

THE IMPACT OF MACROECONOMIC FACTORS AND POLICY EVENTS ON THE FINANCIAL AND REAL ECONOMY

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1. Introduction

1.1. Motivation, Literature and Methodologies

The relation between the real and the financial economy has been a popular topic in the history of economics. Particularly the financial crisis of 2008 and the European sovereign debt crisis have renewed emphasis on this issue, since the outbreak of these financial related crisis also had an impact on the real economy. The existing interdependencies between the financial and the real economy lead, however, to major difficulties regarding the empirical investigation of the (causal) relation of both sides. Theoretically, changing financial market variables like interest rates, equity prices or exchange rates can have an impact on the real side, for example due to a changing propensity to invest. Or, the other way round, turmoil in the real economy can lead to implications in the financial sector due to changing corporate cash flows, interest rates or exchange rates. Moreover, policy events or political shocks like the Brexit¹ have the potential to impact both the financial and the real economy simultaneously. All in all, for financial market participants, real-side businesses as well as policy-makers it is crucial to understand these dynamic links and to draw lessons from events like crisis and incisive policy decisions.

Regarding the efficient market hypothesis (Fama, 1970) asset prices include all relevant information. Besides company- and sector-specific information, asset prices reflect also macroeconomic information, since they have an effect on company cash flows and profits. Due to the inflationary era in the 1970s, many research articles of these years focus on the relationship of inflation and assets, particularly on US equity prices (for example Bodie (1976), Fama and Schwert (1977), Fama (1981), Pearce and Roley (1983) (1985) and Chen, Roll & Ross (1986)). Most of the research articles written after the 1990s focus on the impact of macroeconomic news announcement surprises on asset prices. In response to the statement of Chan, Karceski and Lakonishok (1998) that empirically macroeconomic factors are not relevant for equity returns, Flannery and Protopapadakis

¹ The United Kingdom's (UK) decision of withdrawal from the European Union (EU) became known under a portmanteau of 'Britain' and 'exit', i.e. Brexit.

(2002) argue that the macroeconomic 'surprise', namely the deviation of the announcement from the expected macroeconomic news should be used for investigating the link between asset prices and macroeconomic factors. They show via a GARCH model of daily equity returns that 17 macroeconomic factors explain equity prices regarding realized returns and their conditional volatility.

A further topic deals with the dependency of the link between macroeconomic factors and asset prices on business cycles. McQueen and Roley (1993) show that the impact of macroeconomic news announcements about inflation, industrial production and unemployment rate on equity prices depends on the state of the business cycle. The response of equity returns on higher real activity is negative during an economic boom phase. The authors suggest that the increasing discount rate could be the reason for this finding, which leads to lower discounted cash flows and stock prices. Boyd, Jagannathan and Hu (2001) find also that the impact of macroeconomic news announcements varies regarding the economic state: While in case of an economic expansion phase, news announcements about an increasing unemployment rate lead to higher equity returns, the direction of this impact turns to negative during economic contraction phases. According to the authors, the reason for this finding could be market participants diverging interpretation of an increasing unemployment rate, namely as a signal for lower interest rates, which leads to higher equity valuations, and lower corporate profits, which leads to lower equity valuations. A similar result shows the article of Andersen et al. (2007), who argue that equity and bond prices as well as exchange rates respond to macroeconomic news releases, respectively, and that these links depend on the state of the economy.

In recent years, two popular methodologies have been used for measuring the impact of political or economic events, namely the event-study methodology and the counterfactual analysis methodologies (also known as program evaluation methodologies). Both methodologies, however, have divergent objectives and strategies. The event-study methodology focuses on the short-horizon response of the dependent variable on news announcements or events and tries to catch up the direction and the

magnitude of the impact on a specific day. Counterfactual analysis methodologies, in contrast, focus on the long-horizon change of the dependent variable due to an economic or political event by comparing the actual data with the predicted counterfactual doppelgänger.

Particularly between the 1980s and 1990s, the event-study methodology has been frequently used for capital market researches focussing on effects of events like initial public offerings (Loughran & Ritter, 1995), stock splits (Desai & Jain, 1997), legal cases (Bhagat, et al., 1994) and share repurchase announcements (Ikenberry, et al., 1995) on asset prices. Furthermore, it is also used for market efficiency tests, since abnormal asset returns, which persistently follow a particular type of event, would be inconsistent with the market efficiency hypothesis (Fama, 1991). There are also research articles, which measure the short-term impact of macroeconomic and fiscal announcements on asset prices. Wachtel and Young (1987) study the impact of fiscal deficit announcements on interest rates in the USA and show a positive link between these two measures. Via an event-study approach, Falagiarda and Gregori (2015) evaluate the impact of fiscal policy announcements by the Italian government on Italian government bond spreads. They show, that these announcements made by the members of president Monti's cabinet showed a significant effect on Italian long-term government bond spread relative to German bond yields. In recent years, the event-study methodology has been also a rather popular application in literature elaborating the impact of non-standard monetary policy measures on both domestic and international assets. A large part of the literature deals with the impact of the FED's unconventional monetary policies (UMP) on stock prices (Fratzscher, et al., 2013), corporate and government bond yields (Chen, et al., 2012), commodity prices (Glick & Leduc, 2012) and exchange rates (Neely, 2015). Put in a nutshell, the studies show that the FED's UMP interventions caused decreasing short-term interest rates, declining long-term government bond and corporate bond yields and led to a depreciation of the US dollar against major currencies. Fratzscher et al. (2014) also analyze the international spillover effects and transmission channels of the ECB's UMP measures on asset prices. Their results show, that asset prices in the euro area and also global equity prices are positively impacted by these measures. Additionally, the

results suggest that the euro depreciated against advanced and emerging market currencies. A similar result shows the event-study research of Georgiadis and Gräß (2015), who elaborate the impact of the ECB's announcement of the extended asset purchase program on 22 January 2015. According to their results, the announcement increased equity prices in the euro area as well as the global equity market and led to a depreciation of the euro against advanced and emerging economy currencies.

