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Financial Innovation of Mass Destruction—The Story of a Countrywide FX Options Debacle

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Abstract: Astonishingly little attention has been paid in academic literature to the 2008–2009 foreign exchange (FX) options debacle in Poland, the scale of which was unheard of. It affected not only an individual organization but a significant part of economy, being an example of a situation in which operational risk at the company level could have impacted systemic risk. The research provides evidence of the dark side of financial innovations through an analysis of a countrywide case on an emerging market, utilizing a primary qualitative content analysis (QCA) of over 750 documents (including press releases, public authorities' accounts, and corporate statements). It documents that the FX options debacle was caused by financial institutions which shrouded some aspects of innovative securities or took advantage of information asymmetry to exploit uninformed clients. The study concludes that both adequate legal regulations and proper operational risk management are crucial to avoid similar corporate failures.

Keywords: derivatives debacle; financial innovation; FX options

JEL Classification: G12; G23; G32; L20



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1. Introduction

Since the beginning of the 1990s, we have witnessed a number of derivative debacles—Barings Bank, Metallgesellschaft AG, Procter and Gamble, Amaranth Advisors LLC, Societe Generale SA, Codelco, Sumitomo Corporation, Daiwa Bank, National Australia Bank Ltd., and Allied Irish Bank PLC, to name a few (see [Jacque 2010](#); [Marthinsen 2018](#)). Those described so far in academic literature almost exclusively focus on a single organization operating in a mature market. All of them highlight the importance of operational risk management, since the materialization thereof used to be the main cause of financial losses. Most of them evoke the discussion about preventative regulations, while some contribute to the debate on financial innovation.

Our paper aims to provide an examination of the 2008–2009 foreign exchange (FX) options debacle on the Polish emerging market from the perspective of the negative consequences of financial innovation. The phenomenon we consider deserves the attention of scholars for at least four reasons. First, the scale of that debacle was unheard of, since it affected not only an individual company, but a significant part of economy. Therefore, it is an example of a situation in which operational risk at the company level can be a trigger of systemic risk. Second, there is a limited number of papers examining corporate crises caused by derivatives in emerging markets. This can be partially explained by the fact that those markets are less transparent, and often a language barrier makes it difficult to analyze media releases, legal documents, or corporate reports. Third, the undeveloped institutional framework of the Polish capital market played an important role in the escalation of the derivatives debacle. Fourth, there is a research gap when it comes to analyzing the phenomenon by exposing the aspects of the dark side of financial innovation, by applying

the rigor of textual analysis to the sources of information available to public opinion in the mass media, and by reflecting on the outlooks of various stakeholders (entrepreneurs, financial institutions, and public authorities, among others).

Based on a thorough primary qualitative content analysis (QCA) of over 750 documents (including press releases, public authorities accounts, and corporate statements), our paper depicts the genesis and mechanism of engagement in currency options, in particular asymmetrical option strategies, applied to numerous companies that faced significant losses and teetered at the verge of bankruptcy due to the derivatives portfolio they owned. The study explains the toxicity of derivatives in terms of product design, the distribution process (including the characteristics of a seller), transaction execution, and the negative consequences of the deals concluded.

The research problem was inspired by the hypothesis that financial institutions shroud some aspects of innovative securities or introduce complexity to exploit uninformed clients. This hypothesis was formulated and tested on mature markets by Gabaix and Laibson (2006); Carlin (2009); Henderson and Pearson (2011); Diaz-Rainey and Ibikunle (2012); Carlin et al. (2013); Beck et al. (2016). Some earlier studies have shown that investors often pay more than a fair price for financial products (see, e.g., Jarrow and O'Hara 1989; Rogalski and Seward 1991).

In order to understand the scale and depth of the 2008–2009 FX options debacle, as well as to underline the importance of the study, it is worth mentioning that close to 30% of domestic companies listed on the Warsaw Stock Exchange in 2008 experienced losses that put them at risk of insolvency. The mean of various estimates of total derivative-related losses recorded by Polish companies (including non-listed ones) is close to EUR 30 billion.¹ This makes the Polish case probably the greatest derivative debacle in history.² Incredible as it may sound, these events have not been thoroughly described and analyzed yet, despite the fact that more than 10 years have passed.

Those numbers are even more striking if we take into account the fact that the Polish economy sailed almost untouched through the stormy waters of the global financial crisis of 2008–2009. The analysis of the real GDP growth rate shows that the Polish economy experienced healthy growth of 4.2% and 2.8% in 2008 and 2009, respectively. In the same years, the rates recorded by the Economic and Monetary Union countries were 0.4% and 4.4% (Eurostat <https://ec.europa.eu/eurostat>, accessed on 1 January 2021).

Despite its size, the Polish FX options debacle has received astonishingly little attention from academics, and sources of existing publications are limited to Polish journals or academic monographs (see the literature review section). Our study contributes to those works by shedding more light on the characteristics and the negative consequences of FX option strategies as financial innovation, as well as by reconstructing public opinion of the event. By doing so, it supplements the prior analyses of one of the greatest corporate failures in modern Polish history.

The remainder of the paper is organized as follows. The literature review synthesizes research on financial innovation and derivative debacles, focusing on academic analyses regarding the FX options crisis in Poland. It is followed by a description of the methodology and the presentation of the study's results. A brief discussion and conclusion wrap up the paper.

2. Literature Review

Risk is inherent in all economic activity. Derivatives markets are traditionally considered a platform of risk transfer. As such, they should facilitate the transfer of market risk from companies that wish to avoid such risks to other parties more willing to manage or that are better suited to manage those risks (Kuprianov 1995). At the same time, there are risks associated with the use of derivative products themselves, the same as those found in any traditional financial products: market, operational, credit, and legal risks (Global Derivatives Study Group 1993). As explained by Kuprianov (1995), market risk is the risk to earnings from adverse movements in market prices; operational risk is the risk of losses resulting from inadequate control systems, human error, or management failure;

credit risk is the risk that a counterparty to a derivative contract will fail to perform on its obligation; finally, legal risk is the risk of loss due to a contract not being legally enforceable. Cases of derivatives-related losses that have been reported to date emphasize market risk, but there are numerous examples confirming that operational risk is significant as well (see, e.g., [Kuprianov 1995](#); [Marthinsen 2018](#)).

Since risk has been mentioned, it is worth distinguishing derivatives traded on exchanges and on the over-the-counter market (OTC). The major difference regards the level of product standardization and methods used to protect counterparties from credit (default) risk.³ A key aspect of the OTC derivatives market is the number of non-standard products that have been created by financial engineers. Those non-standard instruments, without secondary trading and with limited public price information, together with the hazard of the speculative use of derivatives, are exactly the reasons why concern about the growth of OTC derivatives markets has been rising ([Kuprianov 1995](#)). At the policy-making level, this concern stems from the fact that ‘financial regulatory agencies have failed to keep pace with the rapid innovation in OTC derivatives markets’ ([Kuprianov 1995](#), p. 3); hence, the absence of appropriate precautions may contribute to the financial instability of an economic system.

