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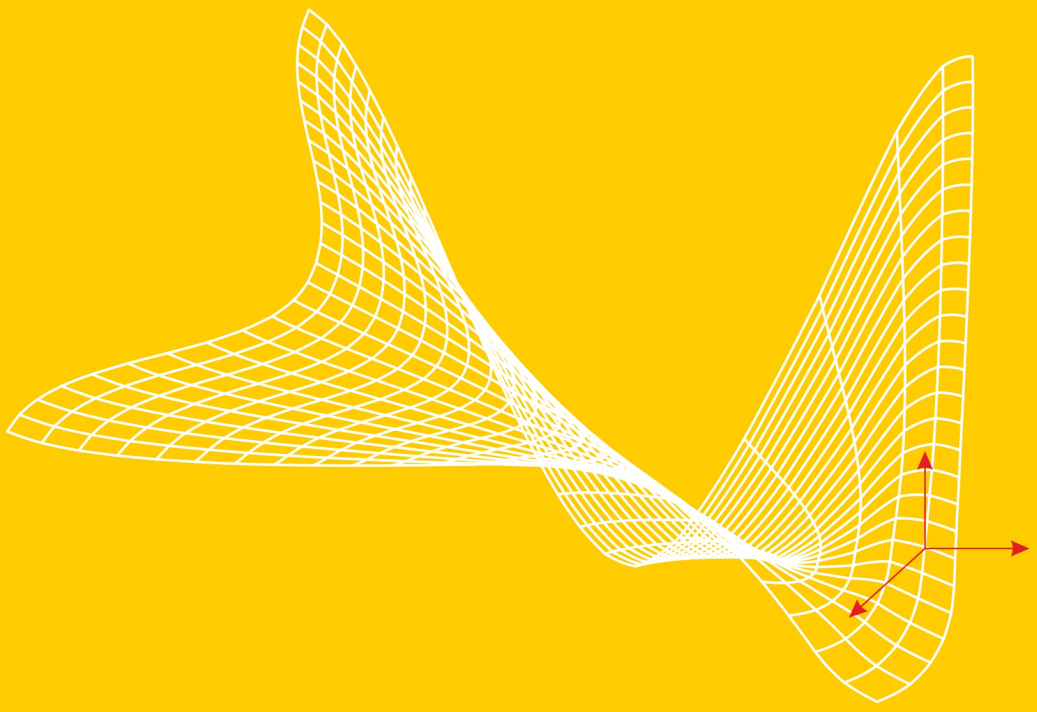

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Reflecting on reflections on COVID-19

Ynte K. VAN DAM, Joke F. WEBBINK

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Abstract:

Aim: This paper is an invited reaction to Platje, Harvey & Rayman-Bacchus, March 2020, 'COVID-19 – reflections on the surprise of both an expected and an unexpected event' in CEREM 4(1). In the tradition of critical science this paper starts from a discussion of the assumptions underlying the paper it reacts upon.

Findings: The original text is a laudable attempt to initiate a discussion on unpredictable future threats that remains constricted in semantic confusions, misperceptions, misinterpretations, and logical fallacies implying preconceived conclusions. As a logical consequence of a socio-economic system that systematically disregards human wellbeing and welfare – and exploits human weaknesses – in its endless pursuit of short term profit, the current pandemic and its subsequent crisis was expected and predictable, but wilfully ignored. And, unless this crisis will be used to rebuild the socio-economic system for sustainable development, so will be the next one.

Key words: COVID-19, Economy, Psychology, Sustainable Development

1. Introduction

Recent The March issue of CEREM published "COVID-19 – reflections on the surprise of both an expected and an unexpected event" (hereafter "REFLECTIONS") as an invitation to contribute to 'the discussion' and submit a reflection (Platje et al. 2020). As it was not clear which discussion was to be contributed to, the current contribution is a critical reflection. According to the first lines of its abstract REFLECTIONS reflects on the 2020 COVID-19 pandemic from the perspective of small probabilities and against the background of basic (and standard) economic

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principles. As implicitly promised the basic and standard economic assumptions themselves are not questioned. In our reflection we will briefly discuss the semantic confusions and economic confabulation of REFLECTIONS. Next we will discuss the socio-economic causes and consequences of the systematic crises of which the current pandemic is just one in a row of examples. Despite the opportunity to use this crisis to turn the tide and change the system towards sustainable development the authors foresee that all efforts will be geared toward further entrenching of the current disastrous system.

2. Semantic confusion

From the title onwards REFLECTIONS struggles with the meaning of 'unexpected' vs. 'expected' and 'unpredicted' vs. 'predicted'. First REFLECTIONS tries to classify the pandemic as a Black Swan (i.e. un unexpected, very unlikely event). REFLECTIONS pursues the black swan metaphor by comparing this pandemic to 'small probability events with potentially high impacts'. Consequently, the pandemic is dubbed 'an unexpected event that could have been expected to appear' (REFLECTIONS: 150), later refined into 'unexpected events that could be expected to appear unpredictably' (REFLECTIONS: 152). To confuse the issue even more REFLECTIONS mentions in passing that 'many predictions probably will not become reality' (REFLECTIONS: 151). At this point the reader may get irrevocably lost. If unexpected and unpredictable events are events that could have been expected to happen they must have been predicted. But if the unexpected has been predicted, and if predictions do not necessarily come true, then what is the meaning of 'unexpected' and 'unpredictable' in this context?

In fact the 2020 pandemic was neither unexpected, nor unpredicted, nor the first in our lifetime. REFLECTIONS quotes the inevitability of a pandemic in this globalised world from the Black Swan (Taleb 2007) so apparently it didn't require epidemiologic training to see it coming. Nor is global society very effective in managing pandemics, as claimed (REFLECTIONS: 152). For example HIV has been spreading unchecked since 1980. Rather than being managed effectively, HIV grew

into a global pandemic with 3.3 million infections annually in 1997. Since then the HIV pandemic has been tamed into spreading by merely 2.6 million new infections annually around 2005 (GBD 2015), and 1.7 million new infections in 2018 (WHO 2020). Since the beginning of the HIV pandemic 75 million people have been infected, of whom 38 million were living with HIV in 2018 (WHO 2020). Likewise Ebola was first described in 1976 and rages intermittently till the present day, while its fatality rate is usually well over 50%. Malaria, typhoid fever, cholera, and numerous other infectious diseases never were contained effectively either. Stating that we have managed many threats of epidemics shows a rather elitist worldview. We mainly managed to shift the burden of epidemics to the underprivileged majority on this planet. The 2002-2004 SARS outbreak, officially contained in 2003, convincingly has shown the effects of exponential infection in an unambiguous warning how fast a corona-type virus can spread across the planet. Since then the pandemic that eventually emerged as the Wuhan-virus just was an accident waiting to happen. It was bound to come, and it was increasingly likely to originate in China (Fan et al. 2019).

Already long before 2003 there have been warnings aplenty that the systematic destruction of the planets ecosystems will have repercussions that jeopardise human survival (Carson 1962; Meadows et al. 1972; WCED 1987). So what REFLECTIONS apparently means is that an expected and predicted event may hit our global political and economic system by surprise, because the most influential decisionmakers collectively and systematically deny and wilfully ignore predicted future disasters. Not because there is a small probability that it will happen but because, even though it is certain to happen sometime, there is a large probability that it will not happen in their tenure. This could be seen as a failure or weakness of the system. It is however far more correct to accept the empirical observation that this is the actual purpose of the current politico-economic systems on this planet. Empirically the ‘purpose of a system is what it does’ (POSIWID) nothing more and nothing less (Beer 2002). The majority of contemporary neo-liberal democracies and kleptocratic dictatorships have one common purpose. That purpose is the institutionalisation of direct private profit and greed by sacrificing long term human well-being and welfare (Steinzor 2012). Anyone who wants to change this shouldn’t try to repair or change the

existing system but should replace it by a radically different system with different institutions.

3. Economy of bookkeeping

REFLECTIONS builds on basic and standard economics, but is rather vague on what that entails. When using economics to discuss an ecological event it should be noted that economy and ecology share the same prefix, eco, derived from the Greek οικος, house or home. The suffix -nomy comes from νομος, law en the suffix -logy from λογος, which is speech or word or consideration. So these suffixes refer to the laws of the house and the talks of the house. It is time to realise that we have these words mixed up disastrously. What we call ecology refers to the irrefutable and nomological laws of nature that apply to our planetary home. What we call economy refers to the socially constructed stories we tell each other on how to manage our housekeeping. Economy is just words and ecology is the law.

This notwithstanding the text turns rapidly to the law of 'cost benefit analysis in economics' (REFLECTIONS: 151). What REFLECTIONS fails to mention is that cost-benefit analysis is a neo-liberal bookkeeping trick that favours short-term private profit over long term public investment (Driesen 2006). The cost-benefit state was introduced in the USA in the 1980s to counter the New Deal of the 1930s (Sunstein 1996). This effectively implied stripping the individual citizen of Roosevelt's governmental protection against many of the harms and risks of a market economy, such as unemployment, poverty, malnutrition, homelessness, lack of education, and hopelessness as a result of disability (Roosevelt 1944). The problem is not that cost benefit analysis does not provide the political and economic system with instruments that can handle rare and stochastic events. The problem is that cost benefit analysis is designed to preclude investing in future welfare and wellbeing. Cost-benefit analysis attempts to summarise the (long term) benefits in monetary value, and then discounts this 'revenue' over time to compare it to the short-term investments in terms of net present value. As long the analysis is used to choose among different investments with the same long term outcome it might be a useful tool, always

assuming that all relevant outcomes and consequences can be known and measured. Quod Non (Sunstein 1996). When it is used to decide for or against investing in general, its apparent elegance hides the ugly fact that under cost-benefit analysis no sewerage or metro system would ever have been built and that environmental protection would be impossible (Ackerman et al. 2005). Long term benefits are systematically underrated (if only because the value of, e.g., preserving nature for infinity would be infinite), and discount rates systematically overstate current costs and understate future benefits (Kahneman, Tversky 1979). The simple observation that sewerage systems, metros, hospitals, and natural parks do exist should be an indication that cost-benefit analysis is a rather poor excuse for the myopia of the currently dominant politico-economic system.

In its economic analysis REFLECTIONS continues to explain that 'there ain't no such thing as a free lunch' (TANSTAAFL). The origin of the phrase is not known, but in its widely popularised use it means no more and no less than that everything has to be paid for by someone eventually (Heinlein 1966). As long as all the costs and benefits are one's own this indeed resembles, as REFLECTIONS claims, the opportunity costs of sacrificing of one benefit for another. The implication of TANSTAAFL however, is that any cost is either carried privately or shifted to someone else. In our current economic system the price of the majority of products and services is kept low by shifting the majority of the costs to (current or future) global society. This, like cost benefit analysis, is a rather recent invention. An extensive analysis of legal cases from medieval times to modernity show how the balance of TANSTAAFL has gradually shifted from private sacrifices for social benefits to widely condoned externalities and public sacrifices for the sake of immediate private profit (Coase 1960). By focusing on opportunity costs REFLECTIONS misses this point entirely. When banks and multinational companies were bailed out in the 2008 crisis, government budgets were balanced by budget cuts across the board. This indeed is not a choice between buying a hamburger or a steak. It also is not a choice between investing in holiday resort, airport, education, or health system. It is not even a choice between treating one patient or another (REFLECTIONS: 152). It is the choice to save banks that are 'too big to fail' at the expense of robust and resilient systems for health care and education. It is the choice

for a society in which uncontrollable banks are indispensable and health care or education are not. And it has proven a choice for 'economising on spare capacity' and shifting the costs of emergency care with cumulative interest to the future where the crisis hits. And that future happens to be now. There just ain't no such thing as a free lunch.

4. Heart of darkness

REFLECTIONS takes a darker turn when discussing the precautionary principle as strategy to prepare for anticipated harm. The precautionary principle suggests that one takes time to review possible undesired consequences before wholeheartedly embracing innovations, in order to minimise the probability of foreseeable disastrous side-effects (Read, O'Riordan 2017). Conversely, where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation (UN 1992). The requirement to actually delay the implementation of new technologies while considering undesired side-effects or possible backfiring is rather unpopular among neo-liberal adherents of deregulation, especially with respect to business. Opponents of the precautionary principle argue that finding convincing scientific proof of lack of harm could paralyse all innovation, which is a hyperbolic rhetorical twist of 'considering undesired side-effects'. The precautionary principle has subsequently been translated into the obligation to take measure to avoid disastrously harmful situations (that may cause systematic collapse) at all costs (Taleb et al. 2014 as quoted in REFLECTIONS), which just is not feasible – especially if the threatened system nurtures the seeds of its own destruction (Marx, Engels 1848).

The current pandemic is attributed to an unknown mutation of a minor common cold virus. At the time of writing it is unknown how long the virus survives outside its host, how long it takes to infect a new host, how contagious it is, how it moves from host to host, how many non-symptomatic carriers it breeds, how many symptomatic carriers die of the infection, whether non-symptomatic carriers will die

of their infection two years from now, and so on and so forth. Nobody knows and everybody muddles through. This makes the current pandemic an exemplary wicked problem: everyone can define the problem and its cause in one's own way to derive one's favourite solution to the problem. Whatever measure is implemented to counter the crisis can be labelled anything from overreacting and creating panic to ignoring the seriousness and wilful negligence. Nobody knows, and if the long term consequences of any measure are unforeseeable then the precautionary principle warns against wholeheartedly embracing any single measure (Read, O'Riordan 2017). Here at least market theory, evolution theory, system theory, and the precautionary principle agree: trying the widest possible diversity of solutions offers the best chance of successful adaptation and survival – not necessarily for all individuals but for the species and the system.

Still in line with the precautionary principle REFLECTIONS argues that due to the current crisis the health care system is threatened in the short run, but the socio-economic system in the long run (REFLECTIONS: 154). This is an interesting 'Umwertung aller Werten', because the current absence of a resilient healthcare system can be attributed to its being sacrificed by the socio-economic system to short term corporate profit and/or shareholder value. This is related to the problem of unseen evidence (REFLECTIONS: 152), combined with politics that are dominated by public opinion. The masses are more easily pleased with 'bread and circuses' than by successfully avoiding disasters that never occur. Even more perversely an avoidable crisis that is managed successfully also scores better in the media than a manageable crisis that is avoided successfully.

"*From the economic point of view*" REFLECTIONS continues, "*should human life be saved at any cost?*" (REFLECTIONS: 154). Preventing as many human deaths as possible may have serious economic consequences, and the spread of the virus may be considered a natural event. This hides the ugly truth that this epidemic, and many other so-called 'natural' disasters, are the result of systemic choices to expose people selectively to foreseeable and predictable threats (Kelman 2020). Pandemics may be natural events, but their consequences – selectively affecting polluted regions, socio-economic groups, ethnic minorities, or opponents of the incumbent regime – are socio-economic and political events. When REFLECTIONS discusses the

affordability of offering health care and saving lives, it glosses over the fact that the word ‘affordability’ turns health care and living from a human right into a privilege. The current pandemic, like Ebola since 1976, like HIV since 1980, but also like the environmental destruction that continues unabated, like the innumerable refugee camps on this planet, all reveal the most sinister truth of our widely praised globalised socio-economic system: it doesn’t care the least little bit about human lives, it only cares about profit and privilege.

In creating businesses (and nation-states) humans have created complex adaptive systems with emergent properties (Lansing 2003). By and large these systems are living their own lives (Draman 2004). Even if these supra-human systems were designed to serve humanity, they have evolved beyond mere servitude (North 1993; Wilkinson 2006) and they have come to ignore their humans. The interest of business is, and has always been, in some respect different from, and even opposite to, that of the public (Smith 1776). And it has long been known that without stringent regulation and control business will widen the market and narrow the competition to pursue its self-interest (Smith 1776). Eventually this unrestrained and self-interested business will undermine society by fostering normlessness (Durkheim 1893). By its own nature business is an enthusiastic supporter of fascism and totalitarianism. Therefore liberal (or neoliberal) economic policy, or any economic policy that defends the interests of business against the public, is an enemy of liberal democracy (Polanyi 1944; Popper 1945). This notwithstanding the liberal democracies of the world have aided in the creation supranational institutions that serve the interests of global business (like UN, IMF, World bank, WTO) and these institutions in turn have forced, lured or cajoled governments into neo-liberal unleashing of business.

5. Living for the day

Among the many weaknesses of the human species is the ineptness to handle psychological distance (Trope, Liberman 2010). Events that are remote in time or space, that concern unknown and anonymous people, and events that have unclear

probabilities all are lumped in a category of psychologically distant and abstract (sur)reality. This implies a representation of reality in simplified general terms and evaluation in terms of desirability. Conversely events that occur here, now, to us, and for certain are psychologically proximal and concretely real. This implies representation of reality in detailed complexity and evaluation in terms of feasibility. The effects of psychological distance cover a wide range of cognitive and motivational effects that make us formulate the best possible resolutions for the future, while succumbing to temptation in the present (see, e.g. Van Dam, Van Trijp 2013, 2016). So we build a roof for the rain but we continue living in the caldera of Naples. Rain will fall and the caldera will erupt, both unpredictably but the latter less often so we ignore this larger threat. Tomorrow we will start saving and tomorrow we will act sustainably and tomorrow we will prepare for disaster, but forever we live in the present and tomorrow is always a day away (Sherman, Sherman 1964). As long as long term goals and short term incentives reinforce each other humans seem perfectly reasonable, but when distant goals require systematically sacrificing pleasure in daily life the distant goal rapidly becomes a lost cause.

This fundamental human weakness has been effectively exploited by modern business. The ever present convenience and indulgence that modern business promises overshadows the psychologically distant costs to health, the environment, and livelihoods. This fundamental human weakness is cleverly exploited by a neoliberal global economic system that provides instant gratification to some in the present with an exponentially growing debt to others and the future. This debt to the future was in economic terms over 300% of GDP globally before the current crisis hit the economy (Global Debt Monitor). In ecological terms this debt is that humanity uses 1.75 planet annually to support the global economy (Foot print network), and that human activity increasingly encroaches on wildlife habitats increasing the spill-over of viruses from natural hosts to humans (Cui et al. 2019). In socio-economic terms this debt means, e.g., child labour, discrimination, poverty, inaccessible healthcare, and/or inaccessible education (ILO, s.d.). And this debt has meant being unprepared for a pandemic that was neither unexpected nor unpredicted, but wilfully ignored for the sake of the growing GDP's of the past.

6. Concluding remarks

Humanity is duped by the short-sighted self-interest of world leaders who maintain and nurture a global socio-economic system that has outgrown its creators. This global socio-economic system repeatedly has displayed that its purpose is to destroy people, planet, and prosperity. Whether it is by the financial crisis of 2008, by ignoring pandemics that 'only hit homosexuals and/or sub-Saharan Africans', by nonchalant indifference to people rotting away in refugee camps all over the planet, or by the denial, disinformation, and political opportunism surrounding the current pandemic: the bankruptcy of the current socio-economic and political system has become increasingly clear over the past few decades. The discussion therefore should not be on unpredictable future threats, but on a global political and socio-economic system wilfully ignoring predicted future disasters.

People are supposed to believe that global economy is in a lockdown, and that a collapse of stock markets or evaporation of shareholder value is disastrous. This is one way of looking at it, but the reverse view is that the essential economy continues as ever. This is the economy that runs our household. Food is grown, care and cleaning are provided, education continues. If these services fail to reach those who need it that is a consequence of the current socio-economic system and not of its collapse If these activities are not considered valuable in our current socio-economic system that is just another reason to get rid of this system and those who serve it. Let's face it: the current economic system of oligarchic capitalism or corporate plan economies is a vastly expensive fiction to provide the most useless people with the highest income, and the most productive people with the lowest income (Smith 1776). From a human point of view, the real question is, should this economic system be saved at any cost? For mainstream economists this may sound horrible, but considering the socio-economic consequences of this current pandemic, the issue is relevant. For once ignoring the habitual selective blindness: when considering the visible consequences of this totally corrupted and bankrupt system, preventing and postponing its inevitable collapse may have serious socio-ecological consequences.

It has taken a pandemic, and especially the global fear of its seriousness, to give our global ecosystem the first months of breathing space in decades, or even

centuries. This might be a perfect moment to restart with a green slate, and force the economy to rebuild itself in line with sustainable development. The former French president and ex general Charles de Gaulle is reputed to have said that 'l'économie c'est l'intendance, et l'intendance suivra', the economy, like a supply corps, follows – no one in a right mind would let it set the course. But of course letting the economy set the course is exactly what will happen with governments who serve business rather than people. So at the next systemic crisis don't tell me that it is surprising, or that is unexpected and unpredictable. It will be just the next disaster that is waiting for its perfect moment to happen.

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Effects of terrorism and political instability on tourist behavior: 2016 conflicts in Turkey

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Abstract:

Aim: This article investigates the effects of two attacks and a failed coup attempt during 2016 on the tourist behavior. Foreign tourist data for the 2003-2019 period is analyzed to observe irregularities in Turkey's national tourism income.

Design / Research methods: Linear regression, multivariate regression and regression based static forecasting methods are applied for modeling the relationships. These models are supported with statistical tests.

Conclusions / findings: Results on this study are in accordance with the current literature in the sense that conflicts in 2016 caused a shift in tourist behavior which in turn impaired the tourism industry in Turkey. Repercussions did not endure longer than expected and Turkish tourism recovered rapidly, only facing a serious loss due to the shift in tourism demand trend.

Originality / value of the article: This study makes an addition to the terror and tourism literature, especially for the Mediterranean region and specifically for Turkey both of which are among the most popular tourist destinations worldwide. The aftermath of attacks and the coup attempt in Turkey during 2016 have not been researched before. The data and the outcomes presented sufficient evidence to infer on this issue.

Keywords: Terrorism, Mediterranean tourism, Turkey, Economic impact, Forecast, Demand

JEL: C12, C22, C53, E71

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1. Introduction

Tourism is an ever growing global industry. It's an important source of income for popular destinations, contributing positively to national GDP, employment rates, foreign direct investment and growth. For the developing countries this positive effect becomes more pronounced. Mediterranean region exemplifies this context ideally, harboring both developed and developing countries with indispensable tourism incomes. To name a few, Turkey, Israel, Greece, Egypt and Lebanon all promise similar benefits to the international tourists; impressive beaches, nature and historical sites at enticing prices. These mentioned countries alone make up for a total share of 5.1% of average worldwide tourism generated revenues during the last decade (including 2010-2017, calculated from the World Bank statistics as is the case in the remainder of this section).

Being the focus of this study, the tourism incomes play a significant role on Turkish economy. As a gateway between Europe and Asia, Turkey is one of the major destinations of tourists. Turkey shares borders with continental Europe, Caucasian region and the Middle Eastern region. In terms of proximity and prices, it's welcoming for visitors to enjoy both history and nature at the same time. Turkey has an average share of 2.39% worldwide tourism revenues in the last decade. The revenue shares of Turkey are 3.8% among the OECD countries, 13.7% among the European countries on the Mediterranean coast and 64.5% among the Levantine coast during the same period. Turkey's average tourism revenue share in the last decade is 11.8% among all of the Mediterranean countries (excluding Libya which lacked data). The share of tourism revenues in Turkey's GDP is 3.35% between 2010 and 2018. These figures show how important tourism is for Turkey's economy and Turkey is for international tourism.

Naturally, countries like Turkey thrive to sustain and improve their tourism incomes. The link between tourism and economic growth has been documented in the literature as being positive (Brida et al. 2016). A vast majority of approximately 100 published articles were in favor of the hypothesis that suggests tourism drives growth. On the other hand, one of the most important factors affecting tourist choice and behavior is safety. Terrorism and conflicts are among the strongest nominees for

affecting the tourist behavior negatively with evidence from numerous articles in the literature discussed in the next section. These two suggestions imply that terrorism and conflict not only endanger the national tourism revenues but also have an impact on national economic growth directly (Gupta et al. 2004) and via the decline on tourism revenues (Öcal, Yildirim 2010; Afonso-Rodriguez 2017).

Middle Eastern region has always been in constant conflict throughout the ages. Since the era of Sumerians and Akkadians, conflicts, conquests and wars have been commonplace. During the recent history, Turkey had its share of all types of conflicts; political, civil, military and by means of armed terrorism. As most notable milestones, 1960s were the times of leftist uprisings, 1970s saw the terror acts of ASALA (Armenian Secret Army for the Liberation of Armenia) and 1980s witnessed the birth of jihadist terrorism in the form of Turkish Hezbollah and the separatist Kurdish movements in the form of PKK (Kurdistan Workers' Party). There have been many riots and pogroms with notable examples of Thrace (1934), Istanbul (1955), Maras and Malatya (1978), Corum (1980) and Sivas (1993). Turkey faced two coups (1960 and 1980) during which there was a huge amount of left-wing and right-wing clash causing thousands of casualties. A military memorandum took place in 1971, along with a post modern military memorandum (1997), an e-memorandum (2007) and a failed coup attempt (2016). During the last decade, the newest notable additions to the list above have been ISIS (Islamic State of Iraq and Syria) on the jihadist side and FETO (Fethullahist Terror Organization). The latter is a religious cult-like structure judged to have constructed a parallel organization, penetrating the key positions in bureaucratic and judicial institutions, and in military and police forces, in order to intervene and take over the government via the 15 July failed coup attempt. A well structured history of terrorism in Turkey before 2010 is summarized by Öcal and Yildirim (2010).

For Turkey, a country which does not have the luxury to risk its tourism incomes, 2016 was an exceptionally disastrous year. There were 16 suicide bomber attacks from PKK, TAK (Kurdistan Freedom Hawks) and ISIS causing 320 deaths. The failed coup attempt on 15 July billed 240 losses and a nationwide outbreak of accusations and arrestments under the emergency state. Also Turkish military forces initiated the land operations for the safety of southern borders in northern Syria. It was not a year to be

forgotten easily and it is reasonable to expect this huge accumulation of terrorist activity and political instability to highly impact the tourism potential for Turkey negatively. The repercussions of 2016 conflicts have not been analyzed yet as we know of it. Perles-Ribes et al. (2016) made a note on it, stating that this period may compromise their conclusions which present Turkey as a winner in terms of tourism based on the Arab uprisings and the effect of 2016 on this interpretation needs to be researched. As we discuss in section 3, the 15-period data looks sufficient to evaluate how tourism in Turkey coped with such a disadvantageous period.

The organization of the rest of the study is as follows. In the next section we provide a brief literature review, focusing mostly on tourism in Turkey and the Mediterranean region. Then we present the data sources and the hypothesis of the study. The following section shows the analysis and the empirical results. Finally we conclude with a summary of the research, findings and their implications.

2. Literature review

Research about the effects of local unrest, terrorism and political instability on tourism took off during the 1990s when the barriers for traveling abroad relaxed, the global media became easier to access and people were more aware of the events taking place in their desired destinations. Although the history of the events stretch further back, by this time all types of unrest and conflicts including terrorist attacks, civil wars, shootings, coups and such became more visible. In the 1980s, Turkey had faced a coup at the start of the decade and the terror acts of Kurdish separatist groups and radical Islamic groups had just started. Israel had conflicts with Palestine and Lebanon with other countries such as Syria and Iran joining the crises on and off. Iraq and Iran had engaged in war. Pakistan and Afghanistan were in conflict and the overall Middle Eastern region had no rest with minor changes in its intrinsic dynamics to this day. In Europe, ETA (Basque Homeland and Liberty) was active in Spain whereas the acts of counter GAL (Antiterrorist Liberation Groups) stretched to France. IRA (Irish Republican Army) was also active in Ireland and UK. Popular tourist destinations like Italy, France, Egypt and Greece also faced serious terrorist attacks. Since then acts of

terrorism continued throughout the world. As a matter of course, the focus of related scientific research was at large on terrorism and war.

Enders et al. (1992) were one of the first to point the negative relationship between terrorism and tourism where they state that increasing acts of terrorism resulted in a decline of revenues gathered from tourism. From here onwards, our take on literature review will bias on Turkey and tourism related competitors of Turkey.

In the Mediterranean region, the negative effect stated by Enders et al. (1992) was confirmed for the 1991-2000 period with an added detection of cross-country demand shift between Greece, Israel and Turkey (Drakos, Kutan 2003). They also state that intensity of casualties and geographic dispersion have an effect on tourism and the acts of terrorism shall be decomposed which is one of the motivations of this study. Llorca-Vivero (2008) verified the adverse effect of declined tourism flows, especially as being more accented for developing countries like Turkey, in their study analyzing flows from G-7 countries to 134 destination countries.

In a study investigating how the macroeconomic parameters of 22 (including Turkey) low to upper-middle income countries were affected by armed conflict, Gupta et al. (2004) found that armed conflict has a negative impact on growth, inflation and governmental spending on defense at a level that risks macroeconomic stability. The effect on growth was stated to be both indirect via defense expenditures and also direct. Yaya (2009) also studied the economic effects of terrorism on tourism, taking Turkey into focus, and found a small decline in tourism industry growth but a large decline on tourist volume. He pointed to a decline of 6 million tourists in a 9-year period and a 700 million USD bill corresponding to costs caused by terrorism for 2006 alone. In another study, Öcal and Yildirim (2010) reported a negative effect of terrorism on overall growth in Turkey in which they support the country focused approach as opposed to cross-country analysis on grounds of risks of heterogeneity. The effect is stated to be more pronounced in the Eastern and South Eastern regions where the terror acts are relatively concentrated. Their suggestion on behavior heterogeneity was later verified by Seabra et al. (2013) at least based on the tourist segmentation perspective.

Feridun (2011) investigated the 1986-2006 time period for Turkey, the period where PKK was most active in terms of armed terrorist activities, and found a negative

causal effect of terrorism on tourism while pointing to a long-run equilibrium level relationship between the two.

Alvarez and Campo (2014) concluded that the image of Israel and the Turkish people's intentions to visit Israel were negatively affected after the Mavi Marmara conflict between the two countries. To pinpoint the importance of political conflicts, Saha and Yap (2014) analyzed 139 countries to find that political volatility and conflicts play a more important role than one-off terrorist attacks as far as the national tourism industries are concerned.

In an extensive study focusing on 1977-2014 time frame, Afonso-Rodriguez (2017) found evidence of negative effects of terrorist attacks on Turkish tourism industry and economic growth. He states a decline up to 10% is plausible in real GDP when the severity of attacks are over a certain threshold.

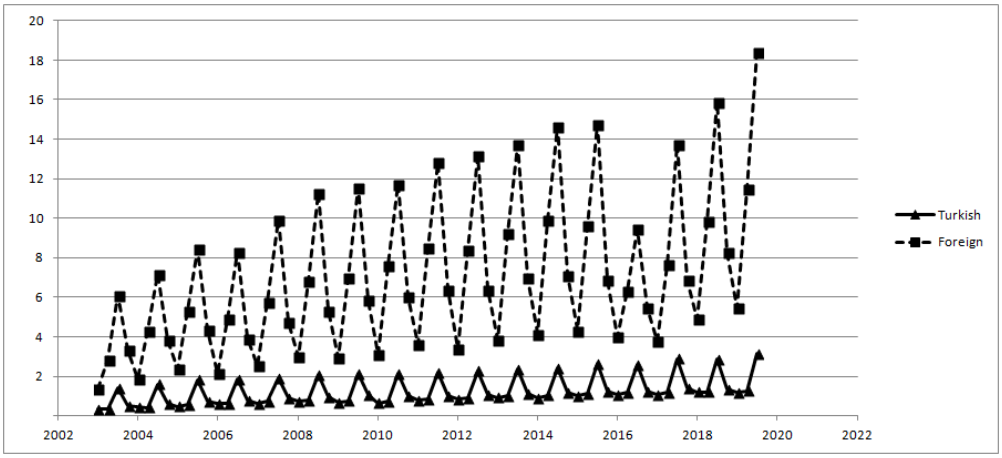
Perles-Ribes et al. (2018) analyzed the effect of Arab uprisings to the Mediterranean tourism to reveal a negative effect in the countries of conflict (mainly Tunisia and Egypt) and a spillover to alternative destinations (Turkey and Morocco). They also noted a postscript about the conflicts in Turkey during 2016 as a cause of uncertainty which is another motivational point for this study. In another recent Mediterranean cross-country analysis, Bassil et al. (2019) studied the tourism – terrorism relationship and the spillover effect between Turkey, Lebanon and Israel. According to them, tourism demand for Turkey and Israel increases when Lebanon faces terror acts whereas Turkey or Israel face a decline when terrorism acts take place in the other country.