Seen from a technical point of view, the application of the event-study methodology requires an identification procedure. A popular way to identify the relevant news or events is the narrative approach, which is adopted for example by Gagnon et al. (2011) and Szczerbowicz (2015), where official press releases are used. Similar to that, Fratzscher et al. (2014) use official press releases and announcements as a base. Additionally, they consider only these events, which are mentioned on the first three pages of a specific financial newspaper on the next day. Another often implemented event identification method is the usage of electronic database which provide press, business and economic information like Google News, Google Trends, Factiva or LexisNexis. As an example, Altavilla et al. (2015), who elaborate the impact of asset purchase programmes on the financial market in the euro area, use an index of news computed from Factiva to identify events. Here, the number of news and articles about the relevant topic, i.e. asset purchase program, is crucial to determine event-days.²

The Difference-in-Differences (DID) approach is a basic and popular counterfactual analysis method. It was probably pioneered by John Snow, who used this technique in the 1850s for cholera epidemics in London (Coleman, 2018). Using data from treatment and control groups, the basic idea here is to compare the difference in outcomes before and after an event (for example a policy change) occurs. Although the DID approach can be straightforwardly applied to measure the impact of an event, it has some important limitations (Li & Bell, 2017): (i) The difference between the treatment and control group should be constant within the pre-intervention period, which is also called as parallel trend assumption. (ii) The treatment group should be strictly exogenous. As an

² Usually, a couple of specific search queries related with the relevant topic are included.

alternative for the DID approach, two novel counterfactual methodologies have gained greatly in popularity in the literature in recent years, namely the Synthetic Control Method (SCM) (Abadie & Gardeazabal, 2003) and the Panel Data Approach (PDA) (Hsiao, et al., 2012). Besides that both methods provide a more flexible way to measure the treatment effect by constructing a counterfactual outcome, the technical approach differs.³

Some research articles use the SCM to elaborate the impact of Brexit on the UK's economy. Douch et al. (2018) apply this method to measure the treatment effect of the Brexit regarding bilateral trade between the UK and 14 EU and 14 non-EU countries. Their results show that exports to both EU and non-EU countries have been lower due to the Brexit. Using the SCM, Campos et al. (2019) construct counterfactuals for countries that joined the EU between 1973 and 2004. The purpose here is to reveal the growth effects stemming from the accession to the EU. The results indicate that for all member countries except Greece the EU accession strongly fostered growth. Serwicka and Tamberi (2018) implement the SCM to elaborate the impact of Brexit on the UK's foreign direct investment (FDI) flows. According to their results, the UK's FDI inflows have followed a downward trend since the Brexit referendum, yielding a decrease between 16 and 20 percent. Particularly investments in 'software publishing', 'investment management' and 'retail banking' have been reduced. Another research paper, which also uses the SCM to measure the impact of Brexit on the UK's FDI flows, is published by Breinlich et al. (2019). Their results indicate that between the Brexit referendum and March 2019 the number of UK's outward investment transactions towards EU member countries has been increased by 17 percent, whereas the amount of outward investment transactions towards non-EU OECD member countries has remained constant. Moreover, they show that the number of EU27 investment projects in the UK has been decreased by 9 percent. Born et al. (2019) estimate the impact of Brexit on the UK's GDP growth by constructing a counterfactual outcome using the SCM. By the end of 2018, their results show that the Brexit referendum has led to a UK output loss of 1.7 to 2.5

³ A comparison of both methods is given by Gardeazabal and Vega-Bayo (2017) and (Wan, et al., 2018).

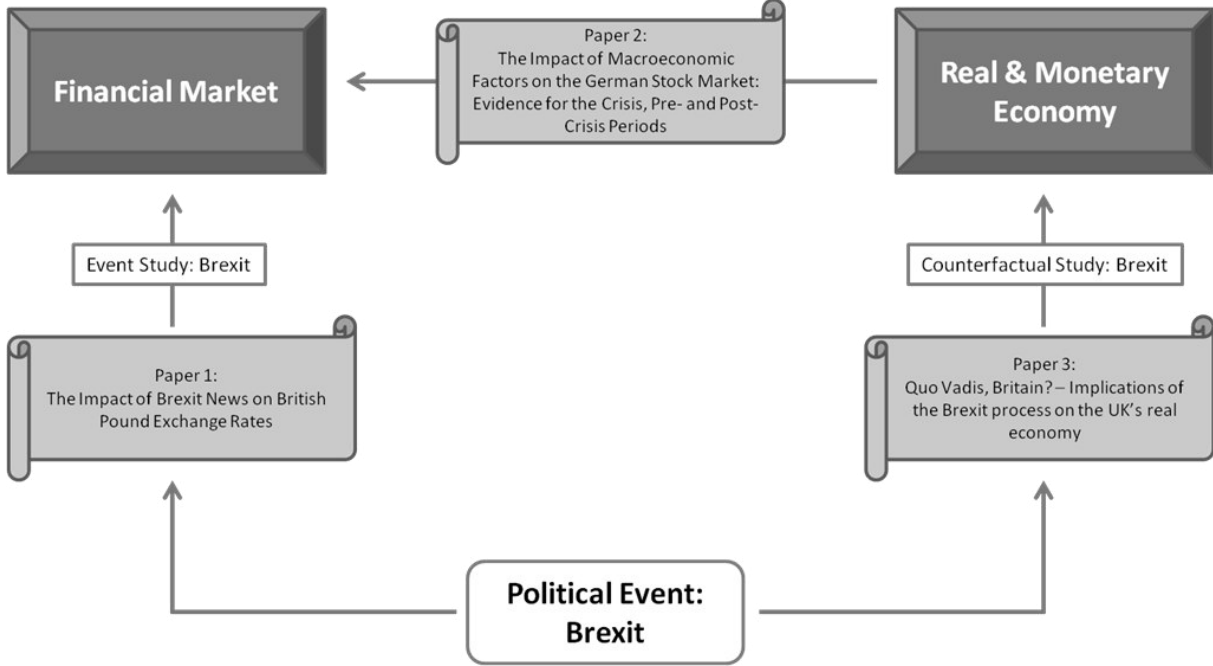
percent. Moreover, their results indicate a cumulative UK GDP loss of the Brexit referendum at about 55 billion British pounds in terms of 2016 GDP.

1.2. Overview

Comprised by three published research articles, the present doctoral thesis deals with short- and the long-horizon effects of political events on financial markets and the real economy and investigates the crisis-dependent impact of macroeconomic factors on equity prices. Thus, the purpose of this dissertation is to contribute to the literature of financial and real economy and to improve the empirical knowledge about implications of policy events.

