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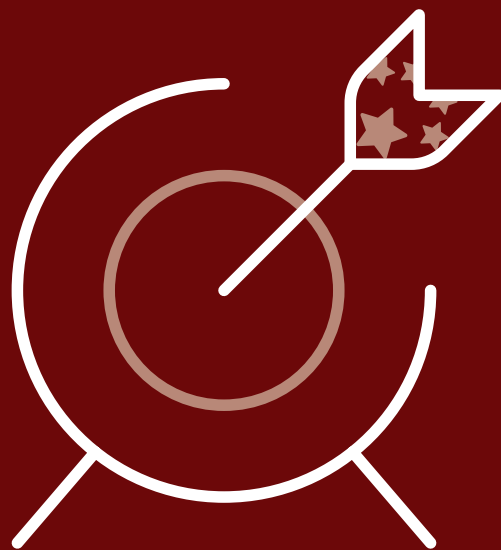
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# Chinese Foreign Direct Investment in the EU

*Jan Knoerich and Tina Miedtank, Ágnes Szunomár and Agnieszka McCaleb, Frank Bickenbach and Wan-Hsin Liu*



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# Chinese Foreign Direct Investment in the EU

## *Jan Knoerich and Tina Miedtank* The Idiosyncratic Nature of Chinese Foreign Direct Investment in Europe

The remarkable rise of foreign direct investment (FDI) from China has drawn much attention in recent years. Bolstered by the growth of China's domestic economy and its growing global economic weight, Chinese multinational enterprises (MNEs) have begun to leave a distinct footprint as investors in all parts of the world (Knoerich 2015). Part of this trend has been the emergence of the European Union (EU) as a key destination for Chinese outward FDI.

Chinese investments have covered all EU member states, with some concentration in Western Europe and the three big economies – France, Germany and Britain. A few smaller Western European countries, like the Netherlands and Sweden, have also received considerable amounts of Chinese FDI, and Eastern European states have gained some prominence more recently as a destination for Chinese multinationals. Chinese FDI into Europe is expected to continue to increase, widening geographical spread in the future.

Since their rapid growth started just over a decade ago, Chinese investments have been subjected to heightened levels of analysis and scrutiny. Alon and colleagues (2018) found that between 2003 and 2016, 382 scholars published 206 academic articles on the internationalisation of Chinese enterprises in 72 journals. Chinese FDI is regularly covered in the media and analysed by think tanks and consultancies, while governments, businesses, workers and other social groups are also focused on how their interests are affected by the rise in Chinese FDI. Chinese investments in Europe have not been greeted with enthusiasm alone, but have also met with a great deal of scepticism and concern (Knoerich and Vitting 2018). These concerns exist despite the fact that FDI is a common economic activity in EU countries, where multinationals from Western advanced economies

and Japan have made large-scale investments for many decades, at times with a considerable local impact. What is it then about Chinese FDI in particular that has sparked such strong interest, scrutiny and sometimes even concern?

In this article, we focus on the aspects that set Chinese multinationals and their FDI apart from the 'traditional' investors that have their origins primarily in advanced Western economies (including FDI among EU countries) and Japan. As we will show through our examination of Chinese FDI in the EU, there are several areas in which Chinese investments exhibit unique properties and characteristics that justify the considered analysis and careful examination that they have received in recent years. We show how these particularities and special features have become a source of many questions and concerns, which are currently being voiced about Chinese MNEs and their investments in Europe.

### **CHINESE OUTWARD FDI IS NEW AND EXPANDING RAPIDLY**

Chinese outward FDI has risen exponentially over the past 15 years. The pace of its expansion is unprecedented – never has FDI from one economy increased so rapidly. According to UNCTAD data, total outward FDI stock from China was insignificant at 37 billion US dollars in 2002, but increased 40-fold in just 15 years to reach almost 1.5 trillion US dollars in 2017. Annual outward FDI flows increased 50-fold from 2.5 billion US dollars in 2002 to 125 billion US dollars 15 years later. In 2016, Chinese outward FDI flows even reached a record of 196 billion US dollars, before dropping to more modest levels a year later. Chinese outward FDI stock and annual flows are now on a par with the inward FDI China receives into its economy, which has remained at high levels for many years. As a result, China already ranked as the second largest source of FDI flows worldwide back in 2016, dropping to the third largest in 2017 (UNCTAD 2018).

Chinese FDI in Europe has mirrored this global trend. According to data from the Chinese Ministry of Commerce (MOFCOM), Chinese FDI into the EU rose from a few million in 2003 to 86 billion US dollars in FDI stock in 2017, an over 90-fold increase. The annual inflow of FDI from China into the EU reached



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a record of 10.3 billion US dollars in 2017, rising to over 200 times 2003 levels (MOFCOM 2018). But these figures from national accounts do not factor in the FDI Chinese MNEs trans-ship *via* offshore financial centres (e.g. Hong Kong and the British Virgin Islands). Estimates that count the ultimate source country of an investment are thus higher, with calculations by the Rhodium Group suggesting that Chinese FDI in the EU alone had reached a record of 35 billion euros in 2016, followed by 30 billion euros in 2017 (Hanemann and Huotari 2018). In 2015, China already ranked among the top 10 source countries of FDI flows into the EU (Eurostat 2017).

This pace of increase in Chinese outward FDI after 2004 was most certainly magnified by the Chinese government's decision to relax regulations and approval procedures prior to that year, which included permission given to private firms to invest abroad for the first time (Buckley *et al.* 2007). While some modest investments had taken place since the early 1980s, the government's change in policy approach towards outward FDI, manifested in the so-called 'going out' policy, suddenly made it possible for many more Chinese companies to contemplate investing outside of China. Thanks to this artificial government intervention, Chinese outward FDI probably rose faster after 2003 than it otherwise would have, catching up on foregone opportunities of earlier years.

The suddenness of the emergence of Chinese outward FDI and the rapidity of its growth globally and in Europe is the first special characteristic that differentiates the Chinese from other investments. FDI from 'traditional' multinationals had emerged and grown over many decades, starting as early as the 1950s and 1960s for Western MNEs, and a decade or two later for Japanese firms (which, incidentally, were also scrutinised for some time). In Europe, this rapid growth of FDI from China is an important opportunity as it brings in new investment capital and promotes business activities. The unanticipated and unexpected rapidity of its rise, however, also created uncertainties. The increased interest, scrutiny and sometimes caution in countries suddenly receiving such heightened investment from a new source country must be understood in this context.

How much Chinese outward FDI will continue to rise in the future is difficult to judge. Despite the recent downturn in FDI flows after the record year 2016 – which was induced by domestic policy in China aimed at curtailing excessive debt-fuelled investments and preventing unfeasible mergers and acquisitions (M&As) – there is little evidence pointing to a substantial reduction in the pace at which Chinese multinationals expand globally. Similarly, Chinese MNEs continue to have a strong interest in the EU as an investment destination, with the EU receiving far more Chinese FDI than the United States in recent months (Brattberg and Soula 2018). China's unique position as the holder of the largest pool of foreign exchange

reserves in the world, currently worth approximately 3 trillion US dollars, could further bolster its outward investment position. Yet, Chinese outward FDI still has a long way to go until it reaches US levels, which, according to UNCTAD data, are currently the largest in the world at close to 8 trillion US dollars. According to data from the US Department of Commerce, US FDI stock in Europe alone reached 3.6 trillion US dollars in 2017 (Bureau of Economic Analysis 2018).

### **CHINESE MULTATIONALS ARE LATECOMERS AND STRATEGIC ASSET-SEEKERS**

Prior to the emergence of Chinese MNEs, FDI was primarily an activity reserved for companies from advanced economies, which invested in economies that were equal or less developed than their country of origin. These companies were able to invest abroad because they possessed some superior competitive advantages that made their FDI to be successful in foreign markets. Such 'ownership' advantages usually originated from a leading position in technological, managerial, branding or other capabilities (Dunning 2001).

Chinese FDI, however, is different as it derives from an emerging economy. Chinese companies have been observed to invest in economies equal to or less advanced than that of China – most notably in Africa and Southeast Asia, where they do exploit ownership advantages resulting from some technological, managerial or other position of strength. More strikingly, a considerable share of Chinese investments has gone to countries that are more advanced than China, including EU member states. Chinese multinationals have accomplished this despite technological and managerial weaknesses, a shortage of internationally known brands and a lack of international experience (Child and Rodrigues 2005). The identification of superior ownership advantages that enable Chinese multinationals to invest in more advanced economies has been difficult. This observation of Chinese companies investing in more advanced economies, such as EU member states, despite a lack of such advantages, is another distinct feature of Chinese investments, exposing two further particularities of Chinese multinationals.

Firstly, some Chinese multinationals probably possess a different set of advantages, which enable them to invest in more advanced economies and EU member states. These have been categorised into 'special ownership advantages' (Buckley *et al.* 2007), such as resilience, frugality and strong networks of Chinese firms, and Chinese 'country-specific advantages' (Rugman 2007), such as low-cost labour, government support, favourable institutions and easy or privileged access to funds. Specific research into Chinese investments in the EU has found that cost competitiveness and specific strengths in niche markets have been important drivers of Chinese

market-seeking FDI in EU member states (Knoerich 2012).

Secondly, Chinese investments in advanced economies and the EU have often been driven by the desire to overcome firm-specific weaknesses. Instead of exploiting ownership advantages, many Chinese multinationals have sought such advantages through strategic asset-seeking FDI in Europe and other leading economies (Luo and Tung 2007; Knoerich 2012; Zheng *et al.* 2016). For example, Chinese multinationals have set up R&D centres in EU countries to tap into local skills, or have acquired leading European companies to obtain and learn technological capabilities (Knoerich 2010). Well-known examples are Midea's acquisition of the German firm Kuka Robotics in 2016 and Huawei's global network of R&D centres. There is emerging evidence that such strategic asset-seeking activities have – to some extent – contributed to improving the capabilities of Chinese multinationals, with associated benefits even reaching the Chinese home economy (Knoerich 2016a; Anderson *et al.* 2015). Yet there are many limitations as to the extent to which outward FDI can successfully be used to acquire technological capabilities, and especially leading cutting-edge technologies (Knoerich 2017).

Of course, advanced economy MNEs, including US multinationals, also seek technologies and other strategic assets when they invest in EU member states. But strategic asset-seeking objectives appear to have been more dominant in the FDI by Chinese multinationals which, as latecomers in the global market, had a greater need to use outward FDI to overcome their competitive disadvantages. Many studies have identified asset-seeking as a key driver of Chinese FDI in developed economies (Alon *et al.* 2018). This behaviour has occasionally raised eyebrows amongst those concerned about Chinese FDI being used as a vehicle to catch up and close the technological gap with the advanced economies.

### **CHINESE MULTINATIONALS ORIGINATE FROM A UNIQUE ECONOMIC AND POLITICAL SYSTEM**

Prior to the emergence of Chinese multinationals, most foreign investors globally and in the EU had been from democracies that endorsed relatively capitalist and liberal economic systems. But Chinese multinationals emerged and grew in a markedly different economic and political system. That system is characterised by state capitalism, wide-ranging industrial policies and strong government intervention. The political system in China is authoritarian and dominated by the Communist Party of China.

During its transformation from communism to a market-oriented economy, China has only partially dismantled the state sector. State-owned enterprises (SOEs) continue to play an important role in China's

economy, especially in strategic industries. Many Chinese multinationals are therefore SOEs, which in 2017 accounted for half of Chinese outward FDI stock, down from 81 percent in 2006 (MOFCOM 2018). Other Chinese MNEs are partially owned by the state (i.e. mixed ownership), and sometimes the precise ownership arrangements of a Chinese company remain obscure. The issue of ownership sets Chinese multinationals distinctly apart from the 'traditional' multinationals, most of which are privately owned.

However, Chinese state involvement in outward FDI is not limited to ownership. Through various legal measures and institutional frameworks, the Chinese government has regulated, guided and promoted outward FDI in an industrial policy-type fashion, so that it dovetails with China's economic and strategic interests (Luo, Xue and Han 2010; Sauvart and Chen 2014; Knoerich 2016a). For example, acquisitions and the establishment of R&D centres in advanced economies to obtain foreign know-how have been encouraged and supported by the National Development and Reform Commission, China's development planning body (Luo *et al.* 2010). Such government influence and support has especially targeted SOEs and has ranged from preferential treatment (e.g. providing easier access to finance) to regulatory control; and even the occasional prohibition of specific investment projects. Other countries also regulate outward FDI, but the sophistication of planning and regulation in this area is exceptional in China.

Thus, in contrast to most other FDI in the EU, many Chinese investments are state-backed, and a significant number of Chinese multinationals cultivate strong links to the Chinese government; or are even ultimately owned by the Chinese state. The gravest concerns in EU member states have been raised about this special characteristic of Chinese FDI, as the economic, political and security implications of such state involvement in FDI for EU economies remain little understood. It is unclear to what extent state backing and ownership is a source of competitive advantage for Chinese firms, for example when they compete in bids for European companies. Moreover, little is known about the extent to which state-backed asset-seeking acquisitions may, over time, undermine European companies' technological leadership.

### **CHINESE MULTINATIONALS ADOPT SOME UNCOMMON APPROACHES TO FDI**

Chinese multinationals have occasionally adopted approaches to FDI not commonly seen in the context of investments by Western and Japanese multinationals. These approaches derive from their latecomer status and lack of international experience, from the specific characteristics of the Chinese home economy, such as a large market and strong state intervention, and from certain cultural preferences.

Chinese acquisitions in EU member states are notably characterised by the adoption of light-touch approaches to post-acquisition integration. ‘Traditional’ investors from the United States, for instance, prefer to integrate acquired firms with their own operations and change the internal management and organisation of their new European subsidiary accordingly. Chinese companies, on the other hand, tend to leave the European firms they acquire largely untouched. They leave the management team intact and grant it great operational autonomy, whilst often committing to keeping many of the target company’s employees. As a result, many acquired subsidiaries of Chinese multinationals in Europe operate very independently, with Chinese headquarters and a few posted expatriates assuming a supporting or observing role (Knoerich 2010 and 2016b; Miedtank 2017). Not only do such light-touch arrangements reflect the requirements by management of the European target firms before agreeing on an acquisition by a Chinese multinational. They also result from the inexperience of Chinese firms in managing and especially integrating international acquisitions, and from the asset-seeking nature of many acquisition deals. Since most strategic assets owned by EU subsidiaries are intangible in nature, relying on tacit technological knowledge and management skills embedded in European human capital, any efforts of knowledge transfer to the Chinese acquirer would have to be a long-term endeavour that involves positive and effective collaboration between the European subsidiary – in its prevalent form – and its Chinese parent. Midea’s acquisition of Kuka Robotics in 2016, ChemChina’s bid in 2017 for the Swiss agribusiness company Syngenta AG and Sany’s acquisition of German Putzmeister in 2012 are all examples in which elements of light-touch approaches form part of the acquisition arrangements.

Another interesting anomaly is the home-market orientation of many Chinese investments in the EU. Having an international profile, or even ownership of a leading European company resulting from an acquisition, has sometimes enhanced a Chinese company’s reputation at home and been viewed favourably among Chinese customers. Moreover, many Chinese investments in the EU have aimed to facilitate entry into and boost the sales of European products in the Chinese market. An example of this is Bright Food’s 2012 acquisition of Weetabix in Britain, a deal that sought to facilitate the entry of Western-style cereals into the Chinese market for breakfast foods (in 2016 it was sold on to the US company Post Holdings). Chinese purchases of wineries in France have been made with an eye on the growing Chinese wine market, and Geely’s acquisition of the Swedish automotive manufacturer Volvo in 2010 resulted in the sales of Volvo cars and technology into China. European firms have themselves sought the assistance of Chinese investors to gain better

access to the Chinese market (Knoerich 2010 and 2016b). This home-market orientation is quite unique to Chinese outward FDI, given the enormous size, growth potential and complexity of the Chinese market.

Chinese investors in Europe have reportedly been relatively cost-conscious, possibly the result of being accustomed to the low-cost environment prevalent in China. A manifestation of this is the less frequent use of services from expensive consultancy firms, at least at the early stages of internationalisation, even when such advice would have been helpful to overcome their lack of experience in EU markets. Instead, some companies have preferred to draw on the free services from EU investment promotion agencies, whose subsidiaries have proliferated in China. But when it comes to complex transactions, such as international acquisitions, drawing on the services of experienced consultancies and law firms becomes a necessity; even for Chinese companies.

A flipside of the low-cost dimension has been the ability of Chinese multinationals to successfully bid for infrastructure and construction projects overseas by making the cheapest offer, often on relatively good value-for-money terms. While this has worked well in developing countries, such as in Africa, where Chinese companies bring their own cheap labour to complete such projects in a lax regulatory environment, Chinese multinationals have faced challenges in breaking into the European market in this sector. Rules in EU member states require more local workers to be hired and paid salaries that tend to be higher than those of Chinese workers. They also insist on the observance of strict environmental and social standards, despite their additional costs. One example of the challenges involved was the successful bid by China Overseas Engineering Group (COVEC) to build a section of the motorway A2 in Poland in 2009. COVEC won the public tender based on a very low offer price, but was unable to complete the project, partially due to heightened cost pressures and misunderstandings about the European business, legal and cultural environment. A lack of familiarity with EU public procurement rules has also complicated the recent aspirations by China Railway International Corporation to construct a high-speed rail line in Hungary, and a lack of familiarity with complex EU public tender procedures has hampered Chinese efforts to bid successfully for involvement in the British HS2 high-speed railway project. Unlike other places in the world, infrastructure projects in EU member states are therefore rarely won by a Chinese bidder.

### **CHINESE FDI IS CONTROVERSIAL AND POORLY UNDERSTOOD**

From an EU perspective, a further characteristic setting Chinese outward FDI apart from Western and Japanese investments is the quality of the EU’s



political relationship with China as the country of origin of the FDI. For the first time, a country that is not a strong ally of the EU in political and security terms, and not an obvious supporter of the liberal international economic order, has become a major source of FDI in the EU. This exacerbates some of the concerns that result from the idiosyncratic nature of Chinese investments and has created controversy over Chinese FDI in Europe. This controversy is exacerbated by the fact that Chinese FDI – and some of its idiosyncrasies – is still relatively poorly understood despite widespread interest and analysis.

Due to these uncertainties about the origin and idiosyncrasies of Chinese FDI, attitudes and approaches towards Chinese investments are double-edged in the EU. On the one hand, Chinese FDI is welcome and considered to be an important current and growing future source of capital, employment and economic activity. European businesses engage intensively with Chinese investors – sometimes becoming willing targets for acquisitions by Chinese firms – and EU governments actively promote and compete for Chinese FDI. Especially Chinese green-field FDI, i.e. investments creating a new enterprise or economic activity rather than acquiring an existing company, is welcome. On the other hand, there are intensifying concerns about technology appropriation by Chinese multinationals through extensive acquisitions of European high-tech firms, about the potential existence of an unfair level playing field when Chinese firms are state-owned or state-backed, and about the possibility of Chinese investments undermining labour and environmental standards. Concerns have even been raised about potential threats to national security if the Chinese manage to tamper with European critical infrastructure after having been involved in its construction or installation (e.g. in the telecommunications or power generation sectors).

The double-edged attitude towards Chinese FDI becomes even more apparent in the controversies surrounding some Chinese investment deals in EU member states. Hinkley Point C in Britain is a nuclear power plant being constructed by a consortium of *Électricité de France* (EDF) and China General Nuclear Power Group (CGN). While no concern existed about mainly state-owned EDF Energy's participation in the consortium, given that it was a 'traditional' foreign investor from France, the minority participation by state-owned CGN was closely scrutinised by Theresa May's government in 2016 prior to approving it. This happened despite the previous government under David Cameron having warmly endorsed Chinese participation in the British nuclear power sector. When Midea acquired Kuka Robotics in 2016, Kuka's management highlighted the opportunities arising from the deal, including better possibilities to enter the Chinese market in the robotics sector. But German politicians were less at ease about the

growing number of Chinese acquisitions than Kuka's chief executives – German Chancellor Angela Merkel apparently once remarked that she thought the latter were being a bit naïve (Mitchell 2016).

European politics are now at a stage at which uncertainties over the potential implications from Chinese FDI and dissatisfaction with some of its idiosyncratic features – most notably the question of state interference – are combining to toughen up EU countries' policy stance towards Chinese FDI. Many EU member states have established investment screening mechanisms which, although formally applicable to multinationals from various countries, were implicitly set up to vet and prevent undesired Chinese acquisitions. The German screening mechanism was used for the first time in 2018 to prohibit the takeover of Leifeld Metal Spinning AG, which produces high-strength metals for the automobile, aerospace and nuclear power sectors, by the Chinese Yantai Taihai Group. Angela Merkel's cabinet vetoed the deal citing national security concerns (Delfs 2018). Deliberations are now ongoing in Brussels to establish an EU-wide framework for FDI screening, spearheaded by the European Commission. Moreover, the perceived unfairness of state-owned and state-backed Chinese multinationals being allowed to acquire almost any European firm without restrictions is another major point of concern in the current EU policy discourse over China. As China imposes many restrictions on foreign investments and acquisitions in numerous sectors in its own territory, European demands for reciprocity in openness to FDI are becoming far louder.

There are also concerns that China is using the investments by its multinationals – and the associated money Chinese development banks provide to countries through loans – to gain greater leverage over some EU member states and to potentially divide the EU. The focus in this context lies on Eastern and Southern Europe. In June 2017, Greece vetoed a shared EU position on human rights in China at the United Nations Human Rights Council. It was claimed that Greece's policy stance was a response to China's growing investments in the Southern European country, including the stake acquired by the state-owned China Ocean Shipping Company in the Piraeus Port. Yet again, allegations of such increased Chinese leverage should be treated with caution as corresponding evidence is scant.