Derivatives are often mentioned when financial innovation is on the agenda (or in the context of financial innovation). The term ‘financial innovation’ is defined in the literature as the creation and popularization of new financial instruments, technologies, institutions, and markets ([Tufano 2003](#)). This broad understanding encompasses the Schumpeterian trilogy of invention, innovation, and diffusion. According to [Afzal and Gauhar \(2020](#), pp. 1–2), financial innovation can be considered ‘a means of reducing and hedging risks’ and ‘a vehicle to address information asymmetry and the resultant adverse selection and moral hazard problems’.⁴

Studies of financial innovation used to focus primarily on the positive impact thereof (see [Tufano 2003](#); [Frame and White 2004](#); [Allen 2012](#), for a review of literature on financial innovation). In particular, financial innovation tended to be viewed as an ‘engine of economic growth’ (see [Miller 1986](#); [Merton 1992](#)). Scholars, however, have started to notice that, in fact, financial innovation has a dark side as well.⁵ Proponents of the ‘innovation-fragility view’ ([Beck et al. 2016](#)) argue that financial innovation is often associated with financial crises and financial malpractice, and it may result in catastrophic consequences. Moreover, its disruptive impact is noticeable not only at the microeconomic level, but also at the macroeconomic level—which the global financial crisis bluntly proved.⁶

Literature indicating the dark side of financial innovation, both theoretical ([Gabaix and Laibson 2006](#); [Carlin 2009](#)) and empirical works (e.g., [Ashton and Hudson 2008](#); [Henderson and Pearson 2011](#); [Bergstresser 2008](#)), highlight the exploitation of behavioral biases and the cognitive limitations of customers by disguising the nature of products or increasing complexity⁷ so as to make it harder for them to make rational choices (which results in purchasing inappropriate instruments or overpaying). [Diaz-Rainey and Ibikunle \(2012\)](#) even developed a taxonomy of the ‘dark side’ of financial innovation. The taxonomy categorizes the negative effects of financial innovation as predatory schemes (when issuers profiteer by delivering a product that has no potential benefit to the buyer), abuse of financial innovation (the apparent mis-selling of products without explaining the associated risks), and the unintended consequences of financial innovation (in terms of the implications for speculation and contagion in times of financial stress).

Mass media as well as scholars have raised the alarm about the dangers posed by the widespread use of derivative instruments in general since at least the 1990s, attempting to provide a lesson for policymakers and managers. The best-known derivatives debacles⁸ were largely caused by in-house professionals usually employed as traders; they resulted mainly from unauthorized trading, and in most cases, they were a single-person criminal activity. This means that those people were highly skilled professionals and trading was their corporate duty. Furthermore, a significant number of cases concerned financial institutions, and only a few related to corporations.

The first, and somewhat exceptional, case analyzed thoroughly in academic literature, e.g., by [Kuprianov \(1995\)](#); [Marthinsen \(2018\)](#); [Culp and Miller \(1995\)](#); and [Edward and Canter \(1995\)](#), is a subsidiary of Metallgesellschaft AG, which in 1993 lost USD 1.3 billion due to its marketing and hedging program based on derivatives. [Kuprianov's \(1995\)](#) analysis argued that the company's losses were attributable more to operational risk—due to inadequate control systems or management failure—than to market risk. He also concluded that government policy or a more comprehensive regulation of derivatives markets cannot prevent firms from making mistakes. The greatest, and the latest, derivatives debacle in terms of losses recorded occurred in 2008 at Societe Generale SA. Its write-down due to unauthorized trading regarding futures hedging on the European equity market indices equalled USD 7.16 billion ([The Wall Street Journal 2008](#)).

When it comes to the OTC-traded currency option⁹ strategies that caused the debacle in Poland in 2008–2009, academic works are almost exclusively limited to those published in the Polish language, meaning that the debacle remains almost completely unknown to the international academic community. Nevertheless, the phenomenon has been studied from different angles. The inappropriate use of derivatives and the aspect of information asymmetry between the parties to a transaction was raised, among others, by [Liberadzki \(2010\)](#); [Puszer \(2012\)](#); [Ancyparowicz \(2010\)](#); [Andrzejewski \(2010\)](#); [Konopczak et al. \(2011\)](#); [Niedziółka \(2009a\)](#); [Pieta \(2013\)](#). [Andrzejewski \(2010\)](#) and [Karkowski \(2009\)](#) argue that the debacle in Poland was a result of international macroeconomic speculation on the Polish zloty. This approach indicates that international financial institutions firstly created demand for derivatives, including currency options, taking advantage of Polish entrepreneurs unaware of the dangerous possible negative consequences, and they later reversed the trend of the Polish zloty from appreciating to weakening, which resulted in a situation in which Polish export companies found themselves in a 'speculative trap'. [Daszyńska-Żygadło and Pastusiak \(2014\)](#) and [Zatoń \(2010\)](#), referring to behavioral economics and behavioral finance, attempt to reveal the psychological mechanisms behind such hazardous transactions. [Niedziółka \(2009b\)](#) and [Kasiewicz \(2010\)](#) identify operational risk management as an area of significant ignorance, lack of competence, and tools and procedures among companies who suffered from the debacle. An analysis of legal issues regarding derivative contracts and financial market regulations was in turn undertaken by [Gontarski \(2009\)](#). In the context of those issues, another area of interest to researchers was the banking sector and its supervision from the perspective of its impact on the real sphere of the economy ([Łasak 2019](#)).

Our study contributes threefold to the existing academic literature on the FX options debacle in Poland. It examines the negative impact of FX options structures as financial innovation, it reimagines public opinion of the crisis (due to the content analysis of press releases, among others), and it identifies 69 cases of companies infected with toxic derivatives, as well as gathering and analyzing their financial data.

3. Materials and Methods

The aim of the paper is to provide a comprehensive presentation of the FX options debacle in Poland in 2008–2009 from the perspective of the negative consequences of financial innovation, which fits snugly into the background setting of this phenomenon. Such a goal is both inspired by and related to the hypothesis about the dark side of financial innovation, which assumes that financial institutions conceal some aspects of innovative securities or introduce complexity to exploit uninformed investors (see, e.g., [Gabaix and Laibson 2006](#); [Diaz-Rainey and Ibikunle 2012](#))—in other words, they design financial products to capitalize on investors' valuation errors ([Henderson and Pearson 2011](#)). It is worth mentioning that this hypothesis has not been tested on emerging markets so far.