As an opposite evidence however, Liu and Pratt (2017) noted that there is no long run effect of terrorism on tourism (9 out of 95) and very small evidence of short run effect (25 out of 95) and yet the effect is rather dependent on political regime, income level and tourism intensity. Still there is sufficient evidence to conclude that terrorism has a significant negative impact on tourism and the geographically close alternative destinations benefit from the suffering country's misfortune.

3. Data and hypotheses

For this study, the data sets used were obtained exclusively from Turkish Statistical Institute (*http://www.turkstat.gov.tr/Start.do*) and The World Bank statistics (*https://data.worldbank.org/*) where noted, such as seen in sections 1 and 4.4. The analysis was based on quarterly reported tourism variables. Main variables utilized were the number of foreign visitors and the incomes generated from foreign visitors. Since the incomes and volumes are highly correlated, only tourism incomes were utilized. Tourism statistics of Turkey are presented threefold; in groups of foreign visitors, Turkish citizens resident abroad and Turkish citizens resident in Turkey. The third group was excluded from the study since the study focuses on the behavior of international tourists visiting Turkey. As for the remaining two groups, Figure 1 shows that the conflicts may have a possible effect on foreign visitors, but a similar reaction is even less than subtle for the Turkish citizens residing abroad. For this reason the scope of the study was limited to the foreign tourists visiting Turkey.

Figure 1. Number of foreign and Turkish resident international tourists visiting Turkey (in millions)

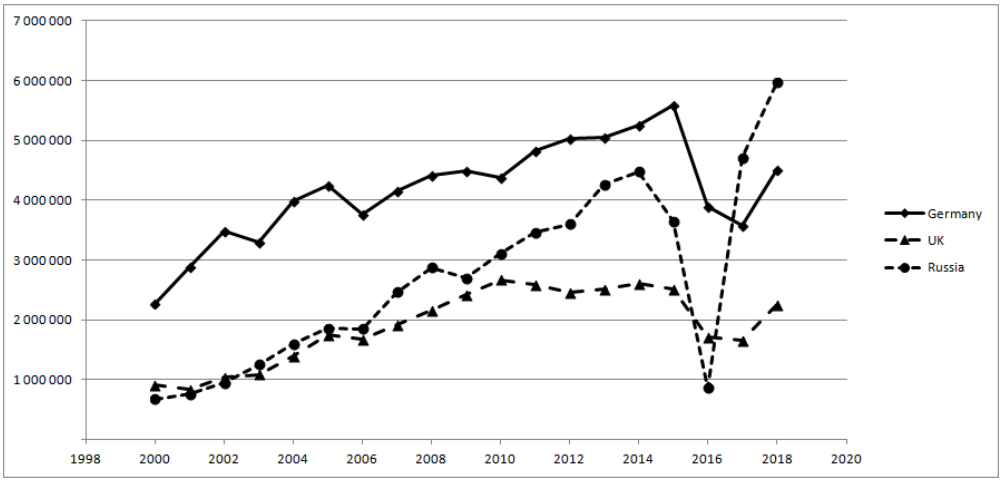


Source: Data processed from *http://www.turkstat.gov.tr/Start.do* by the author

It can be argued that Turkish citizens living abroad have a reason to visit their homelands and were either not affected by the conflicts or were reluctant to cancel

their trips to Turkey. Foreign visitors on the other hand did not have such a motivation and had a chance to cancel or postpone their visits and converted to an alternative destination. Regardless of the reason, the practical consequence of this differentiation in behavior results in the fact that the study would not have benefited from analyzing the Turkish citizens living abroad and therefore this group was also discarded.

Figure 2. Annual visitors to Turkey from the top three source countries



Source: Data processed from *http://www.turkstat.gov.tr/Start.do* by the author

Quickly glancing at the top three countries, a possible 2016 effect is observed clearer in Figure 2 which includes the German visitors with Turkish origins. Tourists of these countries mainly visit for holidays and consequently may have sacrificed (or picked an alternative destination) their plans due to a perceived safety risk. The next group of countries with two million or more visitors (Bulgaria, Georgia, Iran and Iraq) share borders with Turkey and the majority of tourists from these countries visit either daily or for weekends, are expected to be frequent visitors and to be familiar with conflicts in Turkey and thus were not included in the graph.

Foreign visitors show a very well structured demand pattern with an expected seasonality between the four quarters of the year displaying peaks in summer and troughs in winter periods and a general linear upward trend. However, a significant shift is observed during 2016 where the shift becomes most salient at the third quarter.

This corresponds to the period including 12 January Istanbul attack with some lag and 28 June Istanbul airport attack and 15 July failed coup attempt. We expect these dates to be the most striking events of 2016 within the foreign tourists' perception. Based on this irregularity the following hypotheses were constructed:

- H_1: There is a structural change in tourism volume and national tourism incomes which could be attributed to the 2016 conflicts
- H_2: The 2016 conflicts had a significant negative effect on Turkey's tourism demand trend
- H_3: There is a negative shift of tourism trend caused by the 2016 conflicts
- H_4: The 2016 conflicts had a negative impact on Turkish economy

First hypothesis is tested threefold including a breakpoint test and multivariate regression. In the previous section, it was observed from the past research that potential insecurities based on safety would affect the tourist behavior negatively. Two attacks summing up to almost 300 casualties (51 total losses) and a coup attempt causing close to 2,000 casualties (240 losses) is capable of triggering a radical change in tourist opinions to reconsider their destinations along with a large number of attacks throughout the year.

Second hypothesis is investigated by statistically testing the linear trends before and after the start of conflicts. For the third hypothesis, static forecasts were carried out and the potential losses of tourism revenues are compared with Turkey's GDP and reserves.

4. Empirical results

4.1 Structural change in tourist volume and respective revenue

In order to verify the potential structural change caused by the conflicts, revenues generated from tourism were processed as a linear regression with respect to time as a first step. This regression yielded the linear model;

$$RF_i = 3{,}18\text{m} + 55{,}424\ Q_i$$

where RF_i is the quarterly tourism revenues for period i and Q_i is the incremental quarter index.

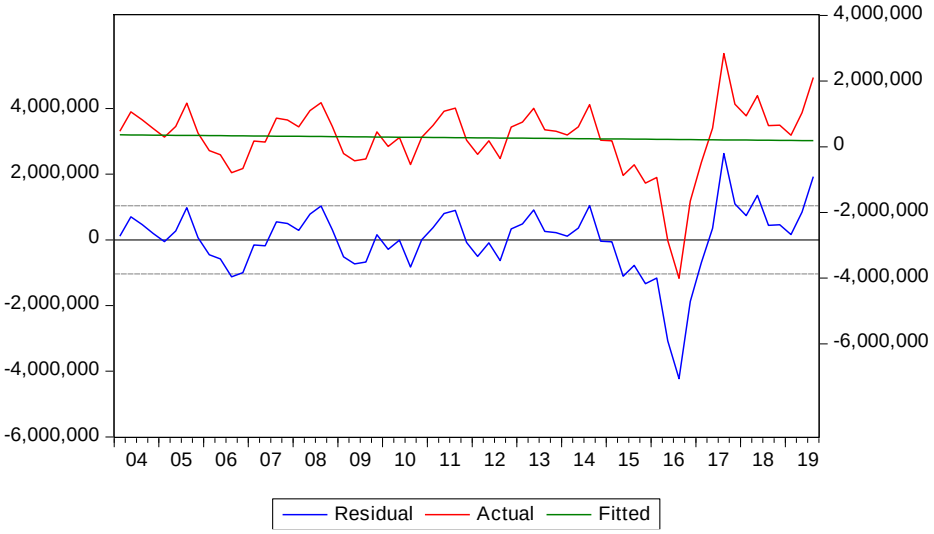
The reason for using a linear regression was to prepare a basis to carry out a structural break test. The chosen test is the popular breakpoint test offered by Chow (1960: 599-602). Results of the test proved that there was a structural change at a 95% confidence level which are presented in Table 1. The sampling period chosen for the Chow test ends in 2016q1.

Table 1. Chow breakpoint test results for RF and VF

Test for RF (2003q1-2016q1)	
F-statistic (Prob.)	5.43 (0.007*)
Log Likelihood Ratio (Prob.)	10.65 (0.005*)
Wald Statistic (Prob.)	10.86 (0.004*)

* Significant at 95% confidence level.

Figure 3. Seasonal difference regression and error plot (DRF)



To make the structural break clearer, the four-period seasonal structured data set was transformed into a four-period ordinary difference data set. Such transformations are expected to provide nearly flat regressions with identically distributed residuals.

The resulting transformed regression and respective residuals for the differenced variable DRF are shown in Figure 3. Figure 3 provides an alternative clear view of the sudden drop in 2016q3 in generated tourism revenues where either the failed coup attempt and 28 June attack received a sudden response or a 6-month lag effect of the 12 January attack is observed.

As a third check, a dummy variable (D) was created where it assumed values of zero for the sampling period in the Chow test and one otherwise. This variable was added to the previous linear regression as a second independent variable. Multivariable regression model is given below in equation (1). Outcomes are presented in Table 2.

$$RF_i = \alpha + \beta_1 Q_i + \beta_2 D_i + \varepsilon_i \qquad (1)$$

Table 2. Multivariable regression results

	RF regression with D	VF regression with D
Intercept (Prob.)	2,422,732 (0.0001*)	3,294,358 (0.0005*)
Quarter variable (Prob.)	93,332 (0.0000*)	130,196 (0.0001*)
Dummy variable (Prob.)	-2,435,636 (0.0111*)	-2,196,303 (0.1228)
Adjusted R^2	0.239	0.245
F-prob.	0.000059*	0.000046*

* Significant at 95% confidence level.

Multivariable regression results show that the dummy variable has a significant effect on the generated tourism revenues.

Hence, we conclude this subsection by stating that the first hypothesis was verified and the 2016 conflicts can be regarded as a factor, hindering the tourism potential and incomes of Turkey. It is apparent that foreign tourists visiting Turkey showed a tendency to cancel their trips after the first attack and during the quarter of the coup attempt and the second attack in targeting tourists during the same year in Istanbul due to safety concerns.

4.2 Trend change before and after the 2016 conflicts

Next we investigate whether there was a change in tourist behavior portrayed by a change in trend before and after the conflicts. It was argued before that the visitors with Turkish origin showed no signs of desisting from travelling to Turkey. But this was not the case for foreign tourists. Due to the fact that armed conflict part of the coup attempt ended in a mere couple of days, and that the repercussions were mostly based on interrogations and investigations directed on discovering and apprehending the attempters with no observable threat on civilians, it is plausible to expect the tourism demand for Turkey to survive this incident unscathed. But as Perles-Ribes et al. (2019: 1826) stated, the repercussions of the two armed attacks involving tourists and the remaining local attacks could be huge and whether Turkish tourism industry would recover is yet to be analyzed.

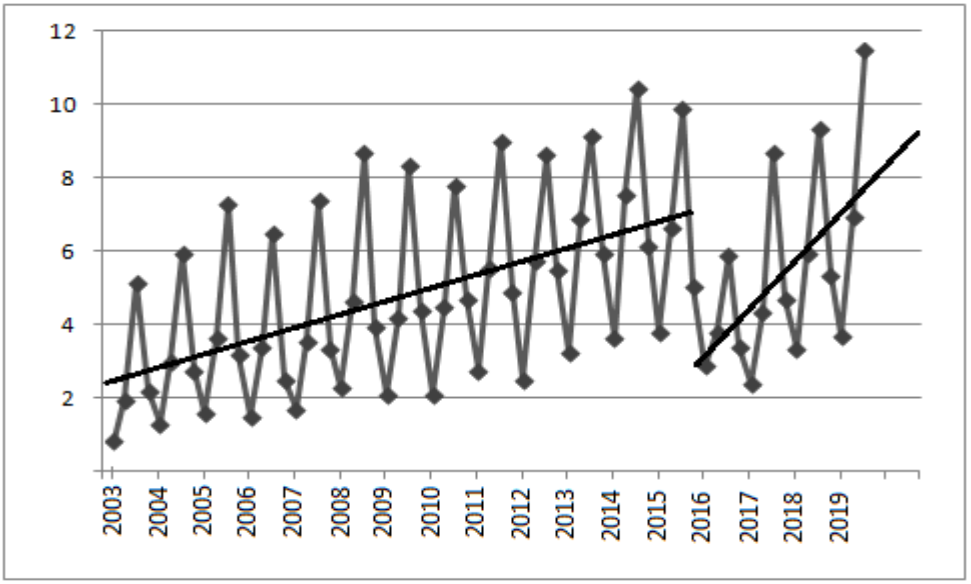
Table 3. Tourism revenue trends before and after the conflicts

	Before the conflicts (Model 2)	Remaining periods (Model 3)
Constant variable (Prob.)	2,572,178 (0.0001*)	-14,477,505 (0.0902)
Quarter variable (Prob.)	87,472 (0.0000*)	338,495 (0.0250*)
SE of Quarter variable	19,677.73	133,697.30
R^2	0.283	0.330
F-prob.	0.000049*	0.025039*

* Significant at 95% confidence level.

For this purpose, the sample was split into two in a similar fashion as the previous subsection. Pre-conflict and the remaining period revenues were separately converted into linear regressions in order to test their slopes to see if the latter period has a significantly flatter slope. Since the significance for structural change was more apparent in generated revenues, we proceed with the remaining analysis with the RF variable. The outcomes of the two aforementioned regressions (labeled as models 2 and 3) are given in Table 3 and the matching graphs are presented in Figure 4.

Figure 4. Tourism revenues (in billion USD) before and after the conflicts



As is readily seen from Figure 4, the general trend changes after the conflicts with a sharper slope, denoting an overall increase in tourism revenues for Turkey. The change in trend shall be considered significant via testing. Such a test is offered by Paternoster et al. (1998: 862). Accordingly, the test statistic Z for the null hypothesis H_o: $\beta_1 \geq \beta_2$ can be calculated from the regression outputs in Table 3:

$$Z_{cal} = \frac{\beta_1 - \beta_2}{\sqrt{SE_{\beta_1}^2 + SE_{\beta_2}^2}} = \frac{87{,}472 - 338{,}495}{\sqrt{19{,}677.73^2 + 133{,}697.30^2}} = -1.85754$$

Resulting Z value has a p-value of 0.0316, meaning a rejection of the null hypothesis at a 5% significance level. Therefore we conclude that after the first shocks, the general trend of tourism demand for Turkey was not negatively affected by the 2016 conflicts and Turkey actually recovered fairly quickly from such a hazardous period.

The main drivers of this recovery may be attributed to several factors. Firstly, the Turkish Lira devalued heavily against Euro and USD starting from October 2016 (possibly due to the coup attempt) until late 2018 whereas the exchange rates were mostly stable during the prior one year period. This, in turn might have lead to a

boosted spending power for foreign tourists visiting Turkey. The economic instability in Turkey also acted as a driver which accented the country as a significantly more affordable tourist attraction. Secondly, Turkey started investing in international tourism advertising campaigns in the last decade. Thirdly, major companies contributed largely to the image of Turkey via sponsorships. Especially Turkish Airlines became a huge actor, most notably sponsoring F.C. Barcelona (2009-2015), EuroLeague (2010-2020) in Europe and advertising in the Super Bowl games since 2016 in the United States among many other sponsorships.

It must also be noted that two other direct tourism competitors of Turkey struggling with constant conflicts, namely Israel and Egypt, have experienced completely different scenarios. Israel has an almost linear monotonic increase in their tourism revenues while Egypt's tourism revenues went downhill after the Arab Spring in early 2011 and did not recover until 2016.

4.3 Trend shift after the 2016 conflicts

To effectively control a possible shift in Turkey's tourism demand due to the 2016 conflicts, this time we test the regression given in 4.2 for the intercepts. The null hypothesis H_o: $\alpha_1 \geq \alpha_2$ will be tested. The t-test utilizes a pooled variance of the two intercepts from the regressions (Kleinbaum, Kupper 1978: 101-104) in the form given in equation (3);

$$S^2_{(\alpha_1-\alpha_2)} = \left(\frac{SSE_1+SSE_2}{n_1+n_2-4}\right)x\left(\frac{1}{n_1}+\frac{1}{n_2}+\frac{\overline{RF}_1}{SS_{RF_1}}+\frac{\overline{RF}_2}{SS_{RF_2}}\right) \quad (2)$$

So the test statistic (in million USD) becomes;

$$t_{cal} = \frac{\alpha_1-\alpha_2}{\sqrt{S^2_{(a_1-a_2)}}} = \frac{2.57-(-14.48)}{5.41} = 3.15$$

with a p-value of almost 1.00, which leads to a rejection of the null hypothesis. Thus, we conclude that there has been a significant shift during 2016 and the tourism demand trend declined radically.

4.4 The economic repercussions for Turkey

In this part we focus on a possible scenario where 2016 was a year with no significant conflicts affecting the tourist behavior negatively. In such a case, there would be two alternative expectations. First would be to expect the tourism revenues to follow the past trend and seasonal structure hereafter called the neutral model. Second one is rather more optimistic in which we expect the trend to be sharper upwards as was actually observed.

Therefore we propose two seasonally adjusted static forecasts for the two respective scenarios. Methodology is similar to Ferbar Tratar et al. (2016) but in a static manner without a Holt's or Winters' style dynamic adaptation. The main idea is to smooth the seasonal data via three-period equally weighted moving averages, applying a regression to the smoothed data, obtain the average seasonal factors from the regressed values and estimate the future revenues generated from foreign tourists with the seasonal factors in charge. The model described is given in equation (3) and is of the form;

$$FC_i = (L + TxSRF_i)xSF_i \quad (3)$$

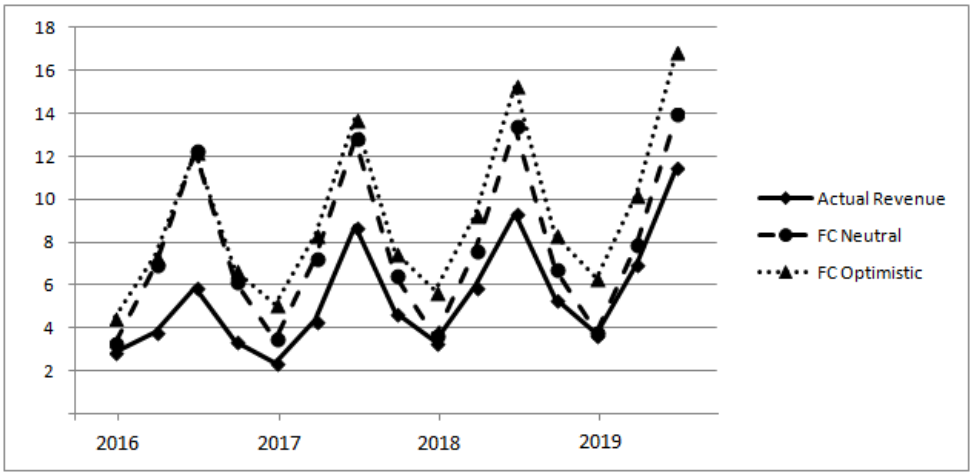
where FC_i is the forecast for i^{th} quarter, L and T are the intercept and slope of the linear structure, SRF_i denotes the smoothed revenues and SF_i denotes the multiplicative seasonal factor for repeating quarters given in mod(4). The neutral model is derived from the period 2003 – 2015 and the optimistic model from the steeper period of 2016 – 2019. Both then are used to estimate the 2016-2019 period tourism revenues in the absence of the conflicts. The forecasts are given in Table 4 and visualized in Figure 5.

Table 4. Forecast outputs of the neutral and optimistic models

	Neutral model	Optimistic model
L	2,587,758.68	3,375,395.16
T	84,879.54	243,791.09
SF_1	0.467	0.622
SF_2	0.966	0.985
SF_3	1.685	1.583
SF_4	0.839	0.841
In-sample MAPE	9.7%	6.1%

The forecasts returned fairly acceptable MAPEs, both under 10%. Based on Figure 5, a revenue gap exists (between the dotted and straight lines) caused by the effect of 2016 conflicts on the behavior of foreign tourists visiting Turkey. We simply assume this gap as a potential loss of tourism incomes for Turkey and calculate the relevant losses in Table 5 and compare them with respect to Turkey's GDP and reserves.

Figure 5. Actual revenues, neutral and optimistic forecasts (in billion USD)



Based on the predictions, potential loss for Turkey is estimated to be between 33.1 up to 55.3 billion USD for the last three year period under the assumption that the attacks and the coup attempt did not take place. To pinpoint the impact of such a loss, we compare it with the most recent annual GDP and reserves of Turkey. Worldbank (2019) states that Turkey's GDP for 2018 was 771.35 billion USD. The loss during the three year period stands for 4.3 - 7.2% percent of the latest annual GDP. Such percentages sum up to the typical annual average GDP growth of Turkey and therefore are too large to be underestimated. For a comparison with the reserves, we utilize the data from TCMB (2019) that provide the most recent reserves information of 104.81 billion USD as of November, 2019. The three year tourism loss corresponds to 31.6-52.8% of current reserves of Turkey. In terms of national economic sustainability, such a loss is of utmost significance for Turkey who has accumulated a maximum reserves amount of around 150 billion USD in the past. Had Turkey been able to

obtain and retain the possible 55.3 billion USD, the Turkish reserves would have reached its all time highest value of 160.11 billion USD.

Table 5. Turkey's potential loss based on forecasts (in billion USD)

Quarter	Actual	Neutral FC	Optimistic FC	Neutral loss	Optimistic loss
2016q1	2.88	3.31	4.50	0.427	1.623
2016q2	3.81	6.93	7.38	3.117	3.566
2016q3	5.89	12.23	12.24	6.338	6.352
2016q4	3.41	6.16	6.71	2.745	3.293
2017q1	2.40	3.47	5.11	1.061	2.705
2017q2	4.38	7.25	8.34	2.878	3.960
2017q3	8.73	12.80	13.78	4.070	5.056
2017q4	4.72	6.44	7.53	1.729	2.812
2018q1	3.35	3.62	5.72	0.276	2.367
2018q2	5.94	7.58	9.30	1.646	3.360
2018q3	9.37	13.37	15.33	3.998	5.955
2018q4	5.37	6.73	8.35	1.357	2.975
2019q1	3.70	3.78	6.32	0.079	2.618
2019q2	6.97	7.91	10.26	0.935	3.281
2019q3	11.48	13.94	16.87	2.457	5.386
TOTAL	**82.41**	**115.52**	**137.72**	**33.112**	**55.311**

5. Conclusion

A shift in tourist behavior triggered by concerns of safety might mean disaster for a developing country whose economy relies heavily on tourism income. Turkey is a typical example. Having a history of political conflicts, successful and failed coups, a generous variety of ethnic, politic and religious groups prepared to arm in the blink of an eye, a risk of economic devastation is always at the door. In this study, we examined the adverse events including two attacks and a failed coup attempt which took place during 2016.

It was evident that the Turkish tourism industry faced a structural change. There was statistical evidence of a break in national tourism incomes (H_1), most evident during the spring and summer periods of 2016. This structural break can be attributed to the 12 January attack with a lag of three to six months and the peak of the break was observed in the summer period which included the failed coup attempt and another attack in the busiest international airport of Turkey. The impact was also supported was H_3, and the shift in tourism trend was statistically clear. The monetary loss of Turkey since the time sums up to an estimated 33.1 to 55.3 billion USD, standing for one-thirds to half of the current national reserves. This huge amount could have boosted the Turkish GDP by 4.3 to 7.2%, a figure no country would be willing to reject.

Yet again, despite all the negative publicity caused by the conflicts, Turkish tourism managed to put things in order. During the four year period (11 quarters), tourism revenues presented an even sharper upward trend. A possible reason for this could be that foreign tourists perceived the conflicts as one-off incidents. The governmental actions in the aftermath were severe, even to the point where the regime had started to be defined as converging autocracy by the local and foreign media and politicians, still this attitude might have provided a reassurance to the potential visitors to Turkey. In short, Turkey got off lightly from a potentially hazardous period and shall not underestimate the economic risk that was evident. Preventive measures to pave the way for a safer, more peaceful and tolerant social environment for tourists and locals alike, political stability in both internal and external terms, utmost care and respect for natural and historical resources should be of the highest priority for Turkey since such improvements could boost the tourism potential for the country.

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Stock Market Reactions to Financing and Payment Decisions for European Mergers and Acquisitions

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Abstract:

Aim: We analyze stock market reactions to merger and acquisition announcements for firms in Europe and contribute to the literature by providing empirical evidence how the decisions with respect to alternative financing sources (equity or debt) and methods of payment (cash or stock) affect the magnitude of the valuation effects.

Research design: An event study methodology is applied to 717 M&A transactions. We analyze the size of the cumulative abnormal returns using the financing sources and payment methods and other variables as the relevant determinants.

Findings: The cumulative abnormal results suggest that target shareholders and bidder shareholders in private deals benefit from mergers and acquisitions. The effect found is centered around the announcement date, making our findings consistent with market efficiency. Debt financed deals outperform equity financed deals and cash paid M&A outperform stock paid M&As due to information asymmetries as well as signaling and agency effects.

Originality: This study adds to our understanding of the relevance of the financing sources and the payment methods for the magnitude of valuation effects of mergers and acquisitions in Europe.

Implications: This study may help practitioners to better assess the valuation effects of alternative financing sources and payment methods when acquiring other firms.

Key words: mergers & acquisitions, abnormal returns, financing sources, payment methods, Europe
JEL: G32, G34

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1. Introduction

Mergers and acquisitions (M&A) are major corporate strategy and investment decisions, often containing tremendous uncertainty and risks for the firms involved as the outcome is often difficult to predict. During the last two decades, the M&A activity in the U.S. has grown rapidly and has become a popular means for many firms to expand their business activities as well as for gaining access to new growth opportunities (Bessler et al. 2017). Historically, most M&A studies focused on the financial markets in the United States and the United Kingdom, since mergers and acquisitions are an important corporate control mechanism in these markets. Therefore, M&As are of greater importance and consequently the deal numbers and values are higher. The M&A activity in Continental Europe has been relatively smaller due to the different corporate governance systems and the banks' dominance in firm financing and its influence through various corporate governance mechanisms. Nevertheless, the M&A activity in Europe has increased substantially subsequent to the financial crisis in 2008/2009 and is nowadays much more pronounced, attracting more academic research. However, many aspects are still unexplored for European M&As such as the mechanisms and determinants for the choice between different financing alternatives and the decision on the method of payment.

When a merger or acquisition is publicly announced, considerable information of the potential transaction and its possible consequences become public knowledge. The stock market reactions to the announcement represents the capital markets' expectation of the possible takeover benefits (Asquith 1983). Therefore, the announcement of a merger should result instantaneously in a new valuation of the bidder and the target, and if the markets are efficient (Fama 1965, 1990), this stock price adjustment should be immediate, fully reflecting all information. Consequently, there should be no significant stock price reaction during the periods before or subsequent to the M&A announcement. To investigate this hypothesis, it is appropriate that most corporate finance studies on merger announcements use the event study methodology (e.g., MacKinlay 1997) in which the capital market's valuation effects of the bidder and the target firms during the event period are

analyzed. In our study, we also perform an event study by investigating the effects of different financing decisions as well as the choice of the method of payment on the magnitude of the stock price reactions around an M&A announcement.

The focus of our research is on the effects that alternative financing sources and methods of payment have on the valuation of the firms. Bessler, Drobetz and Zimmerman (2011) argue that it is theoretically possible that both determinants are viewed independently from each other and that their effect on the firm's value can be analyzed individually as well as jointly. There are a few studies supporting the ideas and discussion of Bessler, Drobetz and Zimmermann (2011), such as Bharadwaj and Shivdasani (2003), Martynova and Renneboog (2009) and Fischer (2017). Fischer (2017) discusses the limitations in understanding the alternative financing sources and suggests that further research should focus only on the dominant source of financing. Our research addresses this issue and assumes that the bidders' financing source is either debt or equity and the method of payment is either cash or shares. Consequently, the transactions using mixed financing sources or methods of payment are excluded. Most importantly, we combine the financing sources with the methods of payment and investigate their interaction effects from different perspectives.

The remainder of this article proceeds as follows. In the next section, we discuss the different financial theories applicable to our research as well as the empirical findings related to financing decisions and methods of payment in M&As. We also derive and present our hypotheses in this section. Section three describes the data on European companies, and the methodology employed in our research is outlined in section four. The empirical results of our study are presented and discussed in section five. Section six concludes.

2. Literature review

This study combines two major research streams within the corporate finance literature: capital structure theories and mergers and acquisitions as well as their respective empirical evidence. The source of financing and the method of payment

are related to both streams and we interpret and treat them as the essential link between both research areas. Therefore, this section begins with a brief discussion of capital structure theories and especially the pecking-order theory (Myers, Majluf 1984), which might explain the ranking of financing sources of M&As. It continues with a discussion of the empirical evidence related to mergers and acquisitions. This section is further divided into two parts discussing first the empirical evidence of the financing sources and second the methods of payment in M&As.

2.1. Capital structure theories related to M&As

Many different theories have been advanced explaining the optimal capital structure of firms. All of them have been empirically tested in many studies for different countries and capital markets (see e.g., Bessler et al. 2008; Bessler, Drobetz, Kazemieh 2011). However, no consensus has been reached so far as this represents a multi-dimensional problem. One of the prominent theories with substantial empirical support are the pecking order theory (Myers, Majluf 1984) and the dynamic pecking-order-theory (Bessler et al. 2014). The pecking-order theory suggests that the cost of financing increases with higher information asymmetry between the firms and its debt and equity holders. Asymmetric information usually implies that one party (management) has better information than the other party (equity and debt holders). Therefore, firms would typically use the financing instrument that has the least information asymmetry and therefore the least relative costs at that moment, resulting in the pecking order of first using internal funds, second debt, and finally equity, making equity the least attractable and most expensive financing alternative. This idea is widely studied in the principal-agent literature and it is fundamental to the signaling theory of Spence (1973). Myers and Majluf (1984) assume in their pecking order theory that management is better informed about the firm's value than outside investors are. An extension of the basic static model results in the dynamic pecking order theory (Bessler et al. 2014). The outcome of this theory and the empirical evidence suggests that firms would issue equity, and often more equity than currently needed, when the information asymmetry between management and investors is at present relatively low. In these situations, management could build-up cash reserves for future acquisitions. This

might be one explanation why firms issue first equity (seasoned equity offering) and then later on employ these cash proceeds as the payment method in an M&A. In any case, access to any form of financing is essential for an M&A (Cornaggia, Li 2019).

If management decides to issue new equity nevertheless, indicating that this is the cheapest financing alternative currently available, this decision contains different signals and potential investors usually interpret this in a way that managers know that their shares are overvalued and hence may take advantage of this over-valuation (Golubov et al. 2016; Samer, Barbopoulos 2018). Therefore, investors may place immediately a lower value on the firm, resulting in negative valuation effects and a decline of the share price and the market value of the firm. In contrast, debt issuance signals the companies' confidence that the investment is profitable and the stock price is possibly undervalued. Thus, debt issues are typically preferred over equity issues, which is consistent with the pecking order theory, and for this reason the theory may be employed to explain the financing decisions. Again, the conclusion for the basic form of the pecking-order-theory is that companies prioritize their financing decisions based on the cost of financing. Therefore, companies use internal funds first, followed by debt and equity last.