## CONCLUSION

This article has set out several idiosyncrasies distinguishing Chinese multinationals and their FDI in the EU from 'traditional' Western and Japanese investors. These special characteristics included China's sudden emergence and rapid growth as a source of FDI in Europe, the fact that Chinese multinationals are latecomers with few ownership advantages in EU member states, their tendency to

seek strategic assets in the EU, the state ownership of many Chinese multinationals and strong state backing they receive for their investments, some uncommon approaches Chinese multinationals adopt when investing in Europe, and the controversial nature of some Chinese FDI projects. While this list may not be exhaustive, it does provide a set of good reasons for the strong public and scholarly interest in Chinese multinationals and their FDI in the EU.

After discussing the idiosyncrasies of Chinese FDI, this article implicitly demonstrated that there is no single type of ‘Chinese investment’. Instead, Chinese investments in the EU differ by entry mode (e.g. greenfield FDI, M&A), size, ownership type, industrial sector, strategic intention, the degree of entrepreneurship and many other dimensions. Some aspects of Chinese FDI are favourable to European economic and business interests, and thus deserve encouragement and support, while other aspects need to be critically assessed. There are reasons to be positive about Chinese FDI in Europe, but also reasons to feel a sense of unease. Yet it is unwise to appear overanxious and exaggerate a phenomenon that is far from dominant in Europe’s economic landscape. After all, the 86 billion US dollars of Chinese FDI stock in the EU, as estimated by MOFCOM, is dwarfed by US FDI in the EU, worth an estimated 3.6 trillion US dollars. The way forward is a balanced approach, endorsing Chinese FDI whilst taking concerns seriously and addressing them through appropriate analyses and policies. Despite the already existing strong interest in Chinese FDI highlighted at the beginning of this article, more research and analyses are needed, and especially academic research that looks beyond the business dimensions of Chinese FDI and focusing on European public policy, technology and security dimensions.

## REFERENCES

- Alon, I., J. Anderson, Z.H. Munim and A. Ho (2018), “A Review of the Internationalization of Chinese Enterprises”, *Asia Pacific Journal of Management* 35, 573–605.
- Anderson, J., D. Sutherland and S. Severe (2015), “An Event Study of Home and Host Country Patent Generation in Chinese MNEs Undertaking Strategic Asset Acquisitions in Developed Markets”, *International Business Review* 24, 758–771.
- Brattberg, E. and E. Soula (2018), “Is Europe Finally Pushing Back on Chinese Investments?”, *The Diplomat*, 14 September.
- Buckley, P.J., J.L. Clegg, A.R. Cross, X. Liu, H. Voss and P. Zheng (2007), “The Determinants of Chinese Outward Foreign Direct Investment”, *Journal of International Business Studies* 38, 499–518.
- Bureau of Economic Analysis (2018), *Direct Investment by Country and Industry: 2017*, News Release, US Department of Commerce.
- Child, J. and S.B. Rodrigues (2005), “The Internationalization of Chinese Firms: A Case for Theoretical Extension?”, *Management and Organization Review* 1, 381–410.
- Delfs, A. (2018), “Germany Toughens Stance and Blocks China Deal”, *Bloomberg*, 1 August.
- Dunning, J.H. (2001), “The Eclectic (OLI) Paradigm of International Production: Past, Present and Future”, *International Journal of the Economics of Business* 8, 173–190.
- Eurostat (2017), *Globalisation Patterns in EU Trade and Investment*, Luxembourg: Publications Office of the European Union.
- Hanemann, T. and M. Huotari (2018), *EU-China FDI: Working towards Reciprocity in Investment Relations*, MERICS Papers on China 3 Update, Mercator Institute for China Studies.
- Knoerich, J. (2010), “Gaining from the Global Ambitions of Emerging Economy Enterprises: An Analysis of the Decision to Sell a German Firm to a Chinese Acquirer”, *Journal of International Management* 16, 177–191.
- Knoerich, J. (2012), “The Rise of Chinese OFDI in Europe”, in: Alon, I., M. Fetscherin and P. Gugler (eds.), *Chinese International Investments*, Basingstoke: Palgrave Macmillan, 175–211.
- Knoerich, J. (2015), “China’s Outward Investment Surge”, in: Dyker, D. (ed.), *World Scientific Reference on Globalisation in Eurasia and the Pacific Rim, Volume 1: Foreign Investment*, Singapore: World Scientific Publishing, 273–297.
- Knoerich, J. (2016a), “Has Outward Foreign Direct Investment Contributed to the Development of the Chinese Economy?”, *Transnational Corporations* 23, 1–48.
- Knoerich, J. (2016b), “Why Some Advanced Economy Firms Prefer to Be Taken over by Chinese Acquirers”, *Columbia FDI Perspectives* 187, 21 November, Columbia Center on Sustainable Investment.
- Knoerich, J. (2017), “How Does Outward Foreign Direct Investment Contribute to Economic Development in Less Advanced Home Countries?”, *Oxford Development Studies* 45, 443–459.
- Knoerich, J. and S. Vitting (2018), “Controversies and Contradictions about Chinese Investments in Europe”, *EuropeNow Journal* 18, Council for European Studies (CES) at Columbia University.
- Luo, Y., Q. Xue and B. Han (2010), “How Emerging Market Governments Promote Outward FDI: Experience from China”, *Journal of World Business* 45, 68–79.
- Luo, Y. and R.L. Tung (2007), “International Expansion of Emerging Market Enterprises: A Springboard Perspective”, *Journal of International Business Studies* 38, 481–498.
- Miedtank, T. (2017), “International Human Resource Management and Employment Relations of Chinese MNCs”, in: Drahokoupil, J. (ed.), *Chinese Investment in Europe: Corporate Strategies and Labour Relations*, Brussels: ETUI, 79–95.
- Mitchell, T. (2016), “Angela Merkel Can Coach Theresa May in Realpolitik with China”, *Financial Times*, 11 August.
- Sauvant, K.P. and V.Z. Chen (2014), “China’s Regulatory Framework for Outward Foreign Direct Investment”, *China Economic Journal* 7, 141–163.
- MOFCOM (2018), *2017 Statistical Bulletin of China’s Outward Foreign Direct Investment*, Beijing: China Statistics Press.
- Rugman, A.M. and J. Li (2007), “Will China’s Multinationals Succeed Globally or Regionally?”, *European Management Journal* 25, 333–343.
- UNCTAD (2018), *World Investment Report 2018: Investment and New Industrial Policies*, New York and Geneva: United Nations.
- Zheng, N., Y. Wei, Y. Zhang and J. Yang (2016), “In Search of Strategic Assets through Cross-border Merger and Acquisitions: Evidence from Chinese Multinational Enterprises in Developed Economies”, *International Business Review* 25, 177–186.

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## Chinese and Other East Asian Foreign Direct Investment in Central and Eastern Europe: Motives, Location Choices and Employment Approaches<sup>1</sup>

### INTRODUCTION

Since the launch of China's 'Go Global Policy' in 2001 the world has observed a dynamic rise in China's outward foreign direct investment (FDI) in both developing as well as developed countries. Western Europe became a favoured destination for Chinese multinational corporations (MNCs) seeking strategic assets such as brands, technology, know-how or distribution channels. Central Eastern European (CEE) countries like Hungary and Poland, which joined the EU shortly after this time, attracted mainly Chinese greenfield investments aimed at obtaining access to the whole EU market, which has changed since 2012 with Chinese MNCs showing interest in acquisitions. In recent years growing concerns and regulatory restrictions relating to Chinese investors have been seen across the globe, especially among developed economies, based on both national security and economic grounds.<sup>2</sup> We would like to investigate the changing motives, location choices as well as employment generation and human resources management approaches of Chinese MNCs in selected host economies of CEE, namely Hungary and Poland, which have attracted the lion share of China's investment in CEE. We also compare Chinese MNCs with Japanese and South Korean MNCs that arrived in CEE much earlier as of the early 1990s.

### CHINESE, JAPANESE AND SOUTH KOREAN FDI IN HUNGARY AND POLAND – HISTORICAL BACKGROUND

Undoubtedly, the change in the institutional setting of CEE countries due to European integration has been the most important driver of Asian FDI in the CEE region. In the manufacturing sector in particular,

however, Asian investors entered the region earlier, with some of them even before the fall of the iron curtain.

The first phase of inward Asian FDI came parallel with the CEE countries' democratic shift in the late 1980s: some Japanese and Korean companies (like Samsung, Suzuki, Matsushita Electric and Hyundai) indicated their willingness to invest in CEE back in the early 1980s, while their investments took place during the first years of the democratic transition, in the late 1980s or at the beginning of the 1990s. The second impetus was given by the CEE region's accession process to the European Union. EU membership of Hungary and Poland (as well as other CEE countries joining the EU) allowed Asian investors to avoid trade barriers, while the countries also served them as an assembly base. Not only membership, but also the prospect of their EU accession attracted new Asian investors to Hungary and Poland. Some Chinese companies like Hisense, for example, made their first investments in Hungary before the country officially became an EU member state. New investments also arrived in the year of accession. The third phase dates back to the global economic and financial crisis, when financially distressed companies all over Europe were often acquired by non-European companies, including Chinese firms. Besides the Chinese, some new South Korean, South African and Indian MNEs started to strengthen their global – as well as CEE – presence in these years too.

According to the Amadeus database, as of 2017 Hungary hosted 83 firms with 51 percent of shares held by Japanese owners, 12 firms with their ultimate owners in South Korea and 15 firms with their ultimate owners in China (there are currently 19 in total due to recent investments not yet recorded in the Amadeus database). During that time in Poland there were 211 Japanese firms, 113 Chinese and 75 Korean companies. Approximately one third of Chinese firms in CEE are state-owned enterprises (SOEs), 31 percent in Hungary and 28 percent in Poland (see Tables 1 and 2). Major Japanese investors are Suzuki Motor Corp., Sumitomo Group, Toyota, Denso, Matsushita Electronic Components, Panasonic, Sanyo, Ajinomoto, and Mitsui. The majority of Japanese FDI is concentrated in the electronics and automotive industries. Japanese investors only recently expanded their interests towards other industries like food (Lotte's acquisition of Wedel and Pijalnie Czekolady, Ajinomoto and Nissin – producer of instant soups), financial services (Meiji Yasuda's interest in Europa Group and Warta Group), fleet management (Hitachi Capital's acquisition of Corpo Flota) and cosmetics (Rohto's interest in Dax Cosmetics). Korean investments are also focused in the electronic and automotive industries as well as the chemical industry. Samsung, Hankook, LG Chem, Daewoo and Nexen are among the major investors. When entering the CEE markets, Japanese and Korean MNCs most



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<sup>2</sup> See <https://www.merics.org/en/papers-on-china/chinese-fdi-in-europe>.

often choose the greenfield entry mode. Korean MNCs initially only engaged in productive investment, but recently also carried out research and development activities.

Chinese investors typically target the secondary and tertiary sectors of CEE countries, including Hungary and Poland. Initially, Chinese investment flowed mostly into manufacturing (assembly), but over time services attracted a growing amount of investment too. In Hungary and Poland, for example, there are branches of Bank of China, and Industrial and Commercial Bank of China, as well as offices of some of the largest law offices in China, Yingke Law Firm (in Hungary in 2010, in Poland in 2012) and Dacheng Law Offices (in Poland in 2011, in Hungary in 2012). Main Chinese investors targeting these countries are primarily interested in telecommunications, electronics, chemical industry and transportation. In addition to the largest investor, Wanhua, major investors include Huawei, ZTE Corporation, Lenovo, BYD and Comlink.

As far as the Chinese MNCs' entry modes are concerned, greenfield investments dominate and were especially common among the first Chinese investors in CEE focusing on assembly after 2005 (Huawei, ZTE, Lenovo, TCL). Mergers and acquisitions (M&As) gained importance as of 2011 (Wanhua, Liu Gong Machinery), while joint ventures were less common (Orient Solar, BBKA, Shanghai Shenda).

### **CHINESE, JAPANESE AND SOUTH KOREAN FDI IN HUNGARY AND POLAND – MOTIVATION**

The main driver behind Asian FDI in CEE is market-seeking investment: by entering CEE market Asian companies gain access not only to the whole of the EU (and domestic) market, but also to the markets of CIS, the Mediterranean countries and the EFTA. During company interviews, almost all participants emphasised their desire to have operations in CEE, which can either be linked to their existing businesses in Western Europe, or can help strengthen their presence in the wider European market. Another aspect of EU membership that has induced Asian investment in Hungary is institutional stability (exemplified by the protection of property rights, for instance). It was important for early investors from Japan or Korea, but was also one of the drivers of Chinese FDI due to the unstable institutional, economic and political environment of their home country (Morck *et al.* 2007). It is also in line with the findings of Clegg and Voss (2012), who argue that Chinese FDI in the EU shows 'an institutional arbitrage strategy'.

While the market-seeking motivation is clearly dominant, the efficiency-seeking motive is also present, and can be explained by the fact that a skilled labour force is available in Hungary and Poland in sectors and industries for which Asian interest is

growing, while labour costs are lower than the EU average. However, there are also differences within the CEE region; unit labour costs are usually cheaper in Bulgaria and Romania than in Hungary and Poland. Corporate taxes also play a role in Asian companies' decision to invest in Hungary or Poland, although these two countries do not have the most favourable tax regime in the CEE region. Nevertheless, these labour cost and tax differences within the CEE region do not really seem to influence Asian investors, as there is more investment from Asian countries in Visegrad countries (especially in Hungary and Poland) – where labour costs and taxes are comparatively higher – than in Romania or Bulgaria. One explanation for this may be the theory of agglomeration, as OFDI in these countries is generally the highest in the region (McCaleb and Szunomár 2017).

Recently, certain Asian investments have also been motivated by the search for brands, new technologies or market niches that they can fill in on European markets, i.e. by strategic asset seeking. Examples include the acquisition of Hungarian BorsodChem, a chemicals producer by Wanhua, Dongren Investment Co. Ltd. The Bonded Zone has also purchased a 33-percent-stake in the Polish Bioton, biotechnology company, which produces insulin among other products (Ningbo.gov.cn 2016). Another interesting feature is that personal contacts were also important when choosing a host country for Asian FDI in the CEE region. For example, one of the Japanese investors chose Hungary because the owner's child studied in the country for several years, while a South Korean investment in Hungary was initiated through a former Hungarian Olympic champion. Besides, Asian companies also appreciate it when a business agreement is supported by the host country's government. Strategic agreements with foreign companies investing in Hungary offered by the Hungarian government may also have spurred Asian investment in Hungary as a result.

McCaleb and Szunomár (2017) also found that, in the case of Chinese MNEs' motives in CEE, institutional factors and other less-quantifiable aspects play a significant role. Besides EU membership, market opportunities and qualified, but cheaper labour, key factors include the size and feedback of Chinese ethnic minority in the host country, investment incentives and subsidies, opportunities to acquire visa and permanent residence permits, privatisation opportunities, as well as the quality of political relations and the government's willingness to cooperate.

### **CHINESE, JAPANESE AND SOUTH KOREAN FDI IN HUNGARY AND POLAND – INDUSTRIES, LOCATIONS, LINKING WITH GLOBAL VALUE CHAINS**

As of 2018, the Chinese MNCs in CEE mainly represent electronics, automotive, industrial machinery,

chemicals and rubber products manufacturing (Tables 1 and 2). The industrial characteristic of Chinese FDI is similar to its Japanese and South Korean counterparts, which are dominated by firms from electronics and automotive industries. Since 2012 Chinese investors have been entering the CEE markets more frequently through acquisitions, with the latter also resulting from M&As carried out in third countries like the United States and Germany, which included the targeted firm's foreign subsidiaries. These acquisitions in industries like the automotive sector, with its highly fragmented production networks, imply China's

accelerated entry into global value chains. In 2018, a share of 23 percent and 17 percent of the Chinese firms analysed were in automotive sector in Poland and Hungary respectively (Amadeus database). This not only means that Chinese firms have acquired the manufacturing technology and skills necessary for China's automotive industry to build a competitive advantage in domestic and global markets, but may also signal the arrival of Chinese cars in the EU market in near future. This, in turn, would imply more Asian competitors in the European car market. In this respect Japanese and South Korean MNCs differ, as they bring their own brands, products, and manufacturing methods, which constitute the basis of competitive advantage. The lead firms like Toyota, Samsung, LG also bring with them suppliers from their home country, which means that they make a limited contribution to the development of host country firms.

The location choice of Chinese MNCs in CEE follows the pattern of total FDI. In Poland, for example, the voivodships (provinces) that have attracted most of the foreign direct investment are mazowieckie, slaskie, dolnoslaskie and wielkopolskie (Kacperska 2014). The largest number of Chinese firms is registered in mazowieckie, wielkopolskie, malopolskie and pomorskie, in that order. Slaskie, dolnoslaskie, mazowieckie, malopolskie and wielkopolskie are the leading voivodships hosting the automotive industry in Poland. Chinese firms from the automotive sector, which are usually result from acquisitions in third countries, are located mainly in malopolskie, wielkopolskie and mazowieckie (Table 2). Japanese and Korean firms in Poland are driven by incentives offered by the special economic zones in their location choice. In Hungary, the capital city of

**Table 1**  
**Location of Chinese MNCs in Hungary**

Voivod-ship/province	Total 19 firms	Company type	Main industries	Entry modes
Budapest, central Hungary	12	3 SOEs	Telecommunications; wholesale of computers, computer peripheral equipment and software, motor vehicle and motor vehicle parts, farm product raw material, chemical products, industrial machinery and equipment; transport, consulting services; Industrial machinery manufacturing; education	Green-field, M&A
Pest	3	1 SOE	Telecommunication and information communication; electric lighting equipment manufacturing; Industrial machinery manufacturing	M&A
Northern Hungary	3	2 SOEs	Wholesale of chemicals; motor vehicle parts manufacturing	M&A, green-field
Western Transdanubia	1		Rubber product manufacturing	

Source: Own compilation based on Amadeus database and news articles.

Budapest is an important hub for foreign investments with concentration of firms from telecommunications, electronics, motor vehicles and their parts, industrial machinery manufacturing, chemicals and education. However, central as well as Northern Hungary and Western Transdanubia are also favoured by Chinese MNCs (Table 1). Korean and Japanese MNCs in Hungary choose slightly different locations to Chinese MNCs. In addition to Budapest, they are also located in Central Transdanubia, the latter hosts firms manufacturing electronics and tyres like Harman Becker, Hankook and Lotte.

### **CHINESE, JAPANESE AND SOUTH KOREAN FDI IN HUNGARY AND POLAND - GENERATING EMPLOYMENT**

Chinese firms contribute to the generation of employment, but mainly preserve jobs through acquisitions. The largest Chinese employers in Hungary are local firms purchased by Chinese MNCs, although some Chinese greenfield investors also became significant employers in recent years. Based on the employment data for Chinese firms in Hungary (Amadeus database),<sup>3</sup> 47 percent of them increased their employment rate since the year of their establishment until 2017, 10 percent maintained their number of employees, while 5 percent decreased the number of employees. The Chinese firm Wanhua that acquired Borsodchem is the biggest Chinese employer in Hungary with 3,000 workers, followed by the Zhengzhou Coal Mining Machinery Group, which purchased Bosch's SEG Automotive Germany GmbH

<sup>3</sup> For Poland no data on employment in recent years is available as reporting number of employees is not required by law thus no information in Amadeus database.



Table 2

**Location Choice of Chinese MNCs in Poland**

Voivodship/province	90 <sup>a</sup> , number of firms in automotive industry	Company type	Main industries	Entry modes
mazowieckie	43, 3 automotive	12 are SOEs	Telecommunications, chemical products, computers, motor vehicles and motor parts wholesalers, semi-conductors and other electronics, industrial machinery, fruit and vegetable juice manufacturing, residential building construction, hotels, services	M&As carried out abroad, greenfield
wielkopolskie	10, 4 automotive	3 SOE	Motor vehicle parts manufacturing; automotive equipment rental and leasing; automotive repair and maintenance; agricultural chemical manufacturing; machinery and equipment wholesalers; services	Greenfield, JV, M&A carried out abroad
malopolskie	8, 6 automotive	4 SOEs	Manufacture of electric motors, generators, and transformers, motor vehicle parts, rubber products, sports goods, fruit and vegetable juice; services	M&A directly in Poland and carried out abroad
pomorskie	8, 2 automotive	2 SOEs	Transportation and real estate services; manufacturing of motor vehicle parts, industrial trucks and tractors, iron and steel mills.	Mostly greenfield
slaskie	6, 2 automotive	1 SOE, 2 state related	Motor vehicle parts manufacturing; wholesale of waste and scrap; construction; wholesale	M&A
dolnoslaskie	4, 1 automotive	1 SOE	Manufacture of pesticides and other agrochemical products, motor vehicle parts, steel pipes, tubes; electronic and precision equipment repair	M&As carried out abroad, greenfield
lodzkie	3, 1 automotive	0 SOE	Casting of light metals; machinery, equipment and motor vehicle and motor vehicle parts and supplies wholesalers	Greenfield
podkarpackie	2, 1 automotive	1 SOE	Agriculture, construction and mining machinery manufacturing; treatment and coating of metals	M&As
kujawsko-pomorskie	2	1 SOE	Waste management services; hardware, plumbing and heating equipment wholesalers and metal product manufacturing	M&A through Germany
lubuskie	2, 1 automotive	0 SOE	Packaging and labelling services; plastics product manufacturing	M&A, greenfield
lubelskie	1	1 SOE	Manufacture of bearings, gears, gearing and driving elements	M&As
opolskie	1	private	Food services	Greenfield

<sup>a</sup> Chinese firms were analysed out of total 113. These are the top 90 Chinese firms in Poland in terms of revenue.