Taking into account numerous studies synthesized in the literature review section, we seek answers to the following research questions regarding the derivatives debacle on the Polish emerging market in 2008–2009: (Q1) how were the derivative products designed?; (Q2) how were the derivative products distributed?; (Q3) in what manner were

the transactions executed?; (Q4) what were the negative consequences of the transactions? Additionally, to set up the context for our findings, we describe the economic background of the debacle and the response of public authorities to the crisis as a follow-up.

Our study is of descriptive-exploratory nature, which endorses qualitative methodology (see, e.g., Yin 2004). This is why, in order to answer the research questions, QCA is exercised, which allows for a systematic and rigorous approach to analyzing documents obtained in the course of the research. In content analysis, ‘analytical constructs, or rules of inference, are used to move from the text to the answers to the research questions’ (White and Marsh 2006, p. 27). In particular, QCA ‘focuses on creating a picture of a given phenomenon that is always embedded within a particular context, not on describing reality objectively’ (White and Marsh 2006, p. 38), which makes this method suitable for the subject of the study.

The data for our research are texts that fall into the categories of mass messaging and organizational messaging according to Neuendorf’s (2002) typology of texts. The data utilized are broken into sampling units and units of analysis (coding units) (see, e.g., Coe and Scacco 2017).

The sampling units are press releases, public authorities’ accounts, and corporate statements, limited to those available online in the period when empirical research data were collected, which is July–September 2019. Units of analysis are individual documents derived from the sampling units by applying time and keyword restraints. The size and diversity of our research sample are briefly introduced in Table 1.

Table 1. Characteristics of the research sample.

Sampling Units	Types of Documents	No. of Units of Analysis
Press releases	Daily newspaper release *	296
	Magazine **	41
	Web service ***	225
Public authorities accounts ****	Statement	9
	Announcement	3
	Report	10
Corporate statements *****	Balance sheet	54
	Profit and loss account	54
	Introduction and notes to the financial statements	54
	Statutory auditor’s opinion	1
	Letter from the management board or other	1
	Report of the management board on its activities	5
	Current report (other than annual)	2
	Total	755

Note: * Dziennik Zachodni, Gazeta Wyborcza, Rzeczpospolita; Gazeta Prawna, Gazeta Polska Codziennie, Puls Biznesu, Głos Wielkopolski, Gazeta Lubuska; ** Polityka, Polska Times, Wprost; *** bankier.pl, podatki.gazetaprawna.pl, prawo.gazetaprawna.pl, finanse.gazetaprawna.pl, biznes.gazetaprawna.pl, gosc.pl, finanse.wp.pl, finansosobiste.pl, forsal.pl, infor.pl, korporacyjni.pl, mojafirma.infor.pl, money.pl, moneymarket.pl, pap.pl, parkiet.com, polskieradio.pl, prawo.pl, prnews.pl, stockwatch.pl, tvn24.pl, tvn24bis.pl, wiadomosci.onet.pl, wnp.pl, wszystkoofinansach.pl, wyborcza.biz.pl; **** Polish Financial Supervision Authority (KNF), Polish parliament, Polish Scientific Bibliography, Statistics Poland (GUS), Supreme Audit Office (NIK); ***** data retrieved from companies’ official websites, bankier.pl, parkiet.pl, gpw.pl (accessed on 1 August 2019). Source: own study.

The QCA of press releases and the accounts of public authorities allowed for the identification of 69 companies that had been negatively affected by derivatives (52 listed and 17 non-listed enterprises), representing 16 different industries according to the Global Industry Classification Standard (GICS) 2018. Those enterprises were further analyzed based on documents from the corporate statement sampling units. Table 2 presents a cross-industry variety of those companies.

The sampling in the case of our QCA was purposive and dynamic. New units were identified in the course of the research and added accordingly. This refers in particular to corporate statements, which were added after the identification of the companies involved in the debacle in press releases. Purposive sampling is one of the advantages of QCA—the selection of data may continue throughout the project, allowing for complete and accurate an-

swers to research questions and the presentation of the big picture (White and Marsh 2006). After open coding in the initial phase of the analysis, the coding scheme for our research was developed in the process of close, iterative reading, embracing categories that represent all relevant aspects of the research questions (White and Marsh 2006). To enhance the study's credibility and confirmability, we adopted triangulation based on multiple data sources for the analyzed phenomenon, as well as for a single aspect of a research question (White and Marsh 2006). As argued by Eisner (1991, p. 110), by triangulating data, the researcher attempts to provide 'a confluence of evidence that breeds credibility'.

Table 2. Characteristics of identified corporate cases.

No.	Industry by GICS	Listed Company	Non-Listed Company	Total
1	Construction and Engineering	12	3	15
2	Machinery	9	1	10
3	Chemicals	7	1	8
4	Food Products	5	1	6
5	Metals and Mining	2	4	6
6	Household Durables	5	0	5
7	Fuels	2	0	2
8	Paper and Forest Products	3	1	4
9	Automobiles	3	1	4
10	Health Care Providers and Services	2	0	2
11	Containers and Packaging	0	1	1
12	Building Products	1	0	1
13	Hotels, Restaurants, and Leisure	1	0	1
14	IT Services	0	2	2
15	Air Freight and Logistics	0	1	1
16	Aerospace and Defense	0	1	1
	Total	52	17	69

Source: own study.

The applied methodology certainly has some limitations. First, the research sample is limited to texts available online, the sources of which have been chosen by the researchers based on their knowledge and experience. Second, coding in QCA is subjective by definition. Third, the transferability of the research may be restricted due to the focus on a single economy and a specific moment in time, which constitute unique situational conditions.

While presenting the results, in the subsequent section, we illustrate the gradual accretion of details, creating a narrative of findings about the phenomenon being studied, supported by several tabulations and self-devised ratios.

4. Results

To present our research results in a clear and concise way, we begin with a review of the events leading to the debacle and follow with a descriptive answer to each research question, finishing by revealing figures depicting the scope and profoundness of the crisis.

4.1. The Economic Setup of the Debacle

From May 2004 to July 2008, the Polish zloty had been appreciating, until it reached a maximum of PLN/EUR 3.20¹⁰ at the end of July 2008. It was then that a couple of the largest Polish banks massively offered a panacea for the strong PLN, not only to exporters sensu stricto, but to most companies whose business operations required any transactions in foreign currency. The panacea was in the form of the so-called zero-cost currency option strategies that were structured in favor of banks and, hence, became highly toxic to entrepreneurs, who at that time were mostly inexperienced in terms of derivatives.

The Polish currency remained strong in August 2008 as well, but then within seven months, the exchange rate rocketed to PLN/EUR 4.90¹¹ (as of 18 February 2009), at which point the debacle reached its peak (see Figure 1). The Polish zloty fell against other currencies as well, such as USD, GBP, and CHF, which were paired with PLN in option contracts, albeit a minor part thereof. Derivatives positions as part of hedging led to losses that threatened the very existence of companies.