Chapter 2 and 3 are co-authored articles, whereas Chapter 4 stems from a single-authored paper. In Chapter 2, we measure the short-term impact of Brexit on British pound exchange rates (Korus & Celebi, 2019), in Chapter 3 we investigate the long-horizon impact of German real and nominal macroeconomic variables, German government bond yields as well as leading macroeconomic indicators on the German stock market benchmark index DAX30 in crisis, pre- and post-crisis periods (Celebi & Hönig, 2019) and in Chapter 4 the long-term impact of Brexit on the UK's GDP (growth), consumption, gross fixed capital formation (GFCF) and exports in real terms is analysed (Celebi, 2020). Figure 1.1 illustrates how all chapters are linked with each other. In the following subchapters, I provide a short summary of the published research articles.

Figure 1.1: Framework of the doctoral thesis



Chapter 2: The Impact of Brexit News on British Pound Exchange Rates

Chapter 2 is based on a paper titled “The Impact of Brexit News on British Pound Exchange Rates” which is co-authored by Arthur Korus. It was published in the peer-reviewed journal *International Economics and Economic Policy* (2019, Vol. 16, No.1, pp. 161-192) as part of the special issue on “Institutional Changes and Economic Dynamics of International Capital Markets in the Context of Brexit”. Using event-study techniques, we investigate the impact of Brexit-related events on the spot exchange rate of the British pound against the euro and the US dollar. We want to find out whether Brexit-related news, including the Brexit referendum itself, has an impact on British pound exchange rates. By splitting our Brexit-related events into ‘good’ Brexit news and ‘bad’ Brexit news, we find an impact of Brexit news on British pound exchange rates. Bad Brexit news is associated with a depreciation of the British pound against the euro and the US dollar whereas ‘good’ Brexit news appreciates the Pound against the euro. Furthermore, our empirical results suggest that market participants display a delayed reaction to bad

Brexit news. As the referendum has clearly a significant impact on both British pound/euro and British pound/US dollar exchange rate volatility, the impact of Brexit news is only for the British pound/euro exchange rate volatility measurable. Besides the asymmetric volatility pattern towards positive and negative shocks in general, we find that the statistical significance and the magnitude of the impact of good Brexit news is higher than these of bad Brexit news. Concerning the British pound/US dollar exchange rate volatility, our results display a weak presence of volatility asymmetry in terms of shocks and good/bad Brexit news, respectively.

Chapter 3: The Impact of Macroeconomic Factors on the German Stock Market: Evidence for the Crisis, Pre- and Post-Crisis Periods

Chapter 3 presents the paper “The Impact of Macroeconomic Factors on the German Stock Market: Evidence for the Crisis, Pre- and Post-Crisis Periods” co-authored by Michaela Hönig. This article was published in the peer-reviewed journal *International Journal of Financial Studies* (2019, Vol. 7, No. 2) as part of the special issue “Macro News and Financial Variables”. This paper investigates the delayed impact of macroeconomic factors like monetary and real factors, German government bond yields, sentiment and other leading indicators on the main German stock index, namely the DAX30, for the time period from 1991 to 2018. Using a dataset on 24 factors and over a timeframe of about 27 years, we find evidence that across most subsamples, the Composite Leading Indicator (OECD), the Institute for Economic Research (ifo) Export Expectations index, the ifo Export Climate index, exports, the Consumer Price Index (CPI), as well as 3 y German government bonds yields show delayed impacts on stock returns. We further find that the delayed impact of the constituents of the monetary aggregate M2 on stock returns changed direction between the crisis and post-crisis periods. Overall, the results illustrate that in the crisis period a larger number of factors and economic indicators had significant impacts on the stock returns compared to the pre- and post-crisis periods. This implies that in the post-crisis period a macro-driven market prevails.

Chapter 4: Quo Vadis, Britain? – Implications of the Brexit Process on the UK's Real Economy

Chapter 4 is based on the article “Implications of the Brexit process on the UK's real economy” where the author of the present dissertation holds single authorship. This paper is published as a discussion paper at the *European Institute for International Economic Relations (EIIW)* (EIIW Discussion Paper 268). Using the PDA of Hsiao et al. (2012) in combination with the LASSO method, this article aims to measure the effect of the Brexit process on the United Kingdom's real economy up to 2019Q2. The results are twofold: Firstly, compared to the existing literature, the PDA improves the measurement of the impact of Brexit on the real economy regarding computation intensity, the feasibility of statistical inference and a wider application area. Secondly, the estimated counterfactuals for the UK show that the Brexit process has played a crucial role in the UK's economy, leading to lower GDP (growth rates), lower private consumption, lower gross GFCF and higher exports. On average, GDP growth has declined between 1.3 and 1.4 percentage points, whereby the cumulative loss ranges between 48 and 54 billion British pounds. Moreover, private consumption in the UK has declined 4.7 billion British pounds quarterly on average. The predicted counterfactuals show that the impact of the Brexit process on GFCF has begun in 2018Q1, whereby the average treatment effect amounts to -2.9 billion British pounds. The UK's exports increased since the referendum, most likely due to the depreciation of the British pound post-Brexit. The average quarterly effect of the Brexit process on exports is estimated here at 4.8 billion British pounds.

Chapter 5: Conclusion, Policy Implications and Future Research

The final chapter presents some conclusions and policy reflections in broader analytical context. Particularly, considerations about future implications of the Brexit are included as regards three major policy aspects: the UK, the EU and other countries. Moreover, Chapter 5 deals with limitations of the dissertation and future research opportunities regarding both technical and topical aspects.

5. Conclusion, Policy Implications and Future Research

5.1. Concluding Remarks

The presented empirical studies contribute to the literature in multiple ways. All in all, they enable to get a deeper insight into the crisis-dependent and political-event affected links and dynamics of the financial and real economy. Considering that the existing literature measures the impact of the Brexit referendum itself, the research article presented in Chapter 2 is the first paper which focuses on the impact of 16 Brexit-related events on British pound exchange rates and their volatilities by categorizing these events into 'good' Brexit news and 'bad' Brexit news. Moreover, the paper presented in Chapter 3 is, to the best of our knowledge, the first research article elaborating on the delayed impact of 24 macroeconomic factors on returns of the German stock market DAX30. The results indicate the presence of lagged and crisis-depending impacts of macroeconomic factors. Thus, the research also provides some indications about the semi-strong market efficiency. The research article presented in Chapter 4 is the first paper adopting the PDA of Hsiao et al. (2012) in combination with the LASSO method, which is proposed by Li and Bell (2017). The paper illustrates that the PDA improves the measurement of the impact of Brexit on the real economy regarding computation intensity, the feasibility of statistical inference and a wider application area. Moreover, by looking from a different methodological angle, the paper contributes to the existing literature by corroborating and measuring the negative impact of the Brexit on the UK's real economy.