Source: Own compilation based on Amadeus database.

at the end of 2017, the former Robert Bosch Starter Motors Generators Holding GmbH, which employs 1,700 workers, and Midea that acquired German KUKA with its foreign subsidiaries in late 2016 with 1,576 employees followed by BYD with 191 employees and Lexmark International Technology acquired by Apex Technology and PAG Asia Capital from China in 2016 with 372 employees. Huawei in Hungary outsources assembly activities to the Hungarian branch of Foxconn, therefore directly they employ around 300 people but indirectly – through Foxconn – they are responsible for the employment of more than 2,500.

Unlike Chinese investors, Japanese and Korean firms in Hungary contribute to generating employment as they enter the Hungarian market through greenfield investments aimed at assembly, which implies training the company's workforce from the scratch. Japanese MNCs in Hungary generally increased employment over the last 10 years. The leaders are Denso (producer of parts and accessories for motor vehicles) with 4,716 employees in 2018,

Suzuki with 2,744 employees in 2017 and Ibiden with 2,464 employees in 2018. The majority of South Korean MNCs have also increased employment in the last decade, with the largest Korean employers being Hankook (3,071 workers in 2017), Harman Becker, a subsidiary of Samsung Electronics (2,454 workers) and Samsung Electronics (1,598 workers) – see Amadeus database.

### **CHINESE, JAPANESE AND SOUTH KOREAN FDI IN HUNGARY AND POLAND – HUMAN RESOURCE MANAGEMENT**

When analysing East Asian investors' activities in Hungary and Poland, we have to examine the impact of cultural differences and cross-cultural business encounters. The most important factors in such encounters are the level of individualism *versus* collectivism, the degree of respect for hierarchy, the role of networks and work ethics (Hall and Wailes 2010). To map out whether – and if so, how – the East Asian multinational companies reproduce or

adapt their management methods and practices across their subsidiaries, we shall focus on human resource management (HRM), which is perhaps the most important issue when analysing the interaction between home and host country culture and institutions (Ozsvald *et al.* 2018).

Although there are several differences between East Asian investors' HRM activity in the CEE region, there are also some similarities too. In general, we can say that East Asian firms in Poland and Hungary try – at least to some extent – to apply their own HR system and use the host country system only if it is absolutely necessary. For example, what is fairly typical for Japanese, Korean and Chinese companies is a low level of organisation among workers and low union density. The majority of their CEE-based companies/branches have so-called works councils, but their role is rather limited. In some cases, factory activity is outsourced to another company, therefore there is not even any need to establish such a body. East Asian companies respect their host country's labour law, but if possible, they use the opportunities provided by it to minimise labour-related costs. For example, they tend to pay relatively low wages to workers who they recruit, although subsidiary-level coordination in wages exists in almost all cases. Working conditions are similar to those of other companies operating in the same sector, but differences do exist. East Asian companies in CEE, for example, use the open office system, and not only for lower-level managers, but in several cases for their top management too. New employees' certificates, diplomas or experience are often not appreciated enough in the view of workers. The main basis for promotion and pay rises is seniority – or loyalty demonstrated by the number of years spent working for a firm – in almost all cases, while relationships (*guanxi*) also play a role, especially in Chinese companies. East Asian firms expect their own working style, which is characterised by dedication to work, working overtime, or being available by telephone in case of emergency. Individualism and bottom-up initiatives are not typical in these companies. Decisions are taken mostly by headquarters, meaning that CEE subsidiaries tend to have an executive function with little space for host-country initiatives.

Employing a large share of expatriates also seems to be characteristic for East Asian companies, as the number of expats is rather high in both the Polish and Hungarian subsidiaries, especially in the first few years following investment in the acquisition of a company. In a Chinese company that arrived in the region over 10 years ago, for example, almost half of the managerial staff are still Chinese expatriates. In the case of a Japanese automotive factory that arrived over 25 years ago, by contrast, the number of expatriates is declining, although still high. Similar characteristics emerge in the case of Korean companies: a company in electronics that arrived in

the late 1980s now has a few Korean expats at the top management levels, while another company in automotive that arrived a few years ago in the region, employs a far higher number of Korean expatriates. Expatriates are not always solely responsible for a certain task or field, and in some cases they have co-managers from the host country.

As host country and home country employees from different cultural backgrounds have to work together and cooperate in these companies, this makes cultural training inevitable. East Asian expatriates are usually given training in European cultural competences before taking up an expat position. Host country employees also learn about the investor's country, culture and habits, although usually not *via* deep and detailed courses, but rather through general presentations. Cross-cultural training courses are, however, not very common in these companies, although several HR managers have indicated that there is a clear need for such courses. Polish employees at a Poland-based Japanese company reported that the communication between Japanese employees and their local counterparts is very poor. This can be explained to some extent by Japanese workers' poor command of English and their lack of familiarity with the local culture. In order to remedy this situation, the Japanese Embassy in Poland organised Sakura Business Seminars for firms with Japanese stakeholders to give Polish employees a better understanding of the Japanese business style. To respond to similar problems, Chinese and Korean companies also try to organise, for example, social events for their colleagues, so as they can get to know each other better.

## CONCLUSION

Chinese MNCs emerged as a new third important player in terms of investment from East Asia in Central and Eastern Europe. Chinese MNCs are similar to Japanese and South Korean counterparts in market-seeking motivation related to the establishment of greenfield investments for assembly. These Chinese firms are mostly from the electronics industry, while Japanese and South Koreans are from both the electronics and the automotive sector. The differences between Chinese, Japanese and South Korean FDI lie in Chinese firms' search of strategic assets (technology, brands, distribution channels) and their entry into global production networks, which is especially visible in automotive industry. It is related to their growing entry into CEE through M&As, while Japanese and Korean MNCs choose the greenfield entry mode as they are already part of those value chains – thanks to their earlier maturity and ownership of technologies, and globally recognised brands that their Chinese counterparts are about to join. Chinese MNCs seem to exhibit a different strategy to that pursued by Japanese and South Korean MNCs,

whereby the leading firm is followed into foreign markets by home country suppliers as through M&As of producers of automotive parts and components, Chinese MNCs establish suppliers first and their lead firms are expected to arrive in Europe in near future. Japanese and South Korean MNCs thus benefit more than the host economies in CEE, as they create more jobs than Chinese investors. These three East Asian MNCs, however, use similar techniques and strategies in human resources management in terms of the level of individualism *versus* collectivism, the degree of respect for hierarchy, the role of networks, as well as work ethics. The increasing number of Chinese firms entering the automotive industry through M&As implies the possible emergence of a third Asian car player in Europe in near future. Like Japanese and South Korean MNCs that are followed by their suppliers and service companies – which does not contribute to the development of host country firms – Chinese firms prefer to cooperate with companies from their home country. As a result, there are very little or limited opportunities for local enterprise development *via* linkages with suppliers, for example.

## REFERENCES

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- Clegg, J. and H. Voss (2012), *Chinese Overseas Direct Investment in the European Union*, Europe China Research and Advice Network, [http://www.chathamhouse.org/sites/default/files/public/Research/Asia/0912ecran\\_cleggvoss.pdf](http://www.chathamhouse.org/sites/default/files/public/Research/Asia/0912ecran_cleggvoss.pdf).
- Hall, R. and N. Wailes (2010), "International and Comparative Human Resource Management", in: Wilkinson, A., N. Bacon, T. Redman and S. Snell (eds.), *SAGE Handbook of Human Resource Management*, Thousand Oaks: SAGE, 115–132.
- Kacperska, E. (2014), "The Regional Variation of Foreign Direct Investment in Poland", *Scientific Journal Warsaw University of Life Sciences – SGGW, Problems of World Agriculture* 14(4), 83–91.
- McCaleb, A. and Á. Szunomár (2017), "Chinese Foreign Direct Investment in Central and Eastern Europe: An Institutional Perspective", in: Drahokoupil, J. (ed.), *Chinese Investment in Europe: Corporate Strategies and Labour Relations*, Brussels: ETUI, 121–140.
- Morck, R., B. Yeung and M. Zhao (2008), "Perspectives on China's Outward Foreign Direct Investment", *Journal of International Business Studies* 39, 337–350.
- Ningbo.gov.cn (2016), *Ningbo Develops Trade with CEEC*, [http://english.ningbo.gov.cn/art/2016/4/21/art\\_931\\_398065.html](http://english.ningbo.gov.cn/art/2016/4/21/art_931_398065.html).
- Ozsvald, É., M. Sass, K. Shobha and Á. Szunomár (2018), *Asian Foreign Direct Investments in Hungary: Home or Host Country Factors Dominate?*, mimeo.



## Frank Bickenbach and Wan-Hsin Liu Chinese Direct Investment in Europe – Challenges for EU FDI Policy

Chinese foreign direct investment (FDI) into the European Union (EU) has increased substantially over the last decade. Whereas the EU generally welcomes inward FDI, FDI from China has been often accompanied by concerns. In view of these developments, the EU now faces the challenge of reforming its FDI policy in such a way as to simultaneously (i) defend the EU's current openness to FDI (including from China); (ii) address the security concerns that have been raised for some types of FDI; and (iii) ensure greater openness and a level playing field for European FDI in China. Two EU policy initiatives are particularly important here: the establishment of an EU-wide framework for screening inward FDI on grounds of national security and public order and the negotiation of a bilateral investment agreement with China. In the following we discuss the motivation, development and prospects of these initiatives.

### DEVELOPMENT OF CHINESE FDI IN EUROPE

Direct investment from China into the EU has increased sharply since 2010, and since 2013 in particular (Figure 1). According to transaction-based data compiled by the Rhodium Group,<sup>1</sup> the value of Chinese FDI flows into the EU was about 29.7 billion euros in 2017, which was slightly lower than the peak in 2016 (35.9 billion euros), but almost fifteen times the value in 2010 (2.1 billion euro).<sup>2</sup> The data also show that the vast majority of these investments were mergers and acquisitions, whereas greenfield projects have only accounted for around five percent of total direct investment in recent years. Geographically, Chinese FDI into the EU has generally focused on the economically more advanced EU member states and on France, Germany, Italy and Britain in particular. Sectorally, they have recently concentrated on transport, utilities and infrastructure, ICT and advanced industrial machinery and equipment (Hanemann and Huotari 2018). The key sectors selected for investments are thus broadly in line with the focus of China's current industrial policy.

<sup>1</sup> We are grateful to Thilo Hanemann of Rhodium Group for providing the data.

<sup>2</sup> For individual years transaction-based FDI data can differ substantially from FDI data from official European and Chinese data sources. For a comparison of different datasets, see Hanemann and Huotari (2017).

Compared to the surge of Chinese FDI in Europe, European FDI in China increased only moderately before 2012, and even declined after 2012. They have recently been much lower than Chinese FDI in Europe (see also Figure 1). One of the factors frequently cited as responsible for the comparatively poor development of European FDI in China is the persistence of a large number of restrictions on European companies investing in China.

In fact, according to the OECD FDI regulatory restrictiveness index, China is one of the most restrictive economies with respect to inward FDI.<sup>3</sup> Among the 68 countries covered, only three countries (Indonesia, the Philippines and Saudi Arabia) had a higher Index (i.e. more restrictive FDI policies) than China in 2017. Despite some improvement over the past two decades, the FDI restrictiveness index for China (0.32) is still much higher than the OECD average (0.07). In contrast, almost all EU nations have been consistently among those countries with the lowest levels of FDI restrictiveness. In 2017, most member states had an index value at or below 0.04; and Austria (0.11) was the only member state with an index value above the OECD average.<sup>4</sup>

### CONCERNS OVER AND POLICY DEBATES ABOUT CHINESE FDI

European countries actively promote inward FDI, including FDI from China. At the same time FDI from China has increasingly raised economic, political and national security concerns among European policy makers and the wider public. The fact that these concerns are raised in particular with respect to FDI from China relates to a number of specific features of Chinese FDI<sup>5</sup> and, more importantly, to broader reservations about the nature of China's economic and political system and its growing geopolitical and geoeconomic ambitions (Hanemann and Rosen 2012; Hanemann and Huotari 2015; Meunier forthcoming).<sup>6</sup>

A first economic concern is that Chinese FDI into Europa may lead to a one-sided transfer of modern technology and related economic activities from Europe to China. China is still an emerging economy

<sup>3</sup> For more on the OECD's FDI regulatory restrictiveness index, see <http://www.oecd.org/investment/fdiindex.htm>.

<sup>4</sup> Overall, the EU has one of the most open investment regimes in the world. Openness to foreign investments is enshrined in the EU Treaties. Article 63 TFEU prohibits any restriction on capital movements not only between member states but also between member states and third countries.

<sup>5</sup> This includes their novelty and rapid growth, their concentration on sensitive or strategically important sectors, and the low share of greenfield investments, which are often seen as more beneficial and less politically problematic than M&As.

<sup>6</sup> China is the world's second-largest economy giving it enormous leverage to shape the world economy and politics. It is still lagging behind the EU in many areas of technology, but has ambitious policies of promoting technology upgrading including through outward FDI. Its economy is characterised by widespread state influence, ambitious industrial policies, and a multitude of restrictions and discriminations of foreign companies. Politically, China is a one-party authoritarian state with a tenuous record for protecting individual rights and the rule of law. It is also an emerging military superpower with geopolitical ambitions and foreign policy goals that are often at odds with those of European countries.

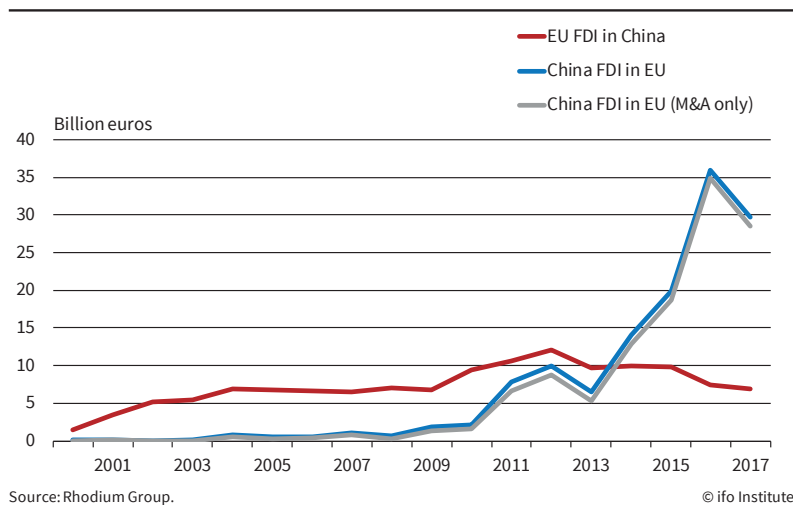


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Figure 1  
Bilateral FDI Transaction Values in China and the EU



lagging behind Europe in many areas of technology and business expertise. At the same time, China is pursuing industrial policies that strongly promote its technological catch-up process including through outward FDI. This may, it is feared, lead to a situation where industrial policy directives trump commercial logic when Chinese acquirers of European companies decide where to deploy the latest technologies of the acquired companies or where to locate their research and development activities (Hanemann and Huotari 2015). As a result, European firms and host countries may not reap the benefits of technological spill-overs usually induced by FDI and, in the long run, Europe might lose its technological edge and economic competitiveness to China.

A second economic concern is that unrestricted FDI by Chinese companies in Europe could exacerbate ‘unfair competitive advantages’ that politically protected and subsidised Chinese companies have over European companies. China is still restricting FDI in many sectors of its economy and many Chinese companies (not just state-owned enterprises) benefit from government subsidies and multiple other political privileges. Through FDI in Europe, these subsidised firms are now competing head-to-head with European firms on European markets too, thereby, extending their unfair competitive advantages over European firms (Hanemann and Huotari 2015). Foreign acquisitions by subsidised Chinese companies can also lead to distortions in the allocation of capital. This is the case, for instance, when a Chinese company can outbid a European company in acquiring another European company, not because it can use the assets of the target company more efficiently, but because it enjoys political advantages in China (Hanemann and Huotari 2015).

Political concerns over Chinese FDI into the EU relate, in particular, to the fear that China could use the promise to increase; or the threat to withhold or withdraw FDI to pressure host governments to act in line with China’s ideas on political issues that are par-

ticularly important for the Chinese government (One-China policy, Tibet, human rights in China). In the past, China has repeatedly demonstrated its willingness to use its economic power to exert political pressure on other countries, or to punish them for political decisions that violate China’s political interests – with some success.<sup>7</sup>

National security concerns over specific types of inward FDI are not new and are not restricted to FDI from China.<sup>8</sup> There are, however, several reasons why security concerns may be particularly relevant

for FDI from China. Unlike most other large source countries of FDI into Europe, China is not a security ally of EU member states. It is a rising superpower with a rapidly modernising army, and with increasing geopolitical ambitions and declared foreign policy goals that are often at odds with those of European countries and their allies in North America and Asia. Security concerns, particularly related to the leakage of militarily sensitive technology, are exacerbated by China’s past violations of export control regulations and the transfer of sensitive technologies to regimes such as Iran, North Korea or Pakistan. Apparent cases of Chinese economic and political espionage and cyber penetration reinforce this distrust. As with economic concerns, national security concerns about Chinese FDI are aggravated by the opaque involvement of the Chinese government in these investments, which leaves some doubt as to their ultimate rationale (Meunier forthcoming; Hanemann and Rosen 2012).

## FDI SCREENING IN THE EU

With the entry into force of the Lisbon Treaty in December 2009, the EU’s exclusive competence over the common commercial policy has been extended to cover FDI too now.<sup>9</sup> This shift of competence has

<sup>7</sup> The political influence that China has gained through direct investment in Europe is already seen by some observers as a serious challenge to the cohesion of EU policy towards China. It has been reported, in particular, that Greece and Hungary have, on different occasions, refused to support joint EU statements on China’s human rights policy, or on its territorial claims in the South China Sea.

<sup>8</sup> In general, potential national security threats from foreign ownership fall into three categories: (i) the transfer of (military) sensitive technology; (ii) the denial or manipulation of access to a critical input by a foreign-controlled supplier; and (iii) the infiltration, surveillance or sabotage of production systems crucial for the functioning of economy (e.g. critical infrastructures in energy or transportation, or telecommunications and cyber networks) – see Moran (2017).

<sup>9</sup> Whereas the general competence for FDI now rests with the EU, specific competences relevant for the design and implementation of a European FDI policy continue to reside with the member states (the protection of their national security) or are shared between the EU and its member states (e.g. the competence for portfolio investments and for provisions on investor-state dispute settlement).

substantially strengthened the role of the European Commission in shaping the EU's FDI policy. With regard to Chinese FDI in Europe, the Commission currently focuses on two policy initiatives: (a) establishing a common framework for screening inward FDI on the grounds of security and public order, and (b) the negotiation of a bilateral investment agreement with China.<sup>10</sup>

Currently there is no centralised mechanism to screen FDI on grounds of public order or security at EU level, and there is no formal coordination among member states or between member states and the Commission in this field. At the same time, about half of the EU nations – including the EU's largest economies, Germany, France, Italy and Britain – have some national FDI screening mechanism in place (Grieger 2017).<sup>11</sup> Existing screening mechanisms vary considerably between member states with respect to both their scope (covering only FDI from third countries or also from other member states; covering only specific sectors or all sectors of the economy; screening for threats to essential interests of national security or to public security and public order) and their design (voluntary *versus* mandatory notifications; *ex-ante* authorizations *versus ex-post* approvals of acquisitions).<sup>12</sup>

Several EU countries have tightened their FDI screening mechanisms in recent years, or are currently discussing such changes. Let us consider the example of Germany, where the most recent legislative tightening of FDI screening came into force in July 2017. A central element of the reform was the introduction of a catalogue of industry sectors for the first time, defining critical infrastructure and security-related technologies, where the acquisition of at least 25 percent of the voting rights of a German company by a non-EU/EFTA foreigner is, by law, considered to be a potential threat to public security or public order and must be notified to the Federal Ministry for Economic Affairs (BMWi). While the BMWi still has to decide on a case-by-case basis whether the acquisition *actually* endangers public order or security, it is expected that the amendment will lead to a more thorough examination of future acquisitions. Hardly a year after this reform came into force the BMWi has already announced a further tightening of the regulations. It plans to lower the threshold for investment screening from 25 to 15 percent of the voting rights of the target company.

The German government's increasingly critical attitude towards Chinese FDI is also reflected in the

treatment of some recent FDI cases involving Chinese investors. A number of proposed acquisitions of German companies, most notably Kuka and Aixtron, were discussed and observed very critically by the federal government in 2016 and 2017.<sup>13</sup> Then, in August 2018, the German cabinet *for the first time* ever prohibited an acquisition of a German firm on national security grounds. The veto concerned the acquisition of German engineering firm Leifeld Metal Spinning by a French unit of China's Yantai Taihai Group. In 2018, the government also prevented two attempts by the Chinese electricity giant SGCC to acquire a 20-percent stake in 50Hertz, one of Germany's four electricity transmission system operators.<sup>14</sup>

The current changes in FDI screening mechanisms within individual members states are accompanied by a growing number of requests for the establishment of an EU-wide framework for screening inward FDI. Most notably, in 2017, the French, German and Italian governments jointly approached the European Commission with a proposal<sup>15</sup> to create legal conditions that would allow member states to prohibit or condition FDI not only on the grounds of national security and public order, but also on the basis of economic criteria such as a lack of reciprocity in investment conditions between the home country of the investor and the EU, or a lack of market compatibility of the transaction due to state influence (including through subsidies) on the investor.<sup>16</sup>

As a result of the intensified debate, the European Commission presented a proposal for a regulation 'establishing a framework for screening of foreign direct investments into the European Union' in September 2017.<sup>17</sup> The regulation intends to provide legal certainty to member states and to ensure EU-wide coordination and communication, but it does not set out a unified EU-wide FDI screening mechanism. According to the proposal, the EU countries may main-

<sup>13</sup> In case of Kuka the acquisition was completed after the BMWi gave green light for the transaction, despite its critical stance. The planned takeover of Aixtron was prohibited by the US administration before the BMWi made its final decision. (In the United States the review process applies not only to foreign investment in the United States, but also to foreign investment in foreign companies that have affiliates in the United States. Aixtron had a wholly-owned subsidiary located in California.)