Figure 1. PLN/EUR exchange rates in 2008 according to the National Bank of Poland. Source: own study.

Back in 2008, the Polish capital market was by all means an emerging one, and it remains so according to the MSCI classification.¹² The market for derivatives, in particular, was at a very early stage of development, with the first currency option issued in February 1996 by ING Bank S.A. and with the commencement of futures and options trading on the Warsaw Stock Exchange in 1998 and 2003, respectively (Wisła 2008). In 2008, however, OTC derivatives trading grew rapidly. The FX options average daily net turnover on the OTC market reached EUR 523.74 million, which represented 50% growth year-to-year (Sobolewski and Tymoczko 2010).

The traditional rationale for regulating financial markets stems from concerns that events in these markets can have a significant impact on the economy. The lack of adequate regulations in Poland contributed to the event being studied having such an impact. One cannot imagine a better setup and timing for the calculated marketing of the FX option structures devised by financial institutions.

4.2. The Dark Side of Zero-Cost OTC FX Option Structures

The marketed currency option structures (also called strategies), which should be viewed as financial innovation¹³ from the position of Polish entrepreneurs back in 2008, were toxic in three respects: product design, distribution, and transaction execution, and they brought a series of negative consequences. If one applies the taxonomy proposed by Diaz-Rainey and Ibikunle (2012) to the analyzed phenomenon, the design of zero-cost OTC FX options may fall into the predatory schemes category; product distribution and transaction execution indicate abuse of financial innovation, whereas corporate financial distress, and its contagion effect on industries and markets, can be viewed as the unintended consequences of financial innovation. We elaborate on each respect below.

4.2.1. Product Design

The FX options strategies consisted of companies purchasing put options and simultaneously issuing call options to the bank in order to compensate for premiums due to the other party to an agreement. The product was advertised as a zero-cost structure (and in fact was an illusion of free hedging) and seemed easily affordable. In reality, the

compounded put and call options were highly asymmetrical—far beyond the normal asymmetry of rights and obligations embedded in this type of derivative. First, the strike prices were different. Second, the options had only the knock down-and-out barrier (which made the potential losses at a company limitless in the case of PLN depreciation¹⁴). Third, call options were leveraged (usually two- to threefold). The products turned out to be substantially overpriced, and according to a standard model of portfolio selection, such products would be rationally purchased by an investor only if their returns covaried positively with the investor's marginal utility (Merton 1982). The products were presented as one-size-fits-all protection against the strong domestic currency. Paradoxically, the high level of exposure of the analysed companies had little to do with their real need for hedging. Therefore, it is very unlikely that FX option structures satisfy any hedging needs of investors, as the product was not tailored to any cash-flow needs of a single company, nor any non-financial enterprise.

4.2.2. Distribution

The derivatives were distributed by the banks which cooperated directly with the affected companies. That meant they were usually offered by key account managers, who regularly visited a company and took part in its everyday financial operations. The timing of the product launch was crucial. The persuasion process illuminating a burning need for hedging was based on showing savvy forecasts and reports indicating further inevitable and long-term PLN appreciation. In addition to providing distorted analytical data to customers, no thorough information or details about the risk, product structure, or mechanism were delivered. The well-established relationships with clients, which allowed banks to exploit their trust, were no coincidence. Neither was the fact that the transactions were concluded based on general agreements with those banks, which had been signed years in advance and on appendixes (usually added in 2007) vaguely exemplifying the trade possibilities of the derivatives. Additionally, banks emphasised the herd behavior of entrepreneurs in their marketing communication. The fact that the derivatives traders were in many cases the same banks that credited the affected companies resulted in a situation where the companies were not able to renegotiate the transaction contracts. This weaker negotiation position for the companies, which also relied on financial institutions from the perspective of access to capital, created another asymmetry between the parties.

4.2.3. Transaction Execution

Transactions valued at millions of EUR were usually concluded over the phone and authorized by just one person—someone from middle or top management or their subordinates. The information asymmetry between the parties was considerable. Not only did a company not have any instruments to value the options and risk management procedures in place for derivatives, but it was unaware of its exposure to that risk. The accessible manner in which the option strategies were traded, together with the dubious authorization of individual transactions, could have given the impression that nothing risky and potentially harmful was happening. The operational risk was unprecedented, and the moral hazard was even magnified during the very first months of those activities when investors (companies) recorded profits on option transactions due to the still appreciating Polish zloty (until August 2008).

4.2.4. Negative Consequences of the Deals

The FX option transactions concluded, together with changes in market conditions, had a number of negative consequences, both for individual enterprises and in the macroeconomic dimension. Although the main motivation behind companies' engagement in option contracts was the desire to reduce the volatility of revenues resulting from exchange rate fluctuations, the financial products that were offered not only failed to protect them against that but became a source of financial losses in the millions and management problems instead. It should be mentioned that some of the press releases as well as the state

financial authorities' accounts suggested that derivative contracts could also have been concluded for speculative purposes—which, however, was denied in corporate statements.

The adverse effects on enterprises arising from derivative contracts consisted primarily of a dramatic deterioration in their financial condition in terms of debt levels, profitability, and liquidity (see Table A1 in Appendix A for details). Under the prudent valuation principle, companies were required to recognize the valuation of financial instruments in their balance sheets. This significantly increased their financial liabilities, resulting in a deterioration of debt ratios (a 27.23% rise on average in the research sample). The loss of profitability was clearly visible in the net results for 2008 (e.g., net profits dropped YTY by 107.38% on average in the research sample), which the companies quite often had to modify from a net profit of several million to a loss of several million. The atrophy of profitability was in most cases accompanied by liquidity setback (a 7% fall of current ratio YTY on average in the research sample). There was also a subsequent fall in the market value of companies as a result of falling share prices (a 59.94% decline of market capitalization YTY on average in the research sample). Further deterioration of profitability and indebtedness was also linked to the fact that some contracts with banks contained clauses allowing them to roll over the currency option contracts, which exacerbated the problem even more. At the same time, banks refused to renegotiate the contracts due to changing economic conditions, and the fact that they often also had other financial products, such as working capital facilities and investment loans, further impaired the already weak negotiating position of the enterprises. The expiration of the options as well as margin calls challenged companies' cash-flows. A sudden and profound loss of liquidity led to the obligation to declare bankruptcy and, in the case of better financial standing, to restructure proceedings.

The management consequences of the crisis were manifested in various anti-crisis measures, such as: conducting composition proceedings with creditors (mainly banks) and remedial proceedings; internal restructuring, e.g., in the area of employment (mainly through redundancies); adopting a concentration strategy and limiting outsourcing by reincorporating parts of the business into the company; reducing costs (mainly marketing, advertising, repairs, transport, and wages); reducing stocks; improving debt collection.