5.2. Policy Implications and Further Considerations

Regarding the impact of the Brexit, there are three major policy aspects, which will be drawn in this section: the UK, the EU (EU27 and Eurozone) and non-EU countries.

As shown in this dissertation, not only the Brexit referendum on 26 June 2016 but the whole Brexit process starting from the Brexit referendum, has led to major changes in the economic environment of the UK: Decreasing real activity, lower consumption and lower investments. Apparently, market participants have anticipated the economic

consequences of the Brexit, primarily the loss of access to the European Single Market with its free movement of goods, services, capital, and labour within the EU. As shown in Chapter 3, market participants behave differently in crisis and non-crisis periods. Thus, as regards the favourable world economic environment of the recent years, one has to mention that the impact of the Brexit could have been substantially different, and most likely far less favourable in case of an economic or financial crisis.

Meanwhile, the UK exited the EU on 31 January 2020 after harsh negotiations and has entered an 11-month transition period, where virtually the UK remains in the European Single Market and obeys EU rules like before. Within the transition period, both the UK and the EU will negotiate regarding a possible trade deal. Further implications within and after the transition period are very likely, strongly depending on the result of the trade deal negotiation and the world economic environment. From the viewpoint of the UK, the trade agreement should permit as much access as possible to the European Single Market. Otherwise, in case of a no-deal scenario, the UK would trade with EU member states under World Trade Organization terms, which would increase trade barriers due to more costly exports and imports. As a result, there is a potential for an increase of the inflation in the UK, which has to be monitored by the Bank of England. Moreover, the UK's labour force could be negatively affected due to the Brexit and the loss of the free movement of labour, which could lead to skill-shortages, increasing wages and thus could negatively impact future growth (Hantzsche, et al., 2019).

Nevertheless, EU countries would also suffer if an EU-UK trade deal would fall. However, negative impacts of a no-trade-agreement case would be relatively higher for the UK than for EU member countries, since this trade relation is relatively more important to the UK than individual EU countries. Hence, in order to minimise losses and risks, both parties should make efforts to establish an EU-UK trade agreement.

Politically, there are several aspects, which hamper the possibility of an agreement. Firstly, Boris Johnson, the current prime minister of the UK, have refused to sign on to maintain EU jurisdiction and to follow "Brussels' rules" (The Guardian, 2020):

“There is no need for a free trade agreement to involve accepting EU rules on competition policy, subsidies, social protection, the environment, or anything similar any more than the EU should be obliged to accept UK rules.”

Secondly, from the viewpoint of the EU, Boris Johnson’s claims could threaten the stability of the EU since the concession of “cherry-picking” of EU privileges could encourage more countries to leave. This aspect shouldn't be neglected since in recent years anti-immigration, anti-EU and nationalist parties have gained popularity throughout Europe. In spite of that, it should also be pointed out that the Brexit could also be a starting signal for the remaining EU member countries to reform the Union. As an example, in a televised address on the Brexit day, the French president Emmanuel Macron talks of a “*historic alarm signal*” (Euronews, 2020):

“The remaining EU 27 nations must make Europe more sovereign, more democratic, closer to our fellow citizens and therefore also simpler in its daily life and that we succeed in rebuilding a clearer European project”.

In addition to these political aspects, the time remaining to implement a trade agreement is very limited considering the sluggish formal and parliament procedures on both sides. Taking these issues into account, it seems very unlikely that an EU-UK trade agreement will be established before the end of the transition period

To avoid further losses and, moreover, to induce positive effects of the Brexit, there are several key elements for British policy makers, which are drawn in Chapter 4.5: (i) Further trade agreements, particularly with the USA, (ii) expansive fiscal policies like tax reductions, increasing government spending (particularly public infrastructure and R&D investments), easing business procedures and (iii) expansive monetary policy measures. Considering that during the Brexit-process the UK’s exports has been boosted probably because of the depreciation of the British pound (see results in Chapter 4.4.4), an expansive monetary policy of the Bank of England could foster growth via three channels, namely supporting the UK’s exports, increasing domestic consumption and investment incentives and attracting foreign investments (Froot & Stein, 1991). This

could also have an increasing effect on stock prices of corporations particularly with subsidiaries in various countries and, thus, cash flows in foreign currencies.

The City of London has served as Europe's leading financial center over decades. After the transition period, financial institutions in Britain will probably lose their passporting rights, which allow firms with a UK license to provide services throughout the European Single Market. As a consequence, British banks as well as international institutions operating from London have to set up a subsidiary in a EU27 country to continue providing services (Welfens, 2019). Considering that a high amount of international financial institutions use London as a gateway for the EU market, the loss of passporting right could decrease the importance of the UK in the financial world with negative effects on employment and output. Thus, this circumstance leads to uncertainties and could increase the overall volatility of the capital markets in the UK.

Highly internationalised EU member countries with a strong physical and digital infrastructure could particularly profit from this relocation. Considering these aspects, the Netherlands, among others, is an example of a good candidate: According to Netherlands' Foreign Investment Agency (NFIA), 140 Brexit-wary companies moved from the UK to the Netherlands since the Brexit referendum, whereby 78 of them moved in 2019 (Government of the Netherlands, 2020). Most of these firms are operating in the services sector like in the Fintech, IT, and the Media and Advertising industry. Moreover, the NFIA report that it is in talks with further 425 companies considering moving to or expanding in the Netherlands due to the Brexit.

Considering that the EU's financial ecosystem has relied strongly on the financial market in London, the Brexit and the relocation due to the passporting issue could also be an impulse for the relatively small and fragmented European capital markets to develop and compete internationally (Guindos, 2020). In a recent speech at the International Swaps and Derivatives Association in Frankfurt am Main, Mr. Benoît Cœuré, Member of the Executive Board of the ECB, states that in the short term over 1 trillion euro of bank assets are expected to be relocated to the euro area and that these activities will move to a number of euro area countries (Cœuré, 2019). Particularly, this progress could help to

remove barriers between EU capital markets and renew momentum towards the Capital Markets Union (CMU), which is seen as a crucial future component for the stability, prosperity and sustainability of the EU and the Eurozone due to (i) increasing private risk-sharing, (ii) reducing financing costs and (iii) expanding sources of funding (European Commission, 2019). With a developed multi-centric European financial system, the international importance of the euro would also be strengthened.