<sup>14</sup> Here the government could not use the official screening mechanism, which only applies to the acquisition of at least 25 percent of a company's voting shares. The government therefore nudged Elia, the Belgian majority owner of 50Hertz, to exercise its right of first refusal to buy the 20 percent stake offered by minority shareholder IFM Investors. Elia made use of its right to purchase the shares; the first time to increase its own stake in 50Hertz, and the second time to resell the shares to the German state-owned development bank KfW.

<sup>15</sup> See *European Investment Policy: A Common Approach to Investment Control*, 28 July 2017, [http://g8fip1kplyr33r3krz5b97d1.wpengine.netdna-cdn.com/wp-content/uploads/2017/08/170728\\_Investment-screening\\_non-paper.pdf](http://g8fip1kplyr33r3krz5b97d1.wpengine.netdna-cdn.com/wp-content/uploads/2017/08/170728_Investment-screening_non-paper.pdf).

<sup>16</sup> Similar suggestions were made by other politicians (including a group of members of the European Parliament), representatives of European business in China (European Chamber 2017) or China experts (e.g. Wübbcke *et al.* 2016).

<sup>17</sup> *Proposal for a Regulation of the European Parliament and of the Council Establishing a Framework for Screening of Foreign Direct Investments into the European Union*, COM(2017) 487, European Commission, 13 September 2017, [https://eur-lex.europa.eu/resource.html?uri=cellar:cf655d2a-9858-11e7-b92d-01aa75ed71a1.0001.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:cf655d2a-9858-11e7-b92d-01aa75ed71a1.0001.02/DOC_1&format=PDF).

<sup>10</sup> While the former is not restricted to FDI from China, it is mainly motivated by concerns related to the strong increase of Chinese FDI into the EU.

<sup>11</sup> Some EU member states are unwilling to impose any restrictions on inward FDI in order to be attractive for foreign investors.

<sup>12</sup> Outside the EU, most large advanced economies such as Australia, Canada, Japan and the United States, and major emerging economies such as China and India, have FDI screening mechanisms of varying scope and design (Grieger 2017). The most widely-known and arguably the most sophisticated of these screening regimes too is that of the United States. It has repeatedly been proposed as a potential role model for other economies, including the EU.

tain, amend or adopt FDI screening mechanisms on the grounds of security or public order, but are not obliged to do so. The proposed regulation features a non-exclusive list of factors that may be taken into consideration in the screening on grounds of security or public order. These factors include the potential effects on critical infrastructure, critical technology, the secure supply of critical inputs, or access to or the ability to control sensitive information. The control of a foreign investor by a foreign government (including through significant funding) could be taken into account in assessing an investment's effects on security or public order. The proposed regulation does not, however, extend the screening grounds to purely economic factors such as reciprocity of investment conditions or market compatibility of the transaction. Member states' screening mechanisms shall not discriminate between different third countries either.

The regulation would introduce a (new) possibility for the Commission itself to screen FDI that are likely to affect projects or programmes of Union interest on the grounds of security or public order.<sup>18</sup> Here the European Commission may address a *non-binding* opinion to the member state in which the investment is planned or completed and which is then responsible for the final decision.<sup>19</sup> To improve the coordination of review decisions taken by EU member states, the regulation would also establish a cooperation mechanism between the EU countries and the Commission to exchange information on cases where a foreign investment planned or completed in one member state is considered likely to affect security or public order in others. In such cases the other member states or the Commission may issue comments or opinions that the member state where the FDI is planned shall duly consider in his decision.

Although the Commission proposal clearly falls short of the common proposal of France, Germany and Italy as regards the reasons for which FDI could be blocked, the governments of the three countries welcomed the proposal. Other member states have, however, expressed scepticism, or even opposition to the proposal (Di Benedetto 2017). Whether, or in which form, the proposed regulation will eventually be adopted thus remains to be seen.

The assessment of any proposal for the introduction of a new FDI screening framework for the EU must be based on the recognition that openness to FDI is an important factor for the success of the European economy. The EU must therefore maintain an investment regime, which is open to investors from the rest of the world, irrespective of the country of origin. At the same time, the EU investment regime should include effective measures to protect the security and public order

of the member states and make sure that differences in their attitudes with respect to investments by Chinese SOEs, for example, do not negatively affect other member states' national security. These objectives do not have to be in conflict. On the contrary, the creation of a transparent, effective and well-focused European framework for FDI screening on grounds of national security and public order may even be a prerequisite for defending the EU's current openness against a protectionist backlash and an increasing politicisation of individual FDI transactions.

It must be ensured, however, that reference to national security and public order cannot be misused for protectionist purposes or other purely economic ends. Investment screening in the EU should thus be explicitly limited to plausible threats to national security and public order only; and should *not* be based on arguments of reciprocity, unfair competition or on any kind of industrial policy or economic security considerations. Moreover, it must not discriminate between investors from different non-EU/EFTA countries.

Possible security threats are not limited to foreign acquisitions in the defence industry. It is adequate, therefore, to allow for the screening of individual foreign acquisitions in a wider range of sectors. However, security screening should not preclude acquisitions by investors from certain countries (like China or Russia) for entire sectors. This would not only exclude valuable investments for broad areas of the European economy, but would also legitimise reciprocal sector-wide exclusions of European investments by these (and other) countries (Moran 2017). It would thus undermine the EU's efforts to negotiate better access for EU investments to third countries, in particular China (see also below).

In this context, state ownership or control of a foreign investor may (only) be taken into account in assessing whether a foreign acquisition is likely to affect security or public order. However, state ownership or control in itself does not constitute proof of a plausible threat to security or public order, but may affect the plausibility of such a threat in individual cases. Purely economic implications of state-ownership or privileged access to government subsidies (e.g. market distortions) should not be used as criteria in investment screening.

Similarly, the approval of proposed acquisitions should not be made conditional to equal treatment of European investors in the home country of the acquiring firm. Instead of following a logic of negative reciprocity, the EU should step up its efforts to achieve greater openness and equal treatment of European firms on foreign, and particularly in Chinese markets through bilateral or multilateral trade and investment negotiations (positive reciprocity).

Industrial policy or 'economic security' considerations should not be legitimate causes in investment screening. This particularly applies to potential technology transfers resulting from the acquisition of Euro-

<sup>18</sup> These include European GNSS programmes (Galileo and EGNSS), Copernicus, Horizon 2020, Trans-European Networks for Transport (TEN-T) and for Energy (TEN-E) and for Telecommunications.

<sup>19</sup> The member state shall, however, 'take utmost account' of the opinion and provide an explanation to the European Commission if it does not follow the opinion.



pean technology companies by investors from China. By acquiring European technology leaders, many Chinese companies want to close their technological gap to leading companies and improve their international competitiveness. In general, this need not be to the disadvantage of the European economy. Acquisitions of European firms by commercially driven investors would generally be unproblematic from an economic point of view (Klodt 2008). Commercially-driven investors will have an interest to continue using the acquired technology in Europe, whenever Europe has a competitive advantage in this regard.<sup>20</sup> Negative effects on the European economy would therefore be largely limited to cases in which an acquisition or subsequent technology transfer would take place mainly for non-commercial reasons and the technology would be transferred to China, although it would be most efficiently used in Europe.

In any case, screening and blocking the acquisition of European technology firms by foreign investors is hardly an appropriate instrument to prevent technology transfer or to defend the competitiveness of European industry. For the Chinese government or government-backed Chinese firms, there are just too many other legal ways of acquiring or transferring a specific technology, particularly when the current owner agreed to the proposed acquisition of his company. The current owner could, for example, sell the technology through patenting or licensing, or follow incentives by the Chinese government to invest and produce in China, possibly in a joint venture with a Chinese company. Alternatively, the owner could decide to develop the next generation of the technology in cooperation with the potential Chinese investor. The legal prohibition of all these alternatives just to slow down an outflow of technology to China cannot be an option for any open market economy, except possibly to avert genuine national security threats.

When it comes to maintaining the competitiveness and the technological lead of Europe's industry, the biggest challenge is not to prevent technology transfer abroad, but to ensure that Europe remains an attractive location for research and innovation. Investment in education, basic research and modern infrastructure, access to finance and human capital, innovation-friendly regulations and a general openness to new ideas are crucial here. It will be more important to ensure that European companies have access to Chinese markets and Chinese human capital and talent than to restrict Chinese access to European technologies and markets.

For all these reasons investment screening in the EU should be strictly limited to averting (plausible) threats to public order and security. In order to improve the legal certainty of investors and to prevent new hidden forms of protectionism, the legal basis for

investment screening and its application to individual cases should aim to develop a narrow, transparent and precise understanding of what is meant by plausible threats to public order and security.<sup>21</sup>

Distinguishing between plausible security threats and implausible allegations of security threats is certainly no easy task. Over four decades of US experience, however, show that such a differentiation is possible. The 'Three Threat' framework developed in the United States could serve as a benchmark model for Europe (Moran 2017). This framework distinguishes between three distinct types of threats to national security that could result from foreign acquisitions, namely: (i) the leakage of sensitive technology or know-how; (ii) the denial or manipulation of access to a critical input; and (iii) infiltration, espionage and sabotage. It also highlights that the relevance and credibility of any of these potential threats for a particular acquisition depend on the level of damage that could actually be inflicted upon national security interests; and whether the acquisition or its blocking actually affect the likelihood of such an event. If, for example, the goods and services produced by the acquired firm or close substitutes were widely available and switching costs were low, there would not be any plausible security threat. And if alternative sources of the technology held by the acquired firm are widespread and easily accessible to the acquirer or its home government, security cannot be assured by blocking the transaction anyway (Moran 2017).

As regards the implementation of FDI screening in the EU, there are important arguments in favour of a close coordination between member states or even (partial) centralisation of FDI screening at EU level. Most importantly, as many companies in Europe have affiliates in several member states or own and operate trans-national infrastructures (e.g. in the energy, transportation, or telecommunications sector), the impact of a foreign acquisition on national security (if any) will often not be limited to the home country of the targeted company. In such cases decentralised and uncoordinated decision making by member states with very different attitudes and rules for security screening may easily lead to inefficient decisions and may cause conflicts between affected member states.

Centralisation could also be in the interest of foreign investors. Foreign investors, whether from China or any other third country, may find it easier to deal with one European set of rules and negotiate with just one European regulator than to negotiate with several national governments applying different national rules. In addition, it is expected that centralised decision-making by an institution at EU level will reduce the risk of politicisation of individual cases at member state level. It will also generally make it easier and less time-consuming

<sup>20</sup> If Europe has a competitive disadvantage in using the technology, a transfer of the technology to China would generally still be in the long-run interest of the European economy.

<sup>21</sup> This is all the more important at a time when the US administration justifies tariffs on steel and aluminium imports from allies such as Canada, Mexico and the EU by claiming that these imports threaten the national security of the United States.

ming for investors to obtain legal protection from the European Court of Justice in cases where a prohibition of an acquisition is contrary to European law.

Irrespective of the potential benefits, any attempt to establish centralised investment screening by a European regulator (be it the Commission, the Council or an independent agency) appears to be a ‘mission impossible’, however, in view of the opposition to be expected from member states.<sup>22</sup> Even a partial harmonisation of member states’ investment screening mechanisms along the lines just described, and a better coordination between member states and Commission in screening individual acquisitions may be hard to achieve. The prospects of increasing the efficiency and coherence of FDI screening decisions, however, should be worth the effort.

Once again, the goal of a new framework for investment screening must not be to turn the EU away from its current openness to FDI. The aim should be to reduce concerns about possible security risks from foreign acquisitions by increasing the efficiency and the acceptance of FDI screenings on grounds of security and public order, which may actually help maintain societal and political support for the EU’s current openness. Irrespective of whether, or in which form, the regulation proposed by the Commission will eventually be adopted, it will thus be crucial that the European Commission and the Court of Justice of the EU continue to oversee investment screening by member states; and to ensure that it is not misused for protectionist purposes.

However, maintaining support for the EU’s current openness to FDI also from China will ultimately also require more openness and a level playing field for European companies in China. The best way for the EU to achieve this is through the ongoing negotiations of a comprehensive EU-China investment agreement.

### **NEGOTIATING AN EU-CHINA INVESTMENT AGREEMENT<sup>23</sup>**

In February 2012, China and the EU decided to launch negotiations on a comprehensive EU-China Investment Agreement. This agreement should replace the 26 different bilateral investment treaties (BITs) that currently exist between EU members and China, and establish a coherent legal framework to promote mutual investments. For the EU, the new agreement should go significantly beyond the existing agreements. It should lower market access barriers for European investors in China (pre-establishment) and guarantee non-discriminatory treatment of investments already made (post-establishment). For China, the agreement should help ensure that European markets stay open for Chinese investment, despite increasing concerns about Chinese takeovers.

<sup>22</sup> This is even more so as the introduction of such a system would probably require an amendment of the EU Treaties.

<sup>23</sup> This section draws on Bickenbach *et al.* (2015).

Even although China and the EU share a common interest in such an agreement, there are also a number of contentious issues that hamper its conclusion. By the end of 2018 nineteen rounds of negotiation have been held without a final agreement having been reached so far.

Investment agreements traditionally do not contain any provisions to liberalise market access. This also applies to the existing BITs between China and EU member states, none of which features any such provisions (Berger 2013a). In its negotiations with China, the EU has made it clear from the beginning, however, that liberalising market access must be a core issue of its investment agreement with China. More specifically, the EU Commission is urging China to adopt a negative list approach granting pre-establishment national treatment to European FDI in all sectors not included in a predefined list. China traditionally refused to include any (significant) market access provisions into its BITs. However, after experimenting with negative lists of different lengths in its free trade zones and other selected provinces, China now appears willing to accept the negative-list approach in its investment agreement with the EU. Conflicts of interest remain, however, as to the scope of the negative list. China prefers a rather cautious and limited approach with a long negative list.<sup>24</sup> In contrast, since European markets are already largely open to Chinese investments, the EU strives for a greater symmetry and thus for a short negative list. For industries on the negative list, China would retain the right to restrict access for European investments. From the perspective of EU investors, it is also important, however, that such restrictions must not be more stringent for European investors than for investors from other countries (most-favoured nation treatment). In addition, some particularly pernicious types of conditions such as compulsory joint ventures or forced technology transfers should be completely ruled out as conditions for granting market access.

Both China and the EU agree that investment screening on grounds of national security or public order must be possible under the agreement. To ensure that screening procedures cannot be (easily) misused for protectionist purposes, however, the EU must have an interest in including general guidelines for investment screening into the investment agreement. These guidelines should, in particular, prevent an overly broad definition of the concepts of national security or public order. This seems to be particularly important in light of the overly broad definition of national security provided by China’s National Security Law, which forms the basis for all rules and regulations relevant for national security, including national secu-

<sup>24</sup> The first nation-wide negative list for FDI in China that was published in mid-2018 still contained 48 restrictions and prohibitions (*Special Management Measures (‘Negative List’) for Foreign Investment in China, 2018 Version*, <http://images.mofcom.gov.cn/wzs/201806/20180628220738627.pdf>).

riety reviews of foreign investment.<sup>25</sup> This definition of national security does not only include military security but also covers civil and political security, economic security, and cultural and social security. Such a broad definition would give Chinese authorities an exceptionally wide degree of discretion in investment screening, implying high levels of uncertainty for European investors.

The main focus of BITs has traditionally been to protect investments once they have been made, and to ensure that these investments receive fair, equitable and non-discriminatory treatment (post-establishment national and most-favoured-nation treatment). This is also true for the existing BITs between China and EU member states. Despite these BITs, however, European companies in China currently still face numerous forms of unfair and discriminatory treatment. These relate, in particular, to subsidies or public procurement policies, the protection of intellectual property rights, or the targeted enforcement of regulation and competition law (Bickenbach *et al.* 2015). The reason why these practices are still possible despite the existing BITs between China and EU member states, is that these existing BITs exhibit a fundamental asymmetry regarding the level of protection that is granted to foreign investors. Whereas EU member states generally commit themselves to equal treatment of domestic and Chinese investments post-establishment, the implementation of national treatment of European investors in China is severely limited. Existing BITs usually contain provisions that allow China to retain existing laws and regulations that are incompatible with national treatment. China merely agrees not to increase discriminatory treatment and promises to progressively remove non-conforming measures (Berger 2013b). In the ongoing negotiation the EU is expected to change this practice and to demand concrete commitments from China to introduce post-establishment national treatment that will go significantly beyond what China was willing to promise in the past; or the progress it has recently made in some of the relevant policy areas.

Another controversial issue is the treatment of state-owned enterprises (SOEs). The EU's aim here is to ensure the competitive neutrality of SOEs. It has an interest, therefore, to include provisions that limit the many forms of preferential treatment of Chinese SOEs (direct subsidies, preferential access to capital and other production factors, preference in public procurement and in regulation) in the agreement and encourage greater transparency with respect to business operations and political linkages of SOEs. SOEs have been a focus of economic reforms in China for years. The aim of recent SOE reform, however, was not to reduce political influence on SOEs or to weaken

SOEs' role in the economy. Instead, there has been a further politicisation of SOEs and a strengthening of their economic capacities (including through mergers). Powerful SOEs have become a key instrument of the government in pursuing its ambitious industrial policies, including its strategy of acquiring advanced technologies through outward FDI. It remains to be seen whether the EU and China can find a consensus on the highly sensitive SOE issue.

Last but not least, potential disagreement between China and the EU also exists with respect to the rules of investor-state dispute settlement (ISDS). The main question here is whether such disputes should be settled by recourse to traditional ISDS procedures or by implementing the permanent investment court system (ICS) proposed by the EU. The traditional ISDS system, which is based on commercial arbitration by *ad hoc* tribunals, has been heavily criticised by many European advocacy groups and citizens. In response to this, the European Commission proposed to reform the system by (i) ensuring a better protection of governments' right to regulate in the public interest, and (ii) setting up a public, permanent investment court for each trade or investment agreement.<sup>26</sup> The European Commission has made it clear that it wants to incorporate ICS in all its future investment agreements, including the agreement with China.<sup>27</sup> It is still highly unclear, however, whether China will accept the ICS. Beginning in the late 1990s China's BITs (including those with EU member states) contain the possibility of investor-state dispute settlement through traditional ISDS procedures. Moreover, only recently, China showed its interest in being more integrated into the traditional ISDS system by intensifying its engagement in the International Centre for Settlement of Investment Disputes (ICSID) at the World Bank in Washington DC and, at the same time, developing its own China-based commercial arbitration institutions. Against this background, it seems likely that China would prefer traditional ISDS over the ICS in the EU-China partnership. Given the Commission's commitment to the ICS and the fierce criticism of the traditional ISDS system within several EU member states, however this would hardly be acceptable for the EU.

Given the many contentious issues related to the agreement, it is not self-evident that the negotiations can be successfully concluded in near future. It was

<sup>26</sup> By setting up a permanent tribunal with a pool of highly-qualified and independent judges, public access to all relevant documents and all hearings, and the right to appeal against verdicts, the ICS is expected to increase procedural transparency and improve legal certainty. In the longer term the European Commission hopes to replace the ICS by a new multilateral investment court that would rule on investment disputes arising from, in principle, all bilateral agreements in place.

<sup>27</sup> Key elements of the new system have already been incorporated into the EU's comprehensive economic and trade agreement with Canada, as well as in recent agreements with Singapore, Vietnam and Mexico. The ICS has not, however, been incorporated in the recently agreed EU-Japan Economic Partnership Agreement (EPA). As Japan appears to favour the traditional ISDS rejected by the EU, the agreement does not include specific rules for resolving investor-state disputes; talks between the EU and Japan continue on this issue.

<sup>25</sup> Back in 2015, the Chinese government published a draft Foreign Investment Law for public consultation; but the law has not yet entered into force (end of 2018). This law would *inter alia* provide a more specific legal base for national security reviews of FDI in China.

reported, however, that at the last China-EU Summit in July 2018, the leaders from both China and the EU agreed to treat the negotiations on the agreement as a priority. Moreover, there are reasons to believe that the importance of the agreement for China has recently increased significantly. On the one hand, the strong increase in Chinese FDI into Europe and the debate it triggered have increased the importance of protecting unrestricted market access and non-discrimination for Chinese investments in the EU. On the other hand, the economic stimuli resulting from a successful conclusion of the negotiations could help China mitigate the negative consequences of its trade war with the United States. It may even help end the trade war. It would provide a solution to some of the issues that the United States has also raised with China (e.g. restrictive market access, forced technology transfers or the role of SOEs); and it would demonstrate that these issues could be solved through negotiations. To the extent that the EU-China agreement would give European companies a competitive advantage over their US counterparts, it would also increase pressure on the US administration to find a similar solution.

In conclusion, we would like to stress that the prospects for success of the two policy initiatives that the European Commission is currently pursuing to reform its FDI policy, particularly with regard to China, are by no means independent of each other. The prospects of defending the EU's openness to FDI (including from China) by passing a European framework that limits FDI screening to genuine threats to security and public order are much better if a comprehensive EU-China investment agreement could be concluded in near future. At the same time, maintaining the EU's openness to foreign investment while protecting security and public order would be a strong EU argument in negotiating an agreement that would ensure greater openness and non-discrimination against European FDI in China.