The exact number of companies affected by the currency options crisis in Poland in 2008–2009 is unknown. Press releases have indicated in that respect that at least several hundred or even several thousand companies may have experienced adverse consequences. Among those were enterprises that went bankrupt because of the loss on derivatives that they recorded. The number of those cases remains yet unknown. The growing scale of the crisis has had a snowball effect, causing perturbations in the activities of numerous entities cooperating with enterprises involved in option contracts. As a result, the negative consequences of the crisis began to make themselves felt across the economy.

Estimates of the number of derivative-related losses are extremely divergent and often juxtaposed with the negative valuation of options or with results from financial activities. For example, according to Statistics Poland (GUS), in Q4 2008 alone, the corporate sector¹⁵ incurred more than EUR 4.6 billion in losses on financial activities and another EUR 2.8 billion in Q1 2009.¹⁶ The Polish Financial Supervision Authority estimated the negative valuation of currency options at EUR 1.6 billion at the end of 2008 and at EUR 2.6 billion in 2009. The president of the Polish Business Roundtable valued the losses arising from options at EUR 14.2 billion. The Association for the Defence of Polish Enterprises—an initiative aimed at protecting Polish enterprises from the negative consequences of the crisis—estimated the losses on derivatives at approximately EUR 57 billion.

Our examination reveals, however, that the total derivative-related losses as of 2008 of only 37 companies, the data of which were available, amounted to EUR 762.7 million. The financial data of the analyzed sample of enterprises affected by the debacle illustrate the levels of financial distress and prove that the concluded deals were totally unrelated to the companies' hedging needs. There were cases when the derivatives valuation to annual sales revenues ratio was as high as 50%, the derivative-related loss to annual sales revenues ratio reached 71%, or the derivative-related loss was over five times greater than the market

capitalization of a given company. Selected financial details of the analyzed companies are presented in Table A1.

It should be stressed that the value of losses on derivative contracts estimated at the end of 2008 does not reflect the scale of the economic problems. First, many enterprises were still settling currency options in subsequent years. Second, the losses arising from the foreign exchange option crisis did not include additional corporate costs, such as the cost of expensive loans that the companies had to incur to settle the option transactions. Third, most of the entities infected with options were not listed companies—which are obliged to make their financial data public—so the actual number and losses of many entities will remain unknown.

4.3. Systemic Risk Mitigation?

In order to mitigate the crisis situation and save businesses, public authorities made efforts to change legislation. Bills were prepared, including the following: ‘on regulating certain legal relationships concerning currency options and amending other acts’ and ‘on preventing socio-economic consequences related to the introduction of certain complex derivatives into the economy’. Those bills were aimed, among other things, at suspending enforcement proceedings in the event of an entrepreneur initiating court proceedings in relation to currency options liabilities, as well as to reduce the adverse effects on citizens, the economy and the state budget resulting from the performance of asymmetrical currency option contracts. Other attempts to change the law also concerned renegotiating contracts with banks, breaking a contract with a bank in the absence of an amicable settlement, annulling option contracts by virtue of the law, and protecting companies from bankruptcy during ongoing negotiations with their creditors. None of those proposals came into force due to various reasons, including the lack of acceptance by the Polish Parliamentary Committee on Public Finance, citing arguments of non-compliance with the Constitution and EU law, as well as the fact that 70% of options contracts had been terminated by mid-2009. In fact, no systemic solutions dedicated to risks related to financial instruments have been introduced at the national level. Finally, Markets in Financial Instruments Directive (MIFID) was implemented in 2009 in Poland, and it seemed to impede the risky practices also related to financial innovations.

Enterprises affected by the currency options crisis also had to deal with tax offices, which was described as a ‘second blow to Polish manufacturers’. Those offices did not post the expenses for settling options as tax-deductible expenses, which entailed negative tax consequences for the enterprises. At the same time, if part of the liabilities towards banks were written off in the course of renegotiating contracts, the tax offices considered that to be taxable income. Work on the amendments to the treasury regulations continued until 2015, but ultimately these were not implemented.

Finally, it is worth mentioning that certain information on option contracts and the size of the resulting losses incurred by some listed companies was concealed, for which the Financial Supervision Authority imposed penalties in the total amount of approximately EUR 0.4 million¹⁷. However, there is only one known case of imposing financial penalties on financial institutions that had been offering hazardous financial innovations. No sooner than in 2021, Erbud S.A. (construction and engineering industry) won the court case against Bank Millennium concerning the loss on derivatives. The value of the dispute amounted to approximately EUR 20.2 million and concerned the compensation of damages caused to the company such as withdrawal of funds from the company’s bank account, lost profits, and costs associated with financial and legal consultancy. Upon the Court of Appeals decision, the company is to receive EUR 14.6 million plus statutory interest from the bank (WNP 2021).

5. Discussion

To the best of our knowledge, there has been only one attempt to tackle the FX options debacle in Poland from the perspective of financial innovation—by Daszyńska-Żygadło

and Pastusiak (2014). Those authors, however, illustrated the problem based on a case study of only one Polish enterprise. This proves that our analysis supplements the existing academic knowledge of the phenomenon in this matter. This is also one of very few papers published in English, which makes the topic more accessible to an international audience. Its novelty value, however, comes from the applied methodology and the adoption of the perspective of public opinion. QCA of press releases allowed the researchers to reconstruct the public's view of the event by collecting threads present in mass media communication. Such an approach is unprecedented when compared to prior works on this subject.

Finally, the added value of our study results from the identification of 69 companies affected by the debacle, and the examination of their financial data. This constitutes the largest sample recorded so far in academic literature, which can be the basis for further research.

In general, the results of our scrutiny confirm the observations of other scholars who have studied the Polish FX options debacle in terms of toxic financial assets, although some of their analyses are more fragmented in terms of the aspects considered.

6. Conclusions

There are three outstanding features of the FX options debacle in Poland—predatory financial innovation, neglected operational risks, and the lack of regulations, which to some extent mirrors the causes of the 2007–2008 global financial crisis (Afzal and Gauhar 2020). Our analysis, primarily focusing on the first one, provides evidence of the dark side of financial innovation traded on an emerging market, and it offers proof against financial innovation as an ‘engine of economic growth’. The case falls into all three categories of the negative impact of financial innovation proposed by Diaz-Rainey and Ibikunle (2012): FX option strategies were toxic with respect to product design, product distribution, and transaction execution, and although they may not have been a predatory innovation *per se*, the use thereof was certainly predatory. The products were mis-sold without explaining (or by obscuring) the associated risks. All of that together exploited customers’ cognitive limitations and abused information asymmetries. Finally, the deals concluded had unintended consequences that spread contagiously through industries and market networks, affecting the economy.

