted to market rates, both banks invest:

Type of bank	Good			Bad		
State of the economy	Worsens	Improves	V	Worsens	Improves	V
Debt	100	100	100	100	100	100
Participation Certificates (State)	78.33	121.67	100	40	160	100
Participation Certificates (Private)	78.33	121.67	100	40	160	100
Equity	78.33	276.67	177.50	40	115	77.50

If only management is aware of the bank's prospects, investors demand a preferred dividend equal to the average of both firms. Thus, in order to raise capital for the project, both firms have to offer a dividend of $50\% * 21.67 + 50\% * 60 = 40.83$. If the state's preferred dividend is not readjusted, the following payoffs are realized:

Type of bank	Good			Bad		
State of the economy	Worsens	Improves	V	Worsens	Improves	V
Debt	100	100	100	100	100	100
Participation Certificates (State)	78.33	170	124.17	40	170	105
Participation Certificates (Private)	78.33	140.83	109.58	40	140.83	90.42
Equity	78.33	209.17	143.75	40	124.17	82.08

If the good bank were to issue and invest the bad bank would do so too: This would allow the bad bank to pay a preferred dividend of 40.83 instead of 60, increasing their shareholder's expected value to 82.08. However, this would mean that good banks would have to pay a dividend of 40.83 instead of 21.67. Their equity holder's expected value would decrease to 177.5, which is less than the 120 they would expect to earn by not investing at all. Thus, the good firm would pass up on the investment project. The bad bank would therefore also pass up, as issuing would identify them, which means that their shareholders value is decreased because of the premium they pay to the state. Neither firm invests, which means that both investment projects are passed up although they have a positive net present value.

Finally, if the state adjusts its preferred dividend to the market rates, the following payoffs are realized:

Type of bank	Good			Bad		
State of the economy	Worsens	Improves	V	Worsens	Improves	V
Debt	100	100	100	100	100	100
Participation Certificates (State)	78.33	140.83	109.58	40	140.83	90.42
Participation Certificates (Private)	78.33	140.83	109.58	40	140.83	90.42
Equity	78.33	238.33	158.33	40	153.33	96.67

Because the rates are readjusted, the good firm saves enough on the participation certificates issued to the state in order to make up for some of their adverse selection costs. Comparing the ex-ante firm value of a bank with and without adjusting preferred dividend rates, the total ex-ante net present value of the banks increases from 22.5 to 27.5, as no underinvestment occurs.

Of course, the loss in equity value due to asymmetric information is not resolved: New participation certificate holders of good banks still receive a preferred dividend that is higher than under full information, at the expense of old equity holders. Issuing participation certificates under asymmetric information is only costly if the bank ends up earning a profit that is higher than the amount required to pay the full information preferred dividend. The full cost is incurred when a profit is earned that is sufficient to cover the rate set by the market. Assuming that the firm either incurs a loss or makes a profit sufficient to pay the full preferred dividend (as it is assumed in our example), the ex-ante cash flow that is incurred by issuing participation certificates under asymmetric information is $CF_{AS} = p_P * PC_{NEW} * (PD_{FULL} - PD_M)$, where p_P is the probability that sufficient profits are made, PC_{NEW} is the total face value of issued participation certificates, PD_M is the preferred dividend set by the market under asymmetric information and PD_{FULL} is the rate set by the market under full information. Banks whose full information rate is below the market rate (“good banks”)

have a negative asymmetric information cash flow, while banks with a full information preferred dividend rate above the market rate have a positive cash flow due to asymmetric information. The discount is also only realized in states where the bank could have paid the pre-discount preferred dividend. Thus, the value of the discount is $D = p_p * PC_{STATE} * (PD_{STATE} - PD_M)$, where PC_{STATE} is the face value of participation certificates sold to the state and PD_{STATE} is the preferred dividend rate promised to the rate without a discount.