After the Brexit and the transition period, the export opportunities of non-EU countries to the British market will be improved. According to Nicita et al (2019), a no-deal Brexit leads, however, to diverging effects with “winners” and “losers”. Using a partial equilibrium approach, their results indicate that Turkey, South Korea, Pakistan, Norway, Iceland, Cambodia and Switzerland are likely to see a decline in their UK exports, whereas major economies like China, USA and Japan could expect increasing exports to the UK. Considering that the British government intends to lower Most Favored Nations tariffs and to make bilateral trade agreements, the authors explain that a no-deal Brexit could increase first and foremost the competitiveness of major economies, which also diminishes the market-share of less competitive countries. On the other hand, a depreciating British pound due to the Brexit makes foreign goods expensive, which could be a crucial topic regarding trade agreements. In particular, this issue could be an obstacle regarding a possible UK-USA trade agreement, since the “America First” economic policy of US president Donald Trump consequently aims to reduce the US trade deficit.

5.3. Limitations and Future Research

In the first research article in Chapter 2, the results revealed reactions of market participants to Brexit-related news. Nevertheless, one has to mention that predictions about the impact of future Brexit events are not provided by these results. However, the applied empirical approach could be easily adopted to measure the impact of Brexit-related news on the UK's equity returns and volatilities. In an analogous manner, it would also be interesting to investigate the impact of these Brexit-related news on

European and US equity markets as well as on the euro/US dollar exchange rate return and volatility. Apart from the adopted Brexit-news dummy variable, the same approach could be also applied with a further dummy variable, which takes the value of one on all days after the Brexit referendum on 23 June 2016. In that way, a possible Brexit-related regime change in capital markets could be revealed.

The second research paper in Chapter 3 elaborates on the lagged impact of macroeconomic factors on capital markets. However, as noted previously in Chapter 1.1, capital markets dynamics could theoretically also affect – lagged and unlagged – macroeconomic factors. Moreover, in Chapter 3, the “gross” effect of macroeconomic factors on German equity prices are measured. Possible channels explaining the significant impacts are discussed, but not tested empirically. As a further step, the impact of macroeconomic factors on capital market volatilities could be investigated, particularly by dividing the sample again in crisis and non-crisis periods in order to reveal the possible diverging risk exposure of macroeconomic variables. Further research can be done for measuring cross country implications. For example, US macroeconomic factors could have effects on European capital markets or vice versa. From the technical point of view, a Principal Component Approach (PCA) could be helpful as regards the relatively large number of variables.²⁹ Although proposed by the doctoral supervisor of this dissertation and an anonymous referee, the PCA could not be applied for the given data, since the first two estimated components cover only about 40 percent of the total variance.

The PCA in the research article in Chapter 4 has proved to be a useful and flexible approach to measure impacts of events. However, this approach cannot predict future developments, since it builds up a counterfactual outcome of an unobservable alternate universe. Thus, an empirical intersubjective validation is also not possible. Regarding the impact of the Brexit, further variables like the UK’s FDI flows or the unemployment rate could be implemented. Moreover, the implications of the Brexit on financial markets (i.a. equity prices, interest rates and government bond yields) could be estimated via the

²⁹ The central idea of the PCA is to cluster the large dataset into a low dimensional set of components. In this way the approach counters in particular the problem of multicollinearity.

PDA. Being a relatively novel approach, it has not been widely applied so far in literature. Thus, it would be interesting to use the PDA not only for recent events but also for historical cases like the German reunification in order to compare these results with existing literature, which applied the SCM. For instance, Born et al. (2019) have investigated the macroeconomic impact of the election of Donald Trump by using the SCM. This research could also be done by using the PDA, which would enrich the literature by serving results from a different methodological angle.

References

- Abadie, A. & Gardeazabal, J., 2003. The Economic Costs of Conflict: A Case Study of the Basque Country. *American Economic Review*, Vol 93, No 1, pp. 113-132.
- Agresti, A., 2007. *An Introduction to Categorical Data Analysis*. Hoboken, New Jersey: John Wiley & Sons, Inc.
- Altavilla, C., Carboni, G. & Motto, R., 2015. Asset purchase programmes and financial markets: lessons from the euro area. *ECB Working Paper No. 1864*.
- Andersen, T. G., Bollerslev, T., Diebold, F. X. & Vega, C., 2007. Real-time price discovery in global stock, bond and foreign exchange markets. *Journal of International Economics*, Vol. 73, No. 2, pp. 251-277.
- Andrews, D. W. K. & Monohan, J. C., 1992. An Improved Heteroskedasticity and Autocorrelation Consistent Covariance Matrix Estimator. *Econometrica*, Vol. 60, pp. 953-966.
- Arnorsson, A. & Zoega, G., 2016. On the causes of Brexit. *CESifo Working Paper 6056*.
- Baier, F. J. & Welfens, P. J. J., 2018. BREXIT and Foreign Direct Investment: Key Issues and New Empirical Findings. *International Journal of Financial Studies*, Vol 6, Issue 46.
- Bai, J. & Ng, S., 2002. Determining the Number of Factors in Approximate Factor Models. *Econometrica*, Vol 70, Issue 1, pp. 191-221.
- Baker, S. R., Bloom, N. & Davis, S. J., 2016. *Policy uncertainty: trying to estimate the uncertainty impact of Brexit*. Presentation:
http://www.policyuncertainty.com/media/Brexit_Discussion.pdf.
- Bank of England, 2016a. Inflation report May 2016.
- Bank of England, 2016b. Inflation report November 2016.
- Barro, R., 2001. Human Capital and Growth. *American Economic Review*, Vol. 91, Issue 2, pp. 12-17.
- Belke, A., Dubova, I. & Osowski, T., 2016. Policy Uncertainty and International Financial Markets: The Case of Brexit. *Ruhr Economic Papers*, No. 657.
- Belke, A. & Kaas, L., 2004. The Impact of Exchange Rate Volatility on European and U.S. Labor Markets. *Journal of Economic Asymmetries*, Vol.1, No.2, pp. 21-50.
- Bhagat, S., Brickley, J. A. & Coles, J. L., 1994. The costs of inefficient bargaining and financial distress: Evidence from corporate lawsuits. *Journal of Financial Economics*, Vol. 35, No. 2, pp. 221-247.