2.2. Mergers and acquisitions

2.2.1. M&A motives

The fundamental objective of mergers and acquisitions is the realization of synergies to develop corporate growth, increase market power, boost profitability, and improve shareholders' wealth (Alexandris et al. 2010; Alexandridis et al. 2017). However, economic theory provides many more reasons for companies engaging in merger activities (Andrade et al. 2001). Possible reasons are centered around efficiency-related purposes involving economies of scale, attempts to create market power, and taking advantage of diversification opportunities. Mitchell and Mulherin (1996) suggest that mergers occur in waves, which are often a reaction to unexpected shocks in industries or technologies. Studies such as Andrade et al. (2001) and Mitchell and Mulherin (1996) provide evidence that merger activity also clusters by industry. In the earlier literature, the main idea among a few others was that synergies could be realized by economies of scale, vertical integration, and the

adoption of more efficient technologies (Jensen, Ruback 1983). This earlier research provided evidence that M&A gains do not result from gaining market power, contrary to later research conducted by Andrade et al. (2001) and Alexandris et al. (2010). Consequently, the explanations for M&A waves and M&A activity is time varying and may have adjusted over time (Alexandridis 2012; Xu 2017).

One of the pivotal questions is how possible M&A related synergy gains are distributed between bidder and target shareholders. There exists a large body of empirical literature in corporate finance how the takeover gains are split between target and bidding firms' shareholders (Alexandridis et al. 2013). Most studies such as Jensen and Ruback (1983) and Andrade et al. (2001) provide evidence that the shareholders of target firms benefit the most from mergers. Some studies suggest that the entire synergy gains are reflected in the takeover premium and therefore are absorbed by the target shareholders (Bessler, Schneck 2015) as they are only willing to tender their shares when they receive this premium. Increases of offer prices during the negotiation period are evidence of this behavior. Therefore, it is an important decision to determine the optimal offer price strategy to prevent bidder competition, being successful in the end by paying the lowest or minimum price for the target (Bessler et al. 2015). The method of payment is one important ingredient in this strategy as is the source of financing. Both aspects provide an important motivation for this research.

The dissimilarities in takeover gains may be due to information asymmetry and uncertainty about the outcome and profitability of a merger and acquisition. Information asymmetry and uncertainty in mergers affect deal characteristics and wealth creation for both parties (Moeller et al. 2005; Luypaert, Van Caneghem 2017). Luypaert and Van Cangehem (2017) argue that the wealth realized by the bidder depends on the accurate assessment of the target value and synergistic effects. In contrast, wealth effects for target firms depend on bidder value and potential synergistic gains. Additionally, Alexandris, Fuller, Terhaar and Travlos (2013) report that the returns of bidders depend on concerns about the strategic potential and complexity of the deal.

All empirical evidence and discussion suggest that M&As are risky investments as the outcome is typically highly uncertain (Fich et al. 2018; Malmendier et al.

2018). Therefore, many merges and acquisitions do not create value ex-post but often destroy value for the shareholders of the bidder and the target firms if they stay invested. Given this inherent riskiness in M&As, management has different alternatives of how to cope with this uncertainty or how to minimize the negative long-term valuation effects on the bidder firm. One aspect is to decide how to finance the deal, the other is how to pay for the deal. Financing alternatives are either issuing new equity or debt, or using internal funds, which may come from previously issued equity or debt or from operational cash flows. The second aspect is the method of payment, or how to pay for the deal. The means are either cash or shares of the bidder or a combination of both. In the next two sections, we discuss the financing alternatives and the method of payment decision in more detail.

2.2.2. Financing decisions

Many empirical studies have focused on the alternative financing sources and methods of payment in corporate takeovers. In most research (Faccio, Masulis 2005; Harford et al. 2009; Vermaelen, Xu 2014), the '*method of payment*' is used as synonymous with the '*sources of takeover financing*'. Bessler, Drobetz and Zimmermann (2011) argue that the method of payment and the sources of financing are independent of each other and thus should be treated and analyzed separately as well as jointly. The argument is similar to the capital structure and dividend policy irrelevance argument of Modigliani and Miller (1958, 1961), suggesting that the financing (debt or equity) and the method of payment (cash or shares) decisions are in theory independent of each other and substitutable in perfect capital markets without asymmetric information and financial signaling. As already argued before, issuing new equity to finance the deal can result in both cash and shares as a method of payment. Issuing new debt usually results in cash payments and less likely in share deals. So far, this perspective has only been briefly discussed for M&As. A few studies are consistent with the interpretation of Bessler, Drobetz and Zimmermann (2011), such as Bharadwaj and Shivdasani (2003), Martynova and Renneboog (2009) and Fischer (2017). This study follows the perspectives of Bessler, Drobetz and Zimmermann (2011), but the other three studies that suggest

that the financing sources are independent from the payment methods are discussed as well.

First, Bharadwaj and Shivdasani (2003) examine a sample of 115 cash tender offers between 1990 and 1996. Their study differs from prior research as the authors focus on the source of financing separately from the method of payment. They investigate under which circumstances acquisitions are bank financed before making a bid. Bank financing is superior when an acquirer has a low cash reserve, or the relative size of the takeover is large. The authors suggest that the abnormal returns around the announcement date are higher for acquisitions financed with bank debt as compared to acquisitions financed with internal funds. However, this advantage could also be due to the signaling effects coming from the monitoring bank that extended or granted the new loans (Slovin et al. 1993). As this study includes only cash tender offers, it is unable to differentiate clearly between financing decisions and payment methods.

Secondly, Martynova and Renneboog (2009) link the method of payment to the source of financing for a European M&A sample. They classified takeovers by the sources of financing to test the predictions from pecking order and market timing theories (Myers, Majluf 1984), regulatory environment (La Porta et al. 1997), debt overhang (Myers 1977) and the agency cost of debt and equity (Jensen, Meckling 1976), among others. This enables them to measure the additional performance of companies that choose the source of financing and the payment method independently. They claim: "…. investors take into account the information signaled by the choices of both the payment method and the sources of takeover financing when estimating the possible synergies of the takeover announcement" (Martynova, Renneboog 2009: 28). The authors find that debt financing outperforms internal financing. Consequently, debt financing sends a positive signal to the market that the shares of the bidder is not overvalued.

Fischer (2017) expands the analysis by claiming that the 'connected model' of Martynova and Renneboog (2009) explains the source of financing to be dominated by the method of payment. Therefore, the author suggests that internal funds are used for smaller takeovers and additionally external funds are required for larger deals. Hence, he argues that the source of financing is decided in a two-stage

process, in which consistent with the pecking-order theory, internal funds are preferred over external funds (Myers, Majluf 1984). Fischer (2017) expects that M&As using internal funds perform better than M&As financed with debt or equity.

In line with the pecking order and other theories, we expect that debt financing results in higher abnormal returns than equity financing around the merger announcement, which leads to our first hypothesis:

Hypothesis 1: Debt financing outperforms equity financing in the short run.

2.2.3. Payment methods

The choice of the method of payment is essential for any deal, since cash and share offers differ with respect to the allocation of the transaction risks. The differences may be due to information asymmetry and disparities in the pricing mechanisms (Bessler, Drobetz, Zimmermann 2011). The bidder could be overpaying the target or face concerns that the offer is too low. Therefore, targets may reject the offer or attract competing bidders, making the acquisition more expensive (Bessler et al. 2015; Peng et al. 2016; Sankar, Bijay 2018). Therefore, the bidder has to decide on the method of payment prior to making an offer. When bidder shares seem to be overvalued or when risk-sharing motives are essential for the acquirer's shareholders, stock payments are preferred over cash payments (Martynova, Renneboog 2009; Bessler, Drobetz, Zimmermann 2011; Cho, Ahn 2017). If other factors play a more important role in the payment decision, cash offers may be preferred (Luypaert, Van Caneghem 2017). Prior research indicates that due to information asymmetry and valuation uncertainty of M&A deals, the markets usually treat a stock payment less favorable than a cash payment (see e.g. Fuller et al. 2002; Moeller et al. 2005; Luypaert, Van Caneghem 2017). Furthermore, cash hoarding of acquirers can strengthen the negative signal if they finance their deal with stock (Lie, Liu 2018). Nevertheless, Ismail and Krause (2010) argue that there is still a significant gap in understanding the determinants of the payment methods, although a large body of literature exists.

Goergen and Renneboog (2004) find in a study of European domestic and cross-border takeovers strong evidence that cash payments trigger substantially higher

abnormal returns than equity offers and/or combined offers. Dutta, Saadi and Zhu (2013) analyze Canadian cross-border deals suggesting that their insignificant findings on payment methods can be due to the relative size of the cross-border deals. Huang, Officer and Powell (2016) indicate that the method of payment has more implications for cross-border than for domestic mergers as the country-level risk factors significantly influence the choice of the payment method. Finally, Mateev (2017) provides evidence that for the United Kingdom and Continental European stock paying bidders achieve better results than cash paying bidders. Empirical evidence by Fuller et al. (2002) and Moeller, Schlingemann and Stulz (2005) support the idea that shareholders of the acquiring firm view cash offers more positively than equity offers. Consequently, the results reveal higher abnormal returns for acquisitions when financed with internal funds. Moreover, based on the pecking order theory, Martynova and Renneboog (2009), Fischer (2017) and Mateev (2017) find that cash offers generate higher abnormal returns than equity offers around the merger announcement. Based on the theory and the empirical evidence we expect that bidders that pay with cash outperform bidders that pay with shares and derive our second hypothesis:

Hypothesis 2a: Cash payments outperform stock payments in the short run.

Studies such as Lie and Liu (2018) and Ismail and Krause (2010) indicate that targets earn positive abnormal returns for both stock and cash payments after the announcement. The authors argue that cash payments are favorable for target shareholders, in line with the theory of Majluf and Myers (1984). Vermaelen and Xu (2015) shed an interesting view on the payment method as they suggest that cash payments may indicate that the acquirer's stock is undervalued. This would be irrelevant to the target firm because a cash transaction is not sensitive to the acquirer's stock price. Yet, since the target firm knows less about the true value of the acquirer, substantial information asymmetry might become evident. Asymmetric information is usually measured by the Tobin's Q, which measures the ratio of market value to book value.

Our objective is to examine the effect of the acquirer's market-to-book-ratio on the target returns in cash paid takeovers. The literature assumes that bidders pay with cash when their stock is undervalued and capital markets expect these companies to have low market to book ratios (*e.g. M/B <1*). Therefore, we expect that acquirers with a high market-to-book-ratio create more wealth for the target shareholders in cash paid takeovers as they are overvalued (see e.g., Ismael, Krause 2010; Vermaelen, Xu 2015). This results in our next hypothesis:

Hypothesis 2b: A high M/B ratio of the bidder creates a higher wealth effect for target shareholders compared to a low M/B ratio of the bidder in a cash paid takeover.

In section 2, we reviewed and discussed the literature and developed our hypotheses, relying on the previous empirical findings of capital structure and M&A research. Both single and multiple regression models will be implemented in section five to investigate how the decision on the financing and payment methods affect shareholder value. In the next two sections we present our data and the methodology.

3. Data

This section consists first of a description of our data and data sources (3.1). We then introduce the dependent and independent variables (3.2.) as well as the control variables (3.3) and provide information on the sample distributions.

3.1. Data description

The transaction data of the deals are obtained from the Zephyr database from Bureau van Dijk. The sample includes M&A deals completed between January 1997 and December 2016. Only European transactions are included, which means that the headquarters of the bidders and targets are located in Continental Europe (CE)

and/or the United Kingdom/Ireland (UK). The bidders must be publicly listed as we investigate valuation effects (stock price reactions). However, the targets include both public and private firms. The initial stake of the bidder in the target has to be below 50% before the deal and above 50% after deal completion. Furthermore, the transaction value is at least 1 million Euro and multiple deals from the same bidder are included as long as they do not overlap within the estimation periods. Given the focus of our research, the following additional information are required which we gather from Zephyr: the method of payment, the financing source, and the deal value in Euro.

The initial sample includes 1,780 European transactions. Stock prices were obtained from Datastream / Thomson Reuters for the period around the events. Some transactions had to be omitted from the final sample due to the small firm size and data restrictions. The final sample consists of 717 transactions, which is equal to the sample of total bidders. Most of the acquisitions involve private targets for which daily market values are not available and the event study methodology is therefore not applicable here. The sample of target firms consists of 102 public companies, and for 92 companies the valuation effects are investigated. Table 1 below displays how the data restrictions reduce our sample size.

Table 1. Sample restrictions

Criteria	**Remaining deals**
Information on payment method	203,102
Information regarding financing sources	12,751
Information on initial and acquired stake	7,070
Transaction within the time period	5,742
Deals in Europe	1,780
Covered by Datastream	980
Deals by Datastream	717

3.2. Dependent and independent variables

This study investigates how financing decisions and the methods of payment of M&A deals in Europe affect the financial performance of bidders and targets. As an event study is conducted to measure the valuation effects, the dependent variable is abnormal returns. The independent variables are the financing sources, the methods of payment, the market-to-book-ratio of the bidder, and whether the transaction is a domestic or cross-border deal. Dummy variables are used for the independent variables, and are specified as follows:

- Financing source = [Debt = 1, Equity = 0].
- Payment method = [Cash = 1, Shares = 0].
- Internationalization = [Cross-border = 1, Domestic = 0].
- Market-to-Book = [M/B < 1 = 0, M/B > 0 =1].

3.3. Control variables

We include a set of control variables in our regression analyses to investigate whether any of these controls affect the results. The set of control variables includes: (i) deal specific characteristics; (ii) firm specific characteristics; and (iii) country specific characteristics. The variety of variables are similar to those used in other studies (see e.g. Martynova, Renneboog 2009; Dutta et al. 2013; Huang et al. 2016; Mateev 2017). The accounting variables and stock returns are winsorized at the lower 1% and upper 99% level to remove outliers. Deal specific variables other than the dependent variables include the deal value and the deals per industry. For this we use the ten category classification benchmark of FTSE Russell. The FTSE Russell is a benchmark adopted globally for categorizing companies across industries, sectors, and subsectors. Furthermore, we include dummy variables for firms from the utility and financial industries, which are usually excluded from most studies due their specific business and higher regulation (Kahle, Walkling 1996) and different financial characteristics such as high leverage levels (Fama, French 1992; Kahle, Walkling 1996).

Table 2. Variable definitions

Variable	Description	Source
AR Acquirer (%)	Acquirer's abnormal returns. The abnormal return is the difference between the firm's returns and the returns of the market model (STOXX). Stock prices are adjusted for stock splits and dividends. *	Datastream
AR Target (%)	Target's abnormal returns. The abnormal return is the difference between the firm's returns and the returns of the market model (STOXX). Stock prices are adjusted for stock splits and dividends. *	Datastream
Financing source	Financing source of the acquirer expressed as a dummy. Takes a value of "1" for Debt, and "0" for Equity.	Zephyr
Payment method	Payment method of the acquirer expressed as a dummy. Takes a value of "1" for Cash, and "0" for Shares.	Zephyr
Transaction value	The deal value in the takeover shown in Euro.	Zephyr
Tobin's Q	Market to book ratio of the acquirer, which is the market value divided by the book value.	Datastream
M/B dummy	Dummy whether the acquirer's stock is overvalued or undervalued. The variable is expressed as a dummy. Takes a value of "1" for overvalued stocks, and "0" for undervalued stocks.	Authors' calculation
Firm size	Firm size of the acquirers is the natural logarithm of total assets.	Datastream
Profitability	Profitability of the acquirers is the EBITDA divided by total assets (in total units).	Datastream
Asset tangibility	Asset tangibility of the acquirers is the power, plant & equipment divided by total assets (in total units).	Datastream
Cash	Cash of the acquirers is the total sum of cash and cash equivalents (in total units).	Datastream
Public target	Dummy variable whether the target is public or private. Takes a value of "1" for public, and "0" for private.	Zephyr
Different industries	Dummy variable whether the acquirer and target operate cross- or in equal industries. Takes a value of "1" for cross-industries, and "0" for equal industries.	ICB
Non-fin./utility	Indicates whether the acquirer and target are financials or industries. Takes a value of "1" if the companies are financials/utilities, and "0" if being non-financials/utilities.	Authors' calculation
Cross-border	2-digit country code for the acquirer and target	Datastream

* The variable in Datastream corrects for both dividends and stock splits.

The firm specific characteristics consist of several balance sheet indicators such as firm size, asset tangibility, profitability and cash. The last set of control variables refers to country aspects as the legal system in Europe consists of mainly Common Law (United Kingdom/Ireland) and Civil Law (Continental Europe) countries. The variables are described in Table 2 above.

3.4. Sample distribution

For most of the 717 deals included in our analysis, the method of payment is cash (560) and the financing source is debt (550) as summarized in Table 3 below. Almost 70% of the deals are from firms operating in the same industry. The consumer services industry has the highest frequency of deal announcements. Around 85% of all transactions involve private targets (615). The annual distribution of the deals distinguishing between public and private targets is provided in Figure 1 below.

Table 3. Summary descriptive of deal characteristics

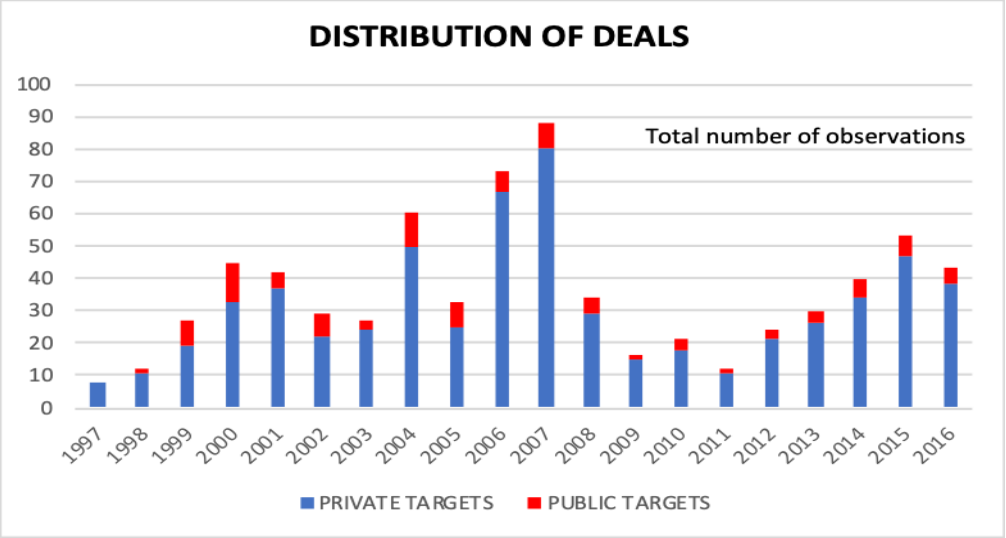
Method of payment	**Obs.**
Cash	560
Shares	157
Financing source	
Debt	550
Equity	167
Status Targets	
Public	102
Private	615

The sample distribution per country is provided in Table 4. Evidently, and as always in European studies, deals with United Kingdom firms involved dominate the sample with about 60% of the bidder and target firms. Deals with companies from other EEA countries are in general quite evenly distributed, with deals from non-EEA countries hardly being present.

Table 4. Distribution per country

Acquirer				**Target**		
Country	Frequency	**Percent**		**Country**	**Frequency**	**Percent**
Austria	2	0.28%		Austria	2	0.28%
Belgium	9	1.26%		Belgium	10	1.39%
Switzerland	15	2.09%		Switzerland	13	1.81%
Cyprus	1	0.14%		Cyprus	1	0.14%
Germany	20	2.79%		Germany	38	5.30%
Denmark	4	0.56%		Denmark	9	1.26%
Spain	20	2.79%		Spain	20	2.79%
Finland	22	3.07%		Finland	13	1.81%
France	31	4.32%		France	33	4.60%
United Kingdom	456	63.60%		United Kingdom	429	59.83%
Greece	2	0.28%		Croatia	1	0.14%
Croatia	1	0.14%		Ireland	11	1.53%
Hungary	1	0.14%		Iceland	1	0.14%
Ireland	16	2.23%		Italy	21	2.93%
Iceland	5	0.70%		Luxembourg	5	0.70%
Italy	19	2.65%		Serbia/Montenegro	1	0.14%
Netherlands	17	2.37%		Malta	1	0.14%
Norway	11	1.53%		Netherlands	34	4.74%
Poland	14	1.95%		Norway	10	1.39%
Russia	3	0.42%		Poland	13	1.81%
Sweden	48	6.69%		Portugal	1	0.14%
				Romania	2	0.28%
				Russia	3	0.42%
				Sweden	44	6.14%
				Turkey	1	0.14%
Total	***717***	***100%***		***Total***	***717***	***100%***

Figure 1. Distribution of deals over the period 1997-2016



4. Methodology

This study focuses on the effects that M&A related financing and method of payment decisions have on the market value of bidders surrounding the merger announcements. We employ the event study methodologies of MacKinlay (1997) and Brown and Warner (1985) as outlined below (4.1.) to determine the abnormal (AAR) and cumulative abnormal returns (CAAR). The factors that determine the magnitude of the performance and the performance differences are analyzed by using cross-sectional regressions. The structure of these models and the regression equations are explained below (4.2.).

4.1. Event study methodology

The standard event study methodologies of MacKinlay (1997) and Brown and Warner (1985) are used to determine the abnormal returns. The abnormal return is the difference between the ex-ante expected return ($E(R_{it})$) and the ex-post realized return (R_{it}). A parameter, such as the firm's beta required to calculate the expected

returns, is determined over the period (estimation window) prior to the announcement. In this study, we use an estimation window of 201 days covering the period from 260 days prior to 60 prior the event. We exclude the 60 days prior to the announcement to avoid any bias caused by merger rumors (MacKinlay 1997; Fischer 2017).

Models for estimating the expected returns include the constant mean return model and the market model (MacKinlay 1997). We use the latter and adopt the STOXX EUROPE 600 Index for representing the market. This index includes 600 large, medium, and small size capitalized European firms from 17 European countries. Therefore, it represents our data set well, is denominated in the euro currency, and is available for the entire sample period from 1997-2016. To capture the abnormal returns, we choose an event window of 61 days, from 30 days prior to 30 days subsequent to the M&A announcement. We also analyze alternative event windows within the range (-30; +30) to test for additional influences (Martynova, Renneboog 2009). A special focus is on the short-term valuation effects covering the three-day event window surrounding the announcement, which is from one day before to one day after the event (-1; +1). All merger related valuation effects should occur during this time window as long as the markets are informationally efficient (Fama 1970). Previous research also suggests that the most statistically reliable evidence whether M&As create shareholder value is observed in this short-term window (Andrade et al. 2001).

The estimated returns for any given security in the event window are calculated as follows:

(1) $R_{i\tau} = a_i + \beta_i R_{mt} + \varepsilon_{it}\ E(\varepsilon_{it} = 0) \qquad var(\varepsilon_{it}) = \sigma_{\varepsilon_i}^2$

with R_{it} = Period t-return on security i,
R_{mt} = Period t-return on the market model,
α_i = Intercept coefficient of the market model,
β_i = Slope coefficient of the market model,
ε_{it} = Zero mean disturbance term.

The abnormal return AR_{it} is calculated as the difference between the ex-ante expected return $E(R_{it})$ and the ex-post realized return AR_{it} for any given security:

(2) $AR_{it} = R_{it} - E(R_{it})$

with AR_{it} = Abnormal return in period t on security i,
R_{it} = Actual return in period t on security i,
$E(R_{it})$ = Expected return in period t on security i.

For different event windows the abnormal returns are summed to cumulative average abnormal returns (CAAR). The CAAR are calculated as follows:

(3) $CAAR_t = \sum_{t=1}^{t=-1} AAR_t$

The calculation of the T-statistic is shown below:

(4) $T \sim Stat = CAARt / (\frac{\sigma CAARt}{\sqrt{N-1}})$

We test for the influences of different variables on the magnitude of the valuation effects by employing the cumulative average abnormal returns (CAARs) as the dependent variables in our regression analyses. Thereby, a range of independent variables – continuous, categorical, and indicator variables - are used to explain the size of the valuation effects and for testing multiple hypotheses. The equation is displayed below:

(5) $CAAR_t = \alpha_i + \beta_1$Financing source + β_2Payment method + β_3M/B + β_4Transaction value + β_5Cash + β_6Firm size + β_7Profitability + β_8Asset tangibility + β_9 Different industries + β_{10} Cross-border + β_{11} Public target + β_{12} Non-fin./utility

All independent variables were previously defined in Table 2.

4.2. Research models

The explanatory power that different variables have in explaining the valuation effects (abnormal returns) of the acquirer are analyzed with single and multiple regression models. We employ two types of linear regression models, whereby attention should be paid not only to the significance of the coefficients, but most importantly to the interpretations of the model and to the regression output. First, the

financing sources regressions are detailed. The first equation is related to the first hypothesis (*H1*) and investigates the impact that debt and equity financing have on explaining the cumulative abnormal returns of acquirers. Since the variable contains a dummy indicator, one could only choose debt or equity as financing source.

(6) $CAAR_t = \alpha_i + \beta_1$ Financing source

The regression model includes multiple explanatory variables that tests for the effects of each variable on the abnormal returns. See Eq. 8 for the mathematical representation:

(7) $CAAR_t = \alpha_i + \beta_1$ Financing source + βn (Explanatory variables)

To analyze whether the group of explanatory variables influences transactions that are financed with debt or equity differently, the regression model should be transformed and the interpretation changed. Eq. 9 exhibits the single regressions of debt or equity on the abnormal returns. Since other variables might explain the model, the outcome is coherent with the one of Eq. 7.

(8) $CAAR_t$|Debt or Equity = α_i

However, if we extend the model to a multiple regression model, the economic explanation is considerable different than the regression model illustrated by Eq. 8. Eq. 10 displays the mathematical description if we extend the regression model to include multiple explanatory variables. Consequently, the explanatory variables measure the impact on the abnormal returns that are financed with debt or equity.

(9) $CAAR_t$| Debt or Equity = $\alpha_i + \beta n$ (Explanatory variables)

In addition, supplementary tests are performed to verify the validity of the regression process and results. First, the multiple regressions are executed on robust standard errors (White standard errors), where heteroskedastic residuals are applied in the model. The procedure was introduced by Huber (1967) and further developed by White (1980). Next, the Mann-Whitney test is used to compare the different values of multiple populations. The Mann-Whitney test (or Wilcoxon rank-sum test)

is a non-parametric test that compares the populations, whether one sample will be significantly less than or greater than a randomly selected value of the other sample (Wilcoxon 1945; Mann, Whitney 1947). Finally, the ordinary Student's t-test assumes that two populations have normal distributions with equal variances, but the Welch's t-test is depicted for different size and unequal variance samples to analyze differences in means (Welch 1947). The Welch's t-test provides more robust results than the normal Student's t-test according to Rasch, Teuscher and Guiard (2007).

Since the sample size of targets is rather low, the Mann-Whitney test and Welch's t-test are performed on the targets' mean populations. Regression analyses on a few observations may lead to highly inaccurate parameters and biased estimates (Potter 2005; Maiti, Pradhan 2009). Therefore, we apply mean comparison tests to prevent inaccurate outcomes.

5. Results

In this section, we present and discuss the empirical results of our study. Section 5.1. contains the analyses of the valuation effects. We first test whether mergers create value for the shareholders of bidder and target firms around the announcement dates. As preliminary evidence, we also graph the abnormal and cumulative abnormal returns to depict the structure of the daily abnormal returns and the cumulative abnormal return over the entire event window. In section 5.2. we present our analyses for the bidder firms, which includes the tests of the three hypotheses – *H1*, *H2a*, *H2b* – and additional tests. For every hypothesis, we present and discuss the single and multiple regression results. In addition, we investigate how the explanatory variables determine the abnormal returns. For this we control for population groups. Subsequently, robust standard errors are used for the multiple regression models and the Mann-Whitney test is performed to compare the population means. In section 5.3. we present the tests for the targets.

5.1. Valuation effects

In Table 5 we present the sample t-test of the abnormal returns over different event windows. The abnormal returns for the targets are for most event windows significantly different from zero at the one percent level (Panel B). Consequently, target shareholders benefit the most from merger announcements, which is consistent with findings of Goergen and Renneboog (2004) and Martynova and Renneboog (2009) and the literature, implying that mergers create substantial wealth for target shareholders. Interpreted from a different perspective, the shareholders of the target are only willing to surrender their shares to the bidder when they are compensated by a substantial premium, i.e. by receiving a significantly higher price than the current share price. To provide a detailed presentation, we analyze different event windows around, before, and subsequent to the announcement.

For the four windows around the event (-30; +30); (-10; +10); (-3; +3); (-1; +1), we observe significantly positive abnormal target returns of 27.08%, 19.99%, 17.03%, and 15.40%, respectively, and 11.99% at the event day, indicating a significant and substantial increase in target share prices. Surprisingly, the abnormal return in the periods before (-10; -1) and subsequent (+1; +10) to the announcement are also significant with 5.71%, and 2.29%, respectively. These results are clearly visible in Figures 2a and 2b, at least for the period before the public announcement and for the event day. For the pre-merger period, we observe a substantial and significant run-up, which seems surprising but is explainable by the fact that our sample contains mainly private targets. The results for private targets and the size of the mark-up at the event date is similar to other studies.

Next, we calculate the (cumulative) abnormal returns for bidder firms and observe some positive valuation affects for the periods surrounding the event. A significant increase in the stock prices is found, which means that the market reacts positively to the announcements. However, these positive abnormal returns are mainly due to the significant announcement returns (0; +1). It appears that there is no leakage of information in the period (-10; -1) before the announcement date for acquirers as the CARs are insignificantly different from zero. Whether the market reacts slowly to the merger announcement or has difficulties in correctly valuing the deal is covered by the (+1; +10) interval window. For the period subsequent the

announcement, there is only a marginal increase revealed, suggesting that the information is fully absorbed at the announcement. Therefore, significant valuation effects occur only on the days (0; +1) and there are no substantial and significant stock price reactions afterwards. This is consistent with other studies, for example, by Goergen and Renneboog (2004), Martynova and Renneboog (2009) and Alexandris et al. (2010). This is also consistent with the *Efficient Market Hypothesis* (Fama 1970), which implies that new information is immediately and fully reflected in stock prices and shareholders cannot capture abnormal returns subsequent to an information release.

Other unreported results suggest that the acquirers from Continental Europe achieve, on average, higher mean returns (1.94%) than their counterparts from the United Kingdom (1.65%). Financial and utility companies that expand their business by acquisitions score lower (0.26%) than non-financials and non-utilities (1.95%). In addition, bidders that acquire public targets have, on average, a negative mean return (-0.92%) around the announcement date. This empirical finding is consistent with most of the literature and highlights again that our overall results are primarily determined by the acquisition of private targets, which reveal mean returns of 2.16%. This is significantly different from public targets, and the argument is that shareholders' confidence in the success from acquiring private targets is considerably higher than when acquiring public targets. Furthermore, targets from the United Kingdom perform, on average, better (13.08%) than firms from Continental Europe (10.29%).