Risk is inherent in all financial products, but when some risks are neglected, ‘securities are over-issued relative to what would be possible under rational expectations’ (Gennaioli et al. 2012, p. 5). The FX option debacle in Poland is an example of neglecting risks—market, operational, and credit—which, once materialized, took by surprise both buyers (companies) and sellers (banks), who probably could not have anticipated the scale of the disastrous micro- and macroeconomic consequences of the deals concluded.

Debacles have always prompted calls for legal and regulatory reforms. Ironically, the MIFID, which was supposed to have been implemented in Poland by 1 November 2007, was delayed by two years (until 21 October 2009). It is believed that those regulations would or could have prevented the debacle. However, no matter what amount of regulation is in force, risk cannot be removed from financial markets. This is why a second crucial component is necessary—(operational) risk management and corporate governance. In line with Diaz-Rainey and Ibikunle (2012), the risks embedded in financial innovation can indeed be mitigated by strengthening regulatory capabilities, but at the same time corporate governance improvements at the level of the firm are necessary. The Polish derivative debacle revealed the existence of disturbing operational weaknesses among the companies involved. Such an experience should encourage companies to scrutinize their risk management practices—not only in the area of derivatives, but in other areas of their operations as well. The study therefore contributes to management practice, but it may as well enrich or verify the theoretical aspects of financial innovation.

With respect to future research, an unexplored avenue is related to measuring the extent to which materialization of operational risk on the company level during the debacle was transferred onto the market, sector, and economy level, as well as to whether the

actual financial market regulations create sufficient safeguards against similar incidents. Moreover, we want to signal an additional aspect of the crisis—in numerous cases, financial institutions breached the trust of their long-term debtors in the name of short-term profit. Such a problem is significant not only for business relations, but business ethics, too, and might be studied from this perspective as well.

We conclude with the apt observation that ‘financial innovation . . . is only as good as the people who employ its use’ (Afzal and Gauhar 2020, p. 9).

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Data Availability Statement: Data available in a publicly accessible repository that does not issue DOIs. Publicly available datasets, press releases, reports, financial statements were analyzed in this study. This data can be found on the websites: <https://dziennikzachodni.pl/>, <https://wyborcza.pl/0,0.html>, <https://www.rp.pl/>, <https://www.gazetaprawna.pl/>, <https://gpcodziennie.pl/>, <https://www.pb.pl/>, <https://gloswielpolski.pl/>, <https://gazetalubuska.pl/>, <https://www.polityka.pl/>, <https://polskatimes.pl/>, <https://www.wprost.pl/>, www.bankier.pl, www.podatki.gazetaprawna.pl, www.prawo.gazetaprawna.pl, www.finance.gazetaprawna.pl, www.biznes.gazetaprawna.pl, www.gosc.pl, www.finance.wp.pl, www.financeosobiste.pl, www.forsal.pl, www.infor.pl, www.korporacyjni.pl, www.mojafirma.infor.pl, www.money.pl, www.moneymarket.pl, www.pap.pl, www.parkiet.com, www.polskieradio.pl, www.prawo.pl, www.prnews.pl, www.stockwatch.pl, www.tvn24.pl, www.tvn24bis.pl, www.wiadomosci.onet.pl, www.wnp.pl, www.wszystkoofinansach.pl, www.wyborcza.biz.pl, <https://www.knf.gov.pl/>, <https://www.sejm.gov.pl/>, <https://pbn.nauka.gov.pl/core/>, <https://stat.gov.pl/>, <https://www.nik.gov.pl/>; www.gpw.pl, data retrieved from companies’ official websites, accessed on 1 August 2019.

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Appendix A

Table A1. Selected financial data of companies affected by the debacle identified in the research (in million EUR).

No.	Company Name	Code	Industry GICS	Total Sales Revenue in 2008	Net Profit/Net Loss in 2008	Net Profit/Net Loss Change 2008/2007	Total Assets as of 31 December 2008	Average Employment in 2008	Market Capitalization as of the End of 2008	Market Capitalization Change 2008/2007	Valuation of Derivatives as of the End of 2008	Loss on Derivatives in 2008	Debt Ratio Change 2008/2007	Current Ratio Change 2008/2007
1.	Ciech	1_Ci	Chemicals	583.1	4.3	−98%	576.1	301	193.19	−79.97%	293.4	48.4	10.24%	−32.67%
2.	Forte	2_Fo	Household Durables	136.0	1.3	−94%	126.9	2378	30.22	−33.28%	−7.1	N/A	−1.14%	49.64%
3.	Cersanit	3_Ce	Household Durables	395.4	1.2	−100%	576.6	292	N/A	N/A	12.1	15.1	14.69%	28.93%
4.	Odlewnie Polskie	4_OdPL	Metals and Mining	40.1	−30.2	−288%	24.1	654	5.54	−74.07%	N/A	28.5	308.87%	−80.61%
5.	Elwo	5_Elwo	Machinery	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	34.2	N/A	N/A
6.	Sanwil	6_Sa	Household Durables	11.9	−6.1	−124%	37.4	1	14.27	N/A	−4.3	3.6	N/A	N/A
7.	Rudniki	8_Ru	Chemicals	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.7	N/A	−75.81%

Table A1. Cont.

