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COSTS AND BENEFITS OF FINANCIAL REGULATION – AN EMPIRICAL ASSESSMENT FOR INSURANCE COMPANIES

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Abstract: We empirically analyze the costs and benefits of financial regulation based on a survey of 76 insurers from Austria, Germany and Switzerland. Our analysis includes both established and new empirical measures for regulatory costs and benefits. This is the first paper that takes costs and benefits combined into account using a latent class regression with covariates. Another feature of this paper is that it analyzes regulatory costs and benefits not only on an industry level, but also at the company level. This allows us to empirically test fundamental principles of financial regulation such as proportionality: the intensity of regulation should reflect the firm-specific amount and complexity of the risk taken. Our empirical findings do not support the proportionality principle; for example, regulatory costs cannot be explained by differences in business complexity. One potential policy implication is that the proportionality principle needs to be more carefully applied to financial regulation.

Keywords: Insurance, Regulation, Cost-Benefit Analysis, Proportionality Principle

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1 Introduction

In light of the growing amount and complexity of regulation in the financial sector (e.g., additional rules for systemically important financial institutions, Basel III, Solvency II), the costs and benefits of financial regulation is a highly relevant and timely topic. One major trend in this context is the shift from simple rules-based solvency measures towards more complex risk-based capital measures, involving the use of internal risk models and the new philosophy of principal-based regulation.[1] One fundamental principal of new insurance regulation is proportionality, meaning that regulatory requirements and their enforcement should take into account the nature, scale and complexity of an insurer's risk.

Although the increasing amount and complexity of regulation is often cited as most important threat to the insurance sector (e.g., I.VW, 2010; PwC, 2011, 2013; and Black Rock, 2013), there is almost no literature on the costs and benefits of insurance regulation. This is most likely due to the considerable difficulty of measuring the costs and benefits.[2] A few researchers have attempted to assess regulatory costs and benefits for the entire financial services sector, especially using survey methods.[3] Other researchers have assessed the costs and benefits of regulation using micro-economic equilibrium models and derive welfare implications from new insurance regulation.[4]

We add to this strand of literature by empirically assessing the effectiveness of regulation on the insurance industry employing a sample of 76 insurers from Austria, Germany and Switzerland. Previous studies only estimate costs and benefits for the whole finance or insurance

[1] An example in Europe is the principal-based Swiss Solvency Test (SST), introduced in 2006 and mandatory since 2011. Another example is Solvency II, which will be implemented by 2016 (Financial Times, 2013) for all countries in the European Union. In the US the solvency modernization initiative is an ongoing reform discussion with respect to the risk-based capital standards (e.g., Klein, 2012).

[2] See Posner and Weyl (2013) who conceptually outline requirements for the measurement of benefits and costs in financial regulation.

[3] For example, Franks, Schaefer and Staunton (1997) empirically analyze the direct and indirect costs of financial regulation in the UK and compare the direct costs with those from the US and France. For insurance, Ernst & Young (2011) have conducted a cost-benefit analysis (CBA) of Solvency II in the UK by evaluating the impact of Solvency II on the required capital of insurance companies; they also estimate the implementing and compliance costs of Solvency II as well as the impact of the new regulatory regime on the financial markets in the UK.

[4] See, for example, Hoy (2006) about the impact of restricting the factors for risk classification, Dong, Gründl and Schlütter (2013) regarding the effects of guarantee funds and Sass and Seifried (2014) regarding the consequences of unisex tariffs. In addition, Lorson, Schmeiser and Wagner (2012) evaluate the policyholders' willingness to pay for stricter regulation and compare it with the costs of Solvency II estimated by previous studies.

industry. We go one step further and analyze these questions at the level of the individual company. In addition, this is the first paper to analyze both costs and benefits. For this purpose, we first regress company characteristics on costs and benefits of regulation individually. Second, we take costs and benefits combined into account by using a latent class regression model with covariates. In a first step, different latent classes are generated and the likelihood of the insurers belonging to a certain class is estimated. Therefore, different insurer profiles regarding costs and benefits are made explicit. In a second step, the ways in which insurer characteristics influence latent class affiliation and their cost-benefit profiles are estimated. Our results thus draw a more differentiated picture than previous research has, and identify the characteristics that can determine if an insurer is more positively or negatively affected by regulation than its peers are.

Our results show that differences in business complexity cannot explain the costs of regulation. In addition, small insurers who compare regulatory costs relative to premium income have higher costs than large insurers. The principal of proportionality thus does not work well. A second important result is that stock insurers exhibit lower regulatory costs than mutuals. Consequently, mutuals are not only at a disadvantage in relation to stocks due to their limited access to the capital markets (Harrington and Niehaus, 2002; Viswanathan and Cummins, 2003), but also because of regulatory requirements (Zanjani, 2007). Finally, the latent class regression identifies two groups of companies with distinct perception of costs and benefits of regulation: The “balanced” insurers vs. the “pessimistic” ones. In general, Swiss insurers tend to belong to the “balanced” class and Austrian as well as German insurers to the “pessimistic” class.

The rest of the paper is structured as follows. Section 2 discusses the literature on costs and benefits of financial regulation and how they are measured. Our understanding of the terms ‘costs’ and ‘benefits’ of regulation for insurance companies is also discussed. The hypotheses tested in this paper and the variables we use to measure ‘costs’ and ‘benefits’ are explained in Section 3. The data and methods used in this paper are discussed in Section 4. Section 5 presents the empirical results and is divided into three parts considering the costs, the benefits and their combination. Section 6 concludes and discusses potential policy implications.

2 Costs and Benefits of Financial Regulation

In principle, the costs and benefits of regulation can be classified along two dimensions: a) if costs and benefits are *direct* or *indirect* and b) if costs and benefits are due to *implementation of new regulation* or due to *compliance with existing regulation*. Both distinctions are far from trivial, since they result in manifold allocation problems.

Franks, Schaefer and Staunton (1997) define *direct costs* as all costs necessary to develop, enact and supervise regulation. *Indirect costs* are all costs market participants and third parties have to bear (including opportunity costs).[5] Another understanding is presented in a report commissioned by the Financial Services Authority (FSA): *direct costs* are those that can clearly be attributed to a particular business activity (Deloitte 2006, p. 64). All other costs are understood to be *indirect*.[6] For example, the labor costs of employees responsible for documentation requirements of a certain business line would be direct costs. In contrast, increased property expenditures which cannot be clearly assigned to a business line would be indirect costs.

Elliehausen (1998, p. 3) defines *implementation costs* as one-time costs of making changes to conform to the requirements of a regulation. The definition includes a broad range of set-up costs from legal and advisory expenses for interpreting and communicating the new regulation to expenses for new IT systems. *Compliance costs* are defined as "… the recurring costs of performing activities required by a regulation." For example, expenses for preparing reports for the regulator and opportunity costs fall into this category.[7]

Most of the literature has classified the costs of regulation, but has not discussed its potential benefits. In this paper we measure both the costs and the benefits of regulation. Table 1 presents an overview of potential costs and benefits of financial regulation. Given manifold allocation problems, it is not possible to develop an unambiguous and complete model with measurable

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5 The Financial Services Authority (FSA) (2000, p. 15) initially and Zwahlen (2010, p. 29) follow this understanding.

6 While the dividing rule in Franks, Schaefer and Staunton (1997) is government vs. market participants/third parties, the dividing rule in Deloitte (2006) is assignable to business activities vs. non-assignable.

7 Deloitte (2006, p. 8) applies a similar classification and differentiates between one-off and ongoing costs in determining the costs of regulation for UK financial services companies. However, they report that for many companies a clear distinction between one-off and ongoing costs is difficult. A study by the CEA (2007, p. 4) focuses only on the administrative costs due to Solvency II and differentiates initial and ongoing administrative costs as well. For a further example, see Lorson, Schmeiser and Wagner (2012, p. 146).

items only.[8] Table 1 should thus not be understood as a closed model, but as an open list of regulatory impacts documented in theoretical and empirical literature (in Table 2 we present these results). Empirical research will always be able to model only parts of the regulatory costs and benefits and will need proxies to measure the impact of regulation.

Costs			**Benefits**
▪ Government costs: - Costs of the supervisor - Costs of the legislative procedure ▪ Company costs: - Administrative costs - External services costs, for example, fees for supervisors, consulting companies and auditing companies	▪ Company costs: - Opportunity costs, for example, due to the ban of certain business activities - Costs due to a change in the market, for example, decrease of demand - Capital requirements - Capital structure and risk-taking	▪ Wider economy impacts: - Impact on competition and market environment - Impact on innovation - Impact on investments - Impact on insurability of certain risks ▪ Non-economic impacts - For example impact of dental insurance on oral health in the society [9] - For example impact on environment[10]	▪ Microprudential benefits - Policyholder protection (reduced default probability of insurers; reduction of abusive market practices) - Reduction of asymmetrical information and more transparency (for the public and the supervisor) ▪ Macroprudential benefits - Ensuring financial stability - Reduction of mislead incentives - Achieving social-political goals (e.g. avoidance of poverty in old age)

Table 1: Costs and benefits of insurance regulation

It is not only the allocation problem (e.g. direct vs. indirect) which complicates the analysis of the cost and benefits of regulation.[11] Any assessment of costs and benefits has to consider two states with their consequences – the state in which the regulation is in place and the state in which it is not. Within each jurisdiction the two states can empirically be analyzed only consecutively, not simultaneously (Lorson, Schmeiser and Wagner, 2012). A simultaneous analysis is only

[8] In order to mitigate the allocation problem, we additionally perform robustness tests without differentiating between direct and indirect costs. Results can be provided upon request.