- Bodie, Z., 1976. Common stocks as a hedge against inflation. *The Journal of Finance*, Vol. 31, pp. 459-470.
- Born, B., Müller, G. J., Schularick, M. & Sedlacek, P., 2019. Stable genius? The macroeconomic impact of Trump. *CEPR Discussion Papers* 13798.
- Born, B., Müller, G. J., Schularick, M. & Sedláček, P., 2019. The Costs of Economic Nationalism: Evidence from the Brexit Experiment. *The Economic Journal*, Volume 129, Issue 10, p. 2722–2744.
- Boyd, J. H., Jagannathan, R. & Hu, J., 2001. The Stock Market's Reaction to Unemployment News: Why Bad News is Usually Good for Stocks. *NBER Working Paper No. 8092*.
- Brakman, S., Garretsen, H. & Kohl, T., 2017. Consequences of Brexit and Options for a "Global Britain". *CESifo Working Paper Series* 6448.
- Breinlich, H., Leromain, E., Novy, D. & Sampson, T., 2019. Voting With Their Money: Brexit and Outward Investment by UK Firms. *CEP Discussion Paper No. 1637*.
- Campos, N. F., Coricelli, F. & Moretti, L., 2019. Institutional integration and economic growth in Europe. *Journal of Monetary Economics*, Vol 103, pp. 88-104.
- Caporale, G. M., Gil-Alana, L. & Trani, T., 2018. Brexit and uncertainty in financial markets. *DIW Discussion Papers* 1719.
- Celebi, K., 2020. Quo Vadis, Britain? – Implications of the Brexit Process on the UK's Real Economy. *EIIW Discussion Paper* 268.
- Celebi, K. & Hönig, M., 2019. The Impact of Macroeconomic Factors on the German Stock Market: Evidence for the Crisis, Pre- and Post-Crisis Periods. *International Journal of Financial Studies*, Vol. 7, No. 2.
- Chan, L. K. C., Larcenko, J. & Lakonishok, J., 1998. The Risk and Return from Factors. *The Journal of Financial and Quantitative Analysis*, Vol. 33, No. 2, pp. 159-188.
- Chen, H., Cúrdia, V. & Ferrero, A., 2012. The Macroeconomic Effects of Large-scale Asset Purchase Programmes. *The Economic Journal*, Vol.122, No. 564, pp. F289-F315.
- Chen, N.-F., Roll, R. & Ross, S., 1986. Economic Forces and the Stock Market. *The Journal of Business*, Vol.59, pp. 383-403.
- Cheung, Y.-W. & Ng, L. K., 1998. International evidence on the stock market and aggregate economic activity. *Journal of Empirical Finance*, Vol. 5, No. 3, pp. 281-296.

- Cœuré, B., 2019. *European capital markets: priorities and challenges*. [Online]
Available at:
https://www.ecb.europa.eu/press/key/date/2019/html/ecb.sp190625_1~49befd1908.en.html
- Coleman, T., 2018. *Causality in the Time of Cholera: John Snow As a Prototype for Causal Inference*. [Online]
Available at: <https://dx.doi.org/10.2139/ssrn.3262234>
- Darby, J., Hallett, A. H., Ireland, J. & Piscitelli, L., 1999. The Impact of Exchange Rate Uncertainty on the Level of Investment. *The Economic Journal*, Vol. 109, No. 454, pp. 55-67.
- Davies, R. B. & Studnicka, Z., 2017. The heterogeneous impact of Brexit: early indications from the FTSE. *CESifo Working Papers* 6478.
- Demmou, L., Stefanescu, I. & Arquíe, A., 2019. *Productivity growth and finance: The role of intangible assets - a sector level analysis*, Paris: OECD Economics Department Working Papers, No. 1547.
- Desai, H. & Jain, P. C., 1997. Long-Run Common Stock Returns following Stock Splits and Reverse Splits. *The Journal of Business*, Vol. 70, No. 3, pp. 409-433.
- Devereux, M. & Love, D., 1994. The Effects of Factor Taxation in a Two-Sector Model of Endogenous Growth. *The Canadian Journal of Economics*, Vol. 27, Issue 3, pp. 509-536.
- Dhingra, S. et al., 2017. The costs and benefits of leaving the EU: trade effects. *CEP Discussion Paper* 1478.
- Douch, M., Edwards, H. & Soegaard, C., 2018. Estimating the trade effects of the Brexit announcement shock. *The UK in a Changing Europe*.
- ECB, 2012. *Manual on MFI Balance Sheet Statistics*. Frankfurt am Main, ISSN 978-92-899-0827-6: ECB.
- Elstner, S., Grimme, C. & Haskamp, U., 2013. Das ifo Exportklima – ein Frühindikator für die deutsche Exportprognose. *ifo Schnelldienst* 66 (04), pp. 36-43.
- Engle, R. F., 1984. Wald, likelihood ratio, and Lagrange multiplier tests in econometrics. *Handbook of Econometrics*, Vol. 2, Chapter 13, pp. 775-826.
- Engle, R. F. & Granger, C. W. J., 1987. Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, Vol. 55, No. 2, pp. 251-276.
- Engle, R. F. & Ng, V. K., 1993. Measuring and testing the impact of news on volatility. *The Journal of Finance*, Vol. 48, No. 5, pp. 1749-1778.