Without a discount (and without alternative financing options), a firm would issue and invest only if $NPV(b) + CF_{as} > 0$. With the provision for a discount in place, the bank issues and invests if $NPV(b) + CF_{as} > -D$. As in Myers and Majluf's original example, a project with a higher net present value obviously makes it more likely that the good firm issues and invests. Banks with a positive cash flow due to asymmetric information would also always want to invest. If the asymmetric information cash flow is negative, the issue and invest decision depends on the size of the negative cash flow as well as the size of the discount: The size of the negative cash flow obviously increases with the size of the issue (PC_{NEW}). It also increases with a decreasing full information preferred dividend rate, i.e. banks with a lower downside potential incur higher adverse selection costs. The discount on the other hand increases with the amount of participation certificates previously issued to the state. The other factors, i.e. the preferred dividend rate set by the state, the dividend rate set on the market, and the probability that sufficient profits are made to cover all preferred dividends are the same for all banks and therefore do not influence the set of banks who do issue and invest. Thus, the provision that allows adjusting preferred dividend rates is more likely to change the issue decision for banks that a) have a high downside potential (but not the highest, as they would issue anyway) and b) already hold relatively high amounts of participation capital issued by the state. All in all, it can be expected that the provision will avoid *some* underinvestment, thus increasing the ex-ante firm value of banks.

5 Conclusion

The financial crisis had negative effects on the equity ratio of Austrian banks, which forced them take participation capital from the state under the terms of the Austrian stabilization scheme for the financial markets. The terms of this stabilization scheme granted a discount on the preferred dividend rate on participation certificates if the banks subsequently raised additional participation capital from private parties. However, as Myers and Majluf showed, issuing equity (and similar securities) yields an adverse selection cost that might be higher than the return on the investment that is supposed to be financed with the proceeds of the issue: the project is passed up and the ex-ante firm value is reduced due to asymmetric information. A simple numerical example demonstrated how the discount on capital provided by the state might diminish this underinvestment problem. Thus, not only the worst banks with investment projects can be expected to invest; also better ones might do so, as the adjusted dividend rate allows them to raise capital profitably. More investment projects will be undertaken, which increases the ex-ante value of banks.

6 Zusammenfassung auf Deutsch

Seit 2007 dauert eine schwerwiegende Finanzkrise an; deshalb hat die österreichische Bundesregierung im Oktober 2008 ein Maßnahmenpaket beschlossen, welches die Stabilität des österreichischen Finanzmarktes gewährleisten soll. Eines der hierfür erdachten Instrumente ist die direkte Zuführung staatlicher Gelder an Banken, um deren Eigenkapitalquote zu erhöhen und Liquiditätsengpässe zu verhindern. Diese Eigenmittel werden in Form von Partizipationskapital zugeführt, welches durch eine Vorzugsdividende abgegolten wird. Diese Vorzugsdividende wurde von der Europäischen Kommission mit mindestens 9,3% p.a. festgelegt, da eine niedrigere Dividende den Wettbewerb beeinträchtigen würde. Allerdings bietet eine der Bestimmungen die Möglichkeit die Dividende zu verringern, wenn dreißig Prozent der neu aufgenommenen Mittel zu gleichen Konditionen vom Markt bereitgestellt werden – in diesem Fall wird die Marktrate auch für die Abgeltung staatlichen Kapitals herangezogen.

Wie Myers und Majluf (1984) erklären, ist der Verkauf von Anteilsscheinen (und ähnlichen Finanzinstrumenten, wie z.B. Partizipationsscheinen) für manche Unternehmen jedoch sehr kostspielig, da asymmetrische Informationsverteilung adverse Selektionskosten verursacht. Diese Kosten können so hoch sein, dass Unternehmen sogar auf neue Eigenmittel verzichten, obwohl sie dadurch auch auf profitable Investitionen verzichten müssen. Da Banken allerdings günstigeres Staatskapital bekommen, wenn sie Partizipationsscheine an private Veräußern, kann es passieren, dass dieser Rabatt die adversen Selektionskosten aufwiegt.

Ziel dieser Arbeit ist es, das Zusammenspiel dieser beiden Faktoren zu analysieren. Im ersten Teil wird Myers und Majlufs „Pecking Order Theory“ der Kapitalstruktur erörtert, welche sich mit Anteilsschein-Verkäufen im Zusammenhang mit asymmetrischer Informationsverteilung befasst. Empirische Arbeiten sowie Erweiterungen des ursprünglichen Modells werden ebenfalls vorgestellt. Der zweite Teil befasst sich mit der

Entstehung des Bankenhilfspakets und seinen Bestimmungen. Der dritte Teil bietet ein Zahlenbeispiel, das die Auswirkungen relevanter Bestimmungen des Hilfspakets in Hinblick auf adverse Selektionskosten illustriert.

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