[9] Bailit et al. (1985) show in a study for the US that extended dental insurance coverage improves oral health in a society especially for people under 35 and people with poor oral health. However, Brennan, Anikeeva and Teusner (2013) find mixed results in a study for Australia. Dental insurance is related to the likelihood of visiting a dentist, but not directly to oral health. For Germany and Switzerland, Staehle and Kerschbaum (2004) show that in contrast to common perception, the extent of insurance coverage cannot explain oral health.

[10] For example, Walters et al. (2012) analyze the impact of crop insurance in the United States on the environment. They find that insurance coverage influences production decisions, but the general impact on the environment seems to be small. However, insurance contract characteristics can explain adverse and beneficial effects on the environment. For instance, high coverage insurance leads to less adverse effects than low coverage contracts.

[11] See, for example, Franks, Schaefer and Staunton (1997) and Deloitte (2006) who point out that for companies it is difficult to consider a situation in which a certain regulatory requirement is absent for all market participants. Normally, companies do not take into account that the abolition of regulation also affects their competitors.

possible by comparing jurisdictions, but this requires controlling for country differences (as we do in this paper). Moreover, unbiased data generation and analysis might be difficult since parties affected by regulation might have a strong interest in a certain outcome and lobby for a certain result of the cost-benefit analysis (CBA). For example, the regulated companies have an incentive to increase the reported compliance costs by allocating elements that would also exist without regulation (e.g., IT systems for financial reporting). Cochrane (2014) discusses this argument in detail and points out the danger of regulatory capture, that is, analyses are guided by the interests of lobbying groups and not by the public interest, if CBA becoming mandatory. Becker (2000) likewise acknowledges the problem, but argues that it is minor since the most adversely affected groups invest most in lobbying and therefore the CBA is still useful. In this paper, regulatory capture is not an issue, since up-to-date CBA are not mandatory in Austria, Germany or Switzerland.

Table 2 gives an overview of studies about costs and benefits of regulation in the insurance industry and reports the key results. All studies are conducted by academics, practitioners (e.g., consultancies or auditing companies), and regulators. PwC (2010) and Practitioner Panel (2013) are practitioner studies. Deloitte (2006), CEA (2007) and Ernst & Young (2011) are collaborations of practitioners and regulators. All of the other 25 studies are conducted by academics. This classification does not necessarily reveal information about the quality of the studies, but is nevertheless helpful to understand the context of the papers. We classify these studies methodologically as case studies, surveys and quantitative studies (our approach is loosely based on Elliehausen, 1998):

- Case studies are mainly based on qualitative reasoning and descriptive statistics
- Surveys include all studies based on data generated by questionnaires
- Quantitative studies include:
    - Papers using econometrical methods to explain costs and benefits
    - Conceptual papers estimating costs and benefits employing theoretical models
    - Papers using efficient-frontier estimation
    - Papers based on event studies

Study	Party evaluated (Who?)	Methodology (How?)	Proxy for costs and benefits (What?)	Key Results
Joskow (1973)	Property-liability insurers	Quantitative Study (Econometrical methods)	Availability of insurance cover	Analysis of the US insurance industry regarding its structure, pricing behavior, performance and consequences for regulation: • The property-liability insurance sector represents a competitive market and deregulation is desirable. Rate regulation is not necessary, direct writing restrictions should be reduced and the insurance regulator should focus on consumer information and protection. Insurers, however, should be required to have insurance against bankruptcy. • Rate regulation and inefficient sales channels lead to unavailability of insurance for individuals representing bad risks and high prices
Lee, Mayers and Smith (1997)[13]	Property-liability insurers	Quantitative Study (Event Study based on introduction of guarantee funds)	Changes in portfolio composition	Evaluation of the impact of state guaranty funds on the risk-taking of property-liability insurers in the US: • Share of equities in the asset portfolio increases after the introduction of a guarantee fund, if the insurer is a stock company • Therefore the risk-subsidy hypothesis (guaranty funds lead to increased risk-taking) is supported for stock companies
Franks, Schaefer and Staunton (1998)	Regulators	Survey and official reporting	Regulatory budget	Evaluation of the costs of the financial regulator (including regulation for life insurance companies) in the US, UK and France: • Regulatory costs per employee in the life insurance sector for 1991 - 1993 • UK: £56; US: £183; France: £41
Grace and Klein (1999)	Property-liability insurers	Quantitative Study (Econometrical methods)	• Share of business written in an restrictive environment • Number of states in which business is conducted • Expense ratios	Evaluation of the compliance costs of US property-liability insurers: • Economies of scale can be observed: size has a negative impact on compliance costs relative to premium income • The claims-cost-expense ratio can explain the share of business written in an restrictive regulatory environment • Salary expenses can explain number of states in which the insurer at hand is active • The licensing costs for insurers alone result in roughly $4.5 bn compliance costs for the US property-liability insurance industry (costs per license ≈ $100,000; number of multi-state insurers ≈ 3,000; average number of states a multi-state insurer is doing business in ≈ 15)
Downs and Sommer (1999)	Property-liability insurers	Quantitative Study (Econometrical methods)	Risk-taking approximated by stock market based risk measures	Analysis of the impact of US guaranty funds on insurance company's risk-taking: • Insider ownership can explain increased risk-taking which is consistent with the risk-subsidy hypothesis (guaranty funds lead to increased risk-taking). The theoretical background is that a guaranty fund represents a put option for the shareholder, but risk-taking should only increase if the management is invested in the company as well since human capital cannot be diversified and therefore according to the principal-agent theory management should have no interest in increased risk-taking. • Relationship between insider ownership and risk-taking decreases for very high levels of insider ownership and therefore the monitoring hypothesis (introduction of guaranty funds increases monitoring of risk-taking due to the fact that solvent insurance companies have to pay ex post for insolvent insurers) cannot be totally rejected
Rees and Kessner (1999)	Life insurers	Quantitative Study (Efficient-Frontier Estimation)	Distance to the efficient frontier estimated by: • Administration costs/stock of insurance sum • Acquisition costs/new premiums	Comparison of the German and UK insurance market (1992-1994) using efficient frontier estimation method (the smaller the variation of efficiency ratios within the market the better the regulation): • In the UK a higher proportion of insurance companies is close to the most efficient insurer than in Germany • Deregulation in Germany led to a higher proportion of companies close to the most efficient insurer
Klein, Phillips and	Automobile and workers'	Quantitative Study	Capital structure (leverage ratio)	Evaluation of rate regulation's impact on the capital structure of insurance companies • A cross sectional analysis of 1349 insurance companies offering automobile and workers' compensation insurance reveals that rate regulation

[13] Studies in addition to the ones mentioned in Table 2, which evaluate the impact of insurance guarantee funds are Brewer, Mondschean and Strahan (1997), Lee and Smith (1999) as well as Schmeiser and Wagner (2013).

Shiu (2002)[14]	compensation insurers	(Econometrical methods)		leads to higher leverage • More stringent regulation leads to higher leveraged insurers in comparison to non-regulated peers, since high leverage increases bankruptcy risk and incentivizes regulators in allowing higher rates
Bhattacharya, Goldman and Sood (2004)	Life insurance policyholders	Quantitative Study (Econometrical methods/theoretical modelling)	Welfare (Utility function of policyholders wealth)	Estimation of welfare implications due to price regulation in the secondary life insurance markets (minimum prices for selling a life insurance policy to a third party): • Price regulation as currently discussed would apply to HIV patients with a life expectancy greater than four years • Deals worth $119 million will be blocked due to price regulation each year • Welfare losses (additional wealth needed so that the utility is the same in the case with and without price regulation) is most severe for people who are poor, have a low bequest motive, have a high time value of money and a low mortality risk
Deloitte (2006)	Financial Services Industry	Survey	Compliance costs (excluding costs for implementing new regulation)	Identification of regulatory requirements which create the highest compliance costs for investment banking & corporate finance, institutional fund management and investment & pension advice companies in the UK: • Companies do not monitor compliance costs • Compliance costs for investment banking & corporate finance companies are relatively low and for investment & pension advice companies relatively high • Compliance costs for investment & pension advice companies do not vary according to size but to the customer base (institutional vs. retail)
Hoy (2006)	Policyholders	Quantitative Study (Theoretical modelling)	Welfare (Utility function of policyholders wealth)	Effect estimation of prohibiting risk classification variables via several models of insurance markets: • On the one hand limiting risk classification variables induces costs, but on the other hand it may mitigate the risk of misinterpreting the risk type of an individual • If the share of high-risk individuals exceeds a critical level then limiting risk classification variables reduces social welfare; if the share of high-risk individuals is smaller than this level limiting risk classification variables increases social welfare
CEA (2007)	Life and non-life insurers, reinsurers	Survey	Compliance and implementation costs for new regulation	Estimation of future administrative costs for insures due to Solvency II: • 4.0 – 6.0 bn € of administrative costs for implementing the new framework • 0.6 – 1.0 bn € per year of administrative costs for compliance with Solvency II
Eling, Gatzert and Schmeiser (2008)	Life and non-life insurers	Case Study (Qualitative reasoning)	Negative and positive consequences of the Swiss Solvency Test	Discussion of Swiss Solvency Test's impact on the Swiss economy: • Asset management: increased demand for long-term bonds • Underwriting: increase in demand for reinsurance; decrease of capital intensive insurance products
Braunwarth et al. (2009)	Financial Services Industry	Case Study (Qualitative reasoning/descriptive statistics)	• Goal realization of individual branches • Profit	Identification of business opportunities with regard to the insurance mediation directive (IMD): • The case of a major German financial services company shows that IMD can lead to increased customer data quality which in turn can result in increased marketing effectiveness and goal realization of individual branches • The insurance mediation directive (IMD) is a directive by the European Union and regulates insurance intermediaries. Its goal is to increase customer protection. For more details, see European Commission (2014)
Holzmüller (2009)	Wider economy	Case Study (Qualitative reasoning)	Disadvantages and advantages of capital requirement regulations	Comparison of US RBC Standards, European Solvency II and Swiss Solvency Test (SST) based on a framework by Cummins, Harrington and Niehaus (1994): • Solvency II and SST fulfill the criteria stated by Cummins, Harrington and Niehaus (1994); Holzmüller (2009); US RBC Standards do not • It is concluded that Solvency II and SST are superior to the US RBC Standards; between Solvency II and SST such a distinction is not possible
PwC (2010)	Life and non-life insurers	Survey	Costs for introducing new regulation	Survey about the introduction of Solvency II in Europe: • 40% of the insurers have a budget less than 1 million € for the implementation of Solvency II and 9% more than 20 million € • IT infrastructure and human resource expenses are anticipated as the main cost drivers
Europe Economics (2010)	Life insurers, intermediaries, banks	Survey	• Compliance and implementation costs for new regulation	Evaluation of costs and benefits of Markets in Financial Instruments Directive (MiFID) regulation regarding life insurance packaged retail investment products (life insurance contracts including a savings component with an exposure to financial markets) in the European Union: • Implementation costs for insurers: 0.14% of operating costs; industry total: 175 – 250 million €; economies of scale present • Compliance costs for insurers: 0.04% of operating costs; industry total: 50 – 80 million €; economies of scale present • Impact on customer demand: increased investor confidence (positive), increased paperwork and too much information (negative)
Weiss, Tennyson	Automobile insurers	Quantitative Study	• Loss costs • Claims frequency	Impact analysis of rate regulation in the automobile insurance market in the US: • Loss costs and claims frequency are slightly higher in states where rate regulation is in force