## REFERENCES

- Berger, A. (2013a), "Investment Treaties and the Search for Market Access in China", *Investment Treaty News* 4(3), 8–9.
- Berger, A. (2013b), *Investment Rules in Chinese Preferential Trade and Investment Agreements*, Discussion Paper 7/2013, Deutsches Institut für Entwicklungspolitik, Bonn.
- Bickenbach, F., W.-H. Liu and G. Li. (2015), *The EU-China Bilateral Investment Agreement in Negotiation: Motivation, Conflicts and Perspectives*, Kiel Policy Brief 95, Kiel Institute for the World Economy.
- Di Benedetto, F. (2017), *A European Committee on Foreign Investments*, Columbia FDI Perspectives 214, <http://ccsi.columbia.edu/files/2016/10/No-214-Di-Benedetto-FINAL.pdf>.
- Grieger, G. (2017), *Foreign Direct Investment Screening: A Debate in Light of China-EU FDI Flows*, EPRS, European Parliament, May, [http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS\\_BRI%282017%29603941](http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI%282017%29603941).
- European Chamber (European Chamber of Commerce in China, 2017), *China Manufacturing 2025: Putting Industrial Policy Ahead of Market Forces*, <http://www.eurochamber.com.cn/en/china-manufacturing-2025>.
- Hanemann, T. and M. Huotari (2015), *Chinese FDI in Europe: Preparing for a New Era of Chinese Capital*, New York: Mercator Institute for China Studies and Rhodium Group.

Hanemann, T. and M. Huotari (2017), Chinese Direct Investment in Europe: What Available Data Sources Tell Us, in: Seaman, J., M. Huotari and M. Otero-Iglesias (eds.), *Chinese Investment in Europe: A Country-Level Approach*, ETNC Report, 19–29, [https://www.ifri.org/sites/default/files/atoms/files/etnc\\_reports\\_2017\\_final\\_20dec2017.pdf](https://www.ifri.org/sites/default/files/atoms/files/etnc_reports_2017_final_20dec2017.pdf).

Hanemann, T. and M. Huotari (2018), *EU-China FDI: Working towards Reciprocity in Investment Relations*, New York: Mercator Institute for China Studies and Rhodium Group.

Hanemann, T. and D.H. Rosen (2012), *China Invests in Europe: Patterns, Impacts and Policy Implications*, New York: Rhodium Group.

Klodt, H. (2008), "Müssen wir uns vor Staatsfonds schützen?", *Wirtschaftsdienst* 88, 175–180.

Meunier, S. (forthcoming), "Beware of Chinese Bearing Gifts: Why China's Direct Investment Poses Political Challenges in Europe and the United States", in: Chaisse, J. (ed.), *China's Three-Prong Investment Strategy: Bilateral, Regional, and Global Tracks*, Oxford: Oxford University Press.

Moran, T.H. (2017), *CFIUS and National Security: Challenges for the United States, Opportunities for the European Union*, Peterson Institute for International Economics, 19 February 2017 Draft, <https://piie.com/system/files/documents/moran201702draft-c.pdf>.

Wübbecke, J., M. Meissner, M.J. Zenglein, J. Ives and B. Conrad (2016), *Made in China 2015: The Making of a High-tech Superpower and Consequences for Industrial Countries*, MERICS Paper on China 2, <https://www.merics.org/de/papers-on-china/made-china-2025>.



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# Digital Transformation, International Competition and Specialization

## INTRODUCTION

'E-commerce', 'industry 4.0' or 'sharing economy' are terms that are associated with progress, innovation and a renewal of the economy. These developments are part or consequences of a digital transformation that is a paradigm shift in the economy, which changes production and organisation. However, stimulating changes are not exceptional, as a brief look at the economic development of the last 200 years shows. Technological progress has always taken place, introducing fundamental innovations and thus making significant contributions to economic growth. Figure 1 shows the 'long economic cycles' first identified by Russian economist Kondratiev (1927), as well as the two other cycles that have since been added (Nefiodov 1994; Linde and Stock 2011). The first cycle started with the invention of the steam engine facilitating work, while significantly increasing production efficiency. The subsequent distribution of railroads and the expansion of marine transport fuelled worldwide trade, as well as the first wave of globalisation (1870–1914, see Williamson 1996). Around 1900 discoveries and developments in chemistry and electricity drastically reduced energy costs. Major innovations in communications, the growing importance of the electronics sector and new applications of

petroleum characterise the fourth cycle. These innovations, together with the removal of trade barriers, also fostered the current second wave of globalisation. The fifth Kondratiev cycle started in 1990 and is marked by progress in information technologies, but also by a stronger focus on sustainable and ecological innovations.

These stimulating innovations show a definitive trend in social and economic development: the first innovations target the exploitation of new energy sources and productivity increase that are crucial for a manufacturing-based society. By contrast, the more recent innovations pave the way for an information-based society that is mostly characterised by access to and an increase in the volume of information available, as well as communication.

## DIGITISATION AND INFORMATION GOODS

By definition, digitisation is the transformation of (physical) information into (electronic) bit sequences. In this process, analog data with continuous specifications are encoded using binary systems. As the complexity of the information grows, a larger code is required to describe it. Compared to physical information, digital information has far lower storage, processing and transmission costs. The physical space required to store digital data is almost negligible thanks also to the rapid miniaturization of technology. A library with over 2,500 books encoded in binary code, for example, can be easily stored on one DVD with a physical area of approximately 113 cm<sup>2</sup>. Digitized data can be almost instantly evaluated, modified, used for further processing and calculations by any computer. To do the same with analog data, by contrast, you either have to digitise them first, or apply time-consuming physical methods. Digitalisation, that is the optimisation of the use of digitised information, is accompanied by the internet as a distribution channel, which enables the fast and cost-effective transmission of information on a global level. In the process of digital transformation, new business ideas and processes based on the merits of digitisation are being developed.

These include, for example, new services like cloud computing that reduce the physical space required for data storage and processing even further (Armbrust *et al.* 2010; Nazir 2012; Bartholomae 2018).

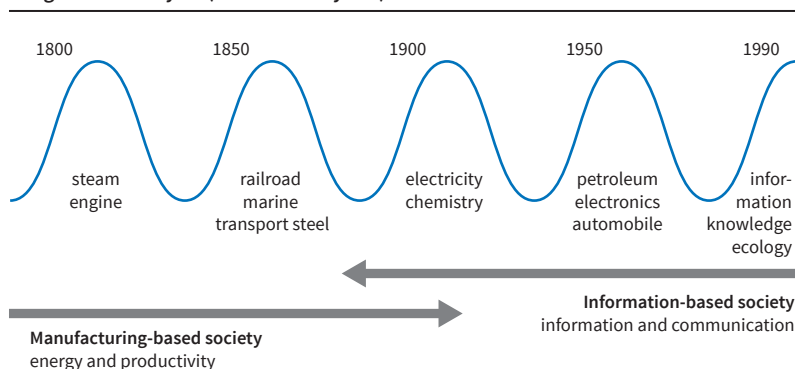
This change in the cost structure and availability of goods has important effects on consumers, firms and politics. Consumers are increasingly demanding e-books: while the share of e-books in Germany was still 0.53 percent in 2010,



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Figure 1

Long Economic Cycle (Kondratiev Cycles)



Source: Linde and Stock (2011).

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it had already increased nine-fold to 4.73 percent by 2017 (Börsenverein des Deutschen Buchhandels 2018). This change in consumer behaviour has an impact on business strategies, meaning that publishers are increasingly required to supply digital product lines. Changed consumer preferences are also affecting the public sector: the number of income tax statements submitted online since 2000 has increased from 0.14 to 22.1 million in 2017 (ELSTER 2018). The legislator is accordingly obliged to react to changed consumer and firm behaviour. As these examples show, digital transformation has already had significant effects.

In general, digitisation turns physical goods and services into digital products or information goods, which partly changes their character as a good. Unlike their physical counterparts, they have four specific characteristics (Linde 2009; Bartholomae 2014): (1) the character of a public good; (2) high fixed costs with low variable costs in production; (3) information asymmetries between the market sides; and (4) network effects.

Information is a public good as its consumption is possible without purchase (non-excludability), and its consumption does not prevent someone else consuming it (non-rivalry). It may be possible to exclude others from using information, through copyrights, patents or, in the case of data files, copy protection, for instance, but as soon as the information is available unprotected, even for a very short time, its distribution can (almost) no longer be controlled (Linde 2005). The immanent characteristics of public goods ultimately lead to a free-rider problem, as third parties may easily copy or imitate information without having to bear the costs of research and development (Foray 2004).

In the process of digitalisation, high fixed costs occur, as the information technology infrastructure that has to be built or integrated into existing database systems also has to be managed. The subsequent use of the data, such as the read back, processing, evaluation or transmission of the information, however, causes almost negligible costs (Ba *et al.* 2000; Linde 2005).

Information asymmetries exist when one market side has more information than the other market side about the quality of the goods, for example. In the best case, this may prevent trade between the market partners or, in the worst case, lead to a collapse of the entire market (Akerlof 1970). Information is an experience good (Shapiro and Varian 1999), i.e. the user can only determine the extent to which his expectations have been fulfilled during or after consumption.

Network effects can be one of the greatest advantages of information goods. This means that a consumer's benefit or the value of the digital product increases in line with the number of additional consumers (Katz and Shapiro 1985; Shy 2011). Firms need to be aware of this effect: if some information is only required for one employee, the benefits of digitising this information will hardly compensate for its costs.

If on the other hand, several employees need this information, possibly at the same time and at different locations, the benefits of digitisation are already considerably greater. If this information is also relevant for business partners and customers, digitisation becomes even more advantageous. It is also crucial that digitisation takes place in a format that is readable by all relevant actors. Exotic isolated solutions only used by a few provide fewer benefits than common standard solutions (Shy 2001a).

## NATIONAL COMPETITION AND MONOPOLISATION

Digitalisation allows for the development of new products and services. Due to the described characteristics of information goods, monopolies are very likely to emerge. On the cost side, the production of digital goods has high fixed costs at low variable costs. This implies that average costs decrease as output volumes increase (economies of scale). Thus, a natural monopoly results, as it is economically efficient that only one firm supplies the market. On the demand side, network effects cause an increase in the consumer's willingness to pay – according to Metcalfe's law, this willingness increases in square terms in the number of users (Shapiro and Varian 1999; Bartholomae 2012). The online auction-platform eBay benefits from this effect: sellers know that many potential buyers are looking for products there and buyers know that many sellers use the platform to offer their products. Both buyers and sellers, who use lesser-known or smaller platforms, will find it difficult to find or sell products. Thus, network effects create a monopoly.

Digital transformation can also cause monopolies in traditional competitive industries because of the cost savings achieved. This is all the more likely the more drastic the cost savings are (Shy 2001b). If a firm experiences only a gradual or minor cost reduction through digitalisation, competition is hardly affected. In this situation, the firm does not change its prices, but increases its profits. If its competitors also reduce their costs by digitising, firms eventually will pass the cost savings down to consumers and lower their prices. Thus, the initial profits of the pioneers of digitalization will disappear again. However, digital transformation may also cause a drastic cost reduction by the firm. In this situation, even if the firm chooses the profit-maximising monopoly price, its costs are so low that it can undercut the price of its competitors. In addition to the firm, which now earns a monopoly profit, consumers also benefit from a lower price. Provided they have sufficient reserves, competitors will certainly press ahead with digital transformation in order to restore their competitiveness.

While in the case of a minor cost reduction, consumers only may benefit from price reductions after some time, a drastic cost reduction immediately lowers prices. This effect will be lasting if enough com-

petitors survive and are able to reduce costs. However, if the monopoly remains, welfare losses can occur in the long term, since monopolists often protect further innovations through patents that could endanger their monopoly position (Gilbert and Newbery 1982), which ultimately impairs economic efficiency.

In Germany, larger industrial companies show a higher degree of digitalisation compared to smaller firms (Kopke *et al.* 2016). Based on the previous analysis, possible reasons for this may be that digitalisation is too expensive due to the high cost of the initial investment, and therefore subsequent cost savings are too low. As digital transformation only pays off if network effects are sufficiently high, small firms with only a few employees may benefit less than big firms that reduce the costs of coordination and cooperation between lots of employees. Customer relations also play a crucial role. If the most important customers are not digitalised, additional costs arise if the digitised information first has to be brought back into analogue form in order to exchange it with the customer or supplier – e.g. by printing product brochures or forms, which then have to be digitised again later for their own processing. It is therefore hardly surprising, especially in the case of small and medium-sized companies and craft businesses, that they do not fully rely on digitalisation.

Overall, digital transformation tends to favour large firms as they can significantly reduce their costs and have the capacity to skim all the benefits off the savings. This may endanger competition, as larger companies with financial reserves can influence competition by investing in digitalisation to their advantage. This is particularly the case if they (initially) pass on the cost savings directly to consumers, and thus put smaller firms under pressure; or even drive them completely out of the market.

## INTERNATIONAL COMPETITION AND PRODUCTIVITY

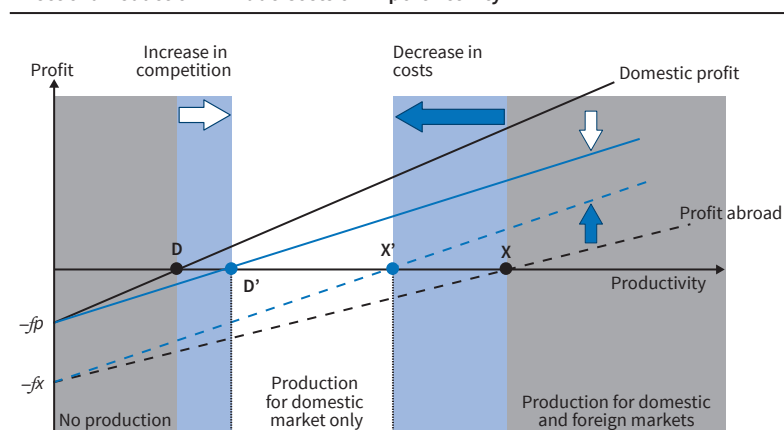
Digital transformation also has a major impact on the international competitiveness of firms. In addition to the decrease in production costs that increases firm productivity, trade costs decrease too: the coordination of logistics gets more efficient; relevant documents are accessible worldwide; search costs for suitable suppliers and customers fall; and steadily improving software is translating digitalised transport documents in an increasingly reliable manner. This reduction in trade costs will lead to an intensi-

fication of competition, as shown by Figure 2 (Melitz 2003; Morasch and Bartholomae 2017).

The continuous line ‘Domestic profit’ in Figure 2 describes a firm’s profit in its home market depending on its productivity – the more productive the firm, the higher its profits. In addition to production costs, fixed costs  $f_p$  have to be covered too, which yields a minimum productivity  $D$  that is necessary to generate non-negative profits. Firms with productivity in the left grey area will not survive in the market. The dashed line ‘Profit abroad’ shows what profits firms can expect to generate when engaging in export activities. As additional fixed market entry costs  $f_x$  occur and trade costs lower profits even further (the line is flatter), a higher productivity  $X$  is necessary to generate positive profits abroad. Thus, there are medium-productive firms that only supply the domestic market, and high-productive firms that also supply foreign markets.

Most obviously, as digitalisation reduces trade costs, firms’ profits abroad increase – the line ‘Profit abroad’ becomes steeper. This means that even companies with lower productivity  $X'$  are able to sell their goods abroad. However, this positive effect affects domestic profits negatively: as foreign firms also benefit from decreased trade costs, more of them will start to export and thus enter the domestic market. Competition increases and the line ‘Domestic profit’ becomes flatter, as profit at all productivity levels decreases. In the end, firms with a productivity below  $D'$  will leave the market. To sum up, two effects occur: firstly, average firm productivity increases, since the least productive firms do not survive the competition, and secondly, a higher share of firms will supply both the domestic and the foreign market. Taking into account that digitalisation also increases firm productivity and reduces fixed costs, the development described above is exacerbated and competition intensifies to an even greater extent, which increases average productivity and more firms engage in international activities.

Figure 2  
Effect of a Reduction in Trade Costs on Export Activity



Source: Morasch and Bartholomae (2017).

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This positive effect on competition from foreign competitors can counter the trend towards monopolization, but it also increases the pressure on all firms to realize any cost savings made possible by digitalisation to maintain their competitiveness. At the same time, however, the lower trade costs also open up greater opportunities in international markets for those surviving medium-productive firms. From the consumer's point of view, this development is advantageous, since it gives consumers a larger product range to choose from at low prices.

### FRAGMENTATION AND OFFSHORING

Fragmentation is one way in which firms can significantly reduce their production costs by capitalising on specialisation advantages. To this end, the various production steps are grouped into production blocks, which are then allocated to different locations according to the local advantages. However, this requires additional services that are not necessary in an integrated production process, such as the organisation of an appropriate logistics, insurances against transport-related production stoppages or additional quality controls. As these additional services connect the production blocks, the associated costs are summarised as service-link costs (Jones and Kierzkowski 1990; Morasch and Bartholomae 2017). Fragmentation therefore only makes sense if the service-link costs are lower than the cost savings resulting from more efficient production.

Figure 3 depicts average production costs, whereby curve  $AC_1$  represents the average cost of integrated production, and  $f_1$  the corresponding fixed costs. As production benefits from economies of scale, average costs fall. Let us suppose that production is split into two blocks. This affects costs in two ways: firstly, fixed costs increase, as additional production sites have to be maintained, and secondly, variable costs decrease as a result from specialization and better realization of economies of scale. However,

additional service-link costs  $s$  have to be considered, which increase costs and are already included in total average costs  $AC_2(s)$ . Since cost reduction becomes significant with increasing production, fragmentation is only profitable for quantities produced of  $x_0$  or more. Digitalisation reduces service link costs, by enabling the improved coordination of production processes, real-time monitoring of production processes at different locations and rapid exchange of information on changes in demand. This decreases  $AC_2(s)$ , which makes fragmentation profitable even for lower quantities.

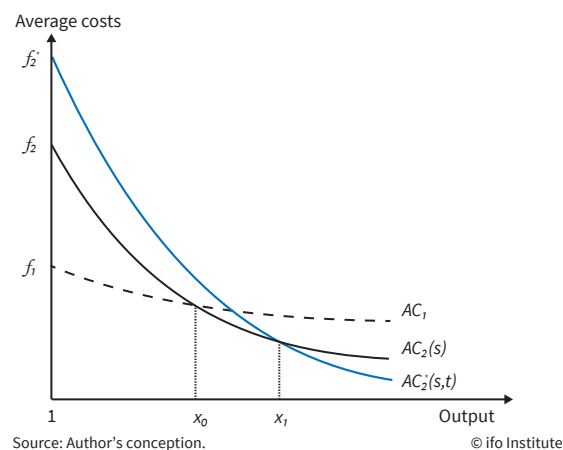
Moreover, by performing international fragmentation (offshoring), the comparative advantages of different location can be used, leading to even more efficient production. As  $AC_2^*(s, t)$  summarizes, this use of comparative advantages through offshoring (implying a steeper run) is associated with higher costs: fixed costs  $f_2^*$  are higher and, in addition to the service-link costs, trade costs  $t$  occur. A firm opts for offshoring if it sells  $x_1$  or more. As digitalisation reduces trade costs, this threshold also decreases.

In summary, digital transformation favours both the national and international fragmentation of value chains. This increases economic efficiency as advantages of specialisation, as well as the comparative advantages of the countries, are used. As a result, the cost savings from digitalisation are greater than initially apparent: an increase in production and organisational efficiency not only leads to direct cost savings, but also offers additional possibilities for further cost reductions that were not feasible before.

### INTERNATIONAL KNOWLEDGE SPILLOVER AND INNOVATION ACTIVITY

The public good character of digital products has a major impact both on international specialisation and on firms' innovation activities, as information distributes very quickly and easily. If external economies of scale prevail, a country's specialisation pattern is path dependent. Productivity depends on the cumulative production experience in an industry, i.e. the more a product has already been produced, the more efficient the industry becomes in its production (Krugman 1987). In addition, the industry may also benefit from foreign experience. However, the influence of these international spill-overs is not as pronounced as that of one's own experience. The path dependency protects the favoured industries from international competition, as the competitors would first have to accumulate sufficient production experience to become dangerous for the industry. However, digital transformation is jeopardizing this comfortable situation by stimulating knowledge spill-overs between the countries. Endangered industries have two options: they intensify their innovation activities to maintain a sustainable technical advantage, which foreign competitors find difficult to catch up. Alternatively, they

Figure 3  
National and International Fragmentation



attempt to evolve from an industry favoured only by path dependency to a core competence industry. Of course, industries can also survive by reducing their production costs in order to benefit from knowledge spill-overs from abroad, at least in the short term. However, this is not a sustainable strategy in the long term, since it only works if there is something to learn, i.e. if foreign industries are innovative.

The innovation process on the firm level is closely linked to product life cycle (Grubel and Lloyd 1975; Vernon 1966). Typically, innovation takes place in developed countries, as they offer the necessary infrastructure and sufficient human capital. The development of a new product causes high costs for the firms that are initially not offset by any sales. Thus, functioning capital markets are an important precondition for innovation. After successful development, the product launch begins, whereby the innovative country is the only production location for the new products. In this phase, consumers are informed and sales increase; in addition, a firm may start to export to its first foreign markets. As there are no real alternatives at this early stage, the price elasticity of consumers is low. In the growth phase, sales begin to increase exponentially, and at the same time, the production experience gained makes it possible to standardise production processes and thus reduce costs. At the same time, consumers are becoming more price-sensitive, which increases the need to reduce costs further and to relocate parts of production to countries with lower production costs. Eventually, the standardisation of production is well advanced and the product sufficiently mature. In this phase, firms from other countries are able to offer cheaper alternatives and to export them to the innovator's market. Trade flows thus reverse, as the country's previous exports now become its imports.