Table 5. One sample t-test of the cumulative abnormal returns

Panel A																
Acquirer	[-30,30]		[-10,10]		[-3,3]		[-1,1]		[0]		[-10,-1]		[1,10]		[0,5]	
Mean	0.0296		0.0337		0.0312		0.0271		0.0173		0.0031		0.0116		0.0311	
T-stat	3.663		6.984		9.465		9.978		8.770		1.090		3.803		9.462	
P-value	0.0001	***	0.0000	***	0.0000	***	0.0000	***	0.0000	***	0.1378		0.0001	***	0.0000	***
Panel B																
Target	[-30,30]		[-10,10]		[-3,3]		[-1,1]		[0]		[-10,-1]		[1,10]		[0,5]	
Mean	0.2708		0.1999		0.1703		0.1540		0.1199		0.0571		0.0229		0.1425	
T-stat	8.565		8.629		8.479		7.706		6.574		4.555		2.331		7.366	
P-value	0.0000	***	0.0000	***	0.0000	***	0.0000	***	0.0000	***	0.0000	***	0.0110	**	0.0000	***

Table 5 presents the cumulative average abnormal returns (CAAR) of the sample of acquirers and targets. The number of observations are respectively 717 and 92. Per event window is the mean, t-statistic and p-value given. The values are winsorized at the lower 1% and upper 99%. The significance levels are: *,**,*** which stands for 10%,5%, and the 1% level.

Figure 2a. Cumulative Abnormal Returns of the acquirers and targets

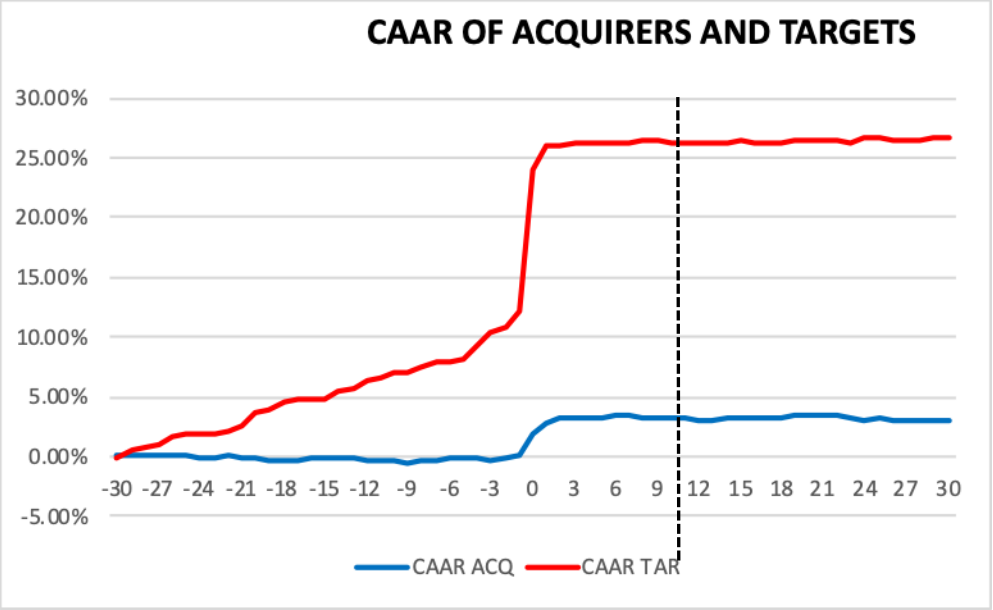
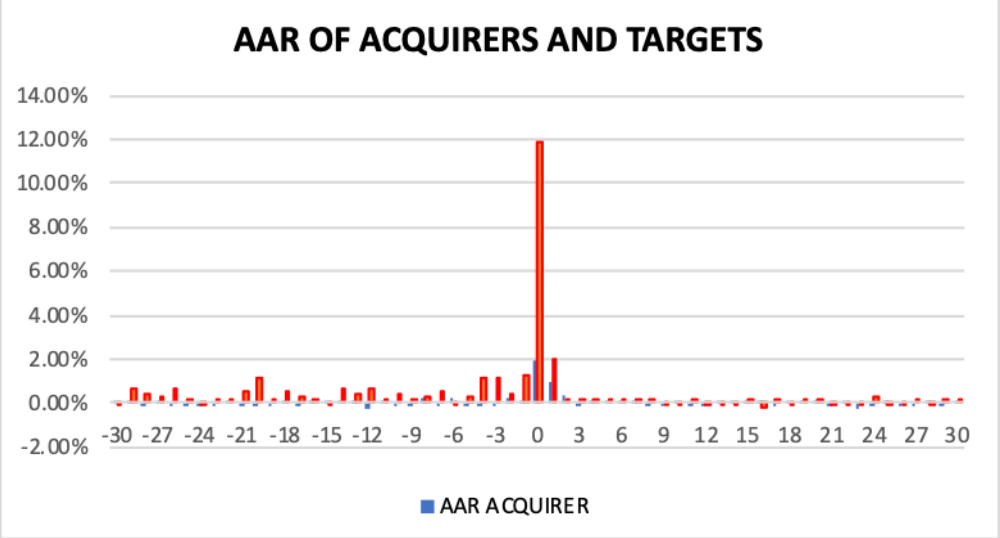


Figure 2b. Abnormal Returns of the acquirers and targets



Number of observations targets = 92.

Number of observations acquirers = 717.

5.2. Acquirers: cross-sectional regression analysis

We start our analysis of the factors determining the magnitude of the abnormal announcement returns of bidders in section 5.2.1., with a focus on the two alternative financing sources debt and equity. The effects of the method of payment on the size of the abnormal announcement returns are investigated in section 5.2.2.

5.2.1. Financing sources

In Table 6, we display the cumulative abnormal returns for the bidder sample. Mean and median values are given for equity, debt and total financing for different event windows. Overall, firms using debt to finance their mergers have considerably higher returns than those issuing new equity. The argument is that management would usually finance good projects with debt, to keep the benefits for themselves, but problematic projects with equity to share the risks and possible losses with the new shareholders. This result suggests that the management of the bidder is able to signal the higher quality of the acquisition by selecting the appropriate financing source. This signal seems to be interpreted accordingly by market participants in that the abnormal returns at the event day (0) and around the announcement date (-1; +1) for debt (1.85% and 2.90%) are higher than for equity (1.29% and 2.09%). For larger windows (-3; +3 and -10; +10) not only the abnormal returns increase for debt (3.47% and 3.75%) and equity (1.97% and 2.07%) financing, but also the differences widens. We observe the largest return difference between debt and equity financing for the (-10; +10) event window with 1.68% (3.75% - 2.07%). All of this is consistent with the previous literature and the findings of Martynova and Renneboog (2009) and Fischer (2017), suggesting that debt is the preferred financing source for value generating acquisitions.

The important question, however, is whether the means of equity and debt financing are significantly different. For this we perform the Mann-Whitney test. The results are displayed in Table 7 by providing the Z-score and P-value for the corresponding event windows. Additionally, the tests are also performed for the announcement date (day 0). The means of debt and equity financing are statistically different from zero in the short run. The Z-score at the announcement date is 2.083, which has a significance level of 5%, compared to the Z-score on the three-day

interval (-1, +1 days) of 1.737 and a corresponding significance level of 10%. The Mann-Whitney test implies that the population mean of debt financing is higher than the mean of equity financing at the merger announcement, which indicates an outperformance and strongly support our signalling argument of debt financing. We therefore provide evidence in support of our first Hypothesis (1), that debt financed deals outperform share financed deals at least in the short run.

Table 6. Cumulative abnormal returns of financing

	[-10,+10]	[-3,+3]	[-1,+1]	[0]	Obs.
Equity	0.0207	0.0197	0.0209	0.0129	167
	(0.0158)	(0.0078)	(0.0096)	(0.0084)	
Debt	0.0375	0.0347	0.0290	0.0185	550
	(0.0236)	(0.0255)	(0.0196)	(0.0061)	
Total	0.0336	0.0312	0.0271	0.0172	717
	(0.0214)	(0.0208)	(0.0154)	(0.0044)	
Average abnormal returns over different interval windows are shown. Mean and median (in parentheses) values are given for equity, debt and total financing. Obs. stands for the number of observations.					

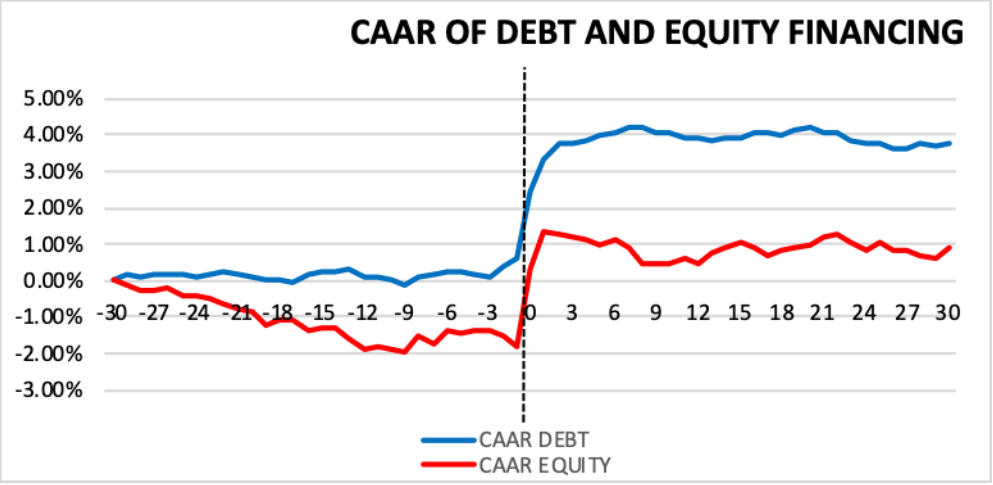
Table 7. Two sample Mann-Whitney test – financing determinants

	Z-score	**P-value**	
AR [0]	2.083	0.0372	**
CAR [-1;+1]	1.737	0.0824	*
CAR [-10;+10]	0.865	0.3872	
Table 7 shows the Mann-Whitney test by comparing the means of the financing determinants. The columns present the Z-score and P-value. The significance levels are: *,**,*** for 10%, 5%, and the 1% level.			

The graphical presentation in Figures 3a and 3b support our expectations and findings so far. For debt financing there is no valuation effect before the

announcement, a substantial announcement effect around the event of about 4%, and hardly any stock price reaction subsequently. For equity financing we observe a different picture, which, however, we already detected by analyzing the abnormal returns in Table 6. Over the pre-announcement period, the abnormal returns cumulate to a negative return of about 2% and then react positively at the announcement day (3%), resulting in an overall valuation effect of about 1% as there is not further stock price reaction subsequently. Overall financing a deal with debt instead of equity results in a three percentage points higher positive valuation effect for the bidder firm as debt financing may signal managements' confidence in the quality and success of the merger or acquisition.

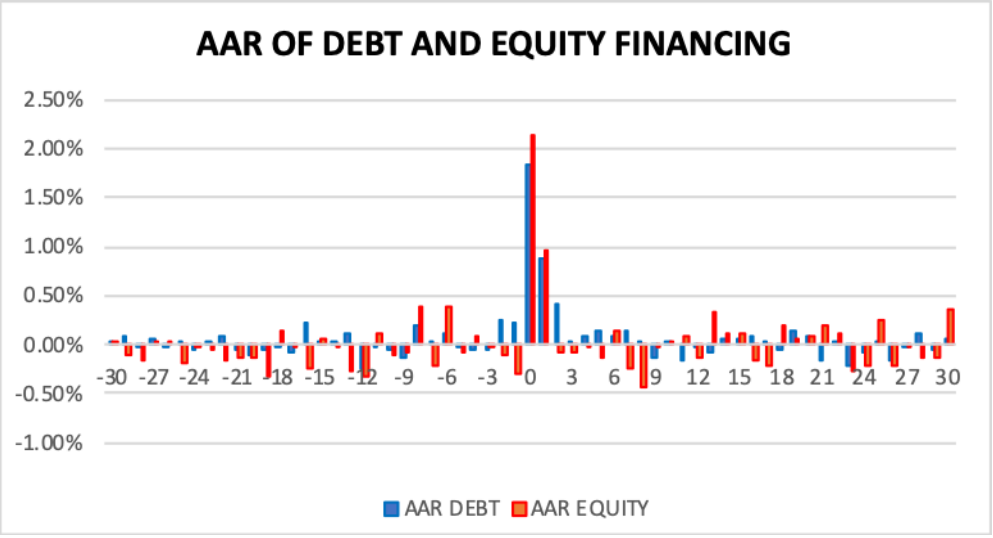
Figure 3a. Cumulative abnormal returns of financing sources



In Table 8 we present the results of the single (Models 1 and 4) and multiple regressions (Models 2, 3, and 5, 6) for six different model specifications. The objective is to analyse the effects of multiple explanatory variables on the cumulative abnormal returns for different event windows. Models 1-3 contain the regressions for the longer window (-10, +10), and models 4-6 analyse the impact around the shorter announcement period (-1, +1). The main independent variable is Debt or Equity, and the model employs the following control variables: Transaction

Value, Cash, Market-to-Book-ratio, Firm Size, Profitability, and Asset Tangibility, followed by dummies that control for different industries, non-financials/utilities, public targets, and cross-border takeovers.

Figure 3b. Abnormal returns of financing sources



Debt – number of observations = 550.
Equity – number of observations = 167.

For the single regression models (first column Table 8), we implement the following approach, which can be illustrated as follows:

(10) $CAAR_t$ Equity = 0.0207 + 0.0168 * Debt

(11) $CAAR_t$ Debt = 0.0375 – 0.0168 * Equity

This pattern occurs since the financing source is a binary variable, which takes the value of “0” or “1”, because, if a company uses equity, it cannot choose debt as its financing source and vice-versa. Therefore, one single regression model suffices

to investigate the effect of the financing sources on the magnitude of CAARs. The pattern holds for other single regression models.

In the single regression Model 1 for the longer window (-10; +10), the intercept (2.07%) presents the CAARs when a company finances the merger with equity. This coefficient is significantly different from zero at the 5% level, holding other variables constant. When the merger is financed with debt, the abnormal returns increases by 1.68% to the level of 3.75%. For the shorter event window (-1; +1), the corresponding figures are an intercept of 2.09%, representing equity financing, and an increase for debt financing by 0.809% to overall abnormal returns of 2.90%. Both coefficient for debt financing are positive but insignificant, although previous evidence suggests that debt financing has a significantly positive effect. Overall, the results suggest that there is some economic support for the argument that debt financing should generate a positive and higher valuation effect (albeit insignificant), which is consisted with our previous results and the conclusions by Martynova and Renneboog (2009).

The results from the multiple regression models in Table 8 reveal some interesting insights and support our previous evidence. Most importantly, we observe a significant difference between public and private targets in all models. The target's status is represented by the public target dummy. Shareholder confidence in the success of acquiring public targets is considerably lower than the confidence when acquiring private targets. The effects of public targets on the abnormal returns are -5.14% (-10; +10) and -3.64% (-1; +1). Since the public targets contain a binary variable, the private targets provide opposite results. The decreasing rate of returns of public targets is substantial, although one should consider that this impact only plays a role if the other variables are held constant. Nevertheless, the results confirm our conjecture that our previously observed positive abnormal bidder returns at the announcement date are mostly due to private targets.

In Models 2 and 3 for the 21-day event window surrounding the event (-10; +10), we observe that the market-to-book-ratio has a substantial and significantly negative effect (-0.00461) on the CAARs. This implies that if, for example, a companies' market-to-book-ratio increases from two to three, the abnormal returns decreases by 0.461%. Profitability also affects the abnormal returns significantly

negative (-0.00130), but Asset Tangibility has a significantly positive impact (0.000814). For the shorter event window (-1; +1), we observe a negative size-effect (-0.00989), suggesting that larger firms experience lower abnormal returns at the announcement (Table 8). Although these results are significant, they seem to be relative small in economic terms, which might be due to the short event windows that we apply.

In Table 9 we provide the regression models for alternative financing sources, analysing the impact that various explanatory variables have on the size of the CAARs of debt and equity financing. We employ single (models 1, 2, 5, 6) and multiple (models 3, 4, 7, 8) regression models. Models 1-4 cover the longer windows (-10; +10), and the models 5-8 the shorter windows (-1; +1). The regression includes the following control variables: Transaction Value, Cash, Market-to-Book-Ratio, Firm Size, Profitability and Asset Tangibility. Dummies control for different industries, non-financials/utilities, public targets, and cross-border takeovers.

The results provide the effect of the explanatory variables on the abnormal returns of debt or equity financing (see Eq. 10). Debt financing significantly outperforms equity financing, which is consistent with most of the literature and with Martynova and Renneboog (2009). The differences are 1.69% and 0.81% for the event windows of 21 days and three days around the merger announcement, respectively. Model 7 reveals that the coefficient of debt financing is statistically significant at the 1% level, implying that the abnormal returns of debt financing in the short-term window could rise to 12.5%. The dependent variable is measured as cumulative percentages, so considerable high returns are economically important. Interestingly, we find for public targets that there is a negative effect on the abnormal returns for both debt and equity financing, which is in accordance with Martynova and Renneboog (2009) and Fischer (2017).

Table 8. Single and multiple regression of cumulative abnormal returns

Model	1	2	3	4	5	6
Variables / Periods	(-10;+10)	(10;+10)	(10;+10)	(-1;+1)	(-1;+1)	(-1;+1)
Constant	0.0207**	0.00277	0.00277	0.0209***	0.103***	0.103***
	(0.00998)	(0.0664)	(0.0612)	(0.00563)	(0.0380)	(0.0351)
Debt	0.0168	0.0105	0.0105	0.00809	0.0102	0.0102
	(0.0114)	(0.0118)	(0.0114)	(0.00643)	(0.00673)	(0.00673)
Transaction V.		-0.0000	-0.0000		-0.0000	-0.0000
		(0.0000)	(0.0000)		(0.0000)	(0.0000)
Cash		-0.0000*	-0.0000*		0.0000	0.0000
		(0.0000)	(0.0000)		(0.0000)	(0.0000)
MB		-0.00461***	-0.00461***		-0.000595	-0.000595
		(0.00140)	(0.00159)		(0.000803)	(0.000860)
Firm size		0.000501	0.000501		-0.00989**	-0.00989***
		(0.00736)	(0.00683)		(0.00421)	(0.00381)
Profitability		-0.00130***	-0.00130**		-0.000214	-0.000214
		(0.000495)	(0.000578)		(0.000284)	(0.000307)
Asset tangibility		0.000814*** (0.000218)	0.000814** (0.000237)		0.000191 (0.000125)	0.000191 (0.000129)
Different industry		0.0192* (0.0104)	0.0192* (0.0100)		-0.000253 (0.00595)	-0.000253 (0.00587)
Non-fin./utility		0.0310**	0.0310**		0.00649	0.00649
		(0.0154)	(0.0128)		(0.00881)	(0.00751)
Public target		-0.0514***	-0.0514***		-0.0364***	-0.0364***
		(0.0147)	(0.0131)		(0.00840)	(0.00805)
Cross-border		-0.00614	-0.00614		0.00137	0.00137
		(0.0119)	(0.0121)		(0.00683)	(0.00658)
Robust	No	No	Yes	No	No	Yes
Observations	717	615	615	717	615	615
R-squared	0.003	0.078	0.078	0.002	0.080	0.080

Figures in parentheses are the (robust) standard errors. The values are winsorized at the lower 1% and upper 99%. The significance levels are *, **, ***, which stands for 10%, 5%, and the 1% level

Table 9. Single and multiple regression of the effects on debt and equity financing

Model	1	2	3	4	5	6	7	8
Financing Source	Debt	Equity	Debt	Equity	Debt	Equity	Debt	Equity
Variables / Periods	(-10;+10)	(-10;+10)	(-10;+10)	(-10;+10)	(-1;+1)	(-1;+1)	(-1;+1)	(-1;+1)
Constant	0.0375***	0.0207**	0.0750	-0.120	0.0290***	0.0209***	0.125***	0.0807
	(0.00558)	(0.00948)	(0.0790)	(0.0998)	(0.00309)	(0.00573)	(0.0427)	(0.0620)
Transaction V.			-0.0000	0.0000			-0.0000	0.0000***
			(0.0000)	(0.0000)			(0.0000)	(0.0000)
Cash			-0.0000	-5.95e-11***			0.0000	0.0000
			(0.0000)	(0.0000)			(0.0000)	(0.0000)
MB			-0.00530***	-0.00405			-0.000769	-0.000795
			(0.00204)	(0.00265)			(0.00118)	(0.000982)
Firm size			-0.00576	0.0150			-0.0106**	-0.00854
			(0.00850)	(0.0119)			(0.00453)	(0.00710)
Profitability			-0.00125**	0.000186			-0.000180	0.000444
			(0.000625)	(0.00123)			(0.000319)	(0.000882)
Asset tangibility			0.000648**	0.00121***			9.39e-05	0.000509***
			(0.000275)	(0.000262)			(0.000144)	(0.000150)
Different industry			0.0236**	0.0112			0.00288	-0.0115
			(0.0116)	(0.0197)			(0.00684)	(0.0119)
Non fin./utility			0.0170	0.0514***			0.000269	0.0218*
			(0.0174)	(0.0196)			(0.00978)	(0.0128)
Public target			-0.0421***	-0.0813***			-0.0352***	-0.0370**
			(0.0154)	(0.0265)			(0.00908)	(0.0176)
Cross-border			-0.00117	-0.0408			0.00256	-0.00242
			(0.0137)	(0.0298)			(0.00754)	(0.0138)
Robust	No	No	Yes	Yes	No	No	Yes	Yes
Observations	550	167	470	145	550	167	470	145
R-squared	0.000	0.000	0.065	0.212	0.000	0.000	0.081	0.150

Figures in parentheses are the (robust) standard errors. The values are winsorized at the lower 1% and upper 99%. The significance levels are *, **, ***, which stands for 10%, 5%, and the 1% level

This may indicate that bidder shareholders are aware of the risks of taking over a listed company. Alternatively, the value of the target is more precisely known in these deals and the target shareholders are successful in demanding a higher premium before tendering their shares. Consequently, our overall findings are determined by the private targets, which may receive, on average, a smaller premium, creating value for the shareholders of the bidder.

5.2.2. Payment methods

The second important factor that may influence the magnitude of the valuation effects are the methods of payment. In Table 10 and Figures 4a and 4b, we display the cumulative abnormal returns for the bidder over different event windows. The windows cover the mean and median abnormal returns for cash, stock and total payments. Companies that employ cash as a method of payment for their corporate takeovers experience considerably higher returns around the merger announcement than those that pay for the deal with their own shares.

We also test whether the means of cash and share payments are significantly different from each other. For this we perform the Mann-Whitney test. The results are displayed in Table 11 by providing the Z-score and P-value for the corresponding event windows. The tests are also performed for the announcement date (day 0). The means of cash and share payments are statistically different from each other at the announcement date. The Z-score at the announcement date is 1.713 and the corresponding P-value is 0.0867. Therefore, with a 10% significance level we can state that the population means of cash and share payments differ significantly and that the population mean of cash significantly outperforms the share mean around the announcement. However, the Z-score for the three-day interval (-1, +1 days) of 1.292 is insignificant. The Z-score for the 21-day interval (-10, +10 days) is close to zero and insignificant. Consequently, the results from the Mann-Whitney test imply that the population mean of cash payments is higher than the mean of share payments at the merger announcement, indicating an outperformance. We therefore provide evidence in support of our Hypothesis 2a, that cash paid deals outperform share paid deals at least at the announcement date.

This result can be explained with asymmetric information and the information advantage of management that signals their perspective on the value generating opportunities of deals with their choice of the method of payment. Deals with expected high returns are paid for with cash and deals where the bidder wants that the target shareholder share the potential risks are paid for with shares. Studies such as Martynova and Renneboog (2009), Fuller et al. (2002) and Moeller et al. (2005) present similar results.

Table 10. Cumulative abnormal returns of the payment determinants

	[-10;+10]	[-3;+3]	[-1;+1]	[0]	Obs.
Cash	0.0348	0.0336	0.0292	0.0192	560
	(0.0210)	(0.0249)	(0.0169)	(0.0048)	
Shares	0.0298	0.0228	0.0197	0.0104	157
	(0.0219)	(0.0078)	(0.0125)	(0.0027)	
Total	0.0336	0.0312	0.0271	0.0172	717
	(0.0214)	(0.0208)	(0.0154)	(0.0044)	
Average abnormal returns over different interval windows are shown. Mean and median (in parentheses) values are given for cash, stock paid and total payments. Obs. stands for the number of observations.					

Table 11. Two sample Mann-Whitney test – payment methods

	Z-score	P-value	
AR [0]	1.713	0.0867	*
CAR [-1;+1]	1.292	0.1965	
CAR [-10;+10]	-0.074	0.9413	
Table 11 shows the Mann-Whitney test by comparing the means of the payment methods. The columns present the Z-score and P-value. The significance levels are: *,**,*** for 10%, 5%, and the 1% level.			

The graphical presentations in Figures 4a and 4b support our expectations and findings so far. For cash payments, there are no valuation effects before the announcement, substantial valuation effects around the announcement of more than 3%, and hardly any stock price reactions subsequently, supporting efficient market arguments. For share payments, we observe different results, which are consistent with the previous observation we gained from our analysis presented in Table 10. Over the pre-announcement period (-30; -10), we observe negative cumulative valuation effects of up to minus 2%. There are positive stock price reactions thereafter of about 4% (-9; +6) including a 1% increase at the announcement day. Thereafter, we identify some negative stock price reactions of about minus 1% (+7; +30), resulting in cumulative abnormal returns of about 1% for the entire period (-30; +30). Overall, paying for a deal with cash instead of shares results in a three percentage points higher positive valuation effect for the bidder firm as cash payments may signal management's confidence in the quality and success of the merger or acquisition.

Figure 4a. Cumulative abnormal returns of payment methods

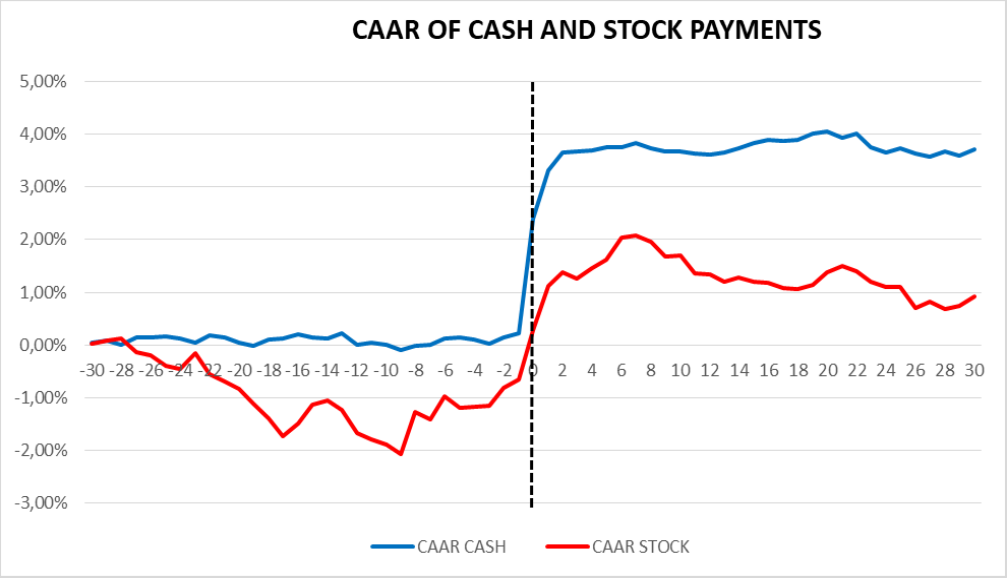
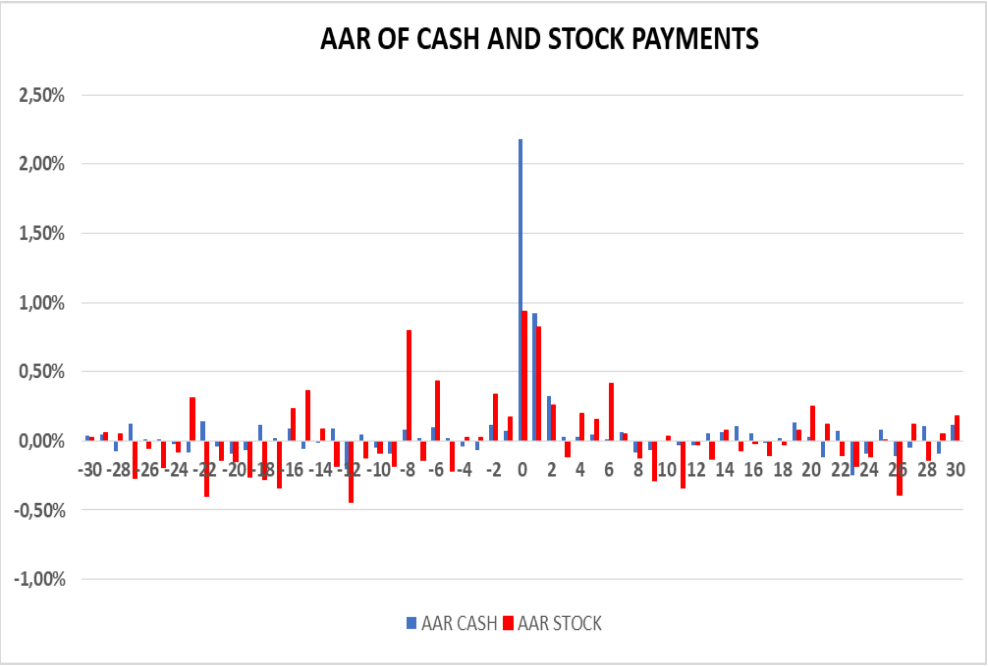


Figure 4b. Abnormal returns of payment methods



Cash – number of observations = 560.
Stock – number of observations = 157.

We now turn our attention on the bidder returns and the results from the regression analysis with respect to the method of payment. Table 12 contains the results from single (models 1,2, and 5,6) and multiple regressions (models 3,4, and 7,8) of the explanatory variable(s) on the abnormal returns for cash and stock paid acquisitions. The impact of multiple explanatory variables on the CAARs of the debt and equity transactions is analysed as well. Models 1-4 include the regression for the longer window (-10; +10), and models 5-8 for the event day (-1; +1). The regression consists of several control variables: Transaction Value, Cash, Market-to-Book-ratio, Firm Size, Profitability, and Asset Tangibility, followed by dummies that control for different industries, non-financials/utilities, public targets, and cross-border takeovers. The payment method is a binary variable, indicating whether companies paid their transactions with cash or equity. We illustrate the single

regression on the short-term window mathematically (models 5 and 6 first row in Table 12).

(12) $CAAR_t$ Cash = 0.0292 – 0.0095 * Equity

(13) CAARt Stock = 0.0197 + 0.0095 * Cash

The single regression conveys that cash payments generate significantly higher abnormal returns than stock paid acquisitions for both windows (3.38% vs. 2.92% and 2.98% vs. 0.197%). In addition, model 5 and 7 indicate that cash payments have a statistically significant effect on the abnormal returns for a window of three days around the announcement. The cumulative abnormal returns and therefore the valuation effects are economically relevant. This implies that investors have more confidence in the quality of cash paid takeovers, because cash payments are interpreted as a positive signal to the market (Fischer 2017; Majluf, Myers 1984).

Profitability expressed as EBITDA divided by total assets reveals opposite reactions on cash and stock paid acquisitions. The models predict that an increase in profitability reduces the abnormal returns for cash paid takeovers. As the effect is significant only at the 10% level (see Model 3) we give less importance to this finding. The binary variable that specifies the financial and utility companies suggest that acquiring companies outside the financial and utility industry leads to significant higher abnormal returns in the longer window (-10; +10). Moreover, cash paid acquisitions of public targets face a substantial and significant decline of the market value. Consequently, the significant effects of public targets on the payment method are driven by the cash paid acquisitions. In addition, the total amount of cash is significantly negative for companies paying with stock (Model 4). It remains unclear how to interpret this effect, because the relative size is not observable. Yet, consistent with the pecking order theory (Majluf, Myers 1984), this implies that firms with sufficient cash levels would use cash for acquisitions.