[14] Studies, in addition to the ones mentioned in Table 2, which evaluate the impact of rate regulation for automobile insurance are Grace, Klein and Phillips (2002), Tennyson, Weiss and Regan (2002), Regan, Weiss and Tennyson (2008) as well as Li et al. (2012). For rate regulation in insurance, see also Skinner, Childers and Jones (1981).

and Regan (2010)		(Econometrical methods)		• States with very stringent regulation have much higher loss costs and claims frequency than states with less stringent regulation • The hypothesis that limiting insurance prices for certain risk classification variables leads to cross subsidies from low-risk individuals to high-risk individuals and therefore to adverse selection is supported
Ernst & Young (2011)	Life and non-life insurers, reinsurers, wider economy	Case Study/Survey	• Compliance and implementation costs for new regulation • Impact on capital • Consequences of Solvency II	Cost-benefit analysis (CBA) of Solvency II in the UK: • Capital impact: reduction of £34 bn in free surpluses (reduction in free surplus of 37% of total surplus) in the insurance industry for moving from Solvency I to Solvency II • Implementation costs: £1.8 bn; compliance costs: unclear • Wider economy impact: increase of premiums or decrease of insurance cover, higher ratings, increased M&A activity, more transparency and a saver insurance sector
Derrig and Tennyson (2011)	Automobile insurers	Quantitative Study (Econometrical methods)	• Loss costs and change in loss costs	Impact analysis of rate regulation in the Massachusetts automobile insurance market: • Loss costs in Massachusetts where rate regulation is existent are 29% higher than in states where there is no rate regulation • The hypothesis is supported that limiting insurance prices for certain risk classification variables leads to cross subsidies from low-risk individuals to high-risk individuals and therefore to adverse selection
Lorson, Schmeiser and Wagner (2012)	Life and non-life insurers, policyholders	Quantitative Study (Econometrical methods and theoretical modelling)/Survey	• Compliance and implementation costs for new regulation • Additional willingness to pay of policyholders	Evaluation if policyholders are willing to pay higher premiums for the increased safety level of Solvency II: • Empirical model: 0.77% - 7.85% higher premiums are acceptable • Option-pricing model: 0.03% higher premiums are acceptable • Utility-based model: 0.16% higher premiums are acceptable
Pasiouras and Gaganis (2013)	Life and non-life insurers, reinsurers	Quantitative Study (Econometrical methods)	Distance to default (z-score)	Cross-country study on the relation of an insurer insolvency probability (measured by the z-score) and regulatory policies (measured by an index based on the IAIS database): • Powerful regulators reduce the probability of insolvency • Technical provisions regulation reduces the probability of insolvency • Investment regulation reduces the probability of insolvency
Dong, Gründl and Schlütter (2013)	Life and non-life insurers, reinsurers policyholders	Quantitative Study (Theoretical modelling)	Welfare (Utility function of policyholders and shareholders wealth)	Evaluation of the welfare effect of insurance guarantee funds financed by flat fees or risk-based fees: • Guarantee funds financed by flat fees paid by insurance companies regardless of their risk exposure lead to increased risk-taking which reduces policyholders' welfare • Guarantee funds financed by risk-based fees paid by insurance companies only prevent increased risk-taking and maximize total welfare if the fees are high
Practitioner Panel (2013)	Financial Services Industry	Survey	• Perceived effectiveness of regulation • Perception of regulator	Biennial survey of companies regulated by the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA) on the industry's view of the regulator in the UK: • Satisfaction with the regulator recovered after it decreased in 2010 due to increased regulation in the aftermath of the financial crisis • 37% consider the regulator as ineffective, 24% as effective • The main consequences of regulation are: higher costs (reported by 74% of the participants), lower profit margins (38%) and creation of disadvantages towards foreign competitors (32%) • Industry recommends that regulation's intensity should be proportional to risk
Sass and Seifried (2014)	Life and non-life insurers, reinsurers and policyholders	Quantitative Study (Theoretical modelling)	• Premium levels • Welfare (Utility function of policyholders and insurers wealth)	Estimation of the effect of unisex tariffs in life insurance on social welfare. For the analysis an insurance market model is developed which is an extension of the one by Rothschild and Stiglitz (1976): • Unisex tariffs lead to small insurance premium reductions for high-risk individuals and substantial premium increases for low-risk individuals • In competitive markets unisex tariffs reduce welfare; in monopolistic markets unisex tariffs can increase welfare, but regulation to enhance competitive markets would increase welfare even more

Table 2: Studies about costs and benefits of regulation in the insurance industry

All studies mentioned in Table 2 focus on the impact of regulation on certain market participants or the wider economy, but they do not analyze if and in which way the impact of regulation differs on the basis of individual company characteristics. Nevertheless, such research is worthwhile, since regulation takes into account different firm characteristics. For example, depending on the sub-sector a financial company has to face different levels of stringency in regulation as shown by Franks, Schaefer and Staunton (1997). In addition, Cummins, Harrington and Niehaus (1994), Skipper and Klein (2000) and Holzmüller (2009) emphasize that capital requirements should be set according to the risk profile of an insurer and support in this way the proportionality principle. Therefore, if regulation requirements differ in stringency and scope according to certain company characteristics, we argue, the costs and benefits of regulation should also vary according to these characteristics.

3 Hypotheses

Table 3 gives an overview of the hypotheses we test in this paper. Hypothesis H1 (with three sub hypotheses) is set up to test the proportionality principle and hypothesis H2 tests for differences in organizational form. While the discussion of the proportionality principle focuses on the cost of regulation, we also include the benefits of regulation in the discussion of the organizational form as well as in the additional tests we present in the empirical part.

Hypothesis			**Description**
H1:	Proportionality	*a) Diversified vs. specialist*	The costs of regulation for a composite insurer are higher than for an insurer active in life or non-life only.
		b) International vs. national	The costs of regulation for an international active insurer are higher than for an insurer active only in one country.
		c) Primary vs. reinsurance	The costs of regulation are higher for primary insurers than for reinsurers.
H2:	Organizational form	*Stocks vs. mutuals*	Costs and benefits of regulation for insurance companies differ among organizational forms.

Table 3: Hypotheses

Globally, the proportionality principle is incorporated in the Insurance Core Principles by the International Association of Insurance Supervisors (IAIS) (Insurance Core Principal (ICP) 2.5 in IAIS, 2013a). In the US it can be found in the Risk Management And Own Risk And Solvency Assessment Model Act by the National Association of Insurance Commissioners (NAIC) and in Europe in the upcoming Solvency II framework.[15] The principle is commonly understood as guidance for regulation to take into account the *nature*, *scale* and *complexity* of an insurer's risk.[16] In Switzerland, regulation should also follow the proportionality principle; it is just codified slightly differently. An insurer's risk is not specified and an emphasis is put on sensitive regulation pertaining to business activity. The Financial Market Supervision Act states that the regulator "…exercises its regulatory powers only to the extent required by its supervisory objectives. In doing so, it takes account in particular of: […] the various business activities and risks incurred by the supervised persons and entities ..." (Article 7 (2c) in the Federal Assembly of the Swiss Confederation, 2007).