The digital transformation has a considerable influence on the individual phases. International knowledge spill-overs shorten development times, as new technologies disseminate more rapidly and international exchange increases. The price elasticity of consumers will be much more distinct, as the knowledge spill-overs also lead to the development of imitation products at a relatively early stage. The later phases are also shorter, as the accelerated innovation activity speeds up the development of technically better successor products to which consumers quickly adapt their preferences. The intensified competition and associated knowledge spill-overs thus require rapid and sustained innovation by firms.

## **INTELLECTUAL PROPERTY RIGHTS AND CYBERCRIME**

To safeguard their positive contribution to business success, however, innovations must be protected, especially in increasingly digitalised economies (Illing and Peitz 2006). Without protection, it is very likely

that the innovator will only benefit to a limited extent from research, which reduces the incentive for firms to innovate. For this reason, developed countries grant innovators patent protection for a certain period. This allows firms to be the only ones to use the innovation and to generate monopoly profits (Gilbert and Shapiro 1990). However, in order not to jeopardize further innovation, knowledge is published during the patent procedure, which can help other potential innovators to solve certain problems or suggest further applications. As patent protection is only granted in the country for which it was requested, a firm must be aware of which countries or markets are relevant to it. Nevertheless, patent protection is not necessarily a guarantee that innovation is really protected, what matters is how the institutional framework is designed or how strongly the institutions advocate compliance with protection.

In addition to institutional problems, the comprehensive digitisation of important company documents also increases the risk of cybercrime. This includes all criminal activities that employ a computer network at any time (Kshetri 2006). The danger potential of cybercrime is enormous, as access to digital documents is usually possible worldwide. At present, the threat from (international) hackers is not too serious. German companies, for example, stated in surveys that former employees are mainly responsible for data theft, whereby in some cases this is only due to careless handling of company data (Bachmann *et al.* 2015; Kopke *et al.* 2016). Nevertheless, on average every second company in Germany has been affected by data theft (Bachmann *et al.* 2015). As the costs of cybercrime are relatively low (Bartholomae 2018), attacks on smaller and less protected firms are also profitable, although the potential value of the data is definitely lower than that of large companies. In the latter case, attacks on departments responsible for research and development are particularly prevalent (Bachmann *et al.* 2015). The damage caused by cybercrime can endanger a company's existence. While direct costs, such as for the recovery of damaged or destroyed files or ransom demands by criminals, are manageable, indirect costs can be significantly higher – e.g. if competitors gain knowledge of key trade secrets. Thus, it is not surprising that, of all types of crime, plagiarism and patent infringements cause the highest damage (Bachmann *et al.* 2015; Kopke *et al.* 2016).

Since customer relations in particular are based on sensitive data and a loss of or unauthorised disclosure of this data can destroy valuable trust, only one in five companies turns to government agencies after a cyber-attack (Bachmann *et al.* 2015). This, however, aggravates the problem, as it makes it impossible to prosecute the (successful) offenders – i.e. the threat to other companies remains and potential hackers are not deterred. Overall, cybercrime can become a serious threat to the competitiveness of companies, and



thus to the prosperity of a society. IT security and data encryption technology will therefore play an increasingly important role, so that the disadvantages do not outweigh the advantages of digital transformation.

## CONCLUSION

In summary, from an economic point of view, digital transformation has a positive effect on competition. Although the immanent characteristics of information goods, such as network effects in particular, favour the emergence of monopolies, cost reductions also lead to an intensification of (international) competition. In addition to direct cost savings, digital transformation improves production and organisational processes, which increases overall economic efficiency. As digital transformation continues to increase the importance of innovation, (economic) pressure on countries with weak institutions will increase, leading to international convergence. An immediate challenge that can ultimately only be tackled in a global environment is cybercrime. This threatens the existence of companies and thus the prosperity of a society. Since cybercrime is a cross-border problem, international cooperation and the improvement of all prosecuting institutions are indispensable (Bartholomae 2018).

Both society and firms must therefore always be aware of the trade-off between cost reduction and increased efficiency on the one hand, and data security and the need for constructive cooperation between all stakeholders on the other. In other words, for the digital transformation to be successful, pure competition must become cooperative competition (coopetition), in which even competitors who are in strong competition with each other cooperate in fundamental areas like data protection or data security, as this is the only way to safeguard the basis for efficient and sustainable economic development.

## REFERENCES

- Akerlof, G.A. (1970), "The Market for "Lemons": Quality Uncertainty and the Market Mechanism", *Quarterly Journal of Economics* 84, 488–500.
- Armbrust, M., A. Fox, R. Griffith, A.D. Joseph, R. Katz, A. Konwinski, G. Lee, D. Patterson, A. Rabkin, I. Stoica and M. Zaharia, (2010), "A View of Cloud Computing", *Communications of the ACM* 53, 50–58.
- Ba, S., A.B. Whinston and H. Zhang (2000), "Small Companies in the Digital Economy", in: Brynjolfsson, E. and B. Kahin (eds.), *Understanding the Digital Economy. Data, Tools, and Research*, Cambridge, MA: MIT Press, 185–200.
- Bartholomae, F. (2012), "Social Games: Im Netz von Facebook", *Wirtschaftsinformatik & Management* 5/2012, 28–33.
- Bartholomae, F. (2014), "Der Markt für Social Games", *Der Betriebswirt* 2/2014, 23–28.
- Bartholomae, F. (2018), "Cybercrime and Cloud Computing. A Game Theoretic Network Model", *Managerial and Decision Economics* 39, 297–305.
- Bachmann, M., M. Shahd and F. Grimm (2015), *Spionage, Sabotage und Datendiebstahl – Wirtschaftsschutz im digitalen Zeitalter*, Berlin: Bitkom e.V., url: <https://tinyurl.com/bitkom2015>.
- Börsenverein des Deutschen Buchhandels (2018), *Umsatzanteil von E-Books im Publikumsmarkt in Deutschland in den Jahren 2010 bis 2018*, url: <https://de.statista.com/statistik/daten/studie/303339/umfrage/umsatzanteil-von-e-books-im-buchmarkt/>.
- ELSTER (2018), *Anzahl elektronisch übermittelter Einkommensteuerklärungen in Deutschland in den Jahren 2000 bis 2018 (in Millionen)*, url: <https://de.statista.com/statistik/daten/studie/153615/umfrage/elektronische-steuererklarung/>.
- Foray, D. (2004), *Economics of Knowledge*, Cambridge, MA: MIT Press.
- Gilbert, R.J. and D.M.C. Newbery (1982), "Preemptive Patenting and the Persistence of Monopoly", *American Economic Review* 72, 514–526.
- Gilbert, R. and C. Shapiro (1990), "Optimal Patent Length and Breadth", *RAND Journal of Economics* 21, 106–112.
- Grubel H.G. and P.J. Lloyd (1975), *Intra-Industry Trade. The Theory and Measurement of International Trade in Differentiated Products*, London: Macmillan.
- Illing, G. and M. Peitz (2006), "Industrial Organization and the Digital Economy", in: Illing, G. and M. Peitz (eds.), *Industrial Organization and the Digital Economy*, Cambridge, MA: MIT Press, 1–10.
- Jones, R.W. and H. Kierzkowski (1990), "The Role of Services in Production and International Trade: A Theoretical Framework", in: Jones, R.W. and A.O. Krueger (eds.), *The Political Economy of International Trade: Essays in Honor of Robert E. Baldwin*, Cambridge, MA: Blackwell, 31–48.
- Katz, M. and C. Shapiro (1985), "Network Externalities, Competition, and Compatibility", *American Economic Review* 75, 424–440.
- Kondratjew, N.D. (1926), "Die langen Wellen der Konjunktur", *Archiv für Sozialwissenschaft und Sozialpolitik* 56, 573–609.
- Kopke, C., A. Petri, T. Kob, S.M. Sophia, W. Holz, A. Seyerlein-Klug, M. Schulz, A. Geschonneck, S. Kröger and M. Münstermann (2016), *Spionage, Sabotage und Datendiebstahl – Wirtschaftsschutz in der Industrie*, Berlin: Bitkom e.V., url: <http://tinyurl.com/bitkom2016>.
- Krugman, P. (1987), "The Narrow Moving Band, the Dutch Disease, and the Competitive Consequences of Mrs. Thatcher. Notes on Trade in the Presence of Dynamic Scale Economies", *Journal of Development Economics* 27, 41–55.
- Kshetri, N. (2006), "The Simple Economics of Cybercrimes", *IEEE Security & Privacy* 4(1), 33–39.
- Linde, F. (2005), *Ökonomie der Information*, Göttingen: Universitätsverlag Göttingen.
- Linde, F. (2009), "Ökonomische Besonderheiten von Informationsgütern", in: Keuper, F. and F. Neumann (eds.), *Wissens- und Informationsmanagement. Strategie, Organisation und Prozesse*, Wiesbaden: Gabler, 291–320.
- Linde, F. and W.G. Stock (2011), *Information Markets. A Strategic Guideline for the I-Commerce*, Berlin: De Gruyter.
- Melitz, M.J. (2003), "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity", *Econometrica* 71, 1695–1725.
- Morasch, K. and F. Bartholomae (2017), *Handel und Wettbewerb auf globalen Märkten*, 2nd Edition, Wiesbaden: Springer Gabler.
- Nazir, M. (2012), "Cloud Computing: Overview & Current Research Challenges", *IOSR Journal of Computer Engineering* 8, 14–22.
- Nefiodow, L. (1994), "Informationsgesellschaft – Arbeitsplatzvernichtung oder Arbeitsplatzgewinne?", *ifo Schnelldienst* 47(12), 11–19.
- Shapiro, C. and H.R. Varian (1999), *Information Rules. A Strategic Guide to the Network Economy*, Boston, MA: Harvard Business Review Press.
- Shy, O. (2001a), *The Economics of Network Industries*, Cambridge, MA: Cambridge University Press.
- Shy, O. (2001b), *Industrial Organization. Theory and Applications*, Cambridge, MA: The MIT Press.
- Shy, O. (2011), "A Short Survey of Network Economics", *Review of Industrial Organization* 38, 119–149.
- Vernon R. (1966), "International Investment and International Trade in the Product Cycle", *Quarterly Journal of Economics* 80, 190–207.
- Williamson, J.G. (1996), "Globalization, Convergence, and History", *Journal of Economic History* 56, 277–306.

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# Converging Media versus Diverging Politics - the Brexit Twitter on Debate

## INTRODUCTION

In the public referendum held on 23 June 2016, 52 percent of the British electorate that turned out voted for Britain to leave the European Union. After the referendum, a new government formed around Prime Minister Theresa May and started preparing for negotiations with the EU. Although finally triggering Article 50 on 29 March 2017 and thus kicking off a two-year negotiation period, Theresa May called new elections at short notice to get a clearer Brexit negotiation mandate. Unfortunately, the poor election outcome for the government did not result in a clear mandate for the Brexit negotiations, but in a 'hung parliament', forcing the Tories into a coalition with the EU skeptical Northern Irish Democratic Unionist Party (DUP).

Furthermore, when negotiations began, it turned out that the British government had not come up with convincing answers to pressing questions like the green border in Ireland and the future trade regime with the EU. Although the negotiation period is slowly coming to an end and Britain will leave the EU - most probably in a transition period - no significant progress has been observed yet and the specter of a 'hard Brexit' leaving Britain with no institutional relationship with the EU continues to loom large.

The uncertainty resulting from the unsuccessful negotiations is partially reflected in public opinion on Brexit. In June 2018, 69 percent of the British believed Brexit was going badly *versus* only 16 percent who believed it was going well. Interestingly, a large majority of both remain (77 percent) and leave (58 percent) voters would blame the British government if Brexit did indeed turn out badly (YouGov 2018a). Another recent poll caused a stir with its estimate that 112 constituencies have switched from Leave to Remain, adding up to 53 percent of the votes for the Remain side. In Scotland and Wales, the majority of voters would also prefer Britain to remain a part of the EU (The Guardian 2018a). Only 21 percent of the respondents of a Deltapoll poll believe that

a hard border in Northern Ireland will be avoided (Deltapoll 2018). Moreover, 43 percent of the respondents of a YouGov poll in Scotland believe Brexit will make it more likely that Scotland leaves Britain - *versus* only 6 percent who think Scottish independence is less likely (YouGov 2018b).

In line with current research (Amador *et al.* 2017; Beauchamp 2017; Gorodnichenko *et al.* 2018; Grčar *et al.* 2017), this paper analyses twitter content as a proxy for the political and public debate. By applying a machine learning algorithm, we highlight textual and content-related changes in the public debate over time and build a Naïve Bayes classifier that sorts out key actors' tweets on a Leave-Remain scale. The classifier is trained by all tweets of the official Twitter accounts of the Remain and Leave campaigns, which remained active from the pre-referendum period until summer 2018. We identify an increasing approval rate for the Remain side in the media; and a further divergence on the Brexit topic between different politicians in recent months.

## DATA DESCRIPTION AND METHODOLOGY

Providing a platform where users can publish brief statements - 'tweets' - and engage in public conversation, Twitter has become an increasingly important factor of public debate across the world (Eltantawy and Wiest 2017; Khatua and Khatua 2016). With the number of active Twitter accounts rising significantly in recent years, from 30 million monthly users in 2010 to 335 million in early 2017, the website's online conversations are bound to take on added political and social importance in coming years (Twitter 2018). Twitter usage has also ballooned among politicians everywhere: 90 percent of Members of Parliament in Britain now have an official Twitter account. This direct access bypasses gatekeepers who control content in a traditional media setting and allows influential persons with large networks to create digital echo chambers (Engesser *et al.* 2016; Ott 2017; Pariser 2011).

A Tweet's limit of 280 characters forces the user to get their point across concisely. There is little room for digression or verbosity, and users must include specific hash-tags, use well-known terminology, or mention specific other users to effectively engage and spread their beliefs. Thus, the individual words or hash-tags must have more rhetorical weight than an individual word in a speech or an article. This suggests that Twitter data and word-choice could be effectively used in a discrete, statistical model to determine opinion or sentiment.

Past work, especially on the Brexit debate, has managed to effectively classify Twitter data using the word choice or the hashtags present in a tweet: Khatua and Khatua (2016) built a rule-based classification algorithm looking at hashtags that were particular to one side of the Brexit debate, such as '#VoteLeave'



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or ‘#StrongerIn’. However, other research has shown that words outside of such hashtags can provide information that is useful for predicting political opinion (Amador *et al.* 2017).

By creating a Remain-Leave classifier, our paper builds upon the existing literature and looks at tweets specifically from the Leave and Remain campaigns’ official Twitter accounts, ‘Leave.eu’<sup>1</sup> and ‘Open Britain’<sup>2</sup> between January 2016 and July 2018. These are the only two official Twitter accounts that have remained active long after the referendum. We use these tweets for our training data as instances of particularly opinionated text because they come from the official accounts of the respective campaign movements.

Our features – the variables for our further analysis – are textual unigrams, bigrams, and trigrams. This allows us to catch individual hashtags as well as phrases, such as ‘Take back control’, a typical refrain for the Leave campaign. There were a total of 6,070 tweets from the Open Britain campaign’s account, with 371,770 total features, 164,820 of which were unique. Leave.eu tweeted more frequently, with a total of 8,369 tweets and 454,152 features, with 220,172 of them unique.

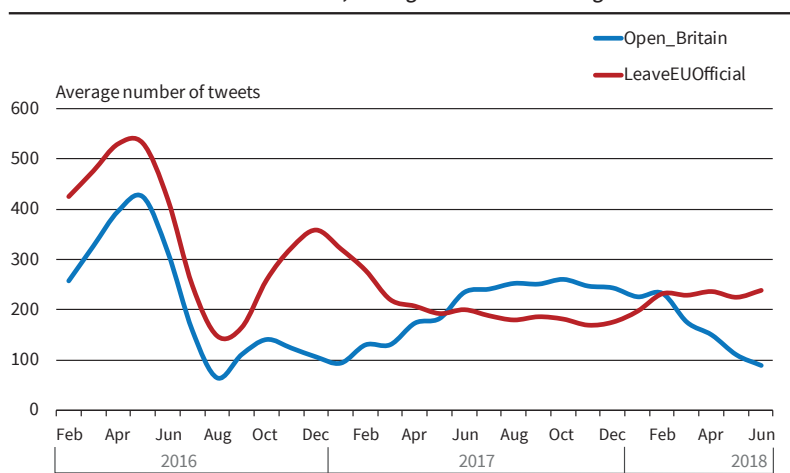
Leave.eu tweets more frequently than Open Britain for most of our time period. Figure 1 shows a graphical representation of the moving average of monthly tweets over time. Notably, there is a period of several months in 2017, centered on the general election in June 2017 and its aftermath, in which Open Britain is more active than Leave.eu. Given that our dataset extends well beyond the referendum, we are able to isolate particular sections of time and explore how the conversation changes.

In line with the analysis restricted to hashtags from Khatua and Khatua (2016), we find that the conversation does vary significantly during substantial

<sup>1</sup> @leaveeuofficial.

<sup>2</sup> @Open\_Britain.

Figure 1  
Tweets from the Accounts over Time, Rolling Three Month Average



Source: Twitter; authors' own representation.

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changes in the geopolitical context over the years and months.<sup>3</sup> We identify strong changes in the debate both after the referendum in June 2016 and after the general election in June 2017. Figure 2 shows word-clouds for the most significant words for the classifier during these specific time periods. We calculate these words by finding the features that have the greatest probabilistic difference over our binary Naïve Bayes classifier. Words that are larger in the pictures have a greater effect on the classification.

The changes in these words reflect the evolving political situation. Before the referendum, a great deal of effort was spent on campaigning and spreading a common message. Thus, both parties use their characteristic hashtags – #VoteLeave and #LeaveEU for the Leave campaign and #strongerin for the Remain campaign. After the referendum the content-related Twitter discussion, especially on the Leave side, was replaced by references to people who agree with Brexit. Leave.EU devotes a good deal of coverage to Trump’s similarly-populist campaign in the United States, which, after all, had attracted Nigel Farage to campaign with him. After the election Open Britain launched a new wave of campaigning and began to push ‘#peoplesvote’ and focus on ensuring that the final deal is not a hard Brexit by demanding that the best possible deal be negotiated to keep Britain open to the EU.

In general, for Open Britain, the economic impact is stressed; the EU presumably offers opportunity, lower prices, and more jobs, while leaving it would bring risk and injury. For the Leave campaign, problems created by the EU are stressed, including references to Greece, the unpopular TTIP deal, and various crises in the Eurozone; and specifically migration. Overall, the Remain campaigned appealed to reason more than emotion. Even although Leave.EU tweeted more frequently than Open Britain, the words ‘would’ and ‘could’ appear 144 times in Open Britain tweets, over twice as often as the 67 appearances in Leave.EU

tweets. The word ‘expert’ and ‘analysis’ appear 30 times in Open Britain Tweets before the referendum and only 4 times in Leave.EU tweets.

### Classifying Data

We use our classifier over the tweets of players present in the Twitter debate. We have three groups of data in our analysis. The first group is tweets from individual politicians. We looked at all

<sup>3</sup> What is more, Gorodnichenko *et al.* (2018) find that dissemination in the Brexit twitter debate runs particularly fast, with reactions news taking just 1–2 hours.



Figure 2  
Evolution of Important Features in Pictures

A) Before the Referendum



B) From the Referendum to the General Election in 2017



C) From the General Election in 2017 to 1 August 2018



Source: Twitter; authors' own representation.

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the most frequently used 'key' words not specific to one of the campaign sides within the Brexit twitter debate: 'EU', 'Article 50', 'Referendum', 'Brexit', 'a50', 'peoplesvote', 'ukip', 'single market', 'trade deal', and 'final deal'. However, there are noticeable areas where some relevant tweets might be missed or irrelevant tweets admitted, such as tweets concerning referenda in Scotland or trade deals outside of the Brexit negotiations. We looked at various users, including Boris Johnson, Andrea Leadsom, Theresa May, Gisela Stuart, Nigel Farage, and many others. Some accounts, however, tweeted relatively infrequently about Brexit, making our results sporadic and potentially unrealistically extreme. Aggregating the accounts of like-minded individuals helps to overcome this issue.

In a second step, we try to map traditional media's positioning on Brexit. From the United States we know that both newspaper subscription (Gerber *et al.* 2009) and television supply influence political knowledge (Gentzkow *et al.* 2006) and decision making (DellaVigna and Kaplan 2007). In the Brexit debate, several newspapers have taken strong pro-Brexit positions

and even applied populist techniques designed to incite the pure people's will against a corrupt elite (Freeden 2016). Because many users follow the Twitter accounts of traditional media sources and because those accounts tend to mirror the opinion of the media source, we consider these media sources' Twitter activity relevant for the public debate. In Britain in particular, newspapers engaged in the public debate around Brexit. Only the six newspapers included in our analysis tweeted 26,198 times with reference to Brexit between January 2016 and June 2018. For the sake of comparability with politicians' tweets, we ignore newspapers' original articles that may use words completely different to those used by players on Twitter, which would make our training data less relevant. We define tweets about Brexit as those that contain our key words. We looked at various national and local papers, including the Guardian, the Independent, the Sun, the Irish News, and Wales Online.

Lastly, we used the data-

base on the 'MPs on Twitter' website, which stores and describes the Twitter use of British parliamentarians, to find tweets by parliamentarians grouped by party. We looked at all tweets tagged by that website as concerning 'Brexit' and the 'EU'. We particularly focused on the Conservative, Labour, and Liberal Democrats parties (mpsontwitter).