Table 12. Single and multiple regression of the effects on cash and stock paid takeovers (see footnote 1 next page)

Model	1	2	3	4	5	6	7	8
Payment Method	Cash	Stock	Cash	Stock	Cash	Stock	Cash	Stock
Variables/Periods	(-10;+10)	(-10;+10)	(-10;+10)	(-10;+10)	(-1;+1)	(-1;+1)	(-1;+1)	(-1;+1)
Constant	0.0348***	0.0298***	-0.00565	0.114	0.0292***	0.0197***	0.115***	0.169*
	(0.00552)	(0.00989)	(0.0729)	(0.119)	(0.00305)	(0.00596)	(0.0388)	(0.0869)
Transaction V.			-0.0000	-0.0000			-0.0000	-0.0000
			(0.0000)	(0.0000)			(0.0000)	(0.0000)
Cash			-0.0000	-0.0000***			0.0000	-0.0000
			(0.0000)	(0.0000)			(0.0000)	(0.0000)
MB			-0.00256	-0.00966***			-0.000572	0.000285
			(0.00161)	(0.00331)			(0.00101)	(0.00159)
Firm size			0.00189	-0.0131			-0.0103**	-0.0183*
			(0.00786)	(0.0135)			(0.00415)	(0.00942)
Profitability			-0.00121*	0.00225			-7.01e-05	0.00175
			(0.000619)	(0.00249)			(0.000284)	(0.00157)
Asset tangibility			0.000828***	-0.00174			0.000179	-0.00147
			(0.000232)	(0.00141)			(0.000122)	(0.000919)
Different industry			0.0195*	0.0158			0.00449	-0.0184
			(0.0113)	(0.0204)			(0.00646)	(0.0134)
Non-fin./utility			0.0323**	0.0433*			0.00811	0.00721
			(0.0150)	(0.0221)			(0.00807)	(0.0197)
Public target			-0.0702***	0.0172			-0.0467***	0.0101
			(0.0145)	(0.0309)			(0.00873)	(0.0201)
Cross-border			-0.0107	0.0213			-0.00207	0.0259
			(0.0139)	(0.0260)			(0.00740)	(0.0159)
Robust	No	No	Yes	Yes	No	No	Yes	Yes
Observations	560	157	481	134	560	157	481	134
R-squared	0.000	0.000	0.086	0.194	0.000	0.000	0.110	0.103

5.3. Interaction between financing sources and methods of payments

So far, we have analyzed the effects of the alternative financing sources and the different methods of payment on the magnitude of the abnormal bidder returns separately. However, it can be expected that there exists some interaction effect between two variables caused by information asymmetry and signaling as well as due to agency problems. In Figures 5a and 5b we present the cumulative abnormal returns for all combinations between these two categories. The following four combinations of financing and payment decisions are possible: debt and cash, equity and shares (Figure 5a) as well as debt and shares, and equity and cash (Figure 5b). Based on the literature and our previous results, we expect that the information asymmetry and the agency problems are minimized and the positive signaling effect is maximized when firms finance the deal with debt and pay with cash. In contrast, equity financing and paying with shares signals the low profitability and riskiness of the acquisition and a likely inferior outcome of the deal.

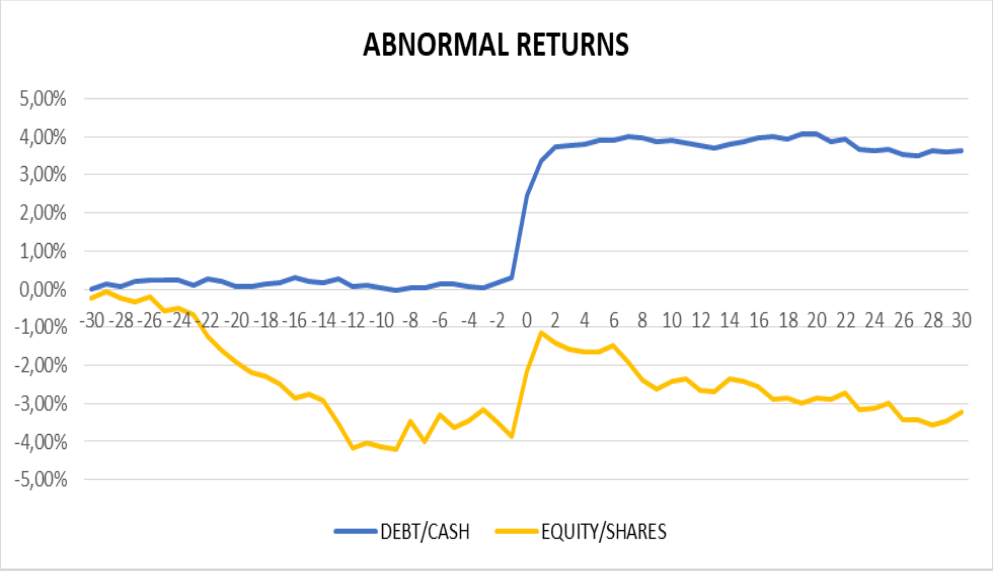
The CAARs in Figure 5a provide convincingly supporting evidence for our conjecture in that the debt/cash combination generates the highest positive abnormal returns at the announcement. There is no run-up or decline before, but persisting returns of about 4% afterwards. In contrast, the combination equity/shares offers the lowest valuation effects in that the returns are negative before and positive at the announcement, but decline thereafter again, indicating the market participants' perspective that a deal for which management selects this combination signals its uncertainty and low value creation potential. Interestingly, the negative valuation effect of equity financing before the M&A may be due to the typical negative equity issuance effect.

Each pair in the combinations in figure 5b includes one positive (debts or cash) and one negative signaling device (equity or shares). This results in insignificantly abnormal returns before the M&A announcement, some positive valuation effects at the deal announcement, and persistent returns subsequent to the announcement of around 4%, however, with some fluctuations. Surprisingly, the post-announcement

[1] In Table 12, figures in parentheses are the (robust) standard errors. The values are winsorized at the lower 1% and upper 99%. The significance levels are *, **, ***, which stands for 10%, 5%, and the 1% level.

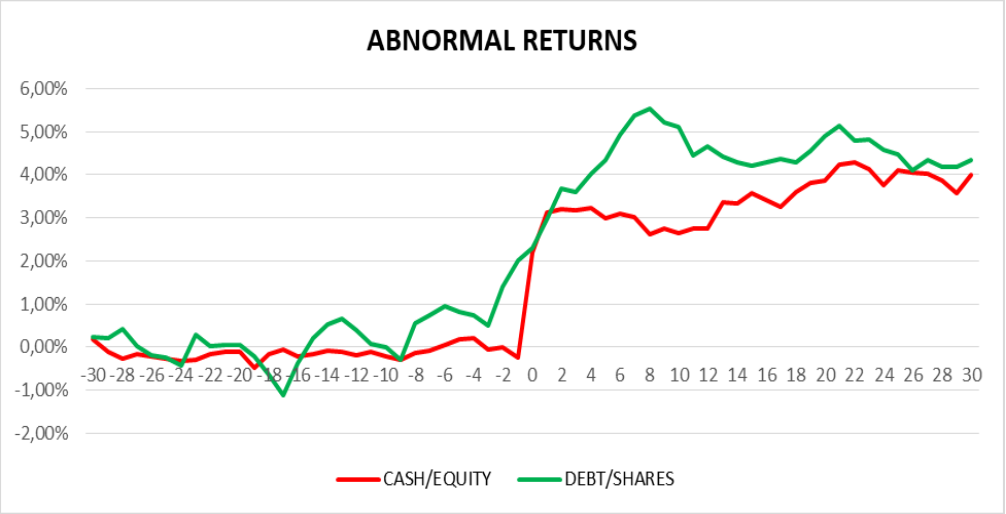
return level is similar to that of debt/cash deals, which we interpret as the best signaling combination. However, it seems plausible that the market does not need both signals simultaneously as one signal may suffice and does convince investors. For example, issuing equity is not that devastating as long as the method of payment is cash, because the equity issuing could have been motivated by other reasoning such as reducing leverage or adjusting the capital structure. Similar arguments could be made for the debt/shares combination as it includes the positive debt financing instrument.

Figure 5a. Abnormal returns of payment methods and financing sources



Debt/Cash – number of observations = 464.
Equity/Shares – number of observations = 71.

Figure 5b. Abnormal returns of payment methods and financing sources



Equity/Cash – number of observations = 94.
Debt/Shares – number of observations = 86.

5.4. Targets: cumulative abnormal returns and methods of payment

So far, we were mostly interested in the merger related returns for the bidder and the effects that the financing and payment decision had on the magnitude of these returns. We now turn to the target and analyze how the different methods of payment affect the size of the valuation effects. This analysis can only be considered as indicative as the majority of the targets in our sample are privately owned and only less than 100 firms are publicly traded. In Table 13 we present our findings for the subsample of publicly traded targets and find that cash bids generate more positive wealth effects for target shareholders than share deals. Although the abnormal target returns are insignificant, the magnitude suggest that they are economically relevant. The announcement day (0) abnormal returns for targets are higher for cash deals (13.30%) than for share deals (6.93%), suggesting that the selection of the method of payment by the bidder's management has a signaling effect on the quality and future prospect of the combined firm. In the share deal the target shareholders usually become shareholders of the bidder and this does not

seem to be a great value generating proposition. The relationships also hold for longer event windows, although the difference decreases for longer intervals. The research offers patterns in accordance with the results in Goergen and Renneboog (2004) and Martynova and Renneboog (2009). Both provide evidence that cash payments generate significantly higher returns for target shareholders, which are economically sensible findings.

Table 13. Cumulative abnormal returns of payment determinants

	[-10;+10]	[-3;+3]	[-1;+1]	[0]	Obs.
Cash	0.2081	0.1820	0.1664	0.1330	73
	(0.1583)	(0.1478)	(0.1287)	(0.0961)	
Shares	0.1684	0.1256	0.1065	0.0693	19
	(0.1561)	(0.1208)	(0.0689)	(0.0371)	
Total	0.1999	0.1703	0.1540	0.1198	92
	(0.1573)	(0.1239)	(0.1021)	(0.0692)	
Average abnormal returns over different interval windows are shown. Mean and median (in parentheses) values are given for cash, stock paid and total payments. Obs. stands for the number of observations.					

6. Conclusions

In this study, we analyze the stock price reactions and short-term performance effects of bidder and target firms engaging in European domestic and cross-border acquisitions. The focus is on the short-term valuation effects of 717 European merger transactions. We use event study methodology to determine the abnormal returns around the merger announcement. The empirical findings suggest that bidder firms benefit substantially from the merger announcement. The evidence for target firms is consistent with the previous M&A literature as the bidder has to pay a premium for acquiring the target, which often represents the entire expected synergy gains (Bessler, Schneck 2015). For bidder firms we also find positive abnormal returns for the full sample at the announcement day, a run-up before and no substantial abnormal returns subsequently. The positive outcome for bidder firms is

primarily determined by the acquisition of private targets. For public targets our findings are in line with most of the previous literature that does not find any significantly positive bidder announcement returns. Only more recent studies report positive valuation effects for the bidder (Martynova, Renneboog 2009; Alexandris et al. 2010). However, as most of our target firms are privately owned the results are consistent with the previous literature.

Most importantly, the focus of our analysis is on explaining the magnitude of the abnormal bidder and target announcement returns by differentiating between alternative financing sources and alternative methods of payment in mergers and acquisitions (Bessler, Drobetz, Zimmermann 2011; Bharadwaj, Shivdasani 2003; Martynova, Renneboog 2009; Fischer 2017). For bidder shareholders we observe that debt financing generates significantly higher abnormal returns than equity financing, which is in line with previous studies by Martynova and Renneboog (2009) and Fischer (2017). Consequently, in financial markets characterized by information asymmetry, management is assumed to be better informed than shareholders and may reveal their information advantage to public equity markets through specific actions such as financing decisions. Moreover, agency theory does also suggest that debt financing is usually preferred over equity financing for deals offering the highest expected rates of return and the lowest uncertainty. The evidence related to the method of payment suggest that cash payments generate higher valuation effects relative to stock payments, at least in the days surrounding the merger announcement. This finding is consistent with studies by Fuller et al. (2002) and Moeller et al. (2005). Again the signaling argument but also the agency theory aspects apply here as well, as management typically prefers to share the potential losses of risky M&As with the target shareholder by paying with shares, but, in contrast, being eager to keeping the benefits of the more valuable and less risky M&As for themselves by paying with cash.

Overall, the above results appear consistent with the pecking order theory as debt issuance seems preferable to equity financing, resulting in positive valuation effects. Moreover, agency theory suggests that for the most promising deals bidders would always issue debt and pay with cash. This study indicates that both the financing source and the method of payment have significant effects on the size of

the bidder and target returns. Consequently, both financing and payment decisions are relevant for analyzing the valuation effects of mergers and acquisitions.

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The behavioral investigation of industry 4.0 concept: a research on Twitter

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Abstract:

Aim: This paper is going to investigate how Industry 4.0 concept, behaves in social networks and the context of this innovative approach find a place in time in means of content and sentiment comprising.

Design / Research methods: Expeditious progress in industrialization and information techniques has made great advancement in developing the next span of production technology. Industry 4.0 is an imperative action where the intention is the alteration of modern production through digitalization and profiteering of the capabilities of new advancements. Today, the absence of powerful appliances still feigns a significant impediment for utilizing the ample potential of Industry 4.0. Notably, behavioral approaches are essential for understanding Industry 4.0, which professes novel trials. This paper briefly surveys the area of Industry 4.0 as it relates to behavioral operations by using sentiment analysis and social network analysis methods and tools by describing features of the relationship network either through numerical and visual representation

Conclusions/Findings: First of all, it should be presumed that the name Industry 4.0 describes various, fundamentally internet-based developments in manufacturing operations. These advancements do not only have technological but moreover accomplished organizational engagements. Appropriately, a shift from product to service orientation is assumed. Following, the introduction of novel varieties of businesses can be envisioned which embraces new particular functions within the production process sequentially the value-creation networks.

Originality/value of the article: Within the context of the current state of the art in operations management literature, this paper fulfills the gap between behavioral operations and Industry 4.0 context for the researchers both in operations management and behavioral sciences

Keywords: Industry 4.0, Behavioral Operations Management, Social Network Analysis.

JEL: C88, D23, D24, E71, M11, O14, O33

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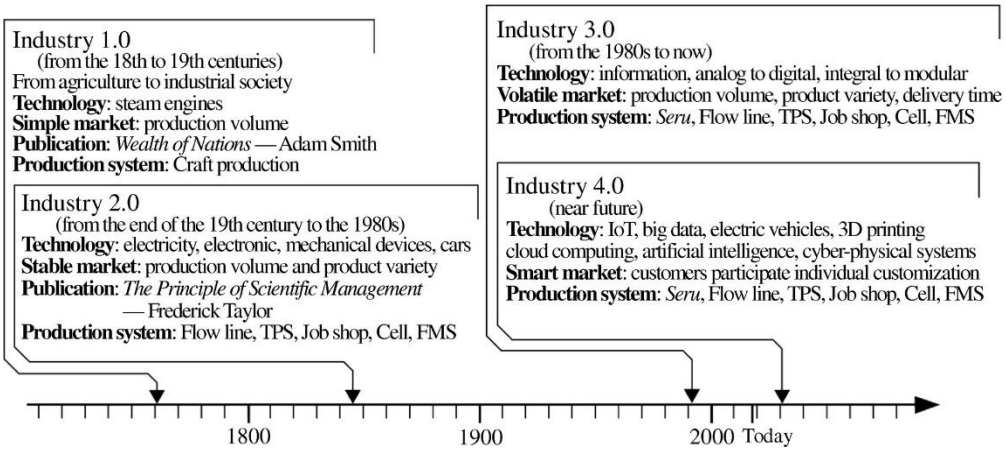
1. Introduction

The industrial revolution or with a more common name “First Industrial Revolution” is known as a transition period from craft manufacturing to machine production. The wide usage of steam and water power lets people to develop mechanized factory environments. Invention and wide usage of steel and electric power consequently give a lead to mass production transformations in many industries then which this era has been named as “Second Industrial Revolution”. This technological innovations also affects the social life in many societies like growing GDPs. It is believed that changing the daily life of people in a good manner, create a positive impression on industry-related thoughts in society. Fostering economic conditions of that era let these adoptions acceptance much easier. Previously invention of the telegraph then Babbage’s analytical engine had silently opened the doors of a new communication skill after nearly a century it named as digitalization by Shannon in mid 20th century (see Shannon 1948). The transformation of the analog revolution to a digital one had started and it is called the “Third Industrial Revolution”. When society started to meet personal computers and the World Wide Web founded nothing has remained as it is before. Latterly, industrial production systems are being transformed due to a higher level of digitalization, which leads to an intelligent, connected, and decentralized production which points to a novel state, the “Fourth Industrial Revolution”. This new level of organization is often called ‘Industry 4.0’ (Kagermann et al. 2013; Hermann et al. 2016). To sum up and visualize what was told, a detailed timeline drawn by the researchers (Yin et al. 2018) which shows the evolution of production systems among decades should be helpful at Scheme 1.

Scheme 1. Timeline of industrial revolutions



Source: Yin et al. (2018).

Industry 4.0 introduces a pathway to achieve a renewal from mechanical manufacturing to digitized production (Oztemel, Gursev 2020). It is a part of networked and learning artificial organisms, and the Industry 4.0 approach mainly depends on real-time data where innovative processes and novel social architectures are in progress. The researchers' projection about the Industry 4.0 and related components accompanying the journey will have an immense outcome or kind of metamorphosis on social life. The operations community should be provoked spontaneously by this social renewal to advance their process groups to handle the customer requirements and nurture competitive advantage (Oztemel, Gursev 2020). Gathering the data about the behavioral approach of customers or in here the novel technology users is available with social network analysis.

Greater interconnected areas, easier communication of people, and the exposure of lots of information tends society to share their ideas much more courageous ways. Social networks like Facebook, Twitter, Linkedin, etc. has grown up within this motive. Either using WWW or social networking the wider usage of mobile communication, the interactions of individuals, and companies are radically changed. Whether some negative behaviors or effects occurred, the expectations are always positive about these developments. Likewise, a technologically encouraging

prospect was formed where gadgets will be connected to the internet and make smart cooperations with other objects everywhere at any moment (Lee et al. 2013).

Social Network traffic provokes enormous volumes of data and analysis of this data is important for both organizations and companies to understand the behavior of subscribers. Holding the beat of social network users is important for organizations and individuals to plan their communication, coordinating operations, gathering information, commenting, marketing activities like advertising, and promotion, and organization of social events strategically (Nguyen, Jung 2017; Bello-Orgaz et al. 2016). Piccialli et al. (2018) states that social data can be collected and analyzed for impact, potency, and performance in combination with behaviors. Especially, Twitter gives excellent opportunities for large-scale analytics, which emanate from various aspects: the real-time character of tweets; unpredictable heartfelt reactions; rapid viral spread over the web; etc. Notably, behavioral approaches are essential for understanding Industry 4.0, which professes novel trials (Xu et al. 2018). This paper briefly surveys Industry 4.0 as it relates to behavioral operations by using twitter sentiment analysis and social network analysis tools by describing features of the relationship network either through numerical and visual representation.

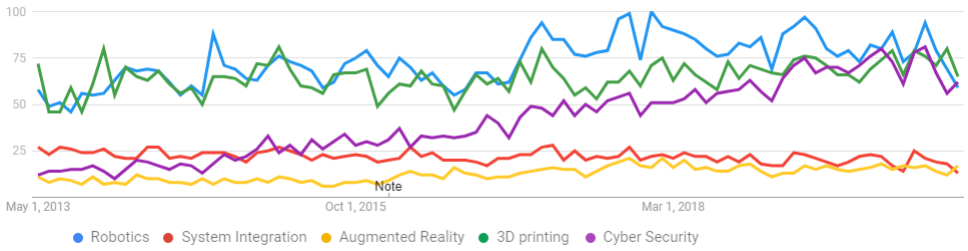
2. Industry 4.0

The Industry 4.0 idea is depending on the evolution of innovative digital technologies. Respectively the most modern technological advancements, each tool becomes intelligent by the time passes with the internet alliance. The prompt interaction of the internet lets these intelligent devices communicate without human cooperation. Meanwhile, smart agents interact together, activities create a big volume of data, that necessitates to be saved and treated. Industry 4.0 introduces inter-discipliner technologies and offers broad application of AI, CPS, RFID, IoT, additive manufacturing (3D-printing), vertical and horizontal systems integration, smart factories, robotics, simulation, cloud computing, big data and cybersecurity (Xu et al. 2018). While human, machines and sources are vertically connected, the

businesses are connected horizontally as in a social network created by Cyber-Physical Systems (Kagermann et al. 2013; Machado 2020).

As Kagermann et al. (2013) publicly introduced the Industry 4.0 at Hannover Fair in April, 2013 the interest in this topic growth increasingly. The graph seen below proves that enthusiasm as a research interest for the concept itself and its components (Graph 1). This excitement occurred whether the absence of powerful appliances still feigns a significant impediment for utilizing the ample potential of Industry 4.0 that may mean people have a strong positivity about this novel subject.

Graph 1. Google Trend Analysis based on Industry 4.0 and its components (2020, May 1)



Source: https://trends.google.com/trends/ [01.05.2020]

3. Social network sentiment analysis

Presently the active internet user population reaches nearly 4.57 billion people as of May 2020[1]. This means nearly 60 percent of the total global population is connecting worldwide as a part of today's information society. Besides 3.81 billion, it means 83% of active internet users, active social media users connecting and influencing each other. This outrageous growth of internet usage has resulted in users' desire to express their opinions among social media tools like blogging. It is fruitful to extract the mood of people from these opinions (Danescu-Niculescu-Mizil et al. 2009).

[1] https://www.statista.com/statistics/617136/digital-population-worldwide/ [02.05.2020].

Microblogging is described as a novel, generally web-based, communication approach where the contributors post their current situation (Java et al. 2007). One of the most popular microblogging services is known as Twitter[2]. This popular microblogging service has a lot of continuous growth in means of users since it launched in October, 2006. Today this social network with 330 million[3] monthly active users, with more than 40 % of these posting daily, post messages, also called tweets, limited to 280 characters. In Twitter's social network the user intentions help people to connect with similar motives, at the public level, when sharing about their daily activities or opinions about popular subjects (Java et al. 2007). Besides this bursting increase in social media engagement, people and companies start to use the created content in these environments for decision making (Liu 2012). Organizations also started to collect notable feedback about newly released products and services (Go et al. 2009). Certainly, it becomes substantial for companies to hatch their business strategies and plans by considering these opinions, like to understand the feelings about the Industry 4.0 concept in the community. Sentiment analysis would be a great tool for extracting feelings from these unorganized opinions for manipulating many business-intelligence tasks like told (Pang, Lee 2008). The word 'sentiment'[4] is often implied as an emotion inspired by an idea or suggests a settled opinion reflective of one's feelings. The broad discussion about the terminology made at Scherer's study (2005) stated that distinguishing the definitions of opinion, sentiment, feeling, mood and emotion from each other is a challenging point. Sentiment and mood-based empirical analyses on textual data obtained from social media especially Twitter become popular in time (Bollen et al. 2011). In literature, these studies are widely collected under sentiment analysis, and are also called opinion mining (Pang, Lee 2008).

Sentiment analysis is the field of study that analyzes people's behavioral attitudes against entities such as products, services, organizations, individuals, issues, events, topics, and their features (Liu 2012). Sentiment analysis principally concentrates on feelings that prove or mention positive or negative sentiments (Liu

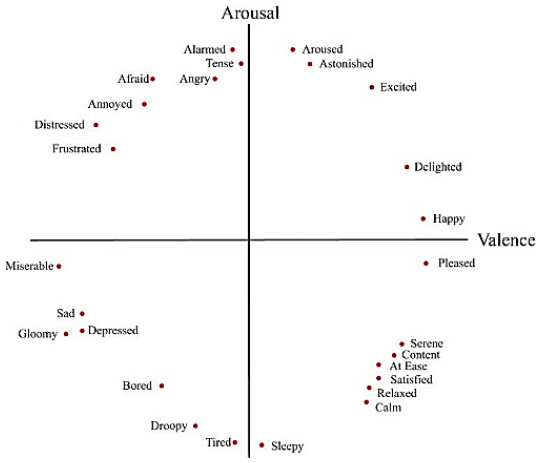
[2] https://twitter.com/ [02.05.2020].
[3] https://www.statista.com/statistics/282087/number-of-monthly-active-twitter-users/ [02.05.2020].
[4] https://www.merriam-webster.com/dictionary/sentiment [08.04.2020].

2012). It contributes helpful intuition into online interaction by enabling emotion measurement in those texts. The data gathered from sentiments is used by researchers interested in mining opinions, moods and attitudes, and in-market data, product comparison. Nasukawa and Yi (2003) stated that the machine learning rooted methods are widely used in sentiment analysis, to categorize the feelings, moods, and judgments whether they have positive or negative opinions. Thus, sentiment analysis identifies the affinity of the sentiment phrases with the subject by looking for the polarity and power of the expressions (Nasukawa, Yi 2003).

4. Methodology

As it is mentioned one of the key tools for sentiment analysis is machine learning, the techniques used for sentiment categorization are the most commonly naive Bayes, maximum entropy, and support vector machine (Tang et al. 2009). Most sentiment analysis algorithms use simple terms to express the sentiment. However, the cultural factors, linguistic difficulties, and differing contexts prevent researchers from drawing the sentiment accurately. The ANEW is being developed to aid emotion studying researchers to set normative emotional ratings for the English language to figure out a tweet's sentiment (Bradley, Lang 1999). This paper used an adopted dictionary-based approach for determining the sentiment of tweets which is developed by Siddharth and Healey (2011). This ANEW dictionary consists of 1034 rated words along the circumplex model where the arousal and valence are consisting of the dimensions. To plot the map of words matched with the ANEW dictionary using mean valance and arousal, they used the arithmetic mean and normal distribution in the calculation. As the power of the emotion referred by arousal, the degree of negativity and positivity attributed to valence. The circumplex model used at this study which is proposed by Russell (1980) shown in Figure 1, allows us to point out the tweet emotion at any position of valence and arousal.

Figure 1. Russel's circumplex model



Source: Seo, Huh (2019).

Sentiment analysis provides information about a written material's emotional contextual polarity. ANEW based technique and Deep Learning model are the two methods used in tweet evaluation. Every word in the tweet matched with the ANEW library is mapped in this technique. Then to enhance the mapping this effort enforced to Porter's stemming algorithm (Porter 1980). Further selection decisions were given with matched words by considering the mean valence (μ_v) and mean arousal (μ_a) with calculating the average of the valence and arousal for all ANEW library.

Considering this approach, in this paper, the ANEW based methodology developed by Healey and Ramaswamy (2011) is used. Moreover, the data collection, cleaning, parsing, and processing is worked on by the help of a web-based tool[5] also developed by Healey and Ramaswamy (2011).

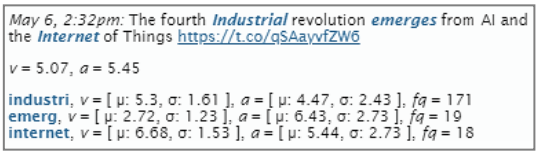
[5] https://www.csc2.ncsu.edu/faculty/healey/tweet_viz/tweet_app/ [02.05.2020].

5. Application and findings

The methodology proposed by Healey and Ramaswamy (2011) converts their open-source code publicly available with a usable web-based tool where you may grab the calculations and visuals easily. The tweet search was done from this site based on Twitter's search API. A virtual database containing hundreds of tweets was processed with the help of this tool. Also, the visuals belong to the Healey and Ramaswamy's (2011) tool. The findings of the Industry 4.0 based search and the terms affection on Twitter users are shown and discussed below.

Twitter keyword search is done with the term "Industry 4.0" and as a mention "#industry40" results with hundreds of findings limited with the tools search time interval. The first figure (Figure 2) below is a sample ANEW dispatch for a just one tweet in part. As was told in the previous methodology section, the valence and arousal scores, for the terms 'industry', 'emerges' and 'internet" are [5.30, 4.47], [2.72, 6.43] and [6.68, 5.44] calculated respectively. The overall valence score $\mu_\vartheta = 5.07$ and the overall arousal $\mu_\alpha = 5.45$ has found for this particular sample tweet. For ANEW it is calculated a standard deviation, shown in the figure also, for every term's valence and arousal, which explains the expansion of potential valences and arousals for the terms used in divergent contexts.

Figure 2. Tweet details

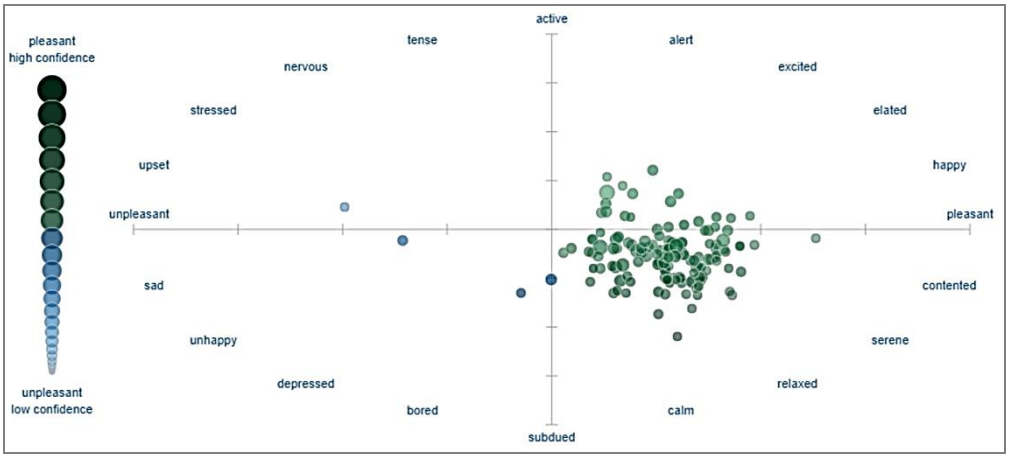


Source: https://www.csc2.ncsu.edu/faculty/healey/tweet_viz/tweet_app/ [06.05.2020].

Next, following the method of the normal distributions by using the means of valence and arousal and for the words listed in ANEW, the standard deviations were calculated. Following, these listed words' computed normal distributions added into a cumulative distribution by using the cumulative distribution functions. This helps us in finding the coordinates, which are the maximum of the results that come out

from the cumulative distribution functions. The x-coordinate results with μ_ϑ and μ_α where the mean score is maximum representing the y-coordinate. After that, to map them on the scale, like seen below (Figure 3) we need to normalize μ_ϑ and μ_α.

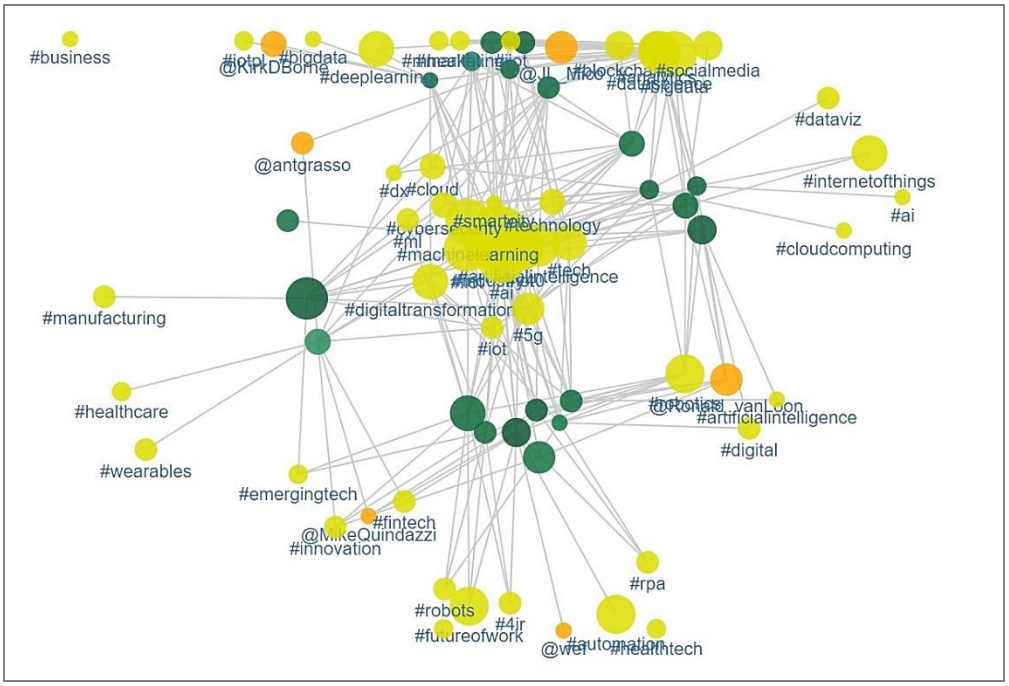
Figure 3. Sentiment map visual



Source: https://www.csc2.ncsu.edu/faculty/healey/tweet_viz/tweet_app/ [06.05.2020].