While proportionality of risk is a fundamental principle that has already been implemented in Switzerland, this principle is also incorporated in the current regulation of insurance companies in Austria and Germany. For example, in Germany the mission statement of the Federal Financial Supervisory Authority (BaFin, 2012) requires risk-oriented regulation and in Austria the Financial Sector Assessment Program report of the IMF (2014, Article 23 and 24) confirms that regulation is already risk-oriented. Nevertheless, Solvency II is expected to trigger the proportionality of regulation regarding risk, and Swiss regulation might be one step ahead of European regulation in complying with the principle. Therefore, in our analyses we control for the fact that the proportionality principle might be more observable for Swiss insurers by considering interaction effects. The results do not offer additional insights and are available upon request.

Academic papers also mention that regulation needs to take the individual risk profile of an insurer into account. For example, Cummins, Harrington and Niehaus (1994) and Holzmüller

[15] See for the US Section 2 (A) of NAIC (2012) and for Europe Article 29 (3) of the European Parliament and European Council (2009).

[16] In this paper we focus on the proportionality principle in the context of insurance. A more general discussion of the proportionality principle from a juridical perspective is given by Harbo (2010). The European Court of Justice, for example, applies the principle by testing if a certain legislative or administrative action is (a) suitable to achieve the stated goals, (b) is necessary to achieve the goals and (c) the measure is appropriate, that is, the burden for affected parties is reasonable in a given context.

(2009) recommend the implementation of firm-specific risk-based capital requirements in order to incentivize insurers to reduce their insolvency risk. Risk-based capital requirements help regulators to identify financially weak companies and to take regulatory action before a bankruptcy occurs.

Our first step is to test the proportionality principle by comparing the costs of regulation for diversified and specialist insurers (**diversified vs. specialists**). According to Hypothesis 1a the regulatory costs for a composite insurer should be higher than for an insurer active in life or non-life only. According to the proportionality principle, there should be different regulatory requirements for life and non-life, because of differences in the nature and complexity of risk in these branches. For example, longevity is a major risk in life insurance, but not so much in non-life insurance. Consequently, composite insurers should have to comply with more regulations and therefore have to incur higher costs than insurers focusing only on life or non-life. If this hypothesis is supported, this would indicate that the scope of regulation indeed varies according to the nature and complexity of risk.

The second step is to test the proportionality principle by comparing the regulatory costs of **international vs. national** insurers. Hypothesis 1b states that costs of regulation for an insurance company are higher if the insurer is active in several countries. The reasoning behind this hypothesis is twofold. First, global activities incorporate more kinds of risks than only local ones and therefore according to the proportionality principle the regulatory requirements for international insurers should be higher.[17] An example is the current development of the Common Framework for the Supervision of Internationally Active Insurance Groups (ComFrame) by the IAIS (2013b). This regulation is exclusively relevant for internationally active insurers, not for ones only with a national scope. Second, international insurers have to comply with different regulatory frameworks and therefore have to endure higher costs than national insurers which have only to comply with one framework.

The third and final step is to test the proportionality principle by comparing **primary vs. reinsurance** companies. Hypothesis 1c states that the costs of regulation are higher for primary

[17] One could argue that diversification effects reduce the overall risk, but the nature and complexity of the risks should be higher. Furthermore, economies of scale should be realizable by implementing regulations from several jurisdictions.

insurers than for reinsurers since many regulatory requirements are applicable for primary insurers, but not for reinsurers.[18] The assumed reason for this pattern is that the policyholder in personal lines of insurance needs more protection by regulation than in commercial lines, since individuals are considered to have fewer capabilities and less resources to implement effective monitoring than companies. For example, Epermanis and Harrington (2006) show for the US that premium growth in commercial lines very much depend on the financial strength of the insurance company, but not so much in personal lines. Therefore, the market discipline in commercial lines can indeed be regarded as higher than in personal lines. Following this line of reasoning, in reinsurance there should be less need for regulation, since both counterparties are companies.[19] Consequently, also the costs of regulation should be less for reinsurers than for primary insurers.

With Hypothesis 2 we want to add a new empirical test to the discussion about the organizational forms of insurance companies: **stocks vs. mutuals**. Previous studies (e.g., Harrington and Niehaus, 2002; Viswanathan and Cummins, 2003) explained the decreasing number of mutuals in the insurance industry mainly by their limited access to capital markets and do not consider differences in regulation. Hypothesis 2 states that costs and benefits of regulation for insurance companies differ among organizational forms. Eling and Pankoke (2013a) compare the requirements for supervisory board members between Germany and Switzerland and illustrate that they vary according to the organizational form of a company. However, if stocks or mutuals are favored by regulation is not clear.

On the one hand, an argument for higher regulation costs of stock market companies is that listed companies are subject to much more transparency and disclosure requirements, which do not apply to mutual companies (see, e.g., internal control weakness reporting under the Sarbanes-Oxley Act as described by Su, Zhao and Zhou, 2014). This argument is in line with the

[18] An example is Article 2 (1a) of the directive on markets in financial instruments by the European Parliament and European Council (2004) which is only relevant for primary insurers and not for reinsurers. In addition, rate regulation in personal lines of property-liability insurance in the U.S. can be mentioned as described by Cummins (2001). In Switzerland, Article 35(1) of the insurance supervision act by the Federal Assembly of the Swiss Confederation (2013) shows that reinsurers are less regulated than primary insures. It specifies that several articles of the legislative act are relevant for primary insurers, but not for reinsurers. For example, generally a Swiss insurance portfolio can only be transferred to a third party if the regulator approves the transaction. An exception is the transaction of a pure reinsurance portfolio which needs not to be approved.

[19] This argument is in line with Skipper and Klein (2000, p. 493) who write: "Governments regulate insurance purchased by individuals more stringently than insurance purchased by businesses and other organizations because of the greater information problems for individuals. Reinsurance historically has been subject to minimal regulatory oversight because both buyers and sellers are usually well informed."

entrenchment hypothesis by He and Sommer (2011) which states that for mutuals there are fewer control mechanisms available than for stock companies. On the other hand, for the US, Zanjani (2007) shows that the historical decline of the number of life insurance mutuals in the 20th century was significantly influenced by regulation. He shows that the stringency of regulation itself has no impact on the choice of organizational form. Rather initial capital requirements define the popularity of mutuals as the preferred organizational form. If high levels of capital are required by regulation to found a life insurer it can be observed that a stock company is the preferred organizational form. This finding follows economic intuition since raising capital is easier for stocks than for mutuals.

In addition to the two main hypotheses regarding the proportionality principle and the organizational form, we control for the size of the insurer, its business focus and its country of origin. We control for **size** since certain regulations – as reporting requirements – have to be fulfilled by all insurers regardless of their size, so the relative burden for small insures should be higher than for large ones. Consequently, the relation between costs and benefits should be seen more positively by large insurers.[20] In addition, we control if the insurer is mainly active in **life** or **non-life** insurance. We expect that life and non-life insurers face different costs of regulation given that different regulations need to be followed. In addition, there are different levels of market discipline in life and non-life insurance as shown by Eling and Schmit (2012), which should also be considered by regulation. An example in which these differences are indeed considered are the guidance papers about technical provisions for life and non-life insurance (FINMA, 2008a, 2008b) in Switzerland. Lastly, we control if the insurer has its headquarters in **Switzerland** or **Austria/Germany**. The Swiss Solvency Test (SST) has already been introduced and implemented in the Swiss insurance industry, but its European counterpart, Solvency II, will not be in force before 2016. Therefore, Austrian and German companies are still busy with implementation efforts and therefore might have higher costs. As reported by CEA (2007), PwC (2010) and Ernst & Young (2011) (see Table 2) costs for the implementation of Solvency II can be quite substantial. Furthermore, according to international statistics there is in general more economic freedom for businesses in Switzerland and the regulatory framework is considered to

[20] A common misunderstanding is to relate size to the proportionality principle. However, the proportionality principle solely relates to the risk of an insurer and size is not necessarily an indicator of risk. See, for example, IAIS (2011, p. 9) and Kessler (2013, p. 9).

be of higher quality than in Austria and Germany.[21] We thus expect to see country differences between Switzerland vs. Austria/Germany, both in the evaluation of costs and benefits.

4 Data and Methodology

The empirical data used in this study was created from an industry study which was conducted on behalf of the Swiss Insurance Association. In order to estimate regulatory costs and benefits, a survey was sent to the CFOs of all insurance companies registered at the national regulator in Austria, Germany and Switzerland in October 2013. The survey was sent to 543 companies, of which 76 participated. This questionnaire is available upon request.[22]

In the market survey, regulation comprises all laws, directives and guidelines which must be met by insurers due to government requirements. Costs and benefits of regulation for insurers are defined as all consequences of regulation – either direct or indirect. Government costs and non-economic costs and benefits are not covered. Furthermore, implementation costs are distinguished from compliance costs. On the benefits side, the benefits for policyholder protection, for financial stability and the impact on the attractiveness of the business location are evaluated.