- Errunza, V. & Hogan, K., 1998. Macroeconomic Determinants of European Stock Market Volatility. *European Financial Management*, Vol. 4, No. 3, pp. 361-377.
- Euronews, 2020. *Macron says Brexit Day is 'historic alarm signal' for reform in Europe*. [Online] Available at: <https://www.euronews.com/2020/01/31/macron-says-brexit-day-is-historic-alarm-signal-for-reform-in-europe> [Accessed 24 February 2020].
- European Commission, 2019. *Capital Markets Union*. [Online] Available at: https://ec.europa.eu/commission/news/capital-markets-union-2019-mar-15_en
- Falagiarda, M. & Gregori, W. D., 2015. The impact of fiscal policy announcements by the Italian government on the sovereign spread: A comparative analysis. *European Journal of Political Economy*, Vol. 39, Issue C, pp. 288-304.
- Fama, E. F., 1970. Efficient capital markets: a review of theory and empirical work. *The Journal of Finance* 25, pp. 383-417.
- Fama, E. F., 1981. Stock Returns, Real Activity, Inflation, and Money. *The American Economic Review*, Vol. 71, pp. 545-565.
- Fama, E. F., 1990. Stock Returns, Expected Returns, and Real Activity. *The Journal of Finance*, Vol. 45, No.4, pp. 1089-1108.
- Fama, E. F., 1991. Efficient Capital Markets II. *Journal of Finance*, Vol. 46, pp. 1575-1617.
- Fama, E. F. & Schwert, G. W., 1977. Asset returns and inflation. *Journal of Financial Economics*, Vol. 5, Issue 2, pp. 115-146.
- Ferson, W. E. & Harvey, C. R., 1991. The Variation of Economic Risk Premiums. *Journal of Political Economy*, Vol. 99, No. 2, pp. 385-415 .
- Flannery, M. J. & Protopapadakis, A., 2002. Macroeconomic Factors DO Influence Aggregate Stock Returns. *Review of Financial Studies*, Vol. 15, pp. 751-782.
- Fratzscher, M., Duca, M. L. & Straub, R., 2013. On the international spillovers of US Quantitative Easing. *ECB Working Paper No. 1557*.
- Fratzscher, M., Duca, M. L. & Straub, R., 2014. ECB unconventional monetary policy actions: Market impact, international spillovers and transmission channels. *Paper presented at the 15th Jacques Polak Annual Research Conference hosted by the International Monetary Fund*.
- Froot, K. A. & Stein, J. C., 1991. Exchange Rates and Foreign Direct Investment: An Imperfect Capital Markets Approach. *The Quarterly Journal of Economics*, Vol. 106, Issue 4, pp. 1191-1217.

- Gagnon, J., Raskin, M., Remache, J. & Sack, B., 2011. The Financial Market Effects of the Federal Reserve's Large-Scale Asset Purchases. *The International Journal of Central Banking*, Vol. 7, No. 1, pp. 3-43.
- Gardeazabal, J. & Vega-Bayo, A., 2017. An Empirical Comparison Between the Synthetic Control Method and HSIAO et al.'s Panel Data Approach to Program Evaluation. *Journal of Applied Econometrics*, Vol 32, Issue 5, pp. 983-1002.
- Georgiadis, G. & Gräß, J., 2015. Global Financial Market Impact of the Announcement of the ECB's Extended Asset Purchase Programme. *Working Paper No. 232, Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute*.
- Glick, R. & Leduc, S., 2012. Central bank announcements of asset purchases and the impact on global financial and commodity markets. *Journal of International Money and Finance*, Vol.31, No. 8, pp. 2078-2101.
- Gourinchas, P. O. & Hale, G., 2017. Brexit: whither the pound?. *FRBSF Economic Letter* 2017-11.
- Government of the Netherlands, 2020. *Record number of foreign companies choose the Netherlands*. [Online]
Available at: <https://www.government.nl/latest/news/2020/02/19/record-number-of-foreign-companies-choose-the-netherlands>
- Graziano, A., Handley, K. & Limão, N., 2018. Brexit Uncertainty and Trade Disintegration. *NBER Working Paper No. 25334*.
- Grübler, J., 2017. Wirtschaftliche Konvergenz trotz politischer Unsicherheit. *The Vienna Institute for International Economic Studies, Forschungsbericht 7*.
- Guidetti, E. & Gyomai, G., 2012. *OECD System of Composite Leading Indicator*. [Online]
Available at: <http://www.oecd.org/sdd/leading-indicators/41629509.pdf>
- Guindos, L. d., 2020. Europe's role in the global financial system. *Speech at the SUERF/De Nederlandsche Bank Conference "Forging a new future between the UK and the EU", 8 January 2020*.
- Hamilton, J. D. & Susmel, R., 1994. Autoregressive conditional heteroskedasticity and changes in regime. *Journal of Econometrics*, Vol. 64, No.1-2, pp. 307-333.
- Hantzsche, A., Kara, A. & Young, G., 2019. The economic effects of the UK government's proposed Brexit deal. *The World Economy*, Vol. 42, No. 1, pp. 5-20.
- Henkel, M. & Seidel, T., 2019. A SPATIAL PERSPECTIVE ON EUROPEAN INTEGRATION: HETEROGENEOUS WELFARE AND MIGRATION EFFECTS FROM THE SINGLE MARKET AND THE BREXIT. *Economic Inquiry*, Vol 57, Issue 1, pp. 333-352.

- Hsiao, C., Ching, H. S. & Wan, S. K., 2012. A PANEL DATA APPROACH FOR PROGRAM EVALUATION: MEASURING THE BENEFITS OF POLITICAL AND ECONOMIC INTEGRATION OF HONG KONG WITH MAINLAND CHINA. *Journal of Applied Econometrics*, Vol 27, Issue 5, pp. 705-740.
- Humpe, A. & Macmillan, P., 2009. Can macroeconomic variables explain long-term stock market movements? A comparison of the US and Japan. *Applied Financial Economics*, Vol. 19, No. 2, pp. 111-119.
- ifoWES, 2017. *Ifo World Economic Survey – Description and Information*. [Online] Available at: <https://www.cesifo-group.de/ifoHome/facts/Survey-Results/World-Economic-Survey/WES-Design.html>
- Ikenberry, D., Lakonishok, J. & Vermaelen, T., 1995. Market underreaction to open market share repurchases. *Journal of Financial Economics*, Vol. 39, No.2-3, pp. 181-208.
- IMF, 2015. Fiscal Policy and Long-term Growth. *IMF Policy Paper*.
- Jungmittag, A. & Welfens, P. J. J., 2016. Beyond EU-US Trade Dynamics: TTIP Effects Related to Foreign Direct Investment and Innovation. *EIIW Discussion Paper No. 212*.
- Korus, A. & Celebi, K., 2019. The impact of Brexit news on British pound exchange rates. *International Economics and Economic Policy*, Vol. 16, pp. 161-192.
- Krause, T., Noth, F. & Tonzer, L., 2016. Brexit (probability) and effects on financial market stability. *IWH online*, 5/2016, Halle Institute for Economic Research.
- Li, K. T. & Bell, D. R., 2017. Estimation of average treatment effects with panel data: Asymptotic theory and implementation. *Journal of Econometrics*, Vol 197 Issue 1, pp. 65-75.
- Loughran, T. & Ritter, J. R., 1995. The New Issues Puzzle. *The Journal of Finance*, pp. 23-51.
- Lucas, R., 1988. On the Mechanics of Economic Development. *Journal of Monetary Economics*, Vol. 22, pp. 3-42.
- McQueen, G. R. & Roley, V. V., 1993. Stock Prices, News, and Business Conditions. *Review of Financial Studies*, Vol. 6, pp. 683-707.
- Meinshausen, N. & Yu, B., 2009. Lasso-type recovery of sparse representations for high-dimensional data. *The Annals of Statistics*, Vol 37, No 1, pp. 246-270.
- Modigliani, F. & Cohn, R. A., 1979. Inflation, Rational Valuation and the Market. *Financial Analysts Journal*, Vol. 35, No. 2, pp. 24-44.
- Neely, C. J., 2015. Unconventional monetary policy had large international effects. *Journal of Banking & Finance*, Vol. 52, pp. 101-111.