The above graph (Figure 3) is the visualized form of how "Industry 4.0" related tweets distributed among the scale's axis. This geographical location expresses the overall sentiment of the tweets. In this particular search, we can figure out that the attitude towards this new development is pleasant but subdued. Besides, the transparency of the visuals, which represents the power of confidence, are tending as opaque that tells us the estimates are assured.

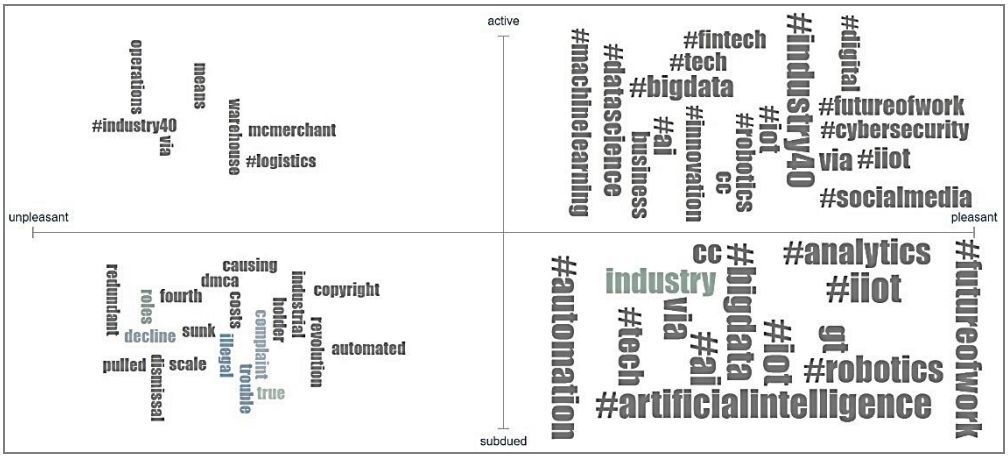
Figure 4. Tweets affinity graph



Source: https://www.csc2.ncsu.edu/faculty/healey/tweet_viz/tweet_app/ [06.05.2020].

The affinity graph visualizes the frequency of tweets together with relationships or closeness between each other. As indicated in related literature (Liao et al. 2017; Xu et al. 2018; Oztemel, Gursev 2020), the relationship between Industry 4.0 and its components is obvious and strong. The strongly linked subjects should easily be observed from the graph like digital transformation, cloud computing, innovation, automation, robots, IoT, AI, cybersecurity, machine learning, healthcare, etc. Furthermore, the following word cloud distributed among the emotional circumplex model both indicates the tweet owners feelings and the sentimental status of the hashtags they used when writing about subject Industry 4.0.

Figure 5. Tweets tag cloud



Source: https://www.csc2.ncsu.edu/faculty/healey/tweet_viz/tweet_app/ [06.05.2020].

6. Concluding remarks

Human being tends such innovative approaches in all ages and eras. The findings show no hesitation that the interest of operations decision-makers about digital transformation in general but Industry 4.0 in specific, is high. The sentiment analysis, performed in this paper, approves this positivity within the Twitter data. The calmness about the 'Industry 4.0' resulted from the sentiment map (Figure 3) should be explained with the absence of powerful appliances still feigns a significant impediment for utilizing the ample potential of Industry 4.0. Also, the resistance among the employee side still not explained in detail. The other approaches associated with Industry 4.0 like Work 4.0 and Society 5.0 creates pressure on both working and social life. Hence, rather the dullness or sometimes negativity pops up in the social media texting.

This social network investigation is important because of the decision-making algorithm's dependency on the surrounding environment. We couldn't take apart the managers decisions free of their imposed and effected by their network. Especially the complaints about the company's products and/or services that are fashionably

favorable on the customer side become extremely important. Hence, the negative opinions weigh more than positive ones (Dave et al. 2003).

This study should be performed with a larger database to be more precise. Pajek, UciNet, NodeXL, and many more social network analysis tools will be helpful in this manner. Within this expansion, not only the Industry 4.0 attachment but also its environment with the core components will become understandable sentimentally.

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Underpricing of initial public offerings in hot and cold markets: An empirical study on Borsa Istanbul

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Abstract:

Aim: The performance of the initial public offerings is one of the most discussed anomalies in financial literature. The study aims to evaluate the initial public offering performance of Borsa Istanbul companies during the hot and cold periods. The size of the companies, industry concentration and investor optimism are considered in this respect.

Design / Research methods: The study covers the 119 IPOs of various sizes from different industries between 2010 and 2017 just after the global financial crisis. The standard event study methodology is applied. This study has revealed the existence of post-crisis underpricing effects in Turkey.

Conclusions/findings: The research shows that although low pricing is valid in hot periods, hot and cold markets do not differ significantly from each other in this context. Besides, this study finds that the low price effect exists for small firms, and this effect is more common in hot markets. On the other hand, although there is a relationship between consumer confidence index and low price, no relation with industry concentration was found

Originality/value of the article: This study has reported the IPO performance in Borsa Istanbul, an important emerging market, after the 2008 crisis, taking into account various market characteristics. This study provides practical results for the capital market players and institutions.

Implications of the research: The study will guide Borsa Istanbul's new companies to have successful public openings and international investors, which pursue market timing along with the financial institutions and policymakers

Limitations of the research: Subsequent studies may include variables such as corporate characteristics, financial performance, firm age and region, and corporate governance.

Keywords: Emerging market, Anomaly, Underpricing, Initial Public Offerings, hot and cold markets.
JEL: G14;G24;G32

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1. Introduction

Market anomalies, which are cross-sectional and time-series patterns in the returns of securities that cannot be estimated by the classical finance theories (Keim 2008), are regarded as the beginning of the behavior approach in finance studies. The discovery of market anomalies is one of the milestones that open the discussion on the insufficiency of CAPM and efficient market hypothesis. Depending on empirical researches since the 1980s, the studies have increasingly attempted to explain the causes of these anomalies, revealing the inadequacies of classical finance theories. Mispricing (Lakonishok et al. 1994), unmeasured risk (Fama, French 1993), limits to arbitrage (Novy-Marx, Velikov 2015), and selection bias (McLean, Pontiff 2016) are the commonly witnessed concepts that try to elucidate them. Studies have shown that behavioral factors are relatively critical in investment decisions such that market players consider not only statistical and mathematical measures but also psychological factors such as sentiment, overconfidence, and overreaction (Kahneman et al. 1982). The current study addresses the underprice phenomenon of initial public offerings (IPO), which is considered as one of the anomalies of market efficiency. It is observed in primary markets worldwide, but the degree of return and significance depends on various factors.

IPO literature has been enriched and developed with new theories and hypotheses in the last decades. It covers not only the efficiency of the market studies but also the timing of initial offerings. In terms of investors, IPOs are usually a profitable timing opportunity in inefficient markets. These markets will enable them to exploit the information and obtain abnormal returns. Furthermore, the measurement of IPO performance in hot and cold markets plays an essential role in the studies focusing on timing.

The hot and cold market issue is based on the cyclical pattern of average initial returns over time. The early study of Ibbotson and Jaffe (1975) presents this cyclical pattern, suggesting the existence of the “hot issue market.” Hot markets have been described as having a high volume of initial public offerings, severe underpricing, frequent oversubscription of offerings, and concentration in particular industries

(Ritter 1984). On the other hand, a cold market will evolve at the end of the hot period, where unnatural low initial returns will tend to occur.

Related literature suggests a diversity of opinions on how hot and cold market firms might differ in IPO performance. Early studies on IPOs are inspired by a hypothesis which states that underpricing is a signaling mechanism and describes hot markets as periods when a significant number of high-quality firms choose to go public (Allen, Faulhauber 1989; Welch 1989). However, as the studies on this area have improved in recent years, various findings and hypotheses have emerged, explaining the underpricing effect in hot markets. The reviews of Chalk and Peavy (1987) and Ibbotson et al. (1994) on U.S. markets indicate that the underpricing phenomenon is more common in generally smaller sized IPOs. On the other hand, the Asymmetric Information and Signalling Hypothesis argue that reputable and high-quality companies will go public during a hot market; hence underpricing signals may indicate quality (Stoughton et al. 2001). Foreign funds that are the leading players of those markets consider larger companies as more reputable and keep relatively more shares of large firms and other firms with greater recognition or visibility in international markets (Kang, 1997; Dahlquist, Robertsson 2001). For this reason, it is necessary to illuminate whether the underprice anomaly will be prevailing for smaller or larger IPOs in emerging markets, such as Borsa Istanbul.

Furthermore, the Market Timing and Investor Sentiment Hypothesis (Lee et al. 1991; Baker, Wurgler 2000; Ljungqvist et al. 2005) and the Sequential Learning, Informational Externality and Industry Concentration Hypothesis and the Demand for Capital Hypothesis (Persons, Warther 1997; Subrahmanyam, Titman 1999) put forward noticeable arguments on the underpricing issue. The first hypothesis indicates that investors' optimism and confidence in the market results in an underpricing effect in initial public offerings. The second one reveals that the underpricing phenomenon of IPOs tends to be aggregated around similar industries (Jenkinson, Ljungqvist 2001). Investors and stock market institutions tend to choose the information externality created by the outcomes of previous IPOs, particularly companies that are similar in their industry.

Although there have been many studies on the IPO performance of hot and cold markets in developed countries, studies testing cold and hot market hypotheses on emerging countries are still limited. Most of the studies in emerging markets focus on the overall underpricing performance of IPOs in the market without going into details of the market type or firm structure. To our knowledge, there are very few studies covering the post-2008 crisis in Turkey. However, Borsa Istanbul is one of the essential emerging stock markets and is ranked 21st among the world stock markets with 425 million USD total trading value of the equity market in 2018. Its market capitalization is about 140 billion USD and has 416 listed companies. International investors hold approximately 60%-70% of publicly traded shares in Borsa Istanbul (Borsa Istanbul Annual Report 2018). Companies of different sizes are quoted in Borsa Istanbul, but international investors generally pay interest to larger ones. The stock market was particularly thrilled by global developments after the 2008 crisis, as well as the local issues. The performance of the market boosted more than 50% in 2010 with the persistent interest of foreign investors after the 2008 crisis. But the regional developments reduced the motivation of the investors in the last years. All these events make the exchange one of the volatile markets in the world.

The study aims to investigate the public offering performance of Borsa Istanbul companies, especially during the hot and cold periods of the stock market. Furthermore, as suggested in the previous hypotheses, the factors like the role of industry concentration, company size, and investor optimism on IPO performances will be evaluated and discussed. Within this framework, the performance of 109 publicly traded companies in different industries during the 2010-2017 period is included in the study. The standard short term event study methodology is applied to measure abnormal returns after IPOs. The hypotheses of the study are: (1) The underpricing of IPOs can be seen in Borsa Istanbul, (2) Underpricing prevails in hot market periods, (3) Underpricing phenomenon is more common for small-size companies, (4) Investors' optimism in Borsa Istanbul is one of the driving forces for the underpricing of IPOs, (5) IPOs' observations tend to be clustered around similar industries.

Focusing on IPOs' performance in Turkey considering hot and cold markets with testing various hypotheses aftermath global crisis is the significant contribution of the study to the IPO literature. We believe that the current research will guide Borsa Istanbul's new companies to have successful public openings and international investors, which pursue market timing along with the financial institutions and policymakers. The rest of the paper is organized as follows. The literature and hypothesis development are given in section two. Data and methodology are explained in the third section. Findings and further discussions are presented in section four, and the paper concludes in section five.

2. Literature and hypothesis development

2.1. Literature

The initial studies on the underpricing effects of IPOs have started in the early 1970s with the rising popularity of market anomalies in the literature. The evidence of IPO underpricing in the existing literature is attributed to Reilly and Hatfield (1969). They reported the superior performance of new issues by analyzing the returns on the first Friday, fourth Friday, and after one year from issuance. Baron (1982), Rock (1986), Muscarella and Vetsuypens (1989), Welch (1989), Allen and Faulhaber (1989), and Ritter and Welch (2002) support the study of Reilly and Hatfield and find additional evidence on underpricing phenomenon just after the initial public offerings in equity markets.

The first study on the existence of underpricing in the hot markets was published by Ibbotson and Jaffe (1975). They examined the initial public offering companies which went public between 1960 and 1970. The findings of the study indicate that underpricing is 12.64% in the hot markets, 11.97% in cold markets. Besides, it was determined that the issuers offer the stocks at higher prices in the cold markets. Afterward, Ritter (1984) studied 1028 companies that went public in the USA between 1977 and 1982. The period between January 1980 and March 1981 was determined to be hot markets, whereas the remaining period was determined to be cold markets. The average initial return is 48.4% in hot markets and 16.3% in cold

markets. Ritter (1991) explored the initial public offerings between 1975 and 1984 for three years. The low performance varies depending on the year and across industries. The weakest performance was seen in the years where a high-volume of public offerings took place. He found out that poor performance concentrated among relatively young and growing companies.

Helwege & Liang (2004) examined 6419 IPOs offered to go public in hot and cold markets between 1975 and 2000. They found that the characteristics of the companies that went public are similar to each other. While there is a concentration in related sectors, there are very few differences in the qualities of the firms. The study identifies long-term low performance as a feature of hot markets. Furthermore, more investor optimism exists in hot markets. Ljungqvist, Nanda, and Singh (2006) find evidence of underpricing in the hot markets as well. They showed the existence of an unreasonable enthusiastic investor class as the leading cause of some anomalies such as underpricing, hot markets, and long-term low performance.

Merikas, Gounopoulos, and Nounis's (2009) study on 143 shipping companies that went public in different countries between the years 1984 and 2007 showed that the average return on the first day is 17.69%. However, firms perform poorly at the end of 5 months, and cumulative abnormal return at the end of 36 months is - 35%. Furthermore, they revealed that the shipping companies entering the market during hot periods make lower pricing than those entering the market during the cold periods.

There are also studies on the underpricing of IPOs in the Turkish equity market. Bildik and Yılmaz's (2008) research on 234 companies which were listed on ISE between 1990 and 2000 for 36 months, indicates the effects of factors such as market conditions on stock performance. There is a difference between the hot and cold prices for the first-day average abnormal returns. The average abnormal return on the first day is %4.46 in the hot markets, whereas it is %7.13 in the cold markets. This research also found that there is no poor performance for the first public offerings in cold markets in the long-term.

Elmas and Amanianganeh (2013) investigated 227 companies that were offered to the public in BİST for the first time between1995 and 2010. They divided markets into three as hot markets, normal markets, and cold markets. The first-day abnormal

return is %5.87 in cold markets, %5.71 in hot markets, and %13.17 in normal markets. According to these findings, the first-day abnormal returns obtained in hot and cold markets are very close to each other. However, the first-day abnormal returns received based on the sectors were very different from each other.

Bayram (2015) analyzed 92 IPOs in Istanbul Stock Exchange between1999 and 2009. The first public offering companies were examined separately against many factors for both short (5 days) and long term (36 months). One of the factors discussed in this study was the timing of the public offerings of companies. In the short term, the average residual return of hot markets is 6.6%, and the average residual return of cold markets is 7.8%. In the long term, the average residual return in hot markets is -47.9%, and the average residual return in cold markets is -28%.

Çakır, Küçükkocaoğlu, and Kapucu (2017) explored 327 IPOs held in BİST between 1993 and 2015 according to their public offering in hot and cold markets. They found out that the first-day abnormal return is 7.29% in hot markets and 2.96 % in cold markets. In addition to this, they demonstrated that there are 10.76% lower pricing in the short term in hot markets and 10.04% higher pricing in cold markets. Lastly, Acıkgoz and Gokkaya (2017) analyzed the Turkish market from 1998 until 2013 and found a significant underpricing in the IPO market. They claimed that factors such as the ratio of the amount of money in insider shares to the total amount, the ratio of the total number of foreign investors to a total number of investors, and the underwriter reputation have a strong effect on underpricing and return volatility.

2.2. Hypothesis development

Within the framework of the previous studies mentioned above and the extensive literature on the underpricing anomaly of initial public offerings, there is an underpricing effect not only in the developed countries but also in the developing countries (Katti, Phani 2016). Moreover, various studies provided evidence of the existence of this effect in the Turkish market. Therefore, the first hypothesis of the study is developed as “there is an underpricing anomaly on the Turkish market, depending on the previous literature.”

One of the critical issues related to the underpricing of IPOs is the size of companies. The initial study on this issue is the work of Chalk and Peavy (1987). They claim that low-priced stocks have a significant abnormal return, and this may be attributable to a kind of small firm effect anomaly. Afterward, Ibbotson et al. (1994) used U.S. market data and provided evidence that underpricing is found to occur more frequently on smaller firms than larger firms. M'kombe and Ward (2002) evaluated South African IPOs, an emerging market, and revealed that IPOs with an offer price below 99 cents showed the highest initial returns. Furthermore, they attributed this to the risk premium issue. As the small offerings involve more risk, investors may ask underpricing on IPOs. Heerden and Alagidede's study (2012) demonstrated similar findings at the Johannesburg Stock Exchange (JSE) between 2006 and 2010. They indicate the low priced shares are generally much more significantly underpriced than the high priced shares, and this trend is evident every year except for 2008, where the inverse appears to be true.

However, the Asymmetric Information and Signalling Hypothesis bring a different view to this approach. Rock (1986) hypothesized that some investors were better informed than some others about the quality of the companies that place in the IPO market. Well informed and less informed investors are in competition with each other; the informed ones can not be faced with the problem of adverse selection as others may have. In short, informed investors only invest in high-quality firms that can cover the costs of underpricing. In terms of high-quality companies, they use IPO underpricing as a signal of its value to attract potential investors in the secondary market. Therefore, the degree of underpricing represents the quality of the firm.

Moreover, the probability of being qualified is higher for larger firms in emerging markets. International institutional investors who are the main players in the emerging markets are investing in large firms that are more reputable because of the high risk involved in emerging markets. This finding leads us to investigate whether the firm size effect is valid for big companies in emerging markets or not. Therefore our second hypothesis is that "there is an underpricing effect on AR and CAR of small firms in the short term after the initial public offerings in hot markets."

The sequential learning, informational externality, and industry concentration hypothesis and the demand for capital hypothesis reveal that sector intensification in public offerings of firms in hot markets is noteworthy (Agathee et al. 2012). Jenkinson and Ljungqvist (2001) demonstrated that there is a strong tendency in this direction, especially in technology companies. Companies often follow companies with similar characteristics in the same sector, benefit from information leaks, and decide to go public after their successful public offering processes. In this process, banks, investment banks, and related players cause information leakage. While there is a correlation between the returns of companies that go public in similar sectors, the underpricing effect is more common.

On the other hand, Helwege and Liang (2004) claimed that clustering of a single industry does not accurately characterize hot markets. Instead, many industries tend to have hot markets at around the same time, and the hot markets attract more of the same kinds of firms. In short, new equity obtained by the companies after the successful initial public offerings attracts the interest of other companies in the same sector with knowledge spill-overs and sequential learning process. Eventually, this process tends towards public offering (Jenkinson, Ljungqvist 2001). Therefore, our third hypothesis is that "initial public offerings initiatives in hot markets tend to be clustered in similar industries."

It has long been believed that the role of investor sentiment is regarded as particularly sensitive in hot markets. The first significant study regarding this point is Lee, Shleifer, and Thaler's work (1991). They claimed that more companies prefer to go public when investor sentiment is high. One of the early studies on this subject was introduced by Otoo (1999). He investigated the relationship between stock prices and consumer confidence indices in the US market in 1999. The study revealed that that stock price movements affect changes in consumer confidence, but the lagged changes in confidence have no significant effect on stock prices. Fisher and Statman (2003) found that increases in consumer confidence about the economy are accompanied by statistically significant increases in the bullishness of individual investors about the stock market. Jansen and Nahuis (2003), Brown and Cliff (2004), found that the current stock prices predict future consumer confidence.

Derrien (2005), Ljungqvist et al. (2006), Cornelli et al. (2006) and Oehler et al. (2004) found a strong relationship between the underpricing anomaly and investor sentiment and showed that in the initial public offerings, investors can obtain a statistically significant abnormal return during periods of optimism.

Above mentioned studies by considering the Market Timing and Investor Sentiment Hypothesis, link underpricing effect of IPO to overconfidence and the self-attribution. Daniel et al. (1998) described a self-confident investor as someone who overestimates the accuracy of the private information he collects along with the available public information. In the case of the public offering, overconfident investors will be able to make the stock overvalued by paying too much attention to the specific information on an issued stock. In the case of self-attribution bias, investor confidence increases after a positive impulse and decreases less after a negative impulse. During the initial public offerings, this prejudice leads to an overvaluation for the value of the share when high returns are achieved on the first day (Hoffman, Post 2015). In this scope, our fourth and last hypothesis was developed as "there is an underpricing anomaly on AR and CAR of companies just after initial public openings in the markets where consumers are optimistic".

3. Data and methodology

The current study had examined the short term daily performance of Borsa Istanbul companies following the public offering dates between 2010 and 2017. This is the period after the global financial crisis that covers important political and economic events in Turkey and in the world. Ending of FED quantitative easing program (2013), Gezi Park protests (2013)[1], and coup attempt (2016)[2] are the main global and domestic events that took place during this time. The study covers 109

[1] The demonstrations and civil unrest throughout the country to protest the urban development plan of Taksim Gezi Park in Istanbul. These events had a negative impact on the financial markets.

[2] On July 15, 2016, a coup attempt organized against the government and state institutions in Turkey. Some members of the army tried to take control of Ankara, Istanbul and many other important places, but this movement failed.

out of 119 IPOs during this period and the event window of the study is the first 15 days. Since 2013, economic and political events have intensified, the number of IPOs are substantially decreased over the years. As seen in Table 1, the number of companies that went public is 86 in the first four years (2010-2013), while only 23 IPOs were realized during the following four years (2014-2017). Moreover, IPOs are concentrated particularly in the industrial and financial sectors. Although the picture looks stable for all years, it is more intense and visible for the first four years. The industries that were categorized as "others" include mostly mining, energy, service, technology sectors. Intense public offerings and high industrial density during the first four years are indicative of the hot period. Depending on the studies of Ibbotson and Jaffe (1975), Ritter (1984) and the Sequential Learning, Informational Externality and Industry Concentration Hypothesis and the Demand for Capital Hypothesis of Jenkinson and Ljungqvist (2001), 2010-2013 period is considered as hot period while 2014-2017 period is called as cold period in this study.

Table 1. Number of IPOs during the 2010-2017 period

Years	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Manufacuring Industry	6	7	10	6	8	3	1	
Finance Industry	10	6	4	4	3	2		1
Other Industry	7	9	10	7	2	1	1	1
Total Number of IPOs	**23**	**22**	**24**	**17**	**13**	**6**	**1**	**3**

Since the size effect of IPOs is investigated in hot and cold periods, following Chalk and Peavy (1987) and Ibbotson et al. (1994) whom found underpricing as more common for big companies, the companies are grouped as big and small according to company size. The average firm capitalization value of the 109 companies examined in the current study is 180,763,911 USD. Out of these

companies 23 of them are selected as big and 86 of them are considered as small ones.

Consumer confidence is one of the leading economic indicators of economies. The consumer confidence index is used to measure optimism levels of investors for the study. It measures how confident consumers are about the overall state of the economy. The Consumer Confidence Index is a survey that measures how optimistic or pessimistic consumers are regarding their expected financial situation, led by the State Statistical Institute in Turkey. Moreover, the index predicts household expenditures and economic activity of the countries (Fisher, Statman 2003). Their confidence impacts their economic decisions – like their spending activity. As a result, consumer confidence is a key indicator of the overall shape of the economy (Chen 2011). Consumer confidence generally moves in line with economic variables such as interest rates, inflation, and unemployment, but sometimes it diverges from them. The normal level of the index is 100 points. If the Index is above 100, consumers are accepted as more confident, and if it is below 100, then they are accepted as less confident.

Within our study, all years were found below 100, which is generally considered as low for the confidence index. However, after the seasonal adjustments made between 2010 and 2017, the average of the consumer confidence index is found as 72.2 (Table 2). Taking into consideration the global economic crisis and the special conditions of the country after 2010, the years were divided into two groups according to the mean value. The years above, the mean value is named as optimistic, and others are called as pessimistic. Therefore 2010, 2011 2012, 2013, and 2015 are optimistic years. This distinction fits mostly with the period of cold and hot markets. The only exception is the year 2015, which is considered a cold one, enters the optimistic group. This picture is consistent with the claims of Ljungqvist, Nanda, and Singh (2005) and Lee, Shleifer, and Thaler (1991). They reveal that as the optimism of sentiment investors increases, more companies have an incentive to go public.

Table 2. The confidence index, after seasonal adjustments for the 2010-2017 period

Years	Confidence Index	State of Index
2010	77.7659	Optimistic
2011	78.8204	Optimistic
2012	73.9561	Optimistic
2013	75.3538	Optimistic
2014	68.1513	Pessimistic
2015	74.0110	Optimistic
2016	63.8691	Pessimistic
2017	65.6352	Pessimistic
Average	72.1954	

Table 3. Descriptive statistics of the variables

Variables	N	Range	Min.	Max.	Mean	SE of Mean	Std. Dev.	Variance
HotCold	109	1.00	.00	1.00	.789	.0392	0.410	.168
LnSize	109	6.59	15.32	21.91	17.827	.1371	1.432	2.050
Manufacturing	109	1.00	.00	1.00	.367	.0469	0.484	.234
Finance	109	1.00	.00	1.00	.266	.0425	0.444	.197
Others	109	1.00	.00	1.00	.367	.0462	0.484	.234
Confidence	109	14.95	63.87	78.82	74.949	.3602	3.761	14.145
Inflation	109	5.76	6.16	11.92	7.835	.1664	1.738	3.019
Car1	109	.33	-.11	.23	.016	.0062	0.065	.004
Car5	109	.90	-.17	.74	.048	.0153	0.160	.025
Car10	109	1.24	-.32	.92	.035	.0173	0.181	.033
Car15	109	1.26	-.45	.80	.042	.0188	0.196	.039

The summary statistics of the variables are given in Table 3. “Hot-Cold dummy” is 1; if the period of IPO is hot, otherwise 0. Size is one of the independent variables of the model. The market value of equity of a company is used, and it is converted to the natural log to normalize its values. The other variables are “Manufacturing,”

"Finance," and "Others" dummies. If the companies belong to these industries, their value is 1, otherwise 0. "Confidence" variable is the average yearly consumer confidence index. Lastly, the inflation variable shows the yearly inflation rates. Furthermore, the values of the 1st, 5th, 10th, and 15th days are given in the table.

Table 4. Descriptive statistics of IPOs in hot and cold markets

Variables	HotCold	N	Mean	Sig. of Mean Difference	Std. Deviation	Std. Error Mean
LnSize	1.00	86	17.952	1.917 (0.063)*	1.453	0.157
	.00	23	17.362		1.273	0.266
Manufactur.	1.00	86	0.326	-1.6620 (0.084)*	0.471	0.051
	.00	23	0.522		0.511	0.107
Finance	1.00	86	0.267	0.0620 (0.951)	0.445	0.048
	.00	23	0.261		0.449	0.094
Confidence	1.00	86	76.496	10.580 (0.000)***	1.979	0.213
	.00	23	69.166		3.160	0.659
Car1	1.00	86	0.018	0.961 (0.341))	0.069	0.007
	.00	23	0.006		0.048	0.010
Car5	1.00	86	0.053	0.617 (0.541))	0.168	0.018
	.00	23	0.033		0.124	0.026
Car10	1.00	86	0.040	0.773 (0.466))	0.197	0.021
	.00	23	0.018		0.105	0.022
Car15	1.00	86	0.046	0.563 (0.575)	0.212	0.023
	.00	23	0.026		0.125	0.026

*,** and *** indicate significance level of 0.10,0.05 and 0.01 respectively.
Equal Variance is not assumed for the t test of mean differences.

Before the case analysis, the mean values of CARs and other variables were compared with the hot and cold periods. In this way, the preliminary reliability of the study was evaluated. As shown in Table 4, CAR averages are positive in both hot and cold markets. In other words, it can be considered as an evidence on the existence of underprice anomaly both in cold and hot markets. Moreover the mean differences of them are not statistically significant. However, the average of hot markets is higher. The average IPO size and confidence level in hot markets are higher and significant. Significance level of the confidence index is remarkable. Contrary to our expectations, the manufacturing sector provides higher premiums during cold periods with 10% significance level. There is no significant difference in the means of the financial sector companies.

We adopt the standard event study methodology to measure the impact of an event on stock returns by selecting an event window as 15 days, following the day of IPOs. In this way, the abnormal returns and cumulative abnormal returns are calculated; the hypotheses are tested and discussed. More specifically, by using event study methodology, we measure whether the public offerings could have an effect on prices of related stocks and the direction and magnitude of any perceived effects might have on those stock prices.

To estimate ex-ante expected returns, the market-adjusted abnormal returns model is used. This model assumes that the ex-ante expected returns are constant across securities but not enforcedly stable over time for given security since all securities in the sample are assumed to be equal in terms of the size and the risk. Market adjusted abnormal returns are simply the difference between actual returns and the market return as given below;

$$E(Ri,t)=Rm,t$$

As stated before, the expected return is the market return (Rm, t) at the same period of time, assuming that all stocks, on average, generate the same rate of return (Ritter 1991). The main simplicity of this model is that it does not need an estimation period. An abnormal return for an individual stock is the difference between the actual return on time (t) in the event window and the expected return of an individual stock. The mathematical expression of the abnormal return and the

average abnormal return for all sample stocks on time (t) can be calculated as follows;

$ARi,t=R_{i,t}- E(R_{i,t})$

$$\overline{AR''} = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t}$$

To calculate cumulative abnormal return (CAR) for 1-15 days (T1-T15) event window for an individual stock, the standard formula is used;

$$CAR_{i(T1,T15)} = \sum_{t=T1}^{T15} AR_{i,t}$$

Since abnormal returns are expected to be zero and no underpricing anomaly in the efficient markets, we test if the abnormal and cumulative abnormal returns in our event window significantly from zero by employing t statistics. The mathematical expression of the t-tests for AR and CAR;

$$t_{AR} = \frac{AR_{i,t}}{S_{e_{i,t}}} \qquad t_{CAR} = \overline{CAR_{i,t}} / (\sigma(CAR_{i,t}) / \sqrt{n}$$

4. Findings

Firstly, daily AR and CAR and t statistics of all companies included in the analysis were calculated within the scope of our event window during the 2010 and 2017 period. The result presented in Table 5 reveals an underpricing effect in the Turkish market. The first day average AR and CAR values of the stocks are significantly different from zero and they are 1.66% and 1.59%, respectively. The finding is consistent with previous literature (Çakır et al. 2017). Among the IPOs

included in the analysis, 50 of them has positive returns. In other words underpricing at the end of 15 days, whereas 59 of them have negative returns, which means overpricing. In the first four days, a low price effect is observed for AR values, but the effect is significant for all CAR values. These findings clearly indicate that the underpricing phenomenon is common in IPOs of Borsa Istanbul companies aftermath of the global crisis.