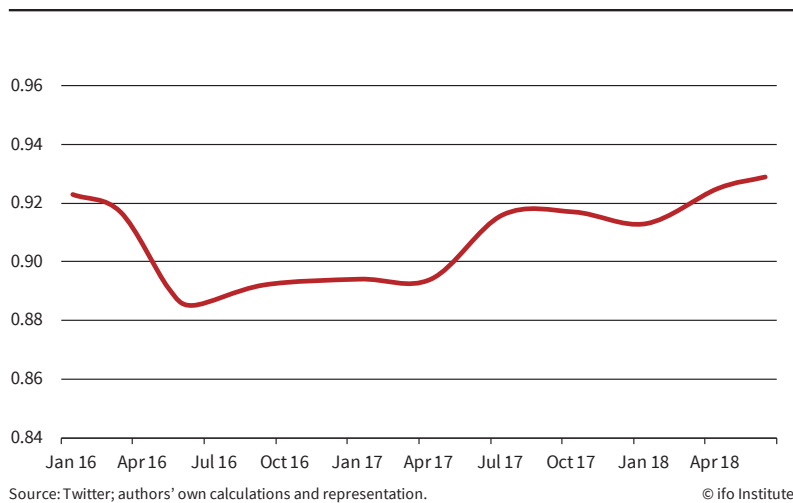
## MODEL

To train and build our model, we isolated a specific section of time and only looked at tweets in that window. However, we ensured that we had at least 1,000 tweets to train on in any given window. Hence, neither the length nor the specific end dates of the respective window are fixed. We removed all stop-words from our texts.<sup>4</sup>

We employ cross-validation as a preliminary step in testing our model. Our model classifies 91.6 percent of all tweets correctly. Interestingly, the model is slightly better at classifying tweets from Leave.eu; its accuracy in classifying tweets from Leave.eu is

<sup>4</sup> To do this, we used Python's NLTK library (Bird *et al.* 2009).

Figure 3  
Accuracy over Time



92.9 percent, while its accuracy in classifying tweets from Open Britain is 89.9 percent. Over time, we see that this cross-validation accuracy maintains itself. Figure 3 shows the accuracy of our classifier for both sides over time. We see it is always within 2.5 percent of our total accuracy. Noticeably, we see the accuracy decreases after the referendum, when there was less to campaign on and then increases later, as Brexit moved into the political dialogue. These accuracy rates are in line with Amador *et al.* (2017), who use a multinomial Naïve Bayes classifier on a similar training set.<sup>5</sup>

There are risks that we over-fit the particular Twitter accounts in our training method. Given that we only look at the two campaigns and there are probably only a small number of authors tweeting, there are probably stylistic preferences that are coded into our classifier. Thus, if another actor tweets with a similar style to one of our accounts, our model might classify that actor accordingly, regardless of the actor's opinion. To get around this issue, we employ another method of looking at the results of our classifier. Because we have smaller amounts of training data that might feature major differences caused by different styles or vocabulary, we look at actors relatively. Thus, we can run the tweets of two actors through our classifier and see which one lines up relatively more with Leave.eu or with Open Britain. Using these tendencies to align rhetorically with one side or the other as a proxy for political opinion on the issue, we can make a quantitative representation of the scale of political opinion among actors.

More specifically, we downloaded the Brexit tweets of all members of parliament on Twitter. We then classified all of these comments using our Naïve Bayes classifier. To account for changes in style and

<sup>5</sup> Although we could have achieved a higher cross-validation accuracy using another e.g. nonlinear model, such as a SVM, this would risk overfitting the data and would prevent us from examining the relative importance of particular features in our classification.

vocabulary over time when we classify other actors' tweets, we normalize their results by dividing them by the results of all classified parliamentary tweets over the same time window. Thus, we can see a relative difference in rhetoric between the actor and the parliament during a certain window. This difference can be used as a proxy for respective deviation of a political opinion from all parliamentarians.

## RESULTS

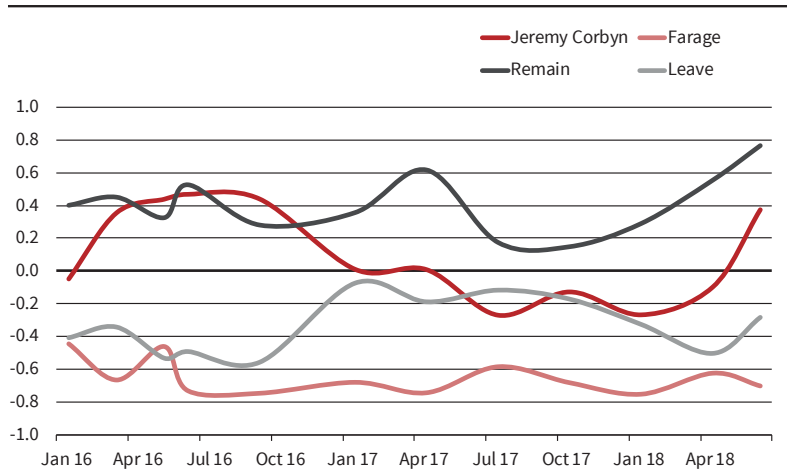
In order to justify our model beyond cross-validation, we will look at specific actors and their classification under our model. Firstly, to show a relative difference, we will take the total tweets from four pro-EU MPs and four Brexiteer MPs.<sup>6</sup> Figure 4 depicts our results. We see that our model classifies tweets from Remain MPs as consistently closer to Open Britain than tweets by Brexiteer MPs.

However, there are still limitations to our model. Such analysis only makes logical sense when looking at actors in relation to one another. For example, we see those Brexiteer MPs are classified more closely to Open Britain in early 2016 than the average of all parliamentarians. However, this data point is from a time when the referendum was just being announced, before campaigning really got off the ground, and the rhetoric was still in flux. In this time period, even the feature 'Brexit' is a strongly weighted pro-Brexit feature, because the term had not yet achieved great popularity. As time goes on, however, we see the expected trend: pro-EU MPs are classified as pro-EU more than the average parliamentarian, and Brexiteer MPs are classified as pro-Brexit more than the average parliamentarian. In general, consistently over time the Leave Twitter output is closer to the average parliamentarians tweets than the Remain group. This could be due to the average parliamentarians tweeting being more pro-Brexit or because the Remain group is more radical in their tweets than its Leave counterpart.

Nigel Farage, who was a chief proponent of the Brexit cause, can be interpreted to be the far out pro-Brexit boundary. Figure 4 shows that this holds with our quantitative analysis. Farage's tweets are always classified more often as pro-Brexit than those

<sup>6</sup> The pro-EU MPs were Anna Soubry, Chuka Umunna, Chris Leslie, and Steven Doughty. They tweeted a total of 4,231 times. The Brexiteer MPs were Gareth Snell, Gloria De Piero, John Redwood, Kate Hoey, Gisela Stuart, and Sammy Wilson. They tweeted a total of 1,981 times. They were chosen for being particularly involved in the Brexit debate and not being involved in Theresa May's cabinet or having other ties that might have swayed their opinion after the referendum.

Figure 4  
Normalized Classification of Grouped Tweets over Time<sup>a</sup>



<sup>a</sup> Unfortunately, Theresa May did not tweet enough in the respective windows to have her Tweets being interpreted as her stance on Brexit.

Source: Twitter; authors' own representation.

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of pro-EU MPs, parliament as a whole, and even than those of other Brexiteer MPs. The one notable exception is the data point immediately after the referendum, when Farage is classified slightly more frequently as pro-EU than other Brexiteer MPs. However, this could result from a congruence of rhetoric from the Leave Campaign immediately before and after the referendum. Later on, however, Farage is always classified as a more hardline Brexiteer than his parliamentary comrades. Thus, we conclude our model effectively captures the relative opinion of individual actors and aggregated groups.

An interesting case is Jeremy Corbyn. Historically sceptical about the merits of the European Union, there have been questions regarding the minister's true stance on the EU and the Brexit referendum (Moseley 2016). However, Corbyn supported 'remaining' in the EU during the referendum. After the referendum, the Labour leader and his party went dark on the issue. There were calls across the British media for the party to describe their approach and perspective on the negotiations more thoroughly (Norman 2017; The Guardian 2018b). Instead of offering a hard opinion on one side or the other, Corbyn seemed to play the middle. Vague statements and consistent pushing back against May's government has led Europhile reporters to say Corbyn has finally 'seen the light' and declared his support for a soft-Brexit, while also placating hardliners by rejecting the Single Market and the European Economic Area (Toynbee 2017; Pickard *et al.* 2018). He advocated staying in the Customs Union, which provides 'a position for proponents of a softer Brexit and those still in favour of no Brexit' (Cooper and Mctague 2018). At the Labour Party's Annual Conference in 2018 he repeated this argument, but without endorsing the Remain side. On the whole, Corbyn's policy seems designed not as a solid and applicable European policy, but as a route to snatching support from both hard Brexiteers and

the pro-EU sympathizers away from Theresa May.

Our results reflect Corbyn's long ideological journey through the Brexit debate: his Twitter rhetoric matches pro-EU MPs for the months leading to the referendum. However, after the referendum, his Twitter presence fell more into line with that of Parliament; and even became closer to that of Brexiteer Ministers. Much like the rhetoric of Theresa May and other government officials, Corbyn focused on ensuring he would make Brexit as good as possible for the British

people. His tweets included protests against May's 'chaotic Brexit', that the British people voted 'to refinance the NHS', and calls for 'a Brexit that is in the interests of the whole country' (Corbyn 2017a, 2017b and 2017c). He made a conscientious effort to accept the results of the referendum. This rhetoric falls into line with the boasting of Leave.EU, while Open Britain still worried about softening out Brexit as much as possible. The tide turns again during summer 2018, when Corbyn's Twitter activity is tracked towards being more pro-EU, even than that of parliament as a whole. This could be a result of his new commitment to a custom's union, or he could be tacking onto the winds of public opinion as polls shift across Britain.

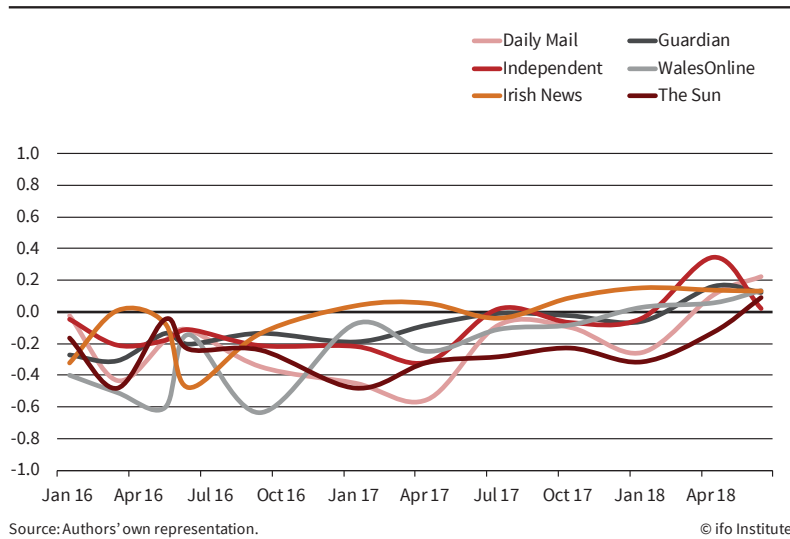
Figure 5 shows the same classification technique applied to the tweets of various newspapers. Much of the pattern is to be expected. The Guardian and the Independent are classified generally as more pro-EU than the Sun and the Daily Mail.<sup>7</sup> When looking at local newspapers, an interesting pattern emerges. The Irish News is generally classified as more pro-EU than other newspapers. Before the referendum, WalesOnline is classified as generally more pro-Brexit. This falls into line with regional opinion on Brexit: Northern Ireland voted to remain, whereas Wales voted for Brexit.<sup>8</sup>

Interestingly, when looking at all newspapers together, there is a general turning away from pro-Brexit sentiment. Relative to all parliamentarians, every newspaper has become progressively more aligned with Open Britain in recent months. As the polls have become more favourable to the European Union, this

<sup>7</sup> The Guardian and The Independent both supported remaining in the EU during the referendum. The Daily Mail and The Sun supported exiting the EU.

<sup>8</sup> A notable exception is the Irish newspaper The Belfast News Letter, which often has an ideological stance in line with the Democratic Unionist Party (DUP), a notably Brexiteer party (O'Toole 2018). Thus, the representation of the media debate in Figure 5 can only be interpreted as a snapshot of the heterogeneous British media landscape.

Figure 5  
Newspaper Bias over Time



perhaps has a very legitimate effect on the rhetoric of the newspapers on Twitter, as their stances may have changed along with that of the population.

Figure 6 shows the process of classification described above as applied to three political parties: Conservatives, Labour, and Liberal Democrats. These are three of the biggest parties in the current UK parliament and produce the most tweets.<sup>9</sup> It can be noted that the Twitter activity of the Conservative party tends to be more pro-Brexit, whereas Labour tends to be more pro-EU. These are unsurprising results given that a far greater share of Labour MPs (95 percent) than Conservative MPs (58 percent) voted to remain in the EU in the referendum (Bloom 2016). Similarly, it is unsurprising that the Liberal Democrats appear to consistently be the most pro-EU, as a cornerstone of the current platform is to guarantee a second referendum on the final Brexit deal, and they openly declare 'Britain is better off in the EU' (Liberal Democrats 2018).

Interestingly, all parties seem to condense together during the General Election in July 2017. All three parties pinch right around the average of parliament as a whole, before branching off again afterwards. This could signify that all parties softened their stances in an effort to strengthen their presence in parliament, as the electorates' wishes have never been parti-

<sup>9</sup> The Conservatives have 316 seats in Parliament and contribute 21,782 tweets to our analysis. Labour has 258 seats and 30,878 tweets. The Liberal Democrats have 12 seats and account for 3,151 tweets (Twitter; UK Parliament)

cularly stable in any region and the median voter is suspected to be fairly undecided, and even indifferent about Brexit in some cases.

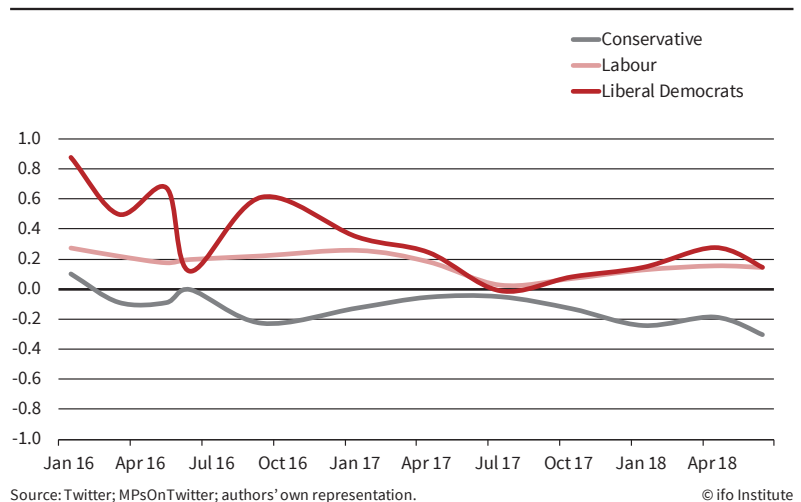
**CONCLUSION**

The damage might already have been done. With recent polls showing increases in support for a people's vote on the final Brexit deal,<sup>10</sup> which has given Open Britain its first major hashtag since before the referendum, patience with the Brexiteer faithful seems to be waning (YouGov 2018c). The general rhetoric coming out of the newspapers seem

to be more closely aligned with that of the Remain campaign as time goes by – the same holds for Jeremy Corbyn's tweets. Interestingly, however, this does not seem to be reflected in the parliamentary debate. After the parliament debate returned to a level consistent with the period prior to the election in our classification results, we see the parties retain a strong degree of the division that they always demonstrated. Significant differences between the Conservatives, Labour, and the Liberal Democrats remain over Brexit. In fact, despite a little push back in spring 2018, when Conservatives became slightly less pro-Brexit than they had previously been, this division now seems to be widening. Given our analysis and classification technique, it seems that the UK Parliament and the political campaigns are drifting away from other sources of debate: they are diverging from the opinions expressed in news-

<sup>10</sup> A July 2018 YouGov poll found 42 percent of Britons favour a second referendum, while 40 percent do not.

Figure 6  
Classification of Parties over Time





papers and polls, as well as showing internal divisions.

Our model has developed a quantitative way to determine where the public debate stands relative to the various sides in it and the main actors in the campaign. We can look at individual actors across the political field through their Twitter accounts and see how they develop over time. When combined with qualitative analysis to determine and explore the causes and machinations behind our results, we are able to discover and better understand large-scale trends in the rhetoric of these various players.

## REFERENCES

- Amador Díaz Lopez, J.C., S. Collignon-Delmar, K. Benoit and A. Matsuo (2017), "Predicting the Brexit Vote by Tracking and Classifying Public Opinion Using Twitter Data", *Statistics, Politics and Policy* 8, 85–104.
- Barberá, P. and G. Rivero (2015), "Understanding the Political Representativeness of Twitter Users", *Social Science Computer Review* 33, 712–729.
- Beauchamp, N. (2017), "Predicting and Interpolating State-Level Polls Using Twitter Textual Data", *American Journal of Political Science* 61, 490–503.
- Bird, S., E. Loper and E. Klein (2009), *Natural Language Processing with Python*, Newton, MA: O'Reilly Media Inc.
- Bloom, D. (2016), "How Did My MP Vote in the EU Referendum?", *Mirror*, <https://www.mirror.co.uk/news/uk-news/how-mp-vote-eu-referendum-9187679>.
- Cooper, C. and T. Mctague (2018), "How Jeremy Corbyn Changed Britain's Brexit Landscape", *Politico*, <https://www.politico.eu/article/jeremy-corbyn-changed-britains-brexit-landscape/>.
- Corbyn, J. (2017a), <https://twitter.com/jeremycorbyn/status/820933010317053954>, 16.01.2017, Tweet.
- Corbyn, J. (2017b), <https://twitter.com/jeremycorbyn/status/819506429711286272>, 12.01.2017, Tweet.
- Corbyn, J. (2017c), <https://twitter.com/jeremycorbyn/status/818850965965144064>, 10.01.2017, Tweet.
- DellaVigna, S. and E. Kaplan (2007), "The Fox News Effect: Media Bias and Voting", *Quarterly Journal of Economics* 122, 1187–1234.
- Deltapoll (2018), *Sun on Sunday Political Landscape Poll*, <http://www.deltapoll.co.uk/wp-content/uploads/2018/08/SOS-website-post.pdf>.
- Eltantawy, N. and J. Wiest (2017), "Social Media in the Egyptian Revolution: Reconsidering Resource Mobilization Theory", *International Journal of Communication* 5, 1207–1224.
- Engesser, S., N. Ernst and F. Esser (2016), "Populism and Social Media: How Politicians Spread a Fragmented Ideology", *Information, Communication & Society* 20, 1347–1364.
- Freedon, M. (2016), "After the Brexit Referendum: Revisiting Populism as an Ideology", *Journal of Political Ideology* 22, 1–11.
- Gentzkow, M. (2006), "Television and Voter Turnout", *Quarterly Journal of Economics* 121, 931–972.
- Gerber, A.S., D. Karlan and D. Bergan (2009), "Does the Media Matter? A Field Experiment Measuring the Effect of Newspapers on Voting Behavior and Political Opinions", *American Economic Journal: Applied Economics* 1, 35–52.
- Gorodnichenko, Y., T. Pham and O. Talavera (2018), *Social Media, Sentiment and Public Opinions: Evidence from #Brexit and #USElection*, Working Papers 2018-01, Swansea University, School of Management.
- Grčar, M., D. Cherepnalkoski, I. Mozetič and P. Novak (2017), "Stance and Influence of Twitter Users, Regarding the Brexit Referendum", *Computational Social Networks* 4:6.
- Khatua, A. and A. Khatua (2016), *Leave or Remain? Deciphering Brexit Deliberations on Twitter*, Conference Paper: 2016 IEEE 16th International Conference on Data Mining Workshops (ICDMW), 12–15 December.
- Liberal Democrats (2018), *Protect Britain's Place in Europe*, <https://www.libdems.org.uk/europe-policy>.
- Moseley, T. (2016), "In Quotes: Jeremy Corbyn and the EU Referendum", *BBC*, <https://www.bbc.co.uk/news/uk-politics-eu-referendum-35743994>.
- Mpsontwitter.co.uk (2018), *MPs on Twitter.co.uk*, <https://www.mpsontwitter.co.uk/>.
- Mudde, C. (2007), *Populist Radical Right Parties in Europe*, New York: Cambridge University Press.
- Norman, M. (2017), "Rumour Has It That Jeremy Corbyn Has Changed His Mind about Brexit", *Independent*, <https://www.independent.co.uk/voices/kezia-dugdale-im-a-celebrity-get-me-out-of-here-jungle-jeremy-corbyn-brexit-changed-his-mind-a8076806.html>.
- O'Toole, M. (2018), "It's Time for the DUP to See Sense on Brexit", *Politico*, 17 March, <https://www.politico.eu/article/northern-ireland-brexit-dup-customs-opinion-its-time-for-the-dup-to-see-sense-on-brexit/>.
- Ott, B. (2017), "The Age of Twitter: Donald J. Trump and the Politics of Debasement", *Critical Studies in Media Communication* 34, 59–68.
- Pariser, E. (2011), *Filter Bubble – What the Internet Is Hiding from You*, New York: Penguin.
- Parliament of the United Kingdom (2018), *Current State of the Parties*, <https://www.parliament.uk/mps-lords-and-offices/mps/current-state-of-the-parties/>.
- Pickard, J., G. Parker and L. Hughes (2018), "Pro-EU Tory Faction to Join Labour on Brexit in Threat to May", *Financial Times*, 26 February, <https://www.ft.com/content/44558030-1ae8-11e8-aaca-4574d7dabfb6>.
- The Guardian (2018a), *More Than 100 Seats That Backed Brexit Now Want to Remain in EU*, 12 August, <https://www.theguardian.com/politics/2018/aug/11/more-than-100-pro-leave-constituencies-switch-to-remain>.
- The Guardian (2018b), *The Guardian View on Labour and Brexit: Too Timid, Too Tactical*, 8 June, <https://www.theguardian.com/commentisfree/2018/jun/08/the-guardian-view-on-labour-and-brexit-too-timid-too-tactical>.
- Toynbee, P. (2017), "Corbyn Has Seen the Light on Brexit. Now He's Taking the Fight to the Tories", *The Guardian*, <https://www.theguardian.com/commentisfree/2017/nov/23/jeremy-corbyn-brexit-tories-labour-eu>.
- Twitter (2018), *Selected Company Metrics and Financials*, [http://files.shareholder.com/downloads/AMDA-2F526X/6344627873x0x982957/0BC2B4F-09C1-48C0-AF8D-BFC8C37975FE/Q2\\_2018\\_Selected\\_Company\\_Metrics\\_and\\_Financials.pdf](http://files.shareholder.com/downloads/AMDA-2F526X/6344627873x0x982957/0BC2B4F-09C1-48C0-AF8D-BFC8C37975FE/Q2_2018_Selected_Company_Metrics_and_Financials.pdf).
- YouGov (2016), *YouGov Survey Results*, [https://www.ucu.org.uk/media/8436/YouGov-Brexit-HE-bill-survey/pdf/YouGov\\_survey\\_Brexit\\_HE\\_Bill.pdf](https://www.ucu.org.uk/media/8436/YouGov-Brexit-HE-bill-survey/pdf/YouGov_survey_Brexit_HE_Bill.pdf).
- YouGov (2018a), *YouGov Survey Results*, [https://d25d2506sfb94s.cloudfront.net/cumulus\\_uploads/document/e2modksu0/InternalResults\\_180628\\_Brexit\(excluding%20DKs%20answers\)\\_w.pdf](https://d25d2506sfb94s.cloudfront.net/cumulus_uploads/document/e2modksu0/InternalResults_180628_Brexit(excluding%20DKs%20answers)_w.pdf).
- YouGov (2018b), *Peoples Vote Campaign Results*, [https://d3n8a8pro7vhm.cloudfront.net/in/pages/15389/attachments/original/1534338044/Scotland\\_180814.xls?1534338044](https://d3n8a8pro7vhm.cloudfront.net/in/pages/15389/attachments/original/1534338044/Scotland_180814.xls?1534338044).
- YouGov (2018c), *YouGov / The Times Survey Results*, [https://d25d2506sfb94s.cloudfront.net/cumulus\\_uploads/document/h8fq3xim2u/TimesResults\\_180726\\_SecondReferendum\\_w.pdf](https://d25d2506sfb94s.cloudfront.net/cumulus_uploads/document/h8fq3xim2u/TimesResults_180726_SecondReferendum_w.pdf).