The questionnaire starts with general questions about the insurance company.[23] The major part consists of questions about the perceived costs and benefits of insurance regulation. In this context, *perceived* means that costs and benefits can be rated on a scale with five options: high, rather high, medium, rather low or low. We ask for the situation today, five years ago and the situation that is expected in five years. Based on this section we create ordinal variables about costs and benefits over time. Perceived costs and benefits are based on the subjective view of the

[21] For a comparison of the business environments in several countries see Heritage Foundation (2014). Our assessment is based on the Index of Economic Freedom for 2013. For a comparison of the quality of the regulatory frameworks in several countries, see World Bank (2013). Our evaluation is based on the information about regulatory quality used to generate the Worldwide Governance Indicator. The latest information is from 2012.

[22] The results thus represent the perspective of the industry, which might raise questions about data bias and industry influence. In order to avoid this potential data bias, different measures for costs of regulation are considered (actual and perceived costs). Moreover, the cross-country setting allows us to compare the evaluation among different countries. The industry was involved to gather the analyzed data, but not in preparation of this paper.

[23] The chosen categories regarding costs and benefits that have to be assessed by the survey participants are based on Skipper and Kwon (2007, p. 627). The general design of the questionnaire follows loosely the one by SECO (2012).

respondent; we also ask the respondents to report the actual costs, which might be seen as a second more objective measure. We thus ask for the actual number of full-time employees committed to existing regulation and the implementing of new requirements. Moreover, we asked the participants to report their actual external costs for compliance with existing regulation and for implementing new requirements. Based on this information, we generate an aggregate cost measure, where we combine the different cost measures.[24] An overview of the variables is shown in Table 4.

[24] In order to calculate the variables $Costs_{Aggregated}$, $Costs_{Implementation}$, and $Costs_{Compliance}$ we consider the external costs as reported in the survey and add the internal costs. Since the internal costs are measured in numbers of employees we calculate first the equivalent labor costs. The monthly labor costs are based on the number of employees (full-time equivalents) and calculated as follows. Per country we multiply the "mean nominal hourly labour cost per employee" with the "mean weekly hours actually worked per employee" as reported by the International Labour Organization (ILO) as of 2010 for Austria, Germany and Switzerland. In order to derive the monthly costs we multiply the resulting figure with 4.34. As the CHF/EUR conversion rate we use 1.38 which is the average in 2010 according to Datastream.

Variable	Type	Description
Dependent Variables		
Actual:		
$Costs_{Aggregated}$	Continuous	Natural logarithm of monthly total costs in €; includes external and internal costs as well as implementation and compliance costs.
$Costs_{Implementation}$	Continuous	Natural logarithm of monthly costs in € for implementing new regulation; includes external and internal costs.
$Costs_{Compliance}$	Continuous	Natural logarithm of monthly costs in € for compliance with existing regulation; includes external and internal costs.
Perceived:		
Costs Current/Past/Future	Ordinal	$Costs_{Current}$ indicates perceived current costs. $Costs_{Historical}$ indicates perceived cost developments within the last five years. $Costs_{Future}$ indicates expected cost developments within the next five years. Each variable is scaled from 1 to 5, whereas 1 means low costs and 5 high costs.
Benefits Public/Policyholders/ FinancialCenter	Ordinal	$Benefits_{Public}$ indicates perceived public benefits. $Benefits_{Policyholders}$ indicates perceived benefits for policyholders. $Benefits_{FinancialCenter}$ indicates the perceived benefits on the attractiveness of the business location. Each variable is scaled from 1 to 5, whereas 1 means low benefits and 5 high benefits.
Independent Variables		
Diversified	Dichotomous	One, if the insurer is active in the life and non-life segment, otherwise 0.
International	Dichotomous	One, if the insurer is active internationally, otherwise 0.
Primary	Dichotomous	Primary is 1, if the insurer is a primary insurer otherwise 0.
Size	Continuous	Size indicates the natural logarithm of yearly gross premium income in million €.
Life	Dichotomous	Life is 1, if the insurer is a life-insurance company, otherwise 0.
Stock	Dichotomous	Stock is 1, if the insurer is a stock company, otherwise 0.
Swiss	Dichotomous	Swiss is 1, if insurer is a Swiss company, otherwise 0.

Table 4: Variables used in the analysis

In addition to the variables shown in Table 4, we apply another variable in robustness tests. $Risk_{Proportionality}$ combines the Diversified, International and Primary into one ordinal variable. According to the proportionality hypothesis this should represent the risk exposure of the insurer's business activities. The weights of the composing variables are determined by a factor analysis.[25] In this way we control for the possibility that an overall proportionality effect might be present, but which is not strong enough to provide significant results for Diversified, International

[25] As a further robustness test we also calculated the variable $Risk_{Proportionality}$ with equal weights of the composing variables. The results do not reveal further insights.

and Primary individually. Descriptive statistics and general information about the participating insurers are presented in Table 5.

	No. of Survey Participants		No. of Survey Participants		No. of Survey Participants
Type of insurer		**Main region**		**Organizational form**	
Primary Insurer	63	National	49	Stock company	54
Reinsurer	13	International	25	Mutual company	15
				Insurance company under public law/branch	6
Country of origin		**Main segment**			
Austria	11	Life	4		
Germany	16	Non-life	50		
Switzerland	49	Life & non-life	22		

	Mean	Std. Deviation	Minimum	Maximum
Premium income (Mio. €)	1'594	3'835	0.33	18'904
Technical reserves (Mio. €)	6'625	19'454	0.33	112'195
Implementation costs (€ per month)[26]	94'671	180'060	325	813'008
Compliance costs (€ per month)	192'916	512'157	1'258	3'182'922
Aggregated costs (€ per month)	269'632	622'475	1'888	3'520'710
$\text{Costs}_{\text{Aggregated}}$	10.92	1.81	7.54	15.07
$\text{Costs}_{\text{Implementation}}$	9.88	1.90	5.78	13.61
$\text{Costs}_{\text{Compliance}}$	10.42	1.83	7.14	14.97
$\text{Costs}_{\text{Current}}$	3.83	0.97	1	5
$\text{Costs}_{\text{Past}}$	4.48	0.62	1	5
$\text{Costs}_{\text{Future}}$	4.39	0.68	3	5
$\text{Benefits}_{\text{Public}}$	3.44	0.89	1	5
$\text{Benefits}_{\text{Policyholders}}$	3.45	0.83	1	4
$\text{Benefits}_{\text{FinancialCenter}}$	2.92	1.04	1	5
Diversified	0.29	0.46	0	1
International	0.33	0.47	0	1
Primary	0.83	0.38	0	1
Size	5.01	2.48	-1.12	9.85
Life	0.05	0.23	0	1
Stock	0.71	0.46	0	1
Swiss	0.64	0.48	0	1

Table 5: Summary statistics

Regarding actual costs, we apply the following multivariate regression model:

$$Y^i = a + \beta_1 \text{Diversified}^i + \beta_2 \text{International}^i + \beta_3 \text{Primary}^i + \beta_4 \text{Size}^i + \beta_5 \text{Life}^i + \beta_6 \text{Stock}^i + \beta_7 \text{Swiss}^i + \varepsilon^i \quad (1)$$

Y is a vector of the dependent variables $\text{Costs}_{\text{Aggregated}}$, $\text{Costs}_{\text{Implementation}}$, and $\text{Costs}_{\text{Compliance}}$ as shown in Table 4. a is the regression constant which is the same for all insurance companies. β_1 to β_7

[26] It is tempting to estimate the total implementation costs for Austria and Germany in order to compare them with the estimates of CEA (2007) and Ernst & Young (2011) which try to estimate the implementation costs associated with Solvency II. We think that the insights are limited since the sample and the understandings of implementation costs differ. If we do so, nevertheless, total implementation costs per year for Austria are 31 million € and for Germany 76 million €. CEA (2007) estimates implementation costs between 4 and 6 billion € for the whole European Union during the whole project. Ernst & Young (2011) estimates 474 million € alone for the UK per year. However, they report as well that the UK Department of Treasury considered in 2008 implementation costs for the UK 97 million € for the whole project. We conclude that the figures by Ernst & Young (2011) might be overestimated and are more likely to represent an upper bound. Further information about our estimation can be received upon request.

are the regression coefficients; i indicates the company. We employ the Newey-West estimator since for some model specifications autocorrelated error terms cannot be rejected at the 5% confidence level.[27] In addition, we check for multicollinearity among the independent variables, but do not consider the issue further since the Variance Inflation Factors are in the 1.1-2.2 range.[28]

For the perceived costs and benefits we use the following ordered probit model:

$$\Phi^{-1}(w^{ij}) = T^j - (\beta_1 \text{Diversified}^i + \beta_2 \text{International}^i + \beta_3 \text{Primary}^i + \beta_4 \text{Size}^i + \beta_5 \text{Life}^i + \beta_6 \text{Stock}^i + \beta_7 \text{Swiss}^i) \quad (2)$$

w^{ij} is a vector and indicates the cumulative probabilities of the dependent variables $\text{Costs}_{\text{Current}}$, $\text{Costs}_{\text{Past}}$, $\text{Costs}_{\text{Future}}$, $\text{Benefits}_{\text{Public}}$, $\text{Benefits}_{\text{Policyholders}}$ and $\text{Benefits}_{\text{FinancialCenter}}$ as shown in Table 4. The company is indicated by i and the category by j. The category is determined by the value of the dependent variable and is indicated by an integer between 1 and 5. Φ^{-1} is the inverse of the cumulative distribution function and is used as the linking function.[29] T^j represents the threshold for category j. β_1 to β_7 are the regression coefficients. In the analysis the maximum likelihood method is used for the model estimation.

Finally, we take perceived costs and benefits combined into account and employ a latent class model with covariates. This methodology allows us to generate participant profiles regarding perceived costs and benefits. We estimate latent classes considering the variables $\text{Costs}_{\text{Current}}$, $\text{Costs}_{\text{Past}}$, $\text{Costs}_{\text{Future}}$, $\text{Benefits}_{\text{Public}}$, $\text{Benefits}_{\text{Policyholders}}$ and $\text{Benefits}_{\text{FinancialCenter}}$ and estimate the likelihood of a certain class composition. In a second step we then analyze the impact of different characteristics on the probability of an insurer to be assigned to a certain class.[30] In order to do

[27] We use least square regressions to estimate the model since other regression methods do not provide additional benefits. We do not use stepwise regressions since our model is based on theoretical reasoning and we only consider a few independent variables. Furthermore, we do not consider fixed effects since there are no intra-group differences. One could argue that the data is censored and a tobit regression might be useful. However, initial tests show that no estimated dependent variables are censored and therefore we do not further employed the methodology.

[28] Literature does not agree on the largest acceptable value of the variance inflation factor under the assumption that multicollinearity is not a concern. Kleinbaum et al. (2008, p. 310) suggest 10 as an upper limit and therefore we believe a maximum variance inflation factor of 2.2, as in our case, is commonly acceptable.

[29] As a further robustness test we also employed a logit function as linking function. The results do not provide any further insights and can be provided upon request.

[30] Since the latent class analysis is applicable only to categorical data we transform the size variable into a categorical variable form 1 to 3 according to the insurers' quantile in the sample. In addition, we transformed the other independent variables from a scale from 1 to 5 to a scale from 1 to 3. This is necessary since otherwise the number of potential latent classes would be limited to two considering our data. We perform the latent regression

so, we estimate the explanatory power of the independent variables on the class affiliation. For the analysis we employ the following log-likelihood function:

$$\ln L = \sum_{i=1}^{N} ln \sum_{r=1}^{R} \frac{e^{X_i \beta_r}}{\sum_{q=1}^{R} e^{X_i \beta_q}} \prod_{d=1}^{D} \prod_{k=1}^{K_d} (\pi_{drk})^{Z_{idk}} \quad (3)$$

The log-likelihood term $\ln L$ is maximized with respect to the class-conditional outcome probabilities π_{drk} and the class conditional coefficients $\beta_{r/q}$. i indicates the company, r/q the latent class, d the dependent variable and k the response. Z_{idk} is an indicator variable and equal to one if the i[th] individual gives the k[th] response to the d[th] dependent variable. X_i is a vector of the dependent variables of individual i. By definition, $\beta_1$is set to zero. For the maximization the expectation-maximization algorithm by Dempster, Laird and Rubin (1977) is used.

5 Empirical Results

5.1 Actual Costs

We first discuss the results for the actual costs, that is equation (1) for the compliance, the implementation and the aggregated costs. In Table 5 the costs numbers include both internal and external costs. Results where internal and external costs are separated are available upon request.

model using the poLCA package in R. For further information about the methodology see Linzer and Lewis (2011) and for an example of its application to finance, see Guerrero, Egea and González (2007).

Dependent Variable:	**Costs** Aggregated 1	**Costs** Compliance 2	**Costs** Implementation 3	**Costs** Aggregated 4	**Costs** Compliance 5	**Costs** Implementation 6
Constant	9.28*** (12.01)	9.14*** (13.57)	9.60*** (8.05)	8.60*** (15.21)	8.02*** (14.21)	8.37*** (11.93)
Diversified	0.27 (0.50)	0.59 (1.01)	0.31 (0.51)	-	-	-
International	-0.74 (-1.42)	-0.84* (-1.84)	-0.80 (-0.89)	-	-	-
Primary	-0.31 (-0.49)	-0.72 (-1.32)	-0.93 (-0.96)	-	-	-
$Risk_{Proportionality}$	-	-	-	0.32 (1.10)	0.25 (0.89)	0.11 (0.33)
Size	0.57*** (6.35)	0.53*** (6.04)	0.53*** (3.90)	0.58*** (7.98)	0.59*** (7.46)	0.57*** (5.08)
Life	0.16 (0.27)	0.62 (0.24)	-0.09 (-0.11)	0.17 (0.31)	0.53 (1.03)	0.03 (0.04)
Stock	-0.69* (-1.77)	-0.79** (-2.19)	-0.92 (0.23)	-0.66* (-1.70)	-0.75* (-1.89)	-0.83 (-1.14)
Swiss	-0.01 (-0.03)	0.26 (0.54)	-0.78 (-1.21)	-0.02 (-0.05)	0.22 (0.44)	-0.83 (-1.25)
R2 adjusted	0.51	0.49	0.38	0.52	0.49	0.39
N	54	54	43	54	54	43

Table 6: Multivariate least-square regression results. The dependent variables represent internal and external total costs. ***,** and * indicate, respectively, the 1%, 5% and 10% confidence levels. T-statistics are reported in parentheses. N stands for the sample size.

Against our initial expectation, the variables Diversified, International, Primary and $Risk_{Proportionality}$ have no significant explanatory power in any model with the exception of International in model 2. Robustness tests (available upon request) with other model specifications show similar results. Therefore, according to Table 6 the proportionality hypotheses can be rejected. An insurer's risk seems not to have any influence on its regulatory costs. One explanation for the significant negative coefficient of the International variable in model 2 might be that the regulatory costs are lower outside Europe than within Europe.[31]

[31] This interpretation is in line with recent developments. Between 2007 and 2012 the costs of the regulators in Austria, Germany and Switzerland increased by 20.9%, 7.9% and 14.2% annually. In comparison the costs of the regulator of New York, USA increased only by 4.0% annually in the same time period. See Eling and Kilgus (2014, Table 8), Insurance Department (2008) and Department of Financial Services (2013). Further analyses which are available upon request support the interpretation that regulator costs outside Europe are lower than within Europe. If costs are differentiated according to internal and external costs, International is only significant in the external costs model. This is consistent with our interpretation since higher fees for insurance companies

The variable Size is significant in all models at a 1% confidence level. The algebraic sign of the coefficient of the size variable is positive and less than 1.[32] This indicates that costs increase underproportionally compared with the size of the company, which suggests that there are economies of scale regarding costs of regulation for insurance companies.[33] Big insurance companies have in total higher regulation costs than small insurers, but in relation to their size regulatory costs are lower. These findings are in line with economic intuition and with Grace and Klein (1999), Deloitte (2006) as well as Europe Economics (2010). As mentioned in Table 2, Grace and Klein (1999) evaluate the explanatory impact of the stringency of the regulatory environment on different expense ratios (total expenses/premiums written, claims costs/premiums written, licenses & fees/premiums written and salary expenses/premiums written). In addition they control for size and report a significantly negative impact of size on each expense ratio. Deloitte (2006) also reports economies of scale regarding costs of regulation for investment banking & corporate finance companies and institutional fund management firms. Investment & pension advice companies are an exception; their size seems not to affect the costs of regulations. Finally, Europe Economics (2010) report that relative to their size, large insurers have to bear lower compliance and implementation costs than small insurers regarding MiFID regulation.

The hypothesis regarding the organizational form is supported by the results shown in Table 6. The variable Stock is at least significant at a 10% confidence level in models 1 and 4 regarding aggregated costs and in models 2 and 5 regarding compliance costs. In addition, the coefficients are negative. This suggests that stock companies have lower regulatory costs to bear than mutual companies. In models 3 and 6 regarding implementation costs the coefficients for the Stock variables are not significant. That could imply that past regulation discriminated against mutuals but not against current regulatory initiatives. The control variables Life and Swiss are not significant in any model.

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would only affect external compliance costs. Implementation costs and internal costs do not include fees issued by the regulator.

[32] If the costs model is transformed into a "costs-relative-to-size-model" only the constant changes and the coefficient for the size variable turns negative. The reason for this pattern is that both dependent variables are logarithmized and therefore both regression models are very similar. As a robustness test we performed the analysis nevertheless and found that size has a strongly significant negative impact on costs relative to premium income as well. Results are available upon request.

[33] Since both the dependent variable and the variable Size are logarithmized the coefficient of the Size variable determines the non-linear relationship between the companies' size and regulatory costs. Model specifications which assume a linear relationship result in a worse model fit.

5.2 Perceived Costs

Results regarding the perceived costs of regulation are shown in Table 7. The perception of current costs (models 1 and 4), the perception of the costs development over the last five years (models 2 and 5) as well as the expected development of costs within the next five years (models 3 and 7) are analyzed.

Dependent Variable:	**Costs** Current 1	**Costs** Past 2	**Costs** Future 3	**Costs** Current 4	**Costs** Past 5	**Costs** Future 6
Diversified	0.55 (1.54)	-0.03 (0.00)	0.06 (0.02)	-	-	-
International	0.15 (0.12)	0.04 (0.00)	0.25 (0.29)	-	-	-
Primary	0.10 (0.04)	0.27 (0.20)	0.08 (0.02)	-	-	-
$Risk_{Proportionality}$	-	-	-	0.07 (0.10)	0.10 (0.20)	-0.10 (0.19)
Size	0.04 (0.27)	0.08 (0.88)	0.07 (073)	0.10 (2.23)	0.08 (1.08)	0.09 (1.50)
Life	-0.25 (0.17)	-1.07 (2.65)	-1.35** (4.28)	-0.40 (0.46)	-1.03 (2.62)	-1.36** (4.67)
Stock	-0.97*** (7.44)	-0.92** (5.24)	-0.02 (0.00)	-1.01*** (8.14)	-0.91** (5.29)	-0.03 (0.00)
Swiss	0.17 (0.24)	-0.19 (0.23)	-0.61* (2.71)	0.12 (0.14)	-0.17 (0.20)	-0.62* (2.80)
Pseudo-R2	0.18	0.18	0.21	0.16	0.18	0.21
N	58	58	60	58	58	60

Table 7: Ordered probit regression results. Dependent variables consist of the perceived costs. ***,** and * indicate respectively the 1%, 5% and 10% confidence level. Wald-statistics are reported in parentheses. N stands for the sample size.

No variable regarding the proportionality principle is significant in any model. This can be interpreted as further evidence that the proportionality hypothesis has to be rejected. Insurers conducting risky business activities do not perceive costs as higher than their peers – neither current, nor past or future costs.

In models 1, 2, 4 and 5, only the coefficients for the variable Stock are significant at a 1% respectively 5% confidence level and are negative. These results indicate that stock companies are less likely than mutuals to perceive the costs of regulation as high. These results could be interpreted as evidence for the hypothesis regarding the organizational form, since stock insurers

seem to perceive current costs and the costs development in the last five years as less onerous than mutuals. An alternative explanation could be that stocks are already accustomed to high regulatory requirements (e.g., Corporate Governance Codices, laws which apply only to stocks[34] and several requirements by stock exchanges). In contrast, for mutuals the large number and high intensity of regulation is relatively new (e.g., in Switzerland Corporate Governance was not an issue for mutuals before FINMA RS 2008/32 was implemented in 2008) and therefore in a relative comparison perceive the cost development as higher burden. Basically, this line of thought would follow the entrenchment hypothesis by He and Sommer (2011) that there are currently fewer control mechanisms for mutuals than for stocks.[35]

Swiss insurers perceive the future costs developments as less burdensome than Austrian and German insurers do. This might be because the Swiss risk-based capital requirements (SST) have already been implemented, whereas its European equivalent Solvency II will not be introduced until 2016. German and Austrian insurers thus expect an increase in costs, while Swiss insurers expect the costs to remain at a relative high level. In this context, we also see that non-life insurers expect more severe costs developments in the future than life insurers. An explanation could be that especially in credit insurance, more stringent regulation is expected. The expected increase in stringency of regulation is also given as an explanation for the currently high percentage of run-off portfolios in this line of business, as reported by Eling and Pankoke (2013b).

A comparison of the analyses regarding the actual and perceived costs shows that the results are consistent. Table 6 and Table 7 both indicate that the proportionality hypothesis can be rejected and provide evidence for the hypothesis regarding the organizational form. The main difference in the results is that the actual costs analysis reveals economies of scale regarding costs of regulation. In contrast, the Size variable in the perceived costs analysis has no explanatory power on the perception of costs. Given the lack of proportionality and the concerns about the

[34] An example of a law only applicable to stocks is the German Gesetz zur Kontrolle und Transparenz im Unternehmensbereich (KonTraG). Its goal is to enhance corporate governance in German companies. It requires the establishment of a risk management system and the disclosure of certain information in annual reports.

[35] The results have to be interpreted with caution since the pseudo-R2 figures are low and therefore the goodness of fit of the models can be doubted. Models 3 and 6 which are acceptable according to pseudo-R2 figures show no significant explanatory power of the variable Stock. In these models the variables Life and Swiss are negative and significant at a confidence level of 5% and 10% respectively. As pseudo-R2 we report the Nagelkerke information criterion. Figures above 0.2 indicate that the goodness of fit of the model is acceptable. See, for example, Backhaus et al. (2006, p. 456).

amount of regulation which is especially often raised by the smaller insurers, we expected a negative link; smaller insurers perceive the burden of regulation as higher. This expectation is, however, not confirmed by our data.[36]

5.3 Perceived Benefits

Results regarding the perceived benefits of insurance regulation are shown in Table 8. We analyze the explanatory power of insurer characteristics on the perceived benefits regarding the general public (models 1 and 4), policyholders (models 2 and 5) as well as on the attractiveness of the business location (models 3 and 6).

Dependent Variable:	**Benefits** Public	**Benefits** Policyholders	**Benefits** FinancialCenter	**Benefits** Public	**Benefits** Policyholders	**Benefits** FinancialCenter
	1	2	3	4	5	6
Diversified	-0.49 (0.92)	-0.69 (1.59)	-0.63 (1.67)	-	-	-
International	-0.65 (1.76)	-0.02 (0.00)	-1.59*** (9.01)	-	-	-
Primary	-0.34 (0.36)	0.33 (0.27)	-1.33** (5.34)	-	-	-
$Risk_{Proportionality}$	-	-	-	0.09 (0.19)	-0.01 (0.00)	0.13 (0.39)
Size	0.02 (0.01)	0.16 (2.62)	0.09 (1.11)	-0.06 (0.74)	0.07 (0.97)	0.00 (0.00)
Life	0.51 (0.42)	-0.46 (0.29)	-0.39 (0.29)	0.67 (0.83)	-0.07 (0.01)	-0.29 (0.19)
Stock	0.54 (2.26)	-0.18 (0.23)	0.05 (0.02)	0.56 (2.49)	-0.14 (0.15)	0.10 (0.89)
Swiss	0.93** (6.41)	0.67* (3.01)	1.12*** (9.62)	0.88** (5.87)	0.64* (2.84)	0.95*** (7.32)
Pseudo-R2	0.25	0.10	0.30	0.22	0.07	0.15
N	59	59	59	59	59	59

Table 8: Ordered probit regression results. Dependent variables consist of the perceived benefits. ***,** and * indicate respectively the 1%, 5% and 10% confidence level. Wald-statistics are reported in parentheses. N stands for the sample size.

[36] Further analyses of the differences between actual and perceived costs reveal that for most insurers the perception of costs is in proportion to actual costs. We find that deviations between actual and perceived costs can be explained by the companies' size. Large companies tend to perceive their regulatory costs as high, although, their actual costs relative to premium income are in comparison with other insurers rather low. We think this result is due to the fact that large insurers benchmark themselves only with their peers regarding size and do not consider smaller insurers only consider insurers which are potential competitors. When thinking about regulatory costs, very small insurers and their regulatory burden are simply not the focus. Results can be provided upon request.

The results provide no further support for the hypothesis regarding the organizational form. In all models the Stock variable has no significant explanatory power. The variables Diversified, International, Primary, $Risk_{Proportionality,}$ Size and Life are not significant in most models. Only the coefficients in model 3 for International and Primary are significant at a 1% respectively 5% level and negative. In case of the International variable in model 3 we interpret the result as follows. As mentioned in Section 5.1, costs of the regulator seem to be higher in Europe than elsewhere. In contrast to national insurers, international active insurers realize this[37] and report that the attractiveness of the business location is suffering because of costly regulation. In model 3 the variable Primary also has significant negative explanatory power. This means reinsurers have a more positive view of the impact of regulation on the attractiveness of the business location than primary insurers do. This finding is consistent with economic reality that regulatory concerns are especially important for reinsurers. For example, Bermuda turned into a reinsurance hub next to the USA, the UK, Germany and Switzerland mainly because of tax advantages and pragmatic regulation (see, e.g. Holzheu and Lechner, 2007).

The variable Swiss is significant at least at a 10% confidence level in all models. However, the interpretation should focus mainly on models 1, 3 and 4 since in all other models the pseudo-R2 figures are below 0.2. In general, Swiss insurers evaluate the benefits of regulation for the public and the business location more highly than do their Austrian and German peers. On the one hand, this can be attributed to a higher quality of the Swiss regulatory framework as reported by the World Bank (2013) and Heritage Foundation (2014). On the other hand, the ongoing discussion about Solvency II and its delayed introduction could cause the benefits of regulation to be considered as lower at the moment by the insurance industry in the European Union.

5.4 Perceived Costs and Benefits

We take costs and benefits combined into account by employing a latent class regression with covariates. In a first step the insurers have to be clustered along latent classes. Table 9 shows the Bayesian and the Akaike Information Criterion regarding the number of classes in the model. The

[37] Alternatively, one could argue that national insurers do realize the differences in costs of regulation for insurance companies among different jurisdictions as well, but are not so much concerned about this fact, since these differences do not pose a competitive disadvantage for them.

goodness of fit is best for the model with two latent classes.[38] Models with more than four classes are not possible if all perceived costs and benefits variables should be considered because the number of estimated parameters exceeds the number of observations.

No. Classes	BIC	AIC
1	515.18	490.45
2	514.01	462.50
3	546.48	468.18
4	584.37	479.29

Table 9: Goodness of fit criteria regarding latent class selection

Figure 1 shows the class-conditional probabilities for insurers to have a certain variable manifestation given they belong to class one or two. In this way, the composition of each class is illustrated. For example, an insurer assigned to class one has a 10% probability to rate current costs as *very low* (represented by 1), a 20% probability to rate them *medium* (represented by 2) and a 70% probability for a *high* rating (represented by 3).