Table 5. AR and CAR values of the all IPOs in the sample

DAY	AR	CAR
t+1	0.0159***	0.0159***
t+2	0.0116**	0.0275***
t+3	0.0063*	0.0341***
t+4	0.0100***	0.0441***
t+5	0.0046	0.0485***
t+6	-0.0067**	0.0415***
t+7	-0.0035	0.0379***
t+8	0.0016	0.0396***
t+9	-0.0027	0.0370**
t+10	-0.0018	0.0353**
t+11	-0.0021	0.0331*
t+12	0.0061**	0.0394**
t+13	0.0021	0.0415**
t+14	0.0006	0.0420**
t+15	0.0037	0.0459**

, and *** indicate significance level of 0.10,0.05 and 0.01 respectively.*

4.1. Hot and cold market

In the second stage of the research, AR and CAR values of the sample were calculated separately for hot and cold markets which was defined before and searched the existence of underpricing for the IPOs of Borsa Istanbul as claimed in previous studies. As presented in Table 6, the existence of underpricing is significant in the hot market. The AR values in two days are significant respectively at 1% and 5% level. Day 6, 11 and 12 are positive and significantly different from zero.

However, underpricing is more common for the CAR values, the CAR of all days are significant. On the other hand, AR and CAR values are positive and there is very weak underpricing in the cold market. However, this effect significantly comes up only in a few days. The result supports previous studies (Katti, Phani 2016).

Table 6. AR and CAR values of the IPOs in hot and cold markets

Days	AR Hot Market	CAR Hot Market	AR Cold Market	CAR Cold Market
1	0.0184***	0.0184***	0.0064	0.0064
2	0.0138**	0.0322***	0.0036	0.0100
3	0.0069	0.0391***	0.0042	0.0142
4	0.0063*	0.0454***	0.0239**	0.0381**
5	0.0071*	0.0526***	-0.0051	0.0330
6	-0.0089**	0.0437***	0.0016	0.0346
7	-0.0027	0.0410**	-0.0063	0.0283
8	0.0006	0.0416**	0.0057***	0.0340
9	-0.0008	0.0408**	-0.0096**	0.0244
10	-0.0005	0.0402**	-0.0065	0.0178
11	-0.0083*	0.0319*	0.0012	0.0191
12	0.0081**	0.0400**	-0.0002	0.0189
13	0.0022	0.0422**	0.0011	0.0200
14	0.0002	0.0424**	0.0018	0.0218
15	0.0035	0.0459**	0.0046	0.0264

*,** and *** indicate significance level of 0.10, 0.05 and 0.01 respectively.

4.2. Size of the companies

The studies of Chalk and Peavy (1987), Ibbotson et al. (1994), and considering the Asymmetric Information and Signalling Hypothesis, we investigated the impact of size on the underpricing effect at Borsa Istanbul public offerings. The IPO performance of large and small companies in hot markets is presented in Table 7. Findings indicate that there is no significant underpricing effect for the AR and CAR values of large firms in general. In terms of AR values, there is slight overpricing at a low significance level on the second day, whereas a significant overpricing occurs on the third day. However, in terms of the small companies, while the overpricing

effect is observed in the first six daily ARs, a widespread low price effect is observed amongst CAR values. This result is consistent with the findings of Chalk and Peavy (1987), and Ibbotson et al. (1994) underline the existence of widespread underpricing for small firms during the hot years of the post-crisis period in the Turkish market. However, when the daily returns are examined, it is seen that the values are very close to zero for all companies, and there are positive returns for the big firms even if they are not significant. Therefore, it is not easy to claim that there is a strong underpricing effect for small firms.

On the other hand, in terms of the cold market, the results are quite different than the hot market case. According to the findings, the underpricing phenomenon for small firms is relatively weakened in the cold markets. Only AR performance on 4th and 8th days are significant, and CAR values on the 4th day are 5% significant; the following two CARs in 5th and 6th days are at a 10% significance level. Similarly, the AR for the big firms in the cold markets have no IPO premium, even a widespread overpricing effect is observed.

Table 7. AR and CAR values of the IPOs in hot and cold markets grouped by size

Days	AR Hot Markets		AR Cold Markets		CAR Hot Markets		CAR Cold Markets	
	Big Firms	Small Firms	Big Firms	Small Firms	Big Firms	Small Firms	Big Firms	Small Firms
1	0.0100	0.0210**	-0.0066	0.0084	0.0100	0.0210**	-0.0066	0.0084
2	0.0154*	0.0133*	0.0023	0.0038	0.0255	0.0343**	-0.0043	0.0121
3	-0.0146***	0.0134**	-0.0114***	0.0066	0.0109	0.0477***	-0.0157**	0.0187
4	0.0018	0.0077*	-0.0007	0.0276**	0.0127	0.0553***	-0.0164**	0.0463**
5	0,0062	0.0074*	-0.0081	-0.0047	0.0189	0.0628***	-0.0246*	0.0417*
6	-0.0058	-0.0098**	-0.0045	0.0025	0.0130	0.0530***	-0.0291***	0.0442*
7	-0.0030	-0.0026	-0.0033	-0.0068	0.0101	0.0504**	-0.0324**	0.0374

Table 7. Cont. …

Days	AR Hot Markets		AR Cold Markets		CAR Hot Markets		CAR Cold Markets	
	Big Firms	Small Firms	Big Firms	Small Firms	Big Firms	Small Firms	Big Firms	Small Firms
8	0.0043	-0.0006	-0.0036	0.0071 ***	0.0143	0.0498 **	-0.0360 **	0.0445 *
9	0.0006	-0.0012	-0.0072 *	-0.0100 *	0.0149	0.0486 **	-0.0432 ***	0.0345
10	0.0023	-0.0014	-0.0001	-0.0075	0.0173	0.0472 **	-0.0434 **	0.0270
11	-0.0225	-0.0040	-0.0449	0.0082	-0.0052	0.0432 **	-0.0883 **	0.0352 *
12	0.0079 **	0.0081	0.0192	-0.0031	0.0027	0.0513 **	-0.0691 ***	0.0321
13	0.0009	0.0025	0.0067*	0.0003	0.0036	0.0539	-0.0624 **	0.0324
14	-0.0024	0.0010	-0.0006	0.0022	0.0012	0.0549	-0.0630 **	0.0345 **
15	0.0008	0.0043	-0.0070	0.0063	0.0020	0.0592	-0.0700 ***	0.0408

, and *** indicate significance level of 0.10, 0.05 and 0.01 respectively.*

4.3. Industry concentration

Building on the premises of the hypotheses of sequential learning, informational externality, industry concentration, and demand for capital, underpricing is widely expected in particular industries during the hot periods. However, our findings are not actively supporting the hypotheses. The returns of IPO concentrated industries do not behave similarly in hot markets (Table 8). Whereas CAR values of the manufacturing sector especially indicate underpricing during the first week after the public offering. It is observed that there are weak significant outcomes in the financial sector. There is also a widespread low price effect in the “other” industry group. These results are not in line with the claims put forward in the hypotheses. Therefore, we reject the third hypothesis of the study that claims initial public offerings initiatives in hot markets tend to be clustered in similar industries.

Table 8. AR and CAR values of IPOs in the hot markets grouped by industries

Days	AR (Hot Markets)			CAR (Hot Markets)		
	Manf.	Finance	Others	Manf.	Finance	Others
1	0.0218*	0.0142	0.0185	0.0218**	0.0142	0.0185*
2	0.0103	0.0128	0.0175*	0.0321*	0.0270	0.0361**
3	0.0150	0.0004	0.0045	0.0471*	0.0274	0.0406**
4	0.0121**	0.0092	-0.0009	0.0592**	0.0366*	0.0397
5	0.0091	0.0069	0.0056	0.0683**	0.0435*	0.0453**
6	-0.0087*	-0.0039	-0.0126**	0.0596*	0.0396*	0.0327*
7	-0.0080	-0.0009	0.0006	0.0516	0.0388*	0.0333*
8	0.0034	0.0005	-0.0019	0.0550*	0.0393*	0.0314
9	-0.0054	0.0012	0.0018	0.0495	0.0405*	0.0333
10	-0.0092*	-0.0038	0.0094	0.0403	0.0367	0.0427
11	-0.0035	-0.0052	-0.0011	0.0368	0.0315	0.0416
12	0.0076*	0.0058	0.0095	0.0443	0.0373	0.0512*
13	-0.0019	-0.0041	0.0107**	0.0425	0.0332	0.0618**
14	0.0079	-0.0031	-0.0040	0.0504	0.0301	0.0579*
15	0.0104*	-0.0054*	0.0039	0.0607	0.0247	0.0617**

*,** and *** indicate significance level of 0.10,0.05 and 0.01 respectively.

In the case of cold markets, there is no underpricing effect at a remarkable level in any industry group (Table 9). Although ARs reflect underpricing effects in the groups of manufacturing and finance, no underpricing has been observed in CARs in none of the industry groups. These findings are in line with previous studies.

Table 9. AR and CAR values of IPOs in the cold markets grouped by industries

Days	AR (Cold Markets)			CAR (Cold Markets)		
	Manf.	Finance	Others	Manf.	Finance	Others
1	0.0099	0.0044	0.0007	0.0099	0.0044	0.0007
2	0.0073	0.0069	-0.0093	0.0171	0.0113	-0.0087
3	-0.0003	0.0075	0.0112	0.0168	0.0188	0.0026
4	0.0104	0.0277	0.0519	0.0272	0.0464	0.0544
5	-0.0154*	-0.0053	0.0198	0.0118	0.0412	0.0742

Table 9. Cont. …

Days	AR (Cold Markets)			CAR (Cold Markets)		
	Manf.	Finance	Others	Manf.	Finance	Others
6	-0.0043	0.0008	0.0168	0.0075	0.0419	0.0910
7	-0.0017	-0.0153	-0.0065	0.0058	0.0266	0.0845
8	0.0095***	0.0018	0.0013	0.0153	0.0284	0.0858
9	0.0023	-0.0235**	-0.0217	0.0176	0.0049	0.0641
10	-0.0003	0.0009	-0.0305*	0.0173	0.0058	0.0336
11	0.0013	0.0001	0.0026	0.0186	0.0059	0.0362
12	0.0033	-0.0037	-0.0044	0.0219	0.0022	0.0318
13	0.0030	-0.0025	0.0009	0.0249	-0.0003	0.0326
14	0.0012	-0.0095**	0.0168*	0.0261	-0.0098	0.0494
15	-0.0026	-0.0021	0.0298	0.0235	-0.0119	0.0793

*,** and *** indicate significance level of 0.10,0.05 and 0.01 respectively.

4.4. Confidence index

According to the Market Timing and Investor Sentiment Hypothesis, there is a positive relationship between sentiment, investor optimism, and IPO activity. Investors can time their IPO's to benefit from these positive conditions of the market. The results given in Table 10 are entirely consistent with the hypothesis. Indeed, this is not a surprising finding as consumer confidence periods widely covered the hot period of our research. Thus, the results are consistent with the outcomes of the hot periods. In periods of high confidence index, both AR and CAR indicate the presence of an underpricing effect (Table 10).

Although the year 2015 is not in the hot period, it is covered by the confidence index. Therefore, the IPO performance of this year is given explicitly in Figure 1. The results indicate that there has been 0,5 and 0,3 percent AR underpricing at the 5% significant level, respectively, in the 4^{th} and 13^{th} days. The widespread underpricing for CAR values is seen between 4^{th} and 15^{th} days with %5 and %10 significance levels. Even though the significance levels of returns are so high, it will not be a mistake to express the underpricing effect on the IPO market in 2015, according to this picture. The findings support the acceptance of the fourth hypothesis.

Table 10. AR and CAR values of the IPOs in high and low consumer confidence periods

Days	AR High Consumer Confidence	CAR High Consumer Confidence	AR Low Consumer Confidence	CAR Low Consumer Confidence
1	0.018371***	0.0183***	0.0026	0.0026
2	0.014578**	0.0329***	-0.0044	-0.0018
3	0.007488*	0.0404***	0.0001	-0.0017
4	0.009668**	0.0501***	0.0119	0.0102
5	0.005437	0.0555***	-0.0002	0.0100
6	-0.00882***	0.0467***	0.0050	0.0151
7	-0.00245	0.0442***	-0.0090*	0.0061
8	0.000854	0.0451***	0.0059***	0.0120
9	-0.00153	0.0435**	-0.0088**	0.0033
10	0.0000	0.0435**	-0.0113**	-0.0081
11	-0.00763	0.0359**	0.0010	-0.0070
12	0.008032**	0.0439**	-0.0029	-0.0099
13	0.00216	0.0461**	0.0008	-0.0091
14	0.000285	0.04640**	0.0021	-0.0071
15	0.002742	0.04914**	0.0089	0.0019

*,** and *** indicate significance level of 0.10,0.05 and 0.01 respectively.

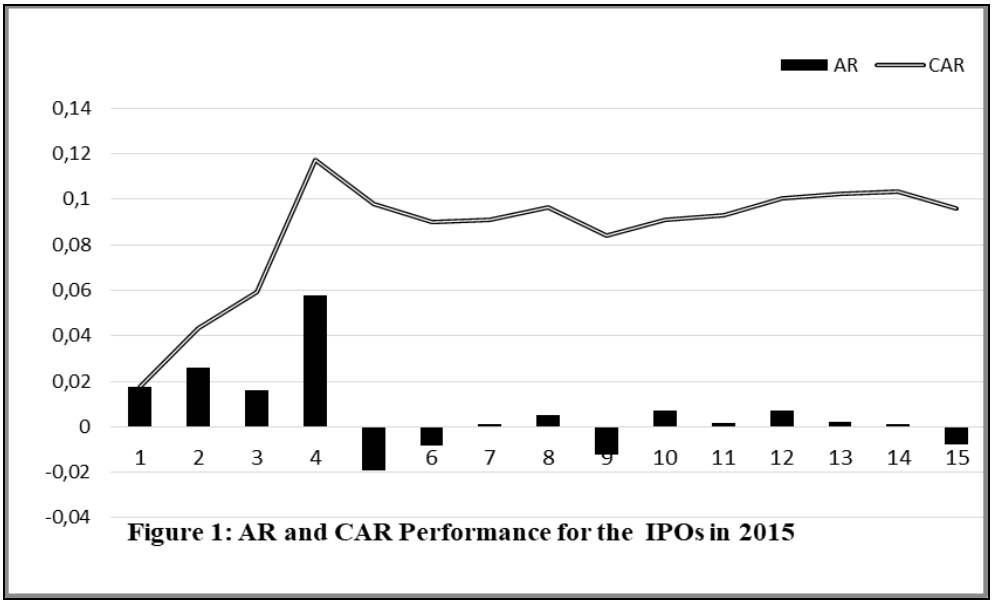

Figure 1: AR and CAR Performance for the IPOs in 2015

5. Conclusion

Since the 1970s, studies on stock market anomalies have intensified, and among those, there have been many studies carried out primarily on the underprice effect in IPOs. These studies have shown that the underpricing effect is seen more strongly in hot markets. The current study investigated the underpricing anomaly in Borsa Istanbul. It tested the hypothesis on the underpricing of small firm which is reported by Ibbotson et al. (1994) in hot and cold markets. Moreover, in the framework of the sequential learning, informational externality and industry concentration hypothesis and the demand for capital hypothesis, the anomaly of underpricing have been tested and searched if industry intensification in public offerings of firms to hot markets. Lastly, under the framework of the Market Timing and Investor Sentiment Hypothesis which links the underpricing effect of IPO to overconfidence and the self-attribution bias of investors, the performance of investors had been evaluated during the high and low confidence index periods.

The study specifically focuses on the performance of IPOs aftermath 2008 crisis when the markets are very volatile and searches to report the recent behavior trends of the investors in the market. The findings support the previous publication and

reveal that the underpricing phenomenon prevails in the Turkish equity market after 2008. The AR and CAR values are definite with a high significance level. On the other hand, in terms of hot and cold market segmentation, the AR and CAR values are still definite in both of the markets. However, the results of a hot market for AR and CAR values are significant at most of the days. On the other hand only a few days are substantial in cold markets. This evidence underlines the underprice anomaly of the hot market, but doesn't indicate an obvious conclusion on differentiation between markets.

When the low price effect in hot and cold markets was evaluated in terms of firm size, it was seen that the underpricing anomaly is quite evident in both hot and cold markets. However, this phenomenon is more pronounced in hot markets. These findings eliminate the possibility of underpricing anomalies as international investors tend to large and reputable companies within the framework of Asymmetric Information and Signalling Hypothesis. This result supports the reports of Ibbotson et al. (1994) and M'kombe and Ward (2002). This finding can be due to the anomaly known as small firm effect (Chalk, Peavy 1987).

In our study, the consumer confidence index is in parallel with the hot markets, but it is explored that there is a much more stronger underpricing effect in periods when consumer confidence is relatively high. The result is consistent with the findings of Cornelli et al. (2006) and Oehler et al. (2004). The evidence reveals the underprice anomaly of optimistic and hot markets, moreover points out the differentiation between markets. Finally, the sequential learning, informational externality, and industry concentration hypothesis and the demand for capital hypothesis, which suggests that there may be an underpricing effect due to industrial concentration in hot markets, have been searched, but no evidence has been found.

In further studies, the relationship between the characteristics of the companies and IPO performance can be investigated, and the findings can be exciting. As firm characteristics, variables such as financial performance, firm age and region and corporate governance may be included as well.

This study will not only present new information to Borsa Istanbul companies, but will also attract the attention of investors and policymakers. Since the results of this study reveal the short-term performances in the initial public offerings, it is

essential for the time planning of the companies that will go public in Borsa Istanbul. On the other hand, it provides crucial information to individual and institutional investors who want to invest in these companies. This study also provides useful findings to the regulatory institutions of the capital markets. These organizations need to consider the performance of public offerings when evaluating issues such as market manipulation and insider trading.

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Demand deficiency, money velocity and heterogeneity

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Abstract:

Aim: Money velocity data for the United States show that there is a decline in all of the broad money aggregates in recent decades. This points to a sustained demand deficiency element. Can consumer heterogeneity be the cause of this declining trend? The aim of this paper is to find an answer for this question.

Design / Research Methods: To achieve our aim we use Agent Based Modelling (ABM). In our model, the agents are heterogeneous consumers with different spending propensities.

Conclusions / findings: We show that heterogeneous consumers with different spending propensities alone puts a downward pressure on money velocity. This pressure is coupled with a sustained worsening in the wealth distribution. We observe that as money accumulates in the hands of agents with the lowest propensity to spend, money velocity keeps declining. This also puts a downward pressure on nominal aggregate demand and hence a deflationary bias on the general price level.

Originality / value of the article: This paper shows that heterogeneity of economic agents should not be ignored and that ABM is a very powerful tool to analyse heterogeneity.

Implications of the research: The implication for policy makers is that the demand deficiency associated with the fall in money velocity will persist until the worsening of wealth dispersion comes to a halt.

Key words: Demand Deficiency, Money Velocity, Heterogeneity, Wealth Distribution, Agent Based Modelling
JEL: D31, D9

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1. Introduction

Visual inspection shows that money velocity for the United States (US) has a declining trend in recent decades. The issue of temporary declines in money velocity was quite a popular topic for academics during 1980's. But somehow, this popularity vanished during the following decades although the velocity declines became very significant and persistent. This paper attempts to explain this recent trend that gives way to a significant deflationary bias. This is important because deflation can be considered as a new problem for the countries, for example especially for Japan. Historically inflation was a problem that was faced by almost every country from period to period either in high or low rates. Dealing with inflation and finding solutions to the problem was studied extensively and the cure is available. However, the problem of deflationary bias due to demand deficiency is a new phenomenon and there exists no consensus on its solution. This paper points the attention to one source of this recent problem of sustained demand deficiency.

In the existing literature, the issue has been analysed from the point of view of the relation between volatility of money growth and money velocity. This relation has been called the Friedman Hypothesis after the influential paper by Milton Friedman (1983).

Yet, there is another theory developed by Santoni (1987) which mentions the possibility of a negative relationship between wealth relative to income and money velocity. We will recall this relation the Santoni Hypothesis here, as an alternative to the Friedman Hypothesis for the explanation of decline in the money velocity. We will enrich the Santoni Hypothesis by allowing for behavioural heterogeneity across consumers since this might explain the decline in money velocity and hence the demand deficiency observed in advanced countries[1] together with worsening of the wealth distribution. Therefore, expansionary monetary policies are not as effective as they could otherwise be. Analysing the issue from the perspective of heterogeneity can be considered as the second contribution of the paper.

[1] Basci et al. (2019) presents the evidence on the presence of a significant demand deficiency problem for the G7 Countries.

Unlike other papers in the literature we use "Agent Based Modelling" (ABM) to explicitly model consumer heterogeneity. Although ABM is a very powerful tool for making such analysis, we do not see much use of this technique in the macroeconomics literature where the "representative agent" is the dominant paradigm. Therefore, the third contribution of the paper is to demonstrate that heterogeneity can be captured quite easily via ABM in macroeconomic modelling as well.

In the paper, we construct a model where we assume (without loss of generality) that there is no money growth in the economy and initially money is distributed equally among the consumers. Moreover, the only income of the agents is the wage they earn which also is a constant share of total nominal income over time. Working time (labor supply) is not changing as well.

We find by using simple ABM that as money starts to accumulate in the hands of agents who have a lower propensity to spend, money velocity, nominal total demand and the price level all start to decline over time.

The paper proceeds as follows. Section II contains the literature review. We present our model and the methodology in Section III. The data analysis is included in section IV. Outcomes of the ABM can be found in Section V. Finally, Section VI concludes.

2. Literature review

Mehra (1989) points attention the two temporary declines, namely those in 1982-83 and 1985-87. In Friedman (1983), the possible reason of these declines is given as increased volatility of money growth caused by uncertainty due to an announcement of procedural changes by Federal Reserve in October 1979. According to the paper, increased volatility of money growth contributed to increasing the demand for money which also means reducing the money velocity. It entered the literature under the name "Friedman Hypothesis".

Friedman Hypothesis is studied in papers by Mascaro and Meltzer (1983), Chowdhury (1988) and Fisher and Serletis (1989). Hall and Noble (1987) and Payne (1992, 1993) used a Granger causality method to support the Friedman Hypothesis. However, the results of Darrat and Suliman (1994) suggest that there is no relation between volatility of money growth and money velocity where the analysis is made explicitly by using a six-variable vector-autoregressive model.

Blundell-Wignall et al. (1984) try to explain the decline in money velocity during 1980's for the OECD countries. They state that for the US, the declines in M1, M2 and M3 are very large compared to the historical standards. There might be two reasons. The first one is a movement along the money demand function due to changes in interest rates or inflation expectations.

Santoni (1987) develops an economic theory for the relationship between wealth relative to income and money velocity. According to the theory, increases in wealth relative to income is an important cause of decline in money velocity. However, when the period of 1982 to 1985 is analysed in the paper, it is observed that during the period with the exception of stock market measure of wealth, all other measures did not increase significantly relative to current income. For this reason, the paper concludes that the evidence does not support that the decline in the income money velocity since 1981 is due to increases in these measures of wealth relative to current income.

The Benk et al. (2010) study provides US money velocity data for the period 1919-2014 by using annual time series data. The paper refers to long cycles around a 1.25% per year upward trend. They explain these cycles by shocks constructed from a Dynamic Stochastic General Equilibrium model.

The above stated papers try to explain the visual inspection of the decline in money velocity by using theory and econometric techniques. On the other hand, the influential paper of Kirman (1992) explains how use of representative agents in macro modelling can miss the behaviour of whole society consisting of millions of individuals, several organized groups and firms. Therefore, based on this idea, one other methodology to analyse the issue can be to use ABM.

In line with Kirman (1992), there are examples of papers which guide how to use ABM in some specific areas of economics. Arthur (1991) models bounded rationality of human agents by using ABM. The recent paper Zhao et al. (2019) use ABM to find out the degree of rationality for monetary policy and macroeconomic fluctuations in China. LeBaron (2001) explains researchers interested in modelling financial markets how to build their own ABM. Axtell et al. (2002) explains how ABM can be used to analyse industrial ecology, that is, how millions of individuals making decisions on product purchases, attitudes of recycle and usage of private cars or public transportation that cannot be brought down to a representative agent analysis.

3. Model and methodology

The general price level of goods and services is directly proportional to the amount of money in circulation or in other words money supply according to the *quantity theory of money*, which can be shown by the below equation:

$$Mv = Py \quad (1)$$

where M is the total amount of money in an economy during a given period, v is the money velocity, P is the price level associated with transactions for the economy during the period and Y is the real total income of the economy.

Quantity theory of money is one simplistic example for models which reflects the complexity of real life economies where for millions of decentralized heterogeneous agents, aggregated results of economic subjects such as growth, wealth, income distribution, labor force, business cycles, etc. are to be studied. However, this model requires very strong simplifying assumptions to obtain a straightforward result. This extremely constrained approach which regards velocity of money as constant provides little help for explaining real life economies, especially if the underlying economic phenomena exhibit highly complex behaviour.

From 1980's onward the "representative agent" assumption very often used in the literature. Although not realistic, since, in fact agents are physically, psychologically and economically heterogeneous, this assumption was needed because there was not a convenient method to deal with heterogeneity. Moreover, the interactions between heterogeneous agents have similarly been ignored. However, there is no immediate justification for this approach.

Some recent studies suggest an alternative methodology for analysing the complex real life economies by using the new technique known as Agent Base Modelling (ABM). It allows to model heterogeneous adaptive agents who interact with each other. This methodology does not resort to oversimplifying assumptions. Arthur (1991) sketches the most important features of this methodology.

Therefore, in this paper, by using ABM, we try to find out whether heterogeneity alone can cause a gradual shifting of wealth from the ones who spend more to the ones who spend less, leading to a decline in money velocity and hence demand deficiency. Our simple model assumes that money is the only asset in which wealth may be held. For simplicity we assume a zero rate of money growth in the economy. Initially we assume an equal distribution of money across the consumers. The only income of the agents, which is also assumed to be equally distributed, is the wage they earn. The labor is supplied inelastically so that labor income is the same for all individuals.

There are N agents. M is the total amount of money in the economy. $\{M_{1t}, M_{2t}, \ldots, M_{Nt}\}$ is the vector of amounts of money each individual has at time t. $M = M_t = \sum_{i=1}^{N} M_{it}$ for all t. The budget constraint for agent i at time t is:

$$M_{it} = M_{i(t-1)} + WL - C_{it} \quad (2)$$

where W is wage, L is working time and C_{it} is the consumption level of the i^{th} agent at time t. Since at the beginning, money is distributed equally among the agents in the economy, the initial condition is:

$$M_{i,0} = M/N \text{ for all } i \quad (3)$$

We assume that consumption is a linear function of money so:

$C_i(M_i) = \gamma_i M_i \; 0<\gamma_i<1 \text{ for all } i$ (4)

where γ_i is propensity to spend out of money for agent i. C is the total nominal demand in the economy. $\{C_{1t}, C_{2t}, \ldots, C_{Nt}\}$ is the vector of amounts of consumption each individual has at time t. $C_t = \sum_{i=1}^{N} C_{it}$ for all t.

A more general but similar macroeconomic model is presented in Asona et al. (2019). In their model agents are heterogeneous as well but in addition they also make decisions about their savings. There are poor households with low savings rates and rich households with high savings rates.

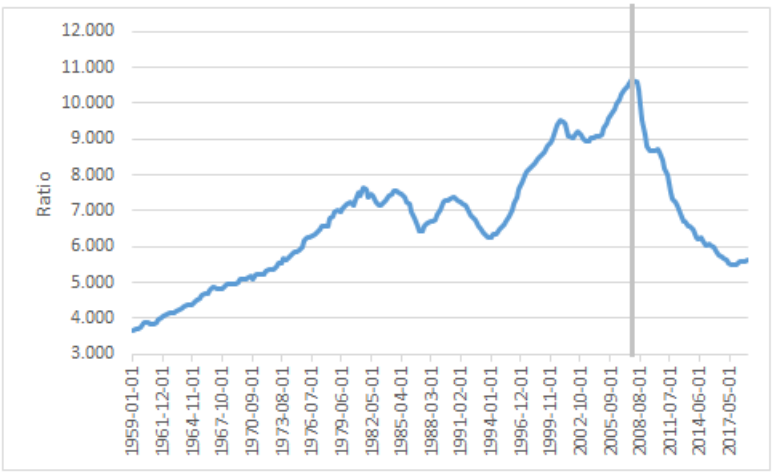
4. Analysis of the data

M1 is the narrow definition of money supply. It includes notes and coins, traveller's checks, demand deposits, and checkable deposits. Declining velocity of M1 means that final expenditures per unit of money are declining as well. In Figure 1, money stock velocity of M1 can be seen for the US economy over time.

In Q1 of 1959, the velocity of M1 was 3.66 and it was 7.59 in quarter 4 of 1981. This means, during that period there was an average annual increase of velocity of 4.88 percent. This period can easily be explained by a rising trend in inflation. Yet, in the recent decade a decline trend has started. In Q3 of 2019, the velocity is 5.57. It is even lower than the velocities of 1980's and early 1990's which end up with an average annual decrease of 4.35 percent. The most striking observation in Figure 1 is the region after the plotted vertical line at the Q4 of 2007 with a fall from a peak velocity of 10.68.

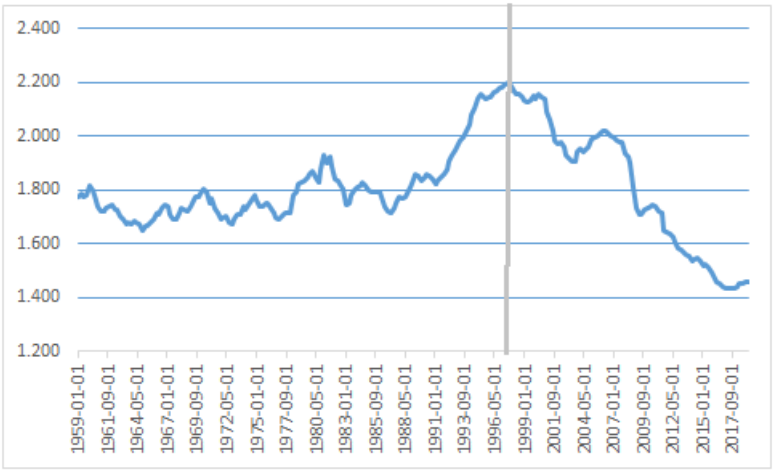
M2 includes M1 and saving deposits, certificates of deposit and money market deposits for individuals. The velocities of M1 and M2 gives a similar pattern. In Figure 2, money stock velocity of M2 can be observed over time for the US economy.

Figure 1. M1 money stock velocity for the US



Source: Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/.
Note: Seasonally adjusted quarterly data (downloaded: April 26, 2019).

Figure 2. M2 money stock velocity for the US



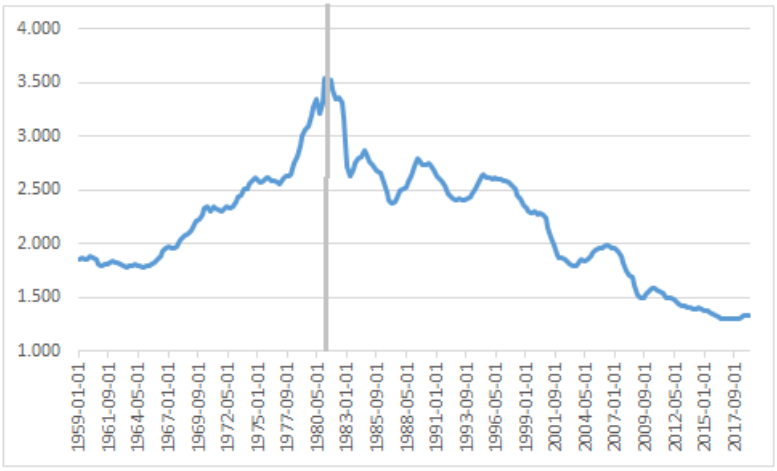
Source: Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/
Note: Seasonally adjusted quarterly data (downloaded: April 26, 2019).