No.	Company Name	Code	Industry GICS	Total Sales Revenue in 2008	Net Profit/Net Loss in 2008	Net Profit/Net Loss Change 2008/2007	Total Assets as of 31 December 2008	Average Employment in 2008	Market Capitalisation as of the End of 2008	Market Capitalisation Change 2008/2007	Valuation of Derivatives as of the End of 2008	Loss on Derivatives in 2008	Debt Ratio Change 2008/2007	Current Ratio Change 2008/2007
8.	Huta Pokój	9_HuPo	Metals and Mining	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	37.0	N/A	−59.81%
9.	Ropczyce	10_Rop	Fuels	123.6	−11.2	−26%	143.3	467	10.16	−87.30%	11.4	5.6	N/A	−32.93%
10.	Jastrzębska Węglowa	11_JSW	Metals and Mining	2176.4	229.4	N/A	2785.4	N/A	N/A	N/A	N/A	28.5	N/A	−21.71%
11.	Katowicki Holding Węglowy	12_KHW	Metals and Mining	N/A	N/A	N/A	N/A	20,000	N/A	N/A	N/A	56.9	36.43%	−21.43%
12.	Węglokoks	13_Weg	Metals and Mining	790.8	13.2	−96%	346.3	154	N/A	N/A	N/A	N/A	77.99%	−52.48%
13.	Huta Szkła Krosno	14_Kro	Building Products	67.7	−39.8	−327%	94.5	3040	N/A	N/A	−10.8	11.1	64.38%	−70.99%
14.	Zakłady Azotowe Puławy	15_ZAP	Chemicals	636.6	53.2	N/A	624.1	N/A	691.00	58.75%	N/A	5.7	−14.02%	20.07%
15.	Paged	16_Pag	Household Durables	96.8	−15.3	−125%	98.8	2240	11.27	−85.33%	N/A	14.8	71.82%	−35.71%
16.	PLL LOT	17_Lot	Aerospace and Defense	76.1	2.5	−97%	109.7	477	N/A	N/A	N/A	113.9	92.37%	−58.62%
17.	Police	18_Pol	Chemicals	684.2	8.2	−99%	531.3	3203	106.31	−70.45%	N/A	35.3	58.10%	−33.16%
18.	Duda	19_Dud	Food Products	416.5	−4.6	−103%	310.8	597	N/A	N/A	−8.3	85.4	N/A	N/A
19.	Amro	20_Amr	Air Freight and Logistics	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.6	N/A	N/A
20.	Zelmer	21_Zel	Machinery	132.5	7.0	−94%	126.5	2522	N/A	N/A	N/A	8.3	49.21%	−33.59%
21.	Grupa Lotos	22_Lotos	Fuels	4638.1	−110.8	−104%	3473.2	1162	388.36	−73.03%	N/A	68.9	43.05%	−9.05%
22.	Feroco	26_Fer	Construction and Engineering	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	42.7	141.76%	−72.79%
23.	Barlinek	27_Bar	Paper and Forest Products	159.1	−9.3	−104%	319.7	2563	N/A	N/A	N/A	14.6	17.23%	−28.37%
24.	Erbud	28_Erb	Construction and Engineering	297.8	3.0	−97%	184.4	351	84.09	−74.06%	N/A	13.4	15.02%	−13.30%
25.	Fazos	29_Faz	Construction and Engineering	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11.3	N/A	N/A
26.	Azoty Tarnów	30_Az	Chemicals	389.4	20.6	−97%	456.6	2389	75.71	N/A	N/A	5.6	−22.71%	115.00%
27.	Fota	31_Fot	Automobiles	197.4	−12.8	−153%	126.8	1338	19.30	−74.03%	−3.8	3.8	31.53%	−22.35%
28.	Synthos	32_Syn	Chemicals	810.0	25.9	−90%	422.0	2000	165.73	−66.15%	−3.3	3.3	−7.72%	330.10%
29.	Pamapol	33_Pam	Food Products	107.9	−11.6	−108%	128.6	518	20.05	−87.01%	N/A	3.1	14.25%	−14.40%
30.	Sfinks Polska	34_Sf	Hotels, Restaurants, and Leisure	60.9	−18.3	−457%	36.1	117	30.54	−55.88%	N/A	1.7	80.04%	−70.00%
31.	Energopol-Południe	35_EnP	Construction and Engineering	25.1	−3.0	−128%	24.1	338	N/A	N/A	−1.7	1.5	13.83%	41.89%
32.	Pol-Mot Warfama	36_Pmot	Machinery	34.5	−1.2	−106%	32.0	518	6.06	N/A	N/A	N/A	−20.33%	33.33%
33.	Kolastyna	37_Kol	Chemicals	23.8	−2.8	−124%	44.4	406	10.30	−71.50%	N/A	N/A	24.09%	20.61%
34.	Polimex-Mostostal	38_Pmos	Construction and Engineering	1224.3	40.0	−90%	966.6	6359	391.24	−65.42%	N/A	N/A	7.81%	−13.89%
35.	Lena Lighting	39_Len	Machinery	35.0	0.5	−98%	34.2	138	8.92	−75.12%	N/A	0.9	16.02%	−21.38%

Table A1. Cont.

No.	Company Name	Code	Industry GICS	Total Sales Revenue in 2008	Net Profit/Net Loss in 2008	Net Profit/Net Loss Change 2008/2007	Total Assets as of 31 December 2008	Average Employment in 2008	Market Capitalisation as of the End of 2008	Market Capitalisation Change 2008/2007	Valuation of Derivatives as of the End of 2008	Loss on Derivatives in 2008	Debt Ratio Change 2008/2007	Current Ratio Change 2008/2007
36.	Decora	40_Dec	Construction and Engineering	86.6	0.0	−100%	80.3	746	29.93	−72.41%	N/A	N/A	18.60%	−22.22%
37.	Pfleiderer Group	41_Pfl	Paper and Forest Products	420.2	−4.1	N/A	523.9	585	25.91	−86.91%	N/A	N/A	9.35%	−33.64%
38.	Kopex	42_Kop	Construction and Engineering	564.3	24.3	−99%	918.8	382	N/A	N/A	N/A	N/A	N/A	N/A
39.	KPPD	43_KPPD	Paper and Forest Products	59.7	−0.2	−94%	32.2	1293	6.00	−84.46%	N/A	0.6	10.50%	−13.24%
40.	Optopol Technology	44_Opt	Health Care Providers and Services	19.8	0.6	−86%	35.3	186	N/A	N/A	N/A	N/A	−22.08%	32.30%
41.	Plastboks	45_PlaB	Chemicals	19.9	0.2	−98%	25.0	210	15.55	54.95%	N/A	N/A	−31.37%	−1.36%
42.	Indykpol	46_Ind	Food Products	217.9	−6.5	−109%	110.8	1320	20.71	−79.66%	N/A	N/A	26.80%	−28.07%
43.	Mieszko	47_Mie	Food Products	65.4	1.6	−85%	63.9	755	N/A	N/A	N/A	N/A	−4.24%	24.55%
44.	Trakcja	48_Tra	Construction and Engineering	226.2	15.9	N/A	214.7	286	181.38	N/A	N/A	N/A	−16.97%	27.34%
45.	Mostostal Export	49_Mos	Construction and Engineering	48.2	10.7	−74%	60.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
46.	HTL-Strefa	50_HTL	Health Care Providers and Services	40.6	8.7	50%	82.4	639	N/A	N/A	N/A	N/A	−9.30%	−23.88%
47.	Naftobudowa	51_Naf	Construction and Engineering	59.5	3.7	−91%	37.6	1136	N/A	N/A	N/A	3.0	N/A	N/A
48.	PJP Makrum	52_Proj	Construction and Engineering	59.9	4.0	−88%	45.9	795	22.63	−66.15%	N/A	N/A	35.98%	−24.85%
49.	Śnieżka	53_Sn	Construction and Engineering	148.8	2.9	−93%	94.6	862	101.47	−45.23%	N/A	N/A	6.18%	−2.38%
50.	Rafamet	54_Rafam	Machinery	33.5	0.6	29%	44.4	458	16.35	−43.40%	N/A	N/A	8.68%	−11.54%
51.	Zetkama	55_Zet	Household Durables	61.4	3.5	−54%	46.4	423	N/A	N/A	N/A	N/A	N/A	N/A
52.	Graal	56_Gra	Food Products	111.2	2.5	−95%	133.1	N/A	N/A	N/A	0.4	N/A	5.08%	25.84%
53.	PBG	57_PBG	Construction and Engineering	595.3	53.3	−87%	808.7	3977	756.90	−35.53%	N/A	N/A	−5.85%	7.41%
54.	Amica	58_Am	Machinery	352.0	1.0	−92%	226.8	2512	18.40	−60.83%	N/A	N/A	11.48%	−5.36%
55.	Koelner	59_Koe	Construction and Engineering	179.5	−1.8	−106%	0.2	2154	N/A	N/A	N/A	0.6	N/A	N/A
56.	Alchemia	60_Alch	Metals and Mining	272.7	10.5	−98%	251.2	1868	502.71	−27.92%	−22.0	N/A	41.74%	−32.27%
57.	RAFAKO	62_Raf	Machinery	320.4	−3.7	N/A	232.6	1797	57.25	−74.01%	10.6	5.1	3.05%	−8.22%
58.	Famur	63_Fam	Machinery	310.0	16.8	−96%	372.7	3989	148.02	−75.34%	N/A	N/A	2.73%	−22.94%
59.	ZREMB	64_Zr	Machinery	8.8	0.1	−88%	6.4	277	8.16	N/A	0.4	N/A	−31.41%	102.58%
60.	Apator	65_Ap	Machinery	101.4	6.6	−95%	88.8	398	95.03	−60.58%	N/A	N/A	125.86%	−51.42%
61.	Wielton	66_Wie	Automobiles	104.9	10.3	−93%	91.5	677	39.87	N/A	N/A	N/A	−3.96%	−12.07%
62.	ACE	67_ACE	Automobiles	112.1	0.1	−100%	97.3	893	2.73	−86.83%	−5.1	7.2	22.27%	−33.15%