- Nelson, D. B., 1991. Conditional Heteroskedasticity in asset returns: a new approach. *Econometrica*, Vol. 59, No. 2, pp. 347-370.
- Newey, W. K. & West, K., 1994. Automatic Lag Selection in Covariance Matrix Estimation. *Review of Economic Studies*, Vol. 61, Issue 4, pp. 631-653.
- Newey, W. K. & West, K. D., 1987. A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix. *Econometrica*, Vol. 55, No. 3, pp. 703-708.
- Nicita, A., Koloskova, K. & Saygili, M., 2019. Brexit. Implications for Developing Countries. *UNCTAD Research Paper No. 31*.
- Oberhofer, H. & Pfaffermayr, M., 2018. Estimating the Trade and Welfare Effects of Brexit: A Panel Data Structural Gravity Model. *Department of Economics Working Paper Series*, 259. *WU Vienna University of Economics and Business*.
- Office for National Statistics, 2019. *GDP quarterly national accounts, UK: April to June 2019*.
[Online]
Available at:
<https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/quarterlynationalaccounts/apriltojune2019>
- Ottaviano, G., Pessoa, J. P. & Sampson, T., 2014. The costs and benefits of leaving the EU. *Technical paper, CEP*.
- Pagan, A. R. & Schwert, G. W., 1990. Alternative models for conditional stock volatility. *Journal of Econometrics*, Vol. 45, No. 1-2, pp. 267-290.
- Pearce, D. K. & Roley, V. V., 1983. The Reaction of Stock Prices to Unanticipated Changes in Money: A Note. *The Journal of Finance*, Vol. 38, pp. 1323-1333.
- Pearce, D. K. & Roley, V. V., 1985. Stock Prices and Economic News. *Journal of Business*, pp. 49-67.
- Portes, J. & Forte, G., 2017. The economic impact of Brexit-induced reductions in migration. *Oxford Review of Economic Policy*, Vol. 33, Supplement 1, pp. 31-44.
- Ramiah, V., Pham, H. N. A. & Moosa, I., 2017. The sectoral effects of Brexit on the British economy: early evidence from the reaction of the stock market. *Applied Economics*, Vol. 49, No. 26, pp. 2508-2514.
- Rapach, D. E., Wohar, M. E. & Rangvid, J., 2005. Macro variables and international stock return predictability. *International Journal of Forecasting*, Vol. 21, No. 1, pp. 137-166.
- Ratanapakorn, O. & Sharma, S. C., 2007. Dynamic analysis between the US stock returns and the macroeconomic variables. *Applied Financial Economics*, Vol. 17, No. 5, pp. 369-377.

- Rebelo, S., 1991. Long-Run Policy Analysis and Long-Run Growth. *Journal of Political Economy*, Vol. 99, No. 3, pp. 500-521.
- Serwicka, I. & Tamberi, N., 2018. Not Backing Britain: FDI Inflows Since the Brexit Referendum. *UK Trade Policy Observatory, Briefing Paper 23*.
- Sir, M. M., 2012. Impact of the Macroeconomic Variables on the Stock Market Returns: The Case of Germany and the United Kingdom. *Global Journal of Management and Business Research*, Vol. 12, No. 16, pp. 23-34.
- Springford, J., 2019. *CER INSIGHT: The cost of Brexit to June 2019*. [Online] Available at: https://www.cer.eu/sites/default/files/insight_JS_16.10.19.pdf
- Szczerbowicz, U., 2015. The ECB unconventional monetary policies: have they lowered market borrowing costs for banks and governments?. *International Journal of Central Banking*, Vol. 11, No. 4, pp. 91-127.
- The Guardian, 2020. *UK will refuse close alignment with EU rules, Johnson to say*. [Online] Available at: <https://www.theguardian.com/politics/2020/feb/02/uk-refuse-close-alignment-eu-rules-boris-johnson-trade> [Accessed 15 02 2020].
- Tibshirani, R., 2011. Regression shrinkage and selection via the lasso: a retrospective. *Journal of the Royal Statistical Society. Series B (Methodological)*, Vol 73, No 3, pp. 273-282.
- Wachtel, P. & Young, J., 1987. Deficit Announcements and Interest Rates. *The American Economic Review*, Vol. 77, No. 5, pp. 1007-1012.
- Walker, N., 2018. Brexit timeline: events leading to the UK's exit from the European Union. *Briefing paper no. 07960, house of commons library*.
- Wanke, S., 2017. *KfW Research, Economics in Brief*. [Online] Available at: https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Volkswirtschaft-Kompakt/One-Pager-2017-EN/VK-No.-139-July-2017-Whatever-it-takes_EN.pdf
- Wan, S.-K., Xie, Y. & Hsiao, C., 2018. Panel data approach vs synthetic control method. *Economic Letters*, Vol. 164, pp. 121-123.
- Welfens, P. J. J., 2019. Lack of international risk management in BREXIT?. *International Economics and Economic Policy*, Vol. 16, pp. 103-160.
- ZEW, 2006. *ZEW Financial Market Survey*. [Online] Available at: http://ftp.zew.de/pub/zew-docs/div/Kurzinfo_English.pdf