Clemens Fuest and Hans-Werner Sinn

# Target Risks without Euro Exits



Clemens Fuest  
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Hans-Werner Sinn  
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Jens Weidmann (2018)

*“Additional central bank money is created when the central banks grant credit to solvent banks against collateral or, for example, buy government bonds.*

*The questions here are:*

*Are the securities sufficient? Are the banks sufficiently solvent? Are the states whose bonds are being bought creditworthy? That is the core of the monetary risks”.*

German Council of Economic Experts (2018),  
p. 186, Box 6

*“As long as no member state leaves the euro area, the TARGET2 claims are not subject to any default risk”.*

The Bundesbank’s Target claims arose as a result of its enforced lending to other European central banks based on Eurosystem rules. Today, it is undisputed that these claims are at risk if Target debtors leave the Eurosystem. But what about the Target risks if the euro continues to exist with all members? This article shows that Target balances imply real risks for creditor countries even if no one leaves, and it presents various ways of limiting the balances. These limitations would not impair the functioning of the monetary union and the common capital market; in fact, quite the opposite is true.

## PRELIMINARY REMARKS: EXIT RISKS AND CREDIT QUALITY OF TARGET BALANCES

In the summer of 2018, there was an internal debate, moderated by Carl Christian von Weizsäcker, among a large number of economists about the Bundesbank’s Target claims, sparked by these claims hitting almost 1,000 billion euros (976 billion) by the middle of the year. The central issue was the view that the Target balances of national central banks (NCBs) were irrelevant clearing items rather than credit. It had been claimed that nothing would happen if these balances were cancelled after a country left the Eurosystem.<sup>1</sup>

<sup>1</sup> The discussion took place under Chatham House rules. As a result, we can only report on the content, insights shared and points raised during the discussion, but cannot link individuals to them. We only name individuals here if they have published their opinion. In this context, please see the controversial discussion of the problem

This position has now proven untenable, as the discussion has clarified two key points: firstly, Target balances are not irrelevant clearing items, the cancellation of which would have no consequences for the other countries if one member state were to withdraw from the Eurozone:

*Statement I. Target liabilities imply an exit risk because, in exchange for Target claims, goods and assets like shares, real estate and domestic bank accounts have come into foreign possession, and marketable claims from existing debt relationships have been returned to the debtors. If a debtor country exits or the euro breaks up, the creditor countries will presumably never be able to realise countervailing transfers of such goods and assets.*

Secondly, it emerged that Target balances do indeed measure loans between NCBs, a fact that had often been denied, because the net payment orders between NCBs reflected in the balances implied an opposite public capital flow between the NCBs, much like any payment order between private banks within a country implies an opposite private capital flow from the bank carrying out the order to the bank making it. Since the counter-directed public capital flow between the NCBs resulting from cross-border payment orders does not imply the transfer of existing assets (e.g. NCBs’ bank deposits with the Eurosystem, which are non-existent) between these NCBs, the NCBs grant each other overdraft credit by carrying out the transfers.

*Statement II. The Bundesbank’s Target claims result from the granting of credit through the Eurosystem to other central banks, which is implied by the rules of the Eurosystem. Therefore, it is not only right, but also necessary in terms of properly informing the public, to speak of ‘Target credit’ or ‘overdraft credit’ which other central banks have obtained from the Bundesbank and other central banks with surplus balances via the Eurosystem.*

It is true that, in the event of a cancellation of the Target debt of an individual country, the consequences for Germany are independent of the level of German Target claims. Germany would always participate in the defaults to the extent of its ECB capital share. Thus, it is particularly important, as far as limited default scenarios are concerned, to focus on countries with large Target liabilities. Nevertheless, one must reckon with the fact that Germany’s high Target claims in a default scenario would lead to the demand that Germany should participate disproportionately in the defaults. For this reason – and not only because of the risk of the Eurozone breaking up as a whole – the high level of German Target claims represents a special political risk for the Federal Republic of Germany.

by Hellwig (2018), Sinn (2018a, 2018b and 2018c) and Westermann (2018). See Sinn (2014) for a general discussion of the issues involved, and Sinn and Wollmershäuser (2012) for an original discussion of the Target problem in a balance-of-payments framework, see also Homburg (2012).

We are aware that public authorities often use pacifying language when communicating Target risks to avoid upsetting the public. For example, it is said that Target balances are ‘only symptoms’ of deeper problems that represent the actual risks. There is not much to say about such semantics, except that they are nebulous and we do not intend to get involved in this discussion.

The so-called banknote liabilities merit a further preliminary remark. Like the Target balances, disproportionately high and low cash disbursements by NCBs imply additional liabilities and claims booked on balance sheets.<sup>2</sup> If a NCB issues a disproportionately large amount of banknotes, the assumption (which cannot be directly verified, of course) is that the extra cash moves from its home state to other countries, where it is used to acquire goods and assets. For this reason, the German Target claims must be netted with the German liabilities from a disproportionately high amount of banknote issues, which amounted to 379 billion euros by mid-2018. This way of booking the extra banknotes issued is economically advisable if the hypothesis that it actually goes to other countries is correct. It does not, of course, apply under any other circumstances. In this article we assume that this hypothesis is correct in order not to complicate the situation excessively and to focus on the far more important Target issue.

### TARGET RISKS WITHOUT EURO EXITS: OUR FINDINGS

We are concerned here with the role of Target balances in the collapse of a national payment system that could lead to the insolvency of a national central bank. It has repeatedly been claimed in the press and elsewhere that Target balances between national central banks are not a risk for Target creditors if the euro remains unchanged.<sup>3</sup> The German Council of Economic Experts (2018) also shares this view.<sup>4</sup> It is also often argued that a central bank cannot become insolvent because it can fulfil its payment obligations at any time by printing money itself.<sup>5</sup> Both allegations are false. The second is true in terms of external relations for the Eurosystem as a whole. However, it is

not true with regard to internal liabilities with NCBs, because these liabilities cannot be fulfilled through the creation of common money. As we will show, the insolvency of a NCB in the Eurosystem is possible if it has Target liabilities and is itself liable for losses from money creating credit, and is thus unable to pass these losses on to other NCBs. As we will show, self-liability (no risk sharing) is the rule under the Statute of the European System of Central Banks (ESCB) and of the ECB. It also follows from the conversion of refinancing loans to emergency liquidity (ELA) in a crisis, such as that implemented in 2012 to protect the other central banks from the Greek state’s insolvency. The following statement is proved in this article:

*Statement III. According to the Statute of the ESCB and of the ECB, money creation credits of a NCB are not normally subject to international risk-sharing. Indeed, the absence of risk sharing protects NCBs against having to bear the potential losses of other NCBs, provided that there are no Target liabilities and no banknote liabilities, as each national central bank lends out as much money as is needed for domestic circulation. However, if the Eurosystem’s money creation credit is relocated to a NCB affected by a financial crisis in order to offset or enable liquidity outflows to other countries, the other NCBs are exposed to a risk of losses equal to the sum of the resulting Target and banknote liabilities of the NCB concerned – despite the formal exclusion of risk sharing. If, exceptionally, formal risk sharing is agreed, there will be potential losses beyond the Target and banknote liabilities.*

In this context, we refer to money creation credit as the sum of all measures that put central bank money into circulation in the broadest sense, i.e. not only refinancing loans of the usual kind, but also purchases of securities, including purchases under the PSPP programme and under the ANFA agreement. We also include ELA loans. The sum of the money creation loans is therefore equal to the monetary base (M0).

### RISK SHARING AND LIABILITY IN THE EUROSISTEM

In order for the reader to understand our analysis, we must first address issues of risk sharing and liability in the Eurosystem. In principle, under the Statute of the ESCB and of the ECB, instead of risk-sharing, NCBs themselves are held liable for their own operations. In concrete terms, this means that NCBs retain the income from assets acquired with their own central bank money (returns from refinancing loans and acquired marketable assets) and bear the losses from the acquisition of such instruments themselves. Only in exceptional cases can NCBs hope to mutualise individual, well-defined losses if the Governing Council of the ECB explicitly decides to do so. This follows from Sections 32.2 and 32.4 of the Statute of the ESCB and of the ECB, or Eurosystem for short:

“32.2. The amount of each national central bank’s monetary income shall be equal to its annual income

<sup>2</sup> See, e.g. Weidmann (2018) or Sinn (2014 and 2018b).

<sup>3</sup> See, for example, Beermann (2018). A similar view is held by Krahen (2018).

<sup>4</sup> The Council of Economic Experts quotes Whelan (2017), who, in a paper for the EU Commission, qualifies his previous remarks from 2014 (Whelan 2014) and confirms that Target balances are associated with real default risks for creditors. However, Whelan’s analysis also focuses on the case of risks arising from a withdrawal from the euro. At the time, Whelan was criticised and contradicted by Ilzetzi (2014) and Westermann (2014). Westermann (2014, 117) also accused the author of adopting the central points of Sinn and Wollmershäuser’s (2012) analysis in the correct parts of his essay and appropriating these points for himself, subsequently attributing statements to Sinn and Wollmershäuser that they had not made in order to be able to refute them (e.g. the assertion that the Target deficits explained current account deficits and were therefore correlated with them).

<sup>5</sup> According to Hellwig (2018) criticising Mayer (2018), who made this assertion.

derived from *its assets* held against notes in circulation and deposit liabilities to credit institutions. These assets shall be earmarked by national central banks in accordance with guidelines to be established by the Governing Council.

[....]

32.4. [...] The Governing Council may decide that national central banks shall be indemnified against costs incurred in connection with the issue of banknotes or *in exceptional circumstances for specific losses arising from monetary policy operations undertaken for the ESCB*. Indemnification shall be in a form deemed appropriate in the judgment of the Governing Council; these amounts may be offset against the national central banks' monetary income" (Italic by us).

However, the Governing Council deviated from the principles defined in this way in several individual decisions, which were unfortunately not published in detail, in favour of a mutualisation of risks, leading to the following statement by a group of ECB authors in 2017 (Alvarez *et al.* 2017, 55):

"As a rule, income *and losses* from decentralised monetary policy operations conducted by the Eurosystem are shared. This is the case for all currently active programmes apart from the PSPP for which only profits and losses on ECB holdings and EU supranationals are shared" (Italic added by us).

However, this statement by the ECB authors is contradictory in itself, as the exception mentioned here, namely the repurchase of government securities by the respective NCBs within the framework of the QE and Public Sector Purchasing Programme (PSPP), which has been running since March 2015, amounted to 1.9 trillion euros at the beginning of November 2018 (see also Graef 2018; Kaden 2018). By contrast, the central bank money supply, and thus the total volume of money creation credit, amounted to 3.2 trillion euros at that time. In purely quantitative terms, therefore, what is defined as an exception in the words of the ECB authors, contradicting the Statute, already corresponds to over half of the money creation credit provided by way of purchasing government bonds under the PSPP.<sup>6</sup>

In addition, purchases of corporate bonds under previous purchase programmes (CBPP1 and CBPP2)<sup>7</sup> as well as ELA and ANFA loans, which amounted to hundreds of billions of euros, are also explicitly excluded from risk sharing. In this respect, the statement by the ECB authors expresses wishful thinking at best.

<sup>6</sup> The total volume of the QE programme was 2.6 billion euros and that of the PSPP, which is part of it, totalled 2.1 billion. On the nature of the programme, see <https://www.ecb.europa.eu/mopo/implementation/omt/html/pspp-qa.en.html>.

<sup>7</sup> See Alvarez *et al.* (2017), p. 55, Footnote 65.

Neither legally nor empirically can it be said that risk mutualisation is the normal case.

ELA stands for Emergency Liquidity Assistance and describes refinancing credit that a NCB may issue at its own risk and, within the framework of the Eurosystem, according to its own collateral rules to the commercial banks in its business area, which, in turn, use them to finance local states and companies.<sup>8</sup> The decision to grant such credit is not taken by the ECB's Governing Council, but by the individual NCB of a member state. However, the Governing Council has the right to prohibit this credit if at least two-thirds of the votes in the Council are in favour. During the crisis, up to 251 billion euros (June 2012) of ELA loans were probably granted by the crisis countries of Southern Europe and Ireland.<sup>9</sup> Before Latvia's accession at the turn of the year 2013/2014, these countries had one vote more than one third in the Governing Council, and could therefore not be prevented from obtaining ELA loans from the common purse.

ELA loans have a special role to play in a crisis, insofar as Greece's financial problems in 2012 and 2015 have shown that they are the relevant source of finance for the national financial system in the event of a capital flight, which results in a loss of liquidity with corresponding Target balances. Shortly before the peak of the euro crisis, on 28 February 2012, the ECB's Governing Council asked Greece to switch even its normal refinancing loans to ELA in order to protect the other central banks of the Eurosystem from a default on Greek refinancing credit (European Central Bank 2012; Sinn 2015b).

ANFA stands for Agreement on Net Financial Assets. This refers to an agreement between the NCBs concluded in principle in 2003 and specified in 2014 to limit the investment business that NCBs conducted on their own accounts and for the benefit of their mostly public owners. After this kind of business for the NCB's own benefit was discovered in 2015 by a Berlin-based doctoral student (Hoffmann 2015), the 2014 agreement was published in 2016 (European Central Bank 2016b; Deutsche Bundesbank 2016). Prior to the agreement, the NCBs of the Eurosystem had created 600 billion euros of money outside the general monetary policy programme by autumn 2011. They had bought up asset portfolios for the benefit of their respective national owners with the joint money they had created themselves, just as the sovereign wealth funds of Norway, Singapore, Hong Kong and the Gulf states have done for a long time. The Bundesbank was not involved and subsequently even held negative ANFA positions by absorbing money and giving private commercial banks claims against itself.<sup>10</sup> One of the banks that made good use of the opportunities offered by the ANFA agreement was the Banca d'Ita-

<sup>8</sup> See Sinn (2014), p. 169 n. In Sinn (2015a), p. 377–385, the Target risk without exits if states declare insolvency and apply for ELA funding is discussed. See also Sinn (2018b), p. 32 n.

<sup>9</sup> See *ibidem* p. 232, Footnote 74.

<sup>10</sup> Deutsche Bundesbank (2016), Figure on p. 94.

lia. According to Hoffmann, the government securities that it acquired under this agreement alone were worth 105 billion euros. With its ANFA agreement, the ECB tried to cap this form of independent money creation, but Italy nevertheless had 114 billion euros in March 2018, Greece 42 billion euros, Spain 35 billion euros of ANFA money creation credit, while even France had 27 billion euros. At that time, ANFA credit totalled 281 billion euros gross, with the ECB's head office itself participating to the tune of just under 6 billion euros.<sup>11</sup>

### INTEREST POOLING DOES NOT IMPLY RISK SHARING

Notwithstanding the exclusion of joint liability for the above-mentioned money creation credit, the interest income of the NCBs is pooled and then redistributed to these NCBs in proportion to the size of the respective country. Article 32.5 of the Statute states as follows:

“32.5. The sum of the national central banks' monetary income shall be allocated to the national central banks in proportion to their paid-up shares in the capital of the ECB [...]”.

At first glance, pooling seems to contradict self-liability and imply risk sharing. However, appearances are deceptive, because the interest to be paid into the pool is not necessarily the actual return. Instead, the proceeds from PSPP, ELA and ANFA assets are fictitious returns that result from multiplying the main refinancing rate by the corresponding expenditure on asset acquisition, i.e. the money creation credit issued. Payments equalling these notional earnings must be transferred to the pool regardless of whether or not the money creation credit is properly serviced by the debtors. Conversely, the NCBs may retain the surplus of real income over the main refinancing rate that they earn on the acquired assets and distribute it to the respective national government.

This point has long been unclear to some economists. For example, it was claimed that the respective NCBs could themselves retain all of the returns on the ELA loans they had granted in their entirety, and because this was the case, the other central banks would not lose anything if these loans were not serviced, effectively following the logic that you cannot lose what does not belong to you in the first place (Hellwig 2015a and 2015b). A discussion of the facts among German economists, the beginnings of which are documented on the internet platform *Ökonomenstimme* – see Fuest and Sinn (2015 and 2016) – and which was subsequently continued in the aforemen-

tioned internet discussion circle chaired by Carl Christian von Weizsäcker, has in the meantime, however, clarified the interpretation of this issue. The Bundesbank has also been helpful in presenting the factual accounting procedures based on internal, partly unpublished decisions by the ECB Governing Council. We quote here from the Bundesbank's statement to ourselves:<sup>12</sup>

“The calculation and netting of monetary income arising from Eurosystem monetary policy operations pursuant to Article 32 of the Statute of the ESCB shall be subject to the specification laid down in Article 32 (6) and (7) of the Statute of the ESCB, which were adopted by Decision of the ECB of 25 November 2010 on the allocation of monetary income of the national central banks of member states whose currency is the euro (recast) (ECB/2010/23) (as last amended by Decision ECB/2015/37). *These have the effect that a NCB must include income from an ELA credit in the distribution of monetary income at the level of the main refinancing rate*” (translated with italic added by the authors).

As the Bundesbank informed us, the interest that a NCB must deliver to the interest pool is calculated by adding returns at the level of the main refinancing rate on the ELA loans to the returns from normal monetary policy operations. As a result of this addition, ELA loans, as well as ANFA loans and PSPP securities, for which a slightly different calculation method is used, ultimately result in payments being made to the interest pool at the main refinancing rate instead of their actual returns, from which all are serviced pro rata.

### INTEREST POOLING AND THE INTEREST ON TARGET BALANCES

Interest pooling therefore does not serve the purpose of risk sharing. Rather, it is explained by the desire to allocate interest income resulting from a disproportionate national issue of money creation credit to other NCBs that have granted relatively little credit of this kind. As we will see, the interest on the Target and banknote liabilities are a manifestation of this endeavour.

According to the accounting system of the Eurosystem, a NCB grants money creation credit:

- (1) To issue bank notes in proportion to its size (statutory bank notes);
- (2) To also disproportionately issue banknotes, which is recorded as a banknote liability to the Eurosystem because it is assumed to flow to other euro area countries;

<sup>11</sup> In net terms, after deduction of the Bundesbank's negative ANFA balances, this figure was smaller, but there is no point in looking at net figures when critically examining the asymmetrical provision of money creation credit.

<sup>12</sup> *Explanations Regarding the Question of Whether the Interest on ELA Credit Can Be “Collectivised”*, Bundesbank, letter to the authors dated 13 January 2016.



- (3) To replenish the minimum reserves of commercial banks;
- (4) To enable commercial banks to form deposits with the NCB in the broader sense, i.e. including the deposit facility; and
- (5) To compensate for the liquidity absorption resulting from net payment orders of commercial banks to other countries, as measured by the Target liabilities. (Such net payment orders lead to the withdrawal of central bank money in the country commissioning the payment orders and to the creation of new central bank money by the NCB executing the payment order.)

In fact, the interest on money creation credit to be paid into the pool by a NCB is calculated by allocating assets in its possