Digitalisation impact Measuring on claim Management for the Insurance Sector

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Abstract

Purpose of the article The aim is to investigate the impact of digital transformation on the insurance sector for claim management and claim reserves using the data from non-life insurance companies located in Baltic countries. The object is digitalisation measurement in claim management. The subject is non-life insurance companies in Baltic countries (Estonia, Latvia, and Lithuania).

Methodology/methods Regression analysis, comparative methods, and Pearson correlation analysis were applied to explore the impact of digitalisation on claims regulation speed, and claim reserves. Authors have also used actuarial methods like the development factor method using aggregate paid claims triangles.

Scientific aim is to provide a discussion of how digitalisation can be measured for insurance sector claim management. Authors have proposed to use claim handling speed as the digitalisation measure. The following hypotheses were advanced in the current study: H1: Claim handling speed, impact of digital transformation depends on technical provisions structure in company's portfolio; H2: Claim handling speed, impact of digital transformation depends on claims paid volume; H3: There is a positive relationship between quick claims paid ratio (claims paid in one year period over total paid claims), the impact of digital transformation and Baltic countries GDP per capita.

Findings All three hypothetical propositions are accepted by authors using the correlation analysis method with 0.05 significance level and regression analysis. Digitalisation's signs can be seen in Baltic non-life insurers' annual financial reports in years 2011-2017. Digitalisation transformation goes in line with economic growth. In 2011, 74% of total paid claims were paid within one year, and in 2017 the amount was 79%. The correlations results showed that digitalisation has positively impacted claim handling speed.

Conclusions This study has its limitations in the scope of data used, the results show 80% of market share (using seven observations) and analyse non-life insurers in Baltic countries.

Keywords: insurance, solvency II, claim management, actuarial science, digitalisation, claim best estimate, claim handling speed, claims paid ratio.

JEL Classification: C58, G22, G32

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Introduction

Digitalisation transformation has just reached the insurance sector, which has become more information technology driven. Increasing competition, fintech, and insurtech start-ups' innovations are reasons why insurance companies must improve and develop their services in order to ensure business continuity. Lemonade is operating in fintech and has announced its plans to expand in Europe by using an entirely different business model compared with a traditional model (Lemonade, 2018). The insurance sector in the European Union is also facing new upcoming regulator rules. Solvency II regulates how much capital insurers should hold with 99.5 percentage confidence level using value at risk measure. It has new updates at least once in three years, and regular reporting is time-consuming. IFRS 17, with the effective year 2022, will entirely change the way how key insurance indicators are measured (Deloitte, 2017). Insurers must also implement general data protection, IFRS 9, packaged retail investment and insurance-based products regulation. All these aspects increase workload in support units. Staying in the market without digital transformation could be impossible.

Porter (1985), Rahlfs (2007), Eling & Lehmann (2017) provide an insurance-specific value chain where primary and supporting activities necessary for insurance products delivery are distinguished. Under support activities are units like IT, human resources, business controlling, legal department, public relations. Under primary sources are units like marketing, product development, sales, underwriting, customer service, claim management, asset risk management. We analyse the claim management part from primary sources. Authors also think that claim handling digitalisation must be the priority and must be mentioned in business strategy. A positive customer experience after the insured event can be the main reason for policy renewal. Cebulsky, Günther, Heidkamp & Brinkmann (2017) have reminded that insurance is more than selling a policy, and pricing must be with correct risk assessment; potential loss levels for the insurer need to be controlled through risk management, claims need to be verified, loss adjustment and payments need to be done, and regress needs to be efficiently processed.

Better understanding of the claim and reserving policy, handling, and future development helps in adequately assessing measurable underwriting risks. This also helps in developing an internal capital model that takes into account dynamic market changes and improves enterprise risk management in a company. Companies' enterprise risk management (ERM) frameworks are considered in the rating process in external rating agencies, for example, Standard and Poor's (2013), Moody's (2019), and A.M. Best (2018). External credit agencies have an increased focus on ERM (Aebi, Sabato & Schmid, 2012; Lundqvist & Vilhelmsson, 2018).

This study's aim is to examine the impact of digital transformation on the insurance sector in the area of claim handling, using the non-life insurance companies' data located in Baltic countries (Estonia, Latvia, and Lithuania).

This paper, thus attempts to provide answers to the following research questions: how digitalisation transformation impact can be measured in the insurance sector for claim management? What is the relationship between claim handling speed (digitalisation measure), claims paid volume (business growth), and the gross domestic product (GDP) in Baltic countries? Also, is companies' product and technical provisions structure impacting digitalisation's effectiveness? Authors have proposed to use claim handling speed as a digitalisation measure. The authors of this paper, therefore, make the following hypothetical propositions for this study:

- H1: Claim handling speed (digitalisation measure) depends on the technical provisions structure in a company's portfolio.
- H2: Claim handling speed (digitalisation measure) depends on claims paid volume (business growth).
- H3: There is a positive relationship between quick (in one year) paid claims ratio and Baltic countries' GDP.

Regarding the structure of this paper, we begin with a review of the literature on research problems and questions (Section 1). We then continue with a short description of our research methodology (Section 2). Finally, we discuss potential areas of work, both practitioners' and from researchers' perspectives, and the results of the hypothesis acceptance or rejection (Section 3).

1 Literature Review

Authors propose to use the 'digitalisation' definition of 'a process of creating value in a new business environment' proposed by Dorner & Edelman (2015). EY (2017) proposes to define the term 'digital transformation' as capitalising on the power of technology to revisit business models, acquire customers on new channels and create

essential user experiences. Eling & Lehmann (2017) have summarised the impact of digitalisation on an insurer's value chain with respect to this research scope, primary activities, and claim management in Table 1.

Table 1 Impact of digitalisation on claim management

Value chain process	Tasks	Impact on the value chain
Claims management	Investigation of fraud Claim settlement	Artificial intelligence and big data: • Prevention of fraud through data analytics • Automated calculation and pay-out of the amount of damage Blockchain: • Storage of the information for the automated pay-out • Mobile devices with apps: • Customers file their claims via smartphones

Source: Eling & Lehmann, 2017

We have reviewed the academic literature by searching for the term "digitalisation & insurance & claims" in the journal databases Web of Science and Scopus and did not identify research related to digitalisation effectiveness or progress in the Baltic and Nordic European countries or non-publicly traded insurance companies. Busquets (2018) published research on the company Multiasistencia, which manages a network-based service called the "Comprehensive Claim Management Service" (CCMS) and was a case study for transforming the digital ecosystem.

After searching for the term "digitalisation & insurance" in the journal databases Web of Science and Scopus, we wanted to highlight the research published by Bohnert, Fritzsche & Gregor (2019). Paper studies 41 publicly traded European insurance companies expressing a digital agenda in annual reports (2007-2017) are analysed and positive correlations can be seen (Bohnert, Fritzsche & Gregor, 2019). Currently, the most digitalisation-affected line of business is health insurance. There is no need even to report a claim as medical services are paid for using electronic insurance cards (pay-as-you-live), reasons for which being a small number of frauds, high-frequency volume, and low severity. Research by Yamamoto (2016) describes a conflict of interest in Japan between public interests and privacy protection, caused by using databases for health insurance claims. Leppert, Gerlach, Ostwald & Greiner (2018) summarise the weaknesses and strengths of Germany's digital health economy where the main weakness is a lack of business models, and private users only have a small willingness to pay for digital services.

For other lines of business, it is possible to buy policy or report claims using a mobile application without human interaction. Fintech and insurtech companies are focused on the customer experience. Regarding claim management, insurtech companies like Claimable (2019) offer an entire process of claims management to insurers by applying artificial intelligence. Authors think that insurtech companies are increasing customer experience satisfaction and traditional insurance model companies can quickly learn from them or acquire these new start-ups. Traditional insurance companies can also invent new ideas much faster due to capital surplus.

The authors have not identified how quantitative studies are changing the claim payment pattern, claim handling speed, and technical reserving structure overall in the market due to digital transformation. Analyses are performed on company profitability levels. The main advantages are fewer human errors (operational risk decrease) and handling claims consistently across the organisation (KPMG, 2017). McKinsey (2015) has ana-lysed that due to claim management, IT automatisation costs can be reduced by 40%. The disruptive technology change allows for cutting up to 10% in premium costs and 8% in claims expenses (BCG, 2018). The combined ratio would have a rapid decrease.

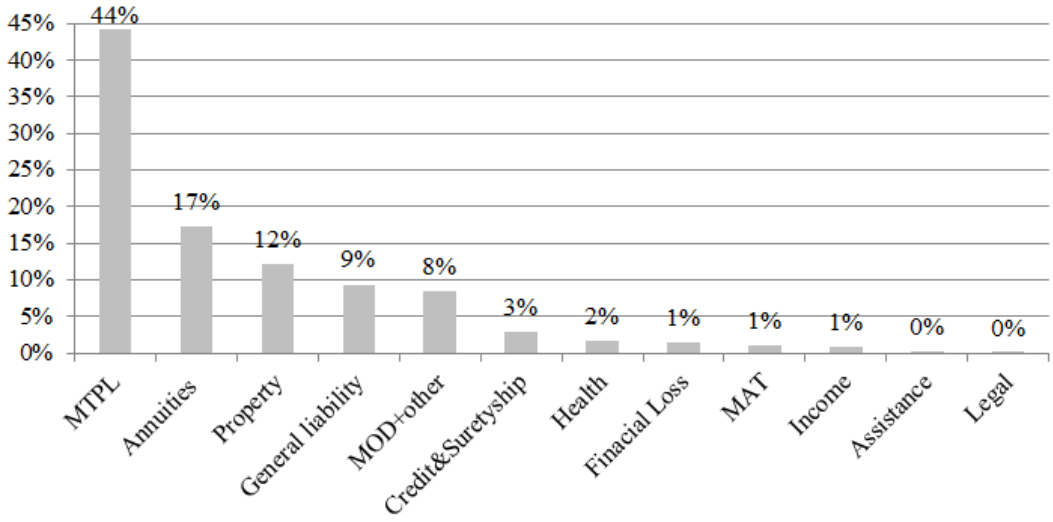
2 Methodology

The study population comprises the seven top non-life insurance companies in Estonia, Latvia, and Lithuania. The sample of seven non-life insurance companies includes Balta (2017), BTA (2017), ERGO (2017), AB Lietuvos draudimas (2017), Gjensidige (2017), Swedbank (2017), and IF (2017). The sample consists of subsidiary companies for group companies with headquarters in Sweden, Norway, Austria, Poland, and Germany. Data was obtained from publicly available annual reports of 2011–2017 and Solvency and Financial Condition reports

(SFCR) in 2017. The following hypothetical propositions for this study are chosen: H1: Claim handling speed (digitalisation measure) depends on the technical provisions structure in a company's portfolio; H2: Claim handling speed (digitalisation measure) depends on claims paid volume (business growth); H3: There is a positive relationship between quick (in one year) paid claims ratio and Baltic countries' GDP. This study employed a descriptive research approach. Data collected were analysed using the Pearson correlation analytical method, the Chain Ladder method, and the comprehensive method.

Total gross written premium volume for Baltic non-life insurance in the year 2017 is 1301.95 million EUR (EIOPA, 2018). The sample of seven non-life insurance companies creates an 80% market share. The rest of six companies have the remaining market share. Dissimilarity index in years 2015-2017 are the following: 27.77%, 27.28%, 26.51%. The market is profitable in the year 2017, with a combined ratio of 92%. There are similar performance indicator results also for previous years and for 2018. Claim reserves are the main position in the balance sheet for non-life insurers. Reserve risk is identified as one of the main risks why companies have become insolvent and failed (Leadbetter & Stodolak, 2009). In order to avoid deficient loss reserves, understanding the digital transformation impacting claim patterns and developments is crucial.

The sample subject claim's best estimate structure can be seen in Figure 1. Almost half of the reserves, 44%, are for motor third-party liability line of business, 17% for long term liabilities (annuities from motor third-party liability line of business), 12% for fire and property damage, and 9% for general third-party liability. The last line of business in the claim's best estimate, above the 5% floor, is motor and other own damage, with an 8% part in structure.



Source: Calculations performed by the authors based on Baltic insurance companies' SFCR reports, 2017

Figure 1 Claim reserves structure year 2017

One of the primary ways to assess digitalisation impact from a claim management aspect is by analysing paid claim triangles. A claim development triangle represents the volume of claims paid in an accident year and a certain financial year. It represents how much of the total paid claims in the financial year are paid from the same accident year, from previous accident years, and so forth. The more claims paid in the same financial year when an event occurred yields a more effective claim handling digitalisation transformation process. The market triangle, in this case, is created from publicly available annual reports of 2011–2017 and the Solvency and Financial Condition Reports (SFCR) in 2017. Percentage from total paid claims (including not yet reported claims) can be calculated using the well-known actuarial reserving method Chain Ladder. It is a simple and distribution free approach (Mack, 1993). Simple triangle example can be seen in Table 2.

Table 2 Market aggregated claim paid triangle in millions EUR

		Development year						
Claim accident year	Year	0	1	2	3	4	5	6
	2011	183.3	242.1	249.1	254.4	257.0	257.9	258.4
	2012	219.0	279.7	286.5	289.2	290.1	290.8	
	2013	238.0	302.0	308.5	311.5	314.1		
	2014	269.7	351.0	363.8	367.6			
	2015	321.0	407.6	415.1				
	2016	377.4	468.3					
	2017	399.5						

Source: Calculations performed by the authors based on Baltic insurance companies' SFCR reports, 2017

3 Results and Discussion

Hypothesis 1

In an attempt to justify the relationship that exists between claims regulation speed and claim reserve portfolio structure, a Pearson correlation technique was employed. This hypothesis helps to understand that despite digitalisation there can still be a line of business that needs more time due to a variety of reasons (court cases, legal requirements, and complicated processes for cause identification of risk). The test procedure is as follows:

- First, authors have divided claim reserves for the year 2017 into two parts: fast and slow handling. Medical expense insurance, income protection insurance, other motor insurance, fire and other damage to property, legal expenses insurance, assistance, miscellaneous financial loss claim reserves are under fast regulation group. Motor vehicle liability insurance, marine, aviation and transport insurance, general liability insurance, credit and suretyship insurance, annuities claim reserves are under slow regulation group, and for this hypothesis, their data are excluded.
- The quick paid claim ratio is calculated using an aggregated cumulative paid claim triangle for each company separately. The ratio shows how much of total claims paid amount is paid in the first year. The authors assumed the quick paid ratio is a digitalisation measure in claim management.

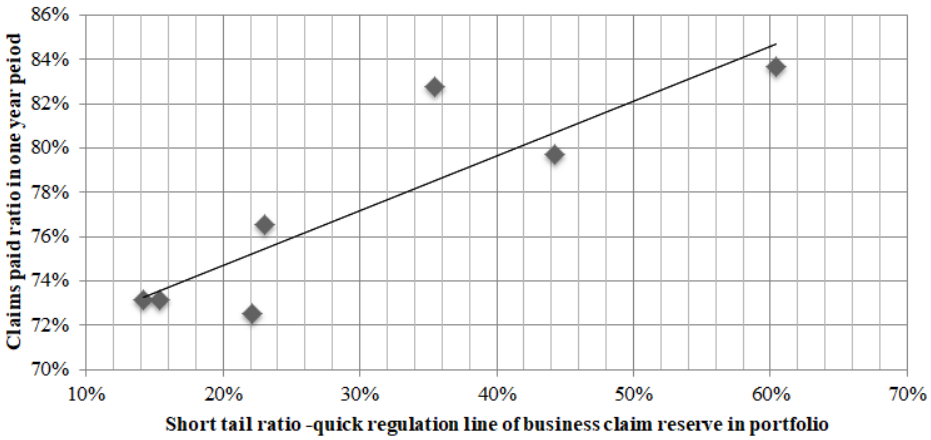
It is possible to calculate how much is paid from total claims in a one-year period using the chain-ladder method. By comparing it year-to-year, it is possible to access the digitalisation impact for each company and the market overall.

Since the correlation result is significant with 0.05 level of significance (i.e., a p-value of 0.007), and the generated result has less than 0.05 significance level in the study, the null hypothesis is accepted, and the alternative hypothesis is thus rejected.

Table 3 Pearson correlation matrix

	Claim reserve ratio with a short tail in a portfolio	Quick paid claim ratio
Claim reserve ratio with a short tail in a portfolio	1	88.69%
Quick paid claim ratio	88.69%	1

Source: Calculations performed by the authors based on Baltic insurance companies' SFCR reports, 2017

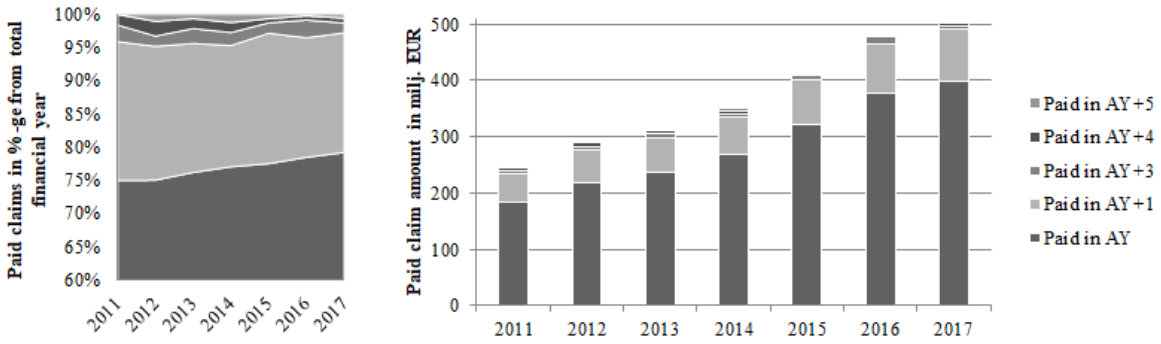


Source: Calculations performed by the authors based on Baltic insurance companies' SFCR reports, 2017

Figure 2 Strong positive relationship between the speed of claim regulation and reserve portfolio structure

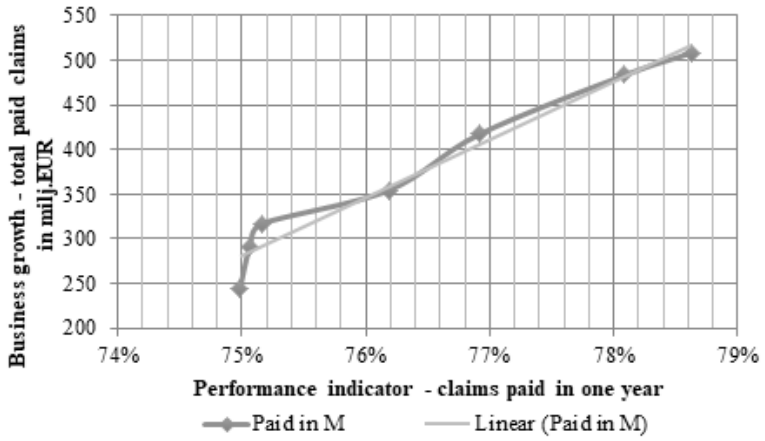
Hypothesis 2

In an attempt to justify the relationship that exists between claims regulation speed and business increase (paid claim volume), a Pearson correlation technique was employed. This hypothesis helps to understand that despite business growth, the increase of claims paid, claims regulation speed also increase. The test procedure is as follows: Claim amount paid in accident year, one year after the accident year, two years after the accident year, and so on is calculated for each year using market aggregate claim triangle. Then, the quick paid ratio is also calculated.



Source: Calculations performed by the authors based on Baltic insurance companies' SFCR reports, 2017

Figure 3 Payment pattern and paid claims in financial years 2011-2017 for each accident year



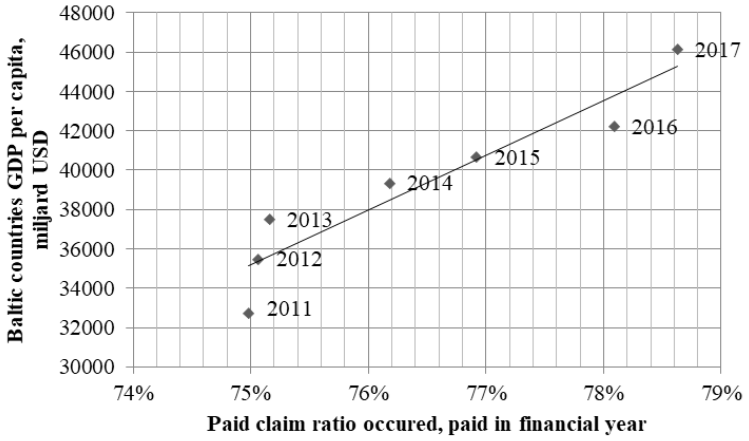
Source: Calculations performed by the authors based on Baltic insurance companies' SFCR reports, 2017

Figure 4 Signs of digitalisation impact - Total paid claims (business growth) and performance indicator - claims paid in one year period

There is a strong positive correlation between total claims paid and claims paid in a one year period divided by total claim volume - 98%. Since the correlation result is significant with 0.05 level of significance (i.e., a p-value of 0.0000, R square 96.31%) and the generated result is less than 0.05 significance level of the study, the null hypothesis is accepted, and the alternative hypothesis is thus rejected. Market data clearly shows that claim handling speed, and digitalisation transformation impact are increasing year to year. In 2011, 74% of total claims paid claims were paid in a year, in 2017, this was - 79%.

Hypothesis 3

In an attempt to justify the relationship between GDP and quick paid claims ratio regression analysis is per-formed. Hypothesis 3 states that there is a strong positive relationship between fast claims paid (in one year pe-riod) ratio and Baltic countries GDP per capita from 2011-2017.



Source: Calculations performed by the authors based on Baltic insurance companies' SFCR reports, 2017 and GDP per capita World Bank, 2019

Figure 5 Quick paid claim ratio and Baltic countries GDP per capita

There is a strong positive correlation between Baltic GDP per capita and digitalisation measure (claims handling speed in one year period from total claims paid) - 94%. Since there is a the correlation, the result is significant at with 0.05 level of significance (i.e., the p-value of 0.0000) and the generated result is less than 0.05 significance level of the study, the null hypothesis is accepted, and the alternative hypothesis is thus rejected. Regression analyses also show a good fit (R square is high 88.79%, $F_{critical}$<F). Digital transformation's products and services

will add 0.8% annually to the Asia Pacific's region's GDP by 2021 (Jimenez, Lim, Cheok & Ng, 2018). Authors have not found a forecast related to digital transformation impact on the European Union's GDP.

Table 4 Regression analysis results

Regression Statistics	
Multiple R	**94.23%**
R Square	**88.79%**
Adjusted R Square	86.55%
Standard Error	0.55%
Observations	7

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.6396	0.0199	32.0866	**0.0000**
GDP per capita mrd.EUR	0.0000	0.0000	6.2932	0.0015

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.0012	0.0012	**39.6040**	**0.0015**
Residual	5	0.0002	0.0000		
Total	6	0.0013			

Source: Calculations performed by the authors based on Baltic insurance companies' SFCR reports, 2017

Conclusion

This study attempted to examine the relationship between the digitalisation transformation impact on claim management for insurers and technical provisions structure, total claims paid volume and GDP per capita in Baltic countries. All three hypothetical propositions are accepted by authors using the correlation analysis method with a 0.05 significance level and regression analysis. The first accepted hypothesis proved that claim handling speed depends on a portfolio, and claim best estimate structure. Legal environment, large claims can decrease digitalisation effectiveness on claim management; thus, human interruption will still be needed. The second accepted hypothesis proved that despite business growth and paid claims increase, claim handling speed also increases. Analysis showed that there is a strong positive correlation. Claim handling speed and the first-year claim payment pattern has increased by 4% during 2011-2017. The third hypothesis showed that the insurance sector has started to use more digitalisation transformation tools with the growing economies in Baltic countries. The findings of the study show positive digitalisation signs in claim management. Financial annual reports represent the effect of faster claim regulation, and faster notification using mobile applications and QR codes in Baltic countries.

The research presupposes that further studies should focus on cost ratio changes, reserve risk assessment under the Solvency II framework, taking into account that, based on standard formula solvency capital requirement is calculated only for next 12 months. Moreover, it would be desirable to study how digitalisation transformation can be integrated into enterprise risk management, reserve risk assessment, and internal capital models, using blockchain, big data analytics, and the more precise risk aggregation technique 'copula approach' and 'tail dependence'.

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