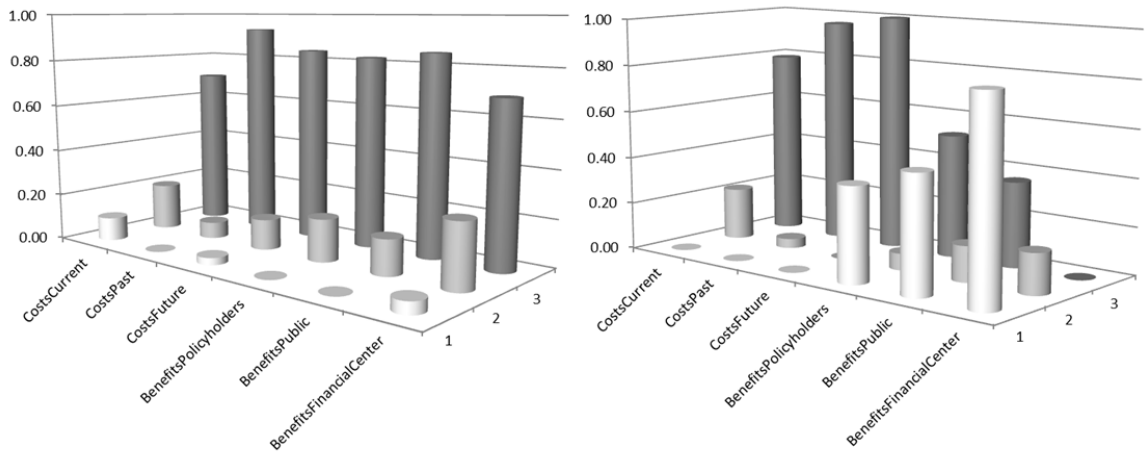

Figure 1: Class-conditional response probabilities. The left figure illustrates class 1 and the right figure illustrates class 2. The variable manifestation 1 represents low perceived costs with respect to benefits and the manifestation 3 high costs with respect to benefits.

[38] For a further discussion of the selection of the number of classes in a latent class analysis, see Linzer and Lewis (2006).

Figure 1 reveals that to both classes a high percentage of insurers is attributed which rates the perceived costs for regulation as rather high. However, insurers which rate the perceived costs as low or medium fall mainly into class one: 30% of the insurers in class one rate current costs as low or medium in contrast to 22% in class two. Regarding past costs the figures are 7% for class one, 4% for class two, and 16% and 0% with respect to future costs. For perceived benefits the class compositions are clearer. In class one over 90% of the insurers rate the benefits regarding the public, policyholders and the business location as medium or high. In contrast, in class two over 40% of the insurers rate the benefits as low or medium.

The class assignments can thus be interpreted as information about the insurer's profile. Class one insurers in general have a positive view of regulation. The costs for regulation are rather high, but provide many benefits for a variety of stakeholders. We call companies belonging to class one "balanced" insurers. In contrast, class two seems two represent insurers with a negative view of regulation. The costs for regulation are very high and the benefits rather low. Especially they have a very unfavorable view of regulation with respect to the business location. These companies we call "pessimistic" insurers. In our sample 58% would be balanced "insurers" and 42% "pessimistic" ones. This result seems reasonable, since the Practitioner Panel (2013) reports for the UK that 37% of all financial services companies consider the regulator as ineffective.

After clustering the insurers in two latent classes and interpreting these clusters in a second step, the impact of independent variables on class assignments can be analyzed. Table 10 shows the model coefficients for class two of the independent variables because by default the coefficients for class one are set to zero. In addition, goodness of fit criteria are shown.[39] It can be seen that the model fit indeed increases when additional variables are used. BIC decreases from 514 to 490 and AIC from 463 to 427. Furthermore, the variable Swiss reduces the probability of an insurer being assigned to class two at a significant level of 1%. No other variables have significant impact on the probabilities for class assignments of the insurers.

[39] In order to illustrate the explanatory effect of the variables, we also calculated the conditional predicted probabilities for latent classes which are available upon request.

	Independent Variables							
	Constant	Diversified	International	Primary	Size	Life	Stock	Swiss
Coefficient	-6.88 (-0.61)	2.80 (1.24)	4.68 (1.53)	2.87 (0.84)	-1.40 (-0.72)	1.47 (0.26)	0.33 (0.14)	-4.79*** (-3.16)
AIC	427							
BIC	490							

Table 10: Parameter and goodness of fit criteria estimation of latent class model with covariates for class 2. By default the coefficients for class one are set to zero. ***,** and * indicate, respectively, the 1%, 5% and 10% confidence levels. T-statistics are reported in parentheses.

Taking perceived costs and benefits combined into account gives neither reason to support nor to reject the proportionality hypothesis or the hypothesis regarding the organizational form. Insurers can be clustered according to their overall view of regulation, but variables regarding the risk profile and the organizational form have no impact on this general view. In addition, the hypotheses focus on costs, but the clustering of the insurers is based mainly on the perception of benefits – the distribution of costs is similar in both classes.

An interesting finding of the latent class regression is that the country of origin plays a crucial role. Swiss companies seem to have a much better view of regulation than their Austrian and German peers. It seems that costs are perceived in both jurisdictions as rather high, but in Switzerland the high regulation is justified by high benefits for all stakeholders. This is in line with our initial reasoning that the business environment in Switzerland is more open than in Austria and Germany.

6 Conclusion and Policy Implications

Cost-benefit analyses of financial regulation, if at all, are conducted mostly for the banking industry (e.g., Elliehausen, 1998). The little material that exists on insurance typically analyzes the cost side without discussing the benefits of regulation. This paper targets this gap in the literature and evaluates both costs and benefits of insurance regulation. In addition, this paper focuses not only on costs and benefits individually, but takes costs and benefits combined into account by employing a latent class regression with covariates. The analysis is based on data from 76 insurance companies in Austria, Germany and Switzerland. Table 11 summarizes the main results.

Hypothesis	Dependent variable	Independent variable	Our result	Comparison with literature
Proportionality	Costs	Diversified, International and Primary	An insurer's risk profile has no impact on costs of regulation.	Result is in contrast to international guidelines and country-specific regulations (Insurance Core Principal (ICP) 2.5 of IAIS, 2013a; Article 7 (2c) of Federal Assembly of the Swiss Confederation, 2007 and Article 29 (3) of European Parliament and European Council, 2009).
Organizational form	Costs and benefits	Stock	Stock insurers have lower regulatory costs than mutual companies.	Result is consistent with Zanjani (2007) and extends, for example, Harrington and Niehaus (2002) as well as Viswanathan and Cummins (2003).

Table 11: Summary of main results and comparison with existing literature

The proportionality hypothesis (regulation intensity increases with risk and complexity of the insurer) must be rejected. Neither the analysis regarding actual costs nor the one about perceived costs provides any evidence that the proportionality principle has been implemented in current regulation. In contrast, the size of an insurer has a significant impact on costs of regulation. Small insurers incur higher costs relative to yearly premium income than their larger peers.

These results are interesting since the regulators in Austria, Germany and Switzerland claim that the stringency of regulations is based on the riskiness and complexity of an insurer, not necessarily on its size. Our results suggest that the opposite might be true and at the very least the proportionality principle has not yet been properly implemented. Therefore, it might be worthwhile to revise existing regulation with respect to the risk sensitivity and, more important, to make sure that future regulation as Solvency II takes the proportionality principle into account. This recommendation is in line, for example, with the Practitioner Panel (2013) which reports that financial companies in the UK ask for more thorough implementation of the proportionality principle.

Regarding the second hypothesis, results show that actual and perceived costs of regulation are lower for stock insurers than for mutuals. In this regard our results support the findings by Zanjani (2007). The limited access to capital seems not to be the only disadvantage of mutuals but also the regulatory framework might deter insurance companies from choosing the organizational structure of a mutual. Further research should evaluate which specific regulations in addition to initial capital requirements are heavier burdens for mutuals than for stock

companies. Similarly, regulators should review if some requirements cause competitive distortions between mutuals and stocks and if any organizational structure is preferable from a regulatory point of view.

Finally, the results show that Swiss insurers rate the perceived benefits of insurance regulation higher than their Austrian and German peers. Especially, when perceived costs and benefits are taken together into account Swiss insurers have a more positive view of regulation than Austrian and German insurers. Swiss insurers tend to be "balanced" in their perception and Austrian and German ones more "pessimistic". We attribute this to two reasons. First, the preparation process for Solvency II in the insurance sector in the European Union creates uncertainty and may lead to more pessimistic views on regulation. Second, the Swiss regulatory framework might be better than the one in the European Union in general.[40] These findings should alert regulators in the European Union not to create competitive disadvantages for insures due to regulatory requirements. Furthermore, after the implementation of Solvency II it would be worthwhile to analyze if the difference in perception of benefits between Swiss and European insurers remains. Theoretically, Solvency II should further increase the benefits of regulation for the public and the policyholders in Europe.[41]

[40] International comparisons of regulatory frameworks by the World Bank (2013) and the Heritage Foundation (2014) rate Switzerland better than the European Union. Moreover, there is a recent trend in the European Union towards economically questionable regulations as unisex tariffs (see, e.g., Sass and Seifried, 2014) or simple solutions to systemic risk (see, e.g. Ashby, Peters and Devlin, 2014).

[41] See, for example, Holzmüller (2009) finds that Solvency II fulfills the criteria for capital requirements as stated by Cummins, Harrington and Niehaus (1994). Furthermore, according to Ernst & Young (2011) it is likely that Solvency II leads to a reduced default probability of insurers, improved risk management and more transparency. In addition, economic growth is supported due to higher confidence in the insurance sector.

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