Table A1. Cont.

No.	Company Name	Code	Industry GICS	Total Sales Revenue in 2008	Net Profit/Net Loss in 2008	Net Profit/Net Loss Change 2008/2007	Total Assets as of 31 December 2008	Average Employment in 2008	Market Capitalisation as of the End of 2008	Market Capitalisation Change 2008/2007	Valuation of Derivatives as of the End of 2008	Loss on Derivatives in 2008	Debt Ratio Change 2008/2007	Current Ratio Change 2008/2007
63.	Stelmet	68_Ste	Paper and Forest Products	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	37.0	8.40%	−28.95%
64.	NASK	69_Nas	IT Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.0	N/A	N/A
Total				18,971.2			17,486.4	83,141	4311.3			762.7		

Note: Other companies identified during the research for which financial data were not available: Kram (7_Kr), Solaris Bus and Coach (23_Sol), Terravita (24_Ter), Wielkopolskie Przedsiębiorstwo Robót Inżynieryjnych w Poznaniu (25_Wie), MIT Mobile Internet Technology (61_MIT). There are limited data as to particular types of derivatives owned by the analyzed companies. Only a few of them specified those types in corporate statements, and they were currency swap, extendible forward, forward, interest rate option, interest rate swap, plain vanilla option, TARN, and zero-cost FX option structure. Source: own study.

Notes

- ¹ To express PLN in EUR in this paper, we use the annual average PLN/EUR exchange rate of 2008, which is PLN/EUR 3.5132, and it has been counted based on the daily weighted average exchange rates published by the National Bank of Poland. Various estimates were reported by the Polish Financial Supervision Authority, mass media, and business associations.
- ² The biggest losses on derivative deals to date have been recorded by Societe Generale SA in the amount of USD 7.16 billion.
- ³ OTC-traded products are customized transactions, and counterparty risk is significant. This is why some protections are negotiated bilaterally between the counterparties. For example, dealers usually establish a line of credit for each customer, which limits their net exposure, and collateralization is widely used as well (see, e.g., [Hull 2012](#); [Marthinsen 2018](#)).
- ⁴ For an elaboration on the information asymmetry concept (see, e.g., [Gancarczyk 2009](#)).
- ⁵ A critique of financial innovation in academic literature has been vividly expressed, especially since the global financial crisis.
- ⁶ The 2007–2008 global financial crisis has put financial innovation high on policy-makers' and regulators' agendas ([Allen and Yago 2010](#); [Afzal and Gauhar 2020](#)).
- ⁷ Complexity confines the ability of market participants to accurately value assets ([Carlin et al. 2013](#)).
- ⁸ In alphabetical order: Allied Irish Bank PLC, Barings Bank PLC, Chase Manhattan Corp., China Aviation Oil (Singapore) Corp., Codelco Corp., Credit Suisse, Daiwa Bank Ltd., Deutsche Morgan Grenfell, Drexel Burnham Lambert, EOTT Energy, Partners LP, Griffin Trading Co., Kidder Peabody Group Inc., Long-Term Capital Management, Merrill Lynch, Metallgesellschaft AG, National Australia Bank Ltd., National Westminster Bank, Orange County, Procter and Gamble, Societe Generale SA, Sumitomo Corp., The Common Fund of the United States, and TransCanada Pipelines Ltd.
- ⁹ Options are asymmetrical derivatives that give buyers (long position) the right, but not the obligation, to buy (call options) or sell (put options) the underlying asset at an agreed price on (European options) or before (American options) a specific date in the future ([Marthinsen 2018](#)).
- ¹⁰ National Bank of Poland (NBP) average exchange rate.
- ¹¹ The exchange rate crossed the 4 PLN/EUR barrier in December 2008.
- ¹² On 24 September 2018, the decision of the FTSE Russell index agency, announced in 2017, came into force, reclassifying the Polish market from emerging to developed. On the other hand, MSCI Inc. still classifies Poland as an emerging market (as of November 2020).
- ¹³ When one understands innovation, based on the definition by [Damanpour \(1991, p. 556\)](#), as 'the adoption of an internally generated or purchased device, system, policy, programme, process, product, or service that is new to the adopting organisation', FX option strategies were innovative to Polish entrepreneurs in 2008—not only to particular companies, but to the emerging market economy of Poland as well.
- ¹⁴ No stop-loss for the company, only for the bank.
- ¹⁵ According to Statistics Poland, non-financial companies employing at least 50 people.
- ¹⁶ Factors other than the loss on derivatives may also have affected the result from financial activities.
- ¹⁷ The following companies were penalised, among others: Zakłady Azotowe Puławy S.A., Sfinks Polska S.A., Alchemia S.A., Paged S.A., Odlewnie Polskie S.A., Erbud S.A., Fabryka Mebli Forte S.A., Krośnieńskie Huty Szkła S.A., MIT Mobile Internet Technology S.A., and PKM Duda S.A.

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