As can be seen in Figures 1 and 2, M2 is more volatile compared to M1 for the whole period and an increasing trend cannot be observed for M2 similar to M1

before 1980s. The decline period is longer for M2 compared to M1 where it is 11 years for M1 and 21 years for M2. The average annual decline is 4.35 percent for M1 and it is 1.93 percent for M2. The most important region of Figure 2 is the region after the vertical line at the peak in the Q3 of 1997 with a velocity of 2.20.

MZM (money with zero maturity) consists of the supply of notes and coins in circulation, traveller's checks, demand deposits, other checkable deposits, savings deposits, and all money market funds. The velocity of MZM is important for determining how often financial assets are switching hands in the economy. In Figure 3, money stock velocity of MZM for the US economy can be seen.

Figure 3. MZM money stock velocity for the US



Source: Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/.
Note: Seasonally adjusted quarterly data (downloaded: April 26, 2019).

For MZM, we observe mainly two periods, the rising period and the falling period. The rising period is from the starting date of the data to the Q1 of 1981. In Q1 of 1959, the velocity was 1.85 and it was 3.54 in Q1 of 1981 with an average annual increase of 2.28 percent. This rising trend in velocity can easily be explained by a rising inflation trend. In Q3 of 2019, the velocity was 1.31 and the average annual decrease was 1.70. The question is why does money velocity values keep falling even *after* inflation is stabilized at 2 per cent. The most important region of

Figure 3 is the region after the vertical line at the Q3 of 1981 with a peak velocity of 3.53.

Table 1 summarizes the above observations on the data. Since all the values of average annualised changes of the last row of Table 1 are negative, we can conclude that declining money velocity continues to be a problem after 2007, even after the inflation rate has been stabilized.

Table 1. Average annualized changes for velocity of M1, M2 and MZM

Year	Velocity of M1	Average Annualized Change	Velocity of M2	Average Annualized Change	Velocity of MZM	Average Annualized Change
Q1 1959	3.66		1.77		1.85	
Q1 1981					3.54	2.28
Q4 1981	7.59	4.88				
Q1 1991			1.83	0.09		
Q1 1994	6.26	-1.46				
Q3 1997			2.20	4.10		
Q4 2007	10.68	5.88				
Q3 2019	5.57	-4.35	1.44	-1.93	1.31	-1.70

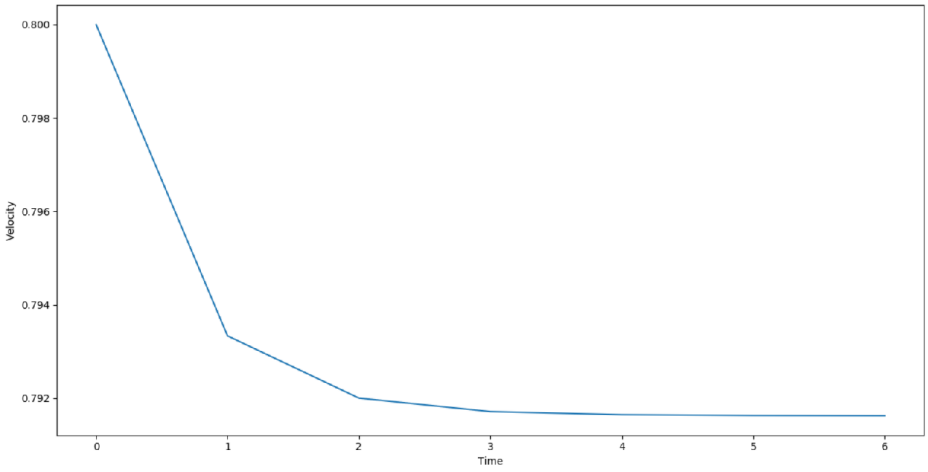
5. Outcomes of the Agent Based Model[2]

For simplicity of demonstration and without loss of generality, the number of agents (i.e. consumers) in the economy, *N*, is taken as 3. The total amount of money in the economy, *M*, is taken as 300 and by Equation (3), $M_{i0} = 100$ for i = 1,2,3. Total real production level, *y*, is taken as 100 units of consumption goods. The three agents are assumed to be heterogeneous and have propensities to spend of 0.9, 0.8 and 0.7 for i = 1,2,3 respectively. This section reports the outcomes of the ABM under this setting.

[2] Results are obtained by using an ABM code written for Python and is available upon request from the authors.

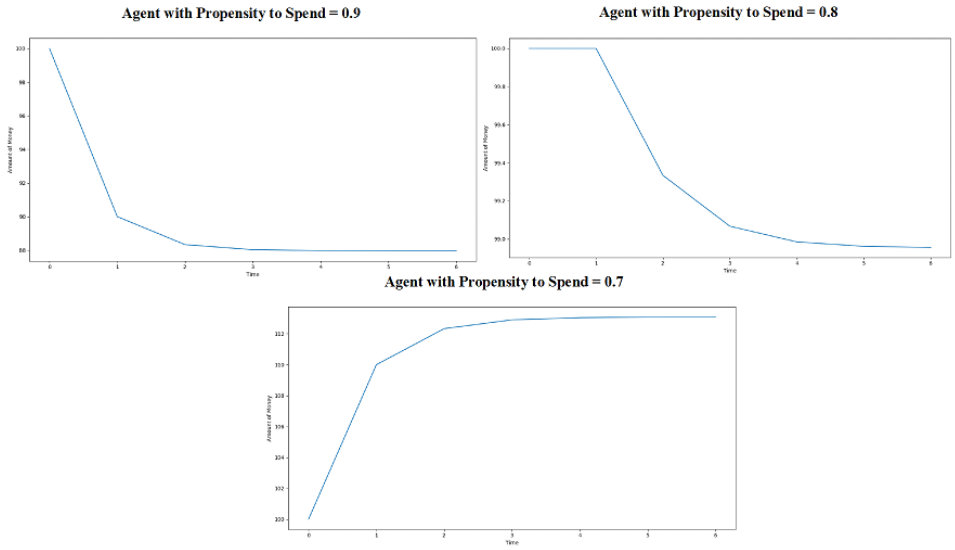
For this study, the most important outcome is the decline in velocity of money which is presented in Figure 4. The horizontal axis is time (i.e. number of iterations) and the vertical axis is the velocity of money generated by the model. The convergence to the value 0.792 is reached at time period 6 where there is a new wealth distribution.

Figure 4. Decline of velocity



This new wealth distribution can be seen in Figure 5. The convergence pattern of the amount of money balances for the three types of agents is seen in this Figure. The horizontal axis is time and the vertical axis is the amount of money of a particular agent. All three agents start with an initial amount of money of 100 units. For agents with propensity to spend of 0.9 and 0.8, we see a decline in money balances. The convergence values for the money balances of agents with propensity to spend of 0.9 and 0.8 are 88 and 99, respectively. On the other hand, for the agent with propensity to spend of 0.7, there is an increase in the amount of money up to the value 113. The convergence is reached after iteration six. These three values add up to 300 since we have the assumption that money stock does not grow in the aggregate.

Figure 5. Convergence of the amount of money balances

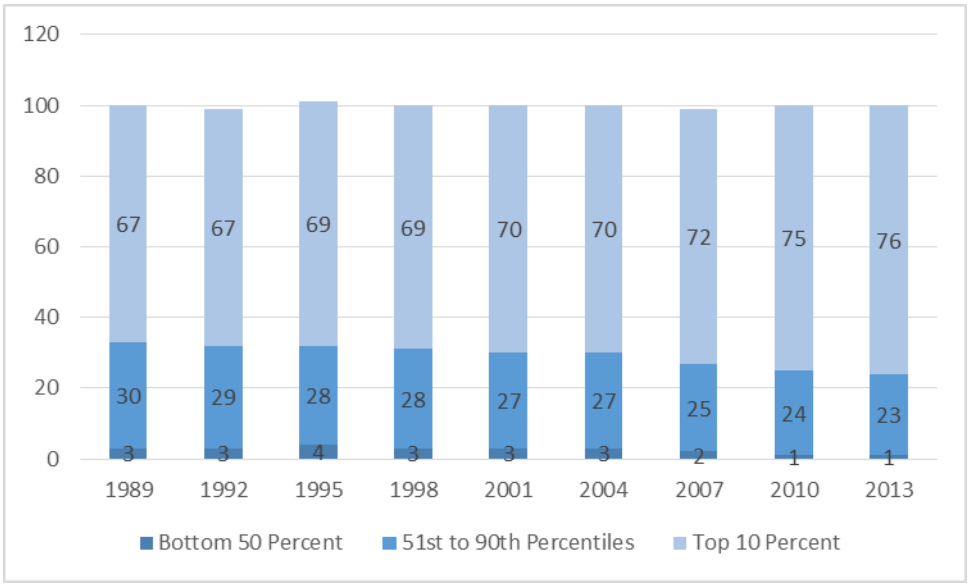


This result is in line with the Santoni Hypothesis with heterogeneity added. To remind, according to this hypothesis, increases in wealth relative to income is an important cause of decline in money velocity. The outcome of the ABM is a transfer of wealth, which is the money in the model, from the ones who have high propensities to spend to the ones who have low propensities to spend. Therefore, money velocity keeps declining until the steady state is reached.

Real data also supports this form of the Santoni Hypothesis as well. Figure 6 is drawn by using the data from the Survey of Consumer Finances reported in Karamcheva (2016). This survey is conducted every three years and it includes detailed information on family wealth, income, and pensions. It covers nearly the full distribution of family wealth. The measure of wealth in the survey is marketable wealth (i.e. the difference between a family's assets and its debt). Assets consist of financial assets, home equity, and other assets such as real estate, vehicles, and business equity. Debt is non-mortgage debt, which consists of a family's consumer debt and other debt like student loans. The declines in money stock velocities for

recent years can indeed be a consequence of this worsening trend in the distribution of wealth.

Figure 6. Shares of family wealth, by wealth group for the US

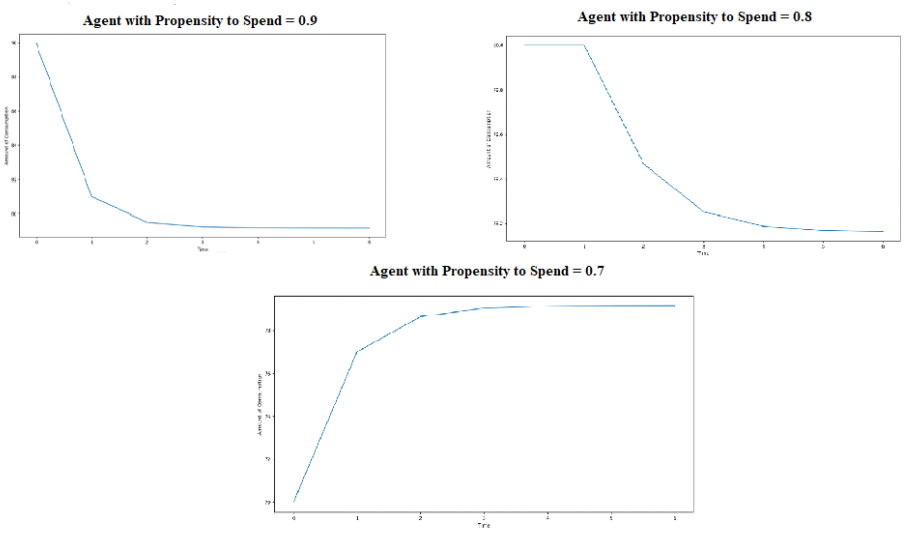


Source: Congressional Budget Office US; Karamcheva (2016).

According to Equation (4), consumption is a linear function of the amount of money for all agents. Therefore, it is not surprising to observe convergence in consumption as well. We can see this in Figure 7. Horizontal axis is time and the vertical axis is consumption. Depending on the propensity to spend of the individual, i.e. γ_i, initial amount of consumption differs for the agents. Since $0<\gamma_i<1$ for all i, the directions of the convergences are same as the ones for amount of money. For agents with propensity to spend of 0.9 and 0.8, we see a decline. The convergence is after iteration two for the agent with propensity to spend 0.9 and it is after iteration four for the agent with propensity to spend 0.8. On the other hand, for the agent with propensity to spent 0.7, there is an increase in consumption. The convergence is reached after iteration three. The timing of these convergences are same as the case for amounts of money. The eventual consumption level is almost the same for the

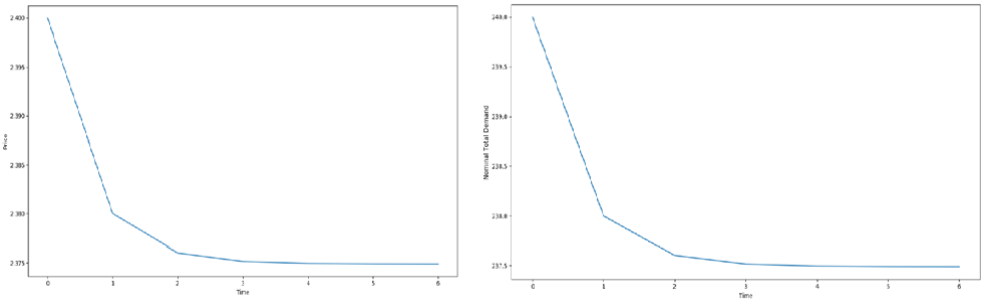
three agents and is around 80, despite the sustained dispersion of wealth in a steady state.

Figure 7. Convergences of consumptions



The effects on price and nominal total demand can be seen in Figure 8. For both left and right hand side parts of the figure time is on the horizontal axis. Price level is the vertical axis on left and nominal total demand is the vertical axis on the right. The convergence is at the level 2.375 for price and it is at the level 237.5 for nominal total demand after period six. They both decline consistent with a demand deficiency and a deflationary bias as would be predicted by the agent based version of the “Quantity Theory”.

Figure 8. Decline of price and nominal total demand



6. Conclusion

Visual inspection of money velocity for the United States shows that there is a declining trend in recent decades. During 1980's there were temporary declines in money velocity and these periods were studied by academicians extensively. Although the rates of declines became much more significant and persistent in recent decades the interest on this issue has diminished.

This paper attempts to bring the problem to the agenda again and tries to explain this recent trend that gives way to a significant deflationary bias. This is important because although inflation is a long time known problem, deflation can be considered as a new problem for especially the developed countries.

We used in the paper an ABM approach. By this way we could address consumer heterogeneity explicitly, instead of using the dominant paradigm of a "representative agent". The outcomes of the model showed that as money starts to accumulate in the hands of agents who have lower propensities to spend, money velocity starts to decline. Since in our model money was the only form of wealth, this relation between amount of money and money velocity supported the Santoni Hypothesis. We also showed the similarities of our results with the real data of distribution of wealth.

Two other outcomes of the model were on price level and nominal total income. They both have a declining trend as time goes on. This is in line with the deflationary bias in developed countries during recent decades associated with a

demand deficiency. Therefore, it can be suggested to the policy makers that expansionary monetary policies might not be as effective as they would be in the absence of heterogeneity.

Our ABM model is a simple one, yet it has striking results. The first simplicity comes from the setting that the only wealth of the agents is money. Moreover, the total amount of this money is constant over time and it is distributed equally among the agents initially. Coming to the income of the agents, which is the wage they earn, it is also distributed equally. The only heterogeneity between the agents is the difference in their spending behaviour.

In future studies these assumptions can be relaxed. For example, money growth can be added to the model, as well as alternative forms of wealth. Moreover, a stochastic version with idiosyncratic shocks can easily be considered. We are of the view that none of these would change the main conclusion: Heterogeneity matters for macroeconomic modelling.

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Cash management organisation decision-making: economics, strategy and operations

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Abstract:

Aim: This article starts from the observations of two experts, who witness varying company views on the almost-vanished issue of structuring the internal decision-making on the organisation of cash management. The aim of this article is to put the current challenging developments in a digitalizing world into a conceptual perspective.

Research design: The article singles out motives for either centralization or decentralization of cash management, models to organize cash management functions, as well as developments in the field over the last some thirty years. Various theoretical views are studied briefly in order to find a way out of the signalled paradox into a refined future.

Findings: It can be concluded that multiple practices may coexist both within and between firms, whereby a refined understanding in terms of financial economics, strategic direction and operational flexibility is called for.

Originality: The present study is unique in that it is among the first in academia to signal the return of the centralisation versus decentralisation issue in cash management in a rapidly evolving digital era and a multi-legislation world.

Implications: The developments offer a unique opportunity for firms, further reducing their costs, to overthink their cash management system, including its relation to the external world. The study calls for follow-up research in terms of case studies at organisations with varying contingencies and survey questionnaires among representative samples.

Keywords: cash management organisation, (de-) centralisation, decision-making
JEL: B27, G30, L23

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1. Introduction

On November 1, 2017, an interview with Jean-François Caillol was published on the Dutch financial management newsfeed site CM Web. In this interview, he was cited as follows (Geyte 2017). “I expect that the trend towards centralisation in cash management will continue. After all, there will be more and more attention for doing it as efficiently as possible and then I do not believe in decentralisation. After all, a small team can process large amounts of transactions and information. It not only reduces the number of people that need to be deployed, which reduces costs, but it is also more professional.” (author’s translation)

Jean-François Caillol is not just somebody. He is the long-time treasurer of the giant Belgium-based chemical company Solvay, a forerunner on global cash management since about four decades. Its internal bank handles much of the Group’s cash transactions, foreign exchange risk hedging and internal financing and also closely monitors accounts receivable and accounts payable positions in relation to this (Treasury Today 2016). No wonder that his local team was chosen as having the best Belgian practice in treasury in 2016. Moreover, although Caillol notes that technological and regulatory limits (also with Solvay) set a boundary to a full centralisation of activities, the decades-long discussion on this issue seemed to be closed.

However, also in the fall of 2017, the present author had a discussion with a US-based investment banker. He told that his clients had been increasingly taken up the issue of centralisation or decentralisation of cash management, because of the evermore speedy and much diversifying customer requirements in the fast moving industries that he serviced. Discussions with observers learnt that digital technology developments in especially the so-called fintech world and regulatory relaxation on financial services supply fuel a move out of centralisation into decentralisation. If indeed becoming true, this would mean a revolutionary changeover of current preferences. But will it really become like that or do we just witness socio-political challenges nowadays (Riggins 2019)?

The question just posed involves crystal-ball judgement and goes beyond the reach of this conceptual and explorative study. Yet, what will be covered are

motives influencing centralisation and decentralisation of cash management and typical models of zero to full centralisation of decision-making. Following, developments in the field will discussed by looking at states of the art and major issues considered over the last thirty years. A look at the present gives way to various academic views on how to respond to current challenges on organising the cash management decision-making. A brief practical framework and an academic outlook conclude the article.

2. Centralisation issues

Cash management[2] refers to corporate short-term financial management policies (https://wikipedia.org/wiki/cashmanagement). It includes cash flows and transactions management, liquidity management (including investments) and (interest rate, foreign exchange and other) risk management. Cash management decision-making can take place at various levels of companies. If so, centralisation or decentralisation issues may arise on various issues, such as the payment of obligations and collection of receivables, whether and how much to invest in a certain currency, how to handle business with banks and other intermediaries, and so forth. In the remainder of this section, these kind of issues will be discussed.

2.1 Centralisation motives

Motives to centralise cash management functions may vary (cf. Westerman, Von Eije 2005; Polák, Klusáček 2010; Treasury Today 2016, Bartsch 2019). First comes the efficiency motive. Administrative costs can be reduced when local affiliate staff time is freed up and bundled at a central level. Also, at this level one may net internal cash flows and pool cash balances, which reduces internal transaction costs and gross interest costs, with synergetic bank deals reducing the costs even further. Moreover, cash balance and cash flow risks and thus expected costs may decline when routing cash bundles centrally via perhaps also less risky

[2] Definitions pertaining to cash management are varying. It is preferred to use a simple definition from Wikipedia, which is a source of common knowledge.

financial institutions. Second comes the professionalization motive of centralisation. Data may become more concentrated in better-streamlined information systems, enhancing the cash planning, measurement and evaluation, and enabling cash routing operations including leading and lagging. Also, internal financing benefits are reaped when concentration of financial know-how enables better investment decision-making.

Motives to decentralise cash management are also frequently found in the standard literature (cf. Westerman, Von Eije 2005; Polák, Klusáček 2010; Treasury Today 2016; Bartsch 2019). Firstly, information needs by both the corporation itself and the regulative authorities increases when centralizing. The highly formalised and upgraded information system needed may contradict corporate decentralisation philosophies. Also, affiliate staff may control cash flows more adequately when functions are decentralised. Moreover, decentralised disciplines may have more sight of operational needs. Next, they may possess capacities that corporate staff at headquarters may not have. Finally, established relationships of affiliates with local banks are interrupted when cash balances and flows are managed at the central corporate level. Overall, centralisation of cash management is not obvious, which allows for various organisational models.

2.2 Centralisation models

There are several ways to organise cash management functions (Westerman et al. 1997; Polák, Klusáček 2010; Treasury Today 2016). Firstly, cash management may be fully decentralised, with only information being exchanged in the corporation. Secondly, a consultancy model may prevail, in which a central unit advises the affiliates on their short-term financing. Thirdly, an agent model may be employed, with this unit handling cash operations on behalf of the affiliates. With an in-house bank, this unit also provides near-banking services to the affiliates. Lastly, in a shared services model, one or more central units even resume all of the cash management responsibilities of the affiliates.

Not all cash management functions need to be dealt with likewise. Polák and Klusáček (2010) hold that risk management functions and large liquidity positions are centralised first, followed by internal and external cash balances, cash transfers

and the entire liquidity management, and completed by the all cash flow management, debtor and creditor management and a central information system. Blenken Blijdenstein and Westerman (2008) refer to country limits (local regulations, fiscal rules and reporting rules), bank limits (on global banking, ICT issues, cost/return trade-offs) and internal limits (cost-benefit, strategic and control considerations). Caillol (Treasury Today 2016) in addition points out technological challenges and Riggins (2019) signals socio-political uncertainty issues (Brexit, regulatory changes in Asia and rise of protectionist legislation).

3. Centralisation over time

Around 1990, the author of this article started with his first cash management projects and studies. In the aftermath of two so-called oil crises resembling pretty much the well-known recent financial crises in terms of economic and social impact, interest rates went up to previously and later unwitnessed post-war levels, whereas the personal computer started a revolution in data processing and analytics. Cash planning and forecasting progress would help to cut costs and increase control. This was often still rather done per local entity, business unit and at best country level than that integrated corporate cash management concepts were employed (cf. Soenen, Aggarwal 1989).

Nevertheless, a broad strive for centralised cash planning and control started at the same time (Westerman et al. 1997). Enthusiastic controllers and treasurers who had been previously building private spreadsheets became assisted by specialised software packages allowing for more rigorous planning and control. Communication via the electronic highway helped to reduce physical and time barriers, but varying accounting practices and local restrictions remained difficult to overcome. Nevertheless, financial markets became deregulated locally, liberalised cross-border and harmonised globally. “Reaganomics”, “Thatcherism” and “Europe 1992” movements acted as catalysers here. Head offices were able to take over cash tasks and responsibilities from lower units. A layered bank account structure and a herewith aligned reporting structure were given priority.

Of course, the trend that started was not general and not always that complete, but seemed almost inevitable (Westerman, Von Eije 2005). Companies like Philips and Solvay saved a lot of money by sweeping bank accounts (pooling) or offsetting payments internally (netting). The banker role became more modest (fee reduction) and detached (disintermediation). Evermore and also smaller firms profited from what became a race to the cost bottom. Banks had to accept margin erosions, but were able to do so because of declining costs on their side in what were abundant times anyway. Cross selling with attractive long-term finance deals also helped to sweeten their pain. When the advent of euro also reduced the exchange costs, things went even better for all.

For over a decade now, the present author is increasingly viewing developments from the side-line, with both much pity and much pleasure though. Indeed, cash management became more efficient in general, with for instance slowly developing accounting system harmonisations and ever closer to real-time cloud applications entering the market. However, limitations of banking systems, practicalities in 'difficult' or 'small' countries, business realignments and limited cooperation from suppliers and customers inhibited the tightening of cash planning and control (Blenken Blijdenstein, Westerman 2008). Moreover, growing insecurity of linked information systems, limited financial crisis resistance of counterparties and regulatory requirements compiled in the course of it, made a complete full centralisation of cash management show to be impossible, even in theory.

As of today in 2020, the new magic words partially match the old ones, but are more eruptive. For example, PSD2 (open banking regulation), fintech start-ups and blockchain technology (the new digital transaction connectors) make the author remind of the disintermediation wave of 30 years ago. Take also for example the emergence of the new so-called crypto-coins, local currencies and documentary credits or whatever the financial transaction routes chosen is. They deregulate, liberalise and harmonise currency markets with almost real-time and free of charge payments, thereby fuelling the embarrassed bankers' efforts in this respect as well. Moreover, since customer relationship management (CRM) and supply chain financing (SCF) require and enable tailor-made solutions, one-fits-all traditional solutions are not that acceptable anymore.

Table 1 below summarises the above, using as yardsticks the years 1990, 2005 and 2020 (Westerman 2017). With this at hand and having arrived in the present, several questions remain and ask for a reply. Can companies handle their business in turbulent cash times? How do they respond to them? Do they want to arrange and control all of the just listed issues? These are questions that may cause headaches to the central cash manager of today, and even more to tomorrow's. The question whether he or she should focus on everything around cash and wants to deal with it becomes topical again, since much can also be done more easily and perhaps more appropriately at affiliate levels. Of course, to set rules and keep an overview is a good thing, but looser reins may let the cash horses run faster, so to say.

Table 1. Cash management developments

Year	On centralising cash management	Key themes around cash management centralisation
1990	"It should become true soon"	Reporting, planning & control, account structure
2005	"We don't get much further"	Efficiency, payment systems, security, supervision
2020	"Towards a refined future"	Digitalisation, suppliers, customers, uncertainty

Source: adapted from Westerman (2017).

4. Centralisation views

Whether centralising or not: the increased complexity of the cash management function makes it necessary to review it in detail. Polák, Masquelier and Michalski (2018) point at four drivers in this respect: contextual challenges, technology/IT systems, new tasks and required skills. They also note an evolution towards less operational staff tasks, more analysis and reporting, and much more strategic tasks. Standardisation and simplification will enable digitisation of processes, but the authors question centralisation of processes in a global context. The trend towards application of artificial intelligence (Polák et al. 2019) in the field makes a process

approach even more pithy. When accepting that centralisation is returning as an issue anyway, the cash management function thus has to take a step beyond the one just described. However, also various other views are at hand.

Firstly, cost-benefit and net present value analyses may be helpful (Westerman, Ritsema 1999). Cost savings and profit margins may offer a yardstick in concrete one-off and limited timeframe issues. In the latter case, measures such as break-even analyses and payback periods may also be helpful. Yet, with an extended timeframe, net present value (NPV) analyses may be better. They allow for economic cash flows instead of accounting profits and discount net receivings back to the present. Nevertheless, a correct NPV determination may be a tricky exercise, if thinking of unquantifiable or unsure cash flow probabilities, as well as disputable interest and equity cost charges. Also, the length of the applicable forecast period may be debatable. Then it may be wise to refer to results and/or to take a broader view.

Transaction cost economics (TCE) is developed by Williamson (1975; 1989). This theory views governance structure issues with transactions. It takes on board not just (direct) production costs, but also coordination and motivation costs. The asset specificity of the transactions, as determined by e.g. frequency and size, is of crucial importance here. Depending on this, the optimal level of centralisation may be determined per cash management task. Since both quantifiable and unquantifiable costs are allowed for, the perspective becomes eclectic. It also becomes dynamic, since variations in costs over time are implied. Yet, the TCE opportunism view is essentially a static strategic approach, with long-term (inter-) organisational relationships being overlooked.

However, in cash management, reciprocal alignment processes often matter, creating long-term bonding. Other than TCE, the network theory allows for this, by including notions such as trust, mutual adaptation and learning (Hallèn 1982; Nooteboom 1993; see also Bartsch 2019). Cash management centralisation is judged from the perspective of staff performing their tasks in multiple relational settings. Going beyond the above, cultural affinity may play a role as well, as do various legislative frameworks and business ethics considerations (Bartsch 2019). Lastly, professional judgement, or call it less sophistically: personal preferences, may

matter as well. Refer for a comprehensive elaboration on cash management organisation views to Table 2 below.

Table 2. Cash management organisation views

Focus	Name/label	How to (de-) centralise cash management
Process	Task analysis	Digitise if possible, centralise when fitting
Accounting	Cost-benefit analysis	Centralise if profitable, else decentralise
Economics	Net present value analysis	Centralise if value creating, else decentralise
Governance	Transaction cost economics	Centralise if asset specificity does allow for it
Relationships	Network analysis	Value network determines (de-) centralisation
Context	(rather directive factors)	Culture/legislation/ethics/judgement shape view

Source: author's own elaboration.

As a refinement of the above, the various parts of cash management can be split up and viewed separately. Traditionally, a division between third party accounts receivable, third party accounts payable, inter-company transfers and liquidity management is made, with the latter two parts being the most centralised ones and especially third party accounts receivable being the least centralised one. In doing so, various grade of centralisation scenarios may be witnessed (Blenken Blijdenstein, Westerman 2008). The focus of the scenario's may range from truly global, via restricted global, towards internally oriented and finally truly local. It is needless to say that general scenarios may in practice demand for slightly different practices, depending upon local peculiarities.

5. Conclusion

Whereas technological, legislative and organisational developments historically have led to increased centralisation of the decision-making on cash management activities, this seemingly ongoing trend may have halted because of legislative and organisational hamperings and in the evolving digital era and multi-legislation world

even reversal decentralisations are deliberated. This creates a unique opportunity for firms, further reducing their costs, to overthink their cash management system, including its relation to the external world. A solution to today's challenges is perhaps not a 'one fits all and forever' centralisation of decision-making, but a refined understanding in terms of financial economics, strategic direction and operational flexibility (see Table 3 below).

Table 3. Cash management organisation framework

Financial economics	Strategic direction	Operational flexibility
Financials: NPV, payback, profit/margin/cost, hunches	Transactions: tasking, size, frequency, opportunism/trust, culture, ethics	Externalities: government, sup-pliers/customers, banks/fintech

Source: author's own elaboration.

The transaction perspective stands in the middle here. In line with McMenemy (2019), cash transactions should all be registered, tracked and reported on, as well as planned for and controlled, as direct as possible to the strategic activities that they are related to. A concomitant decentralisation of the decision-making would also offer a high flexibility in both the intra- and intercompany world. In practice, capacities and heuristics would impose limits to this base guideline, however. Moreover, financial economics considerations might call for bundling of groups of tasks as one anyway. Thus, acceptance of shortcomings as well as sound professional judgement are both still being asked for.

Overall, being almost gone with the wind of time, cash management organisation decision-making in organisations is coming back as an issue. A contribution of this article is that it is among the first to signal the possible impact of recent developments in this respect. In addition, taking into account historical developments and organisational structure models, it shows how theoretical views may help to study actual (de-) centralisation issues. Yet, the article does not go beyond initial stages of the research cycle. Future researchers are encouraged to study how organisations act upon the current challenges. Case studies at

organisations with varying contingencies, as well as survey questionnaires among representative samples, may shed more light on what is and may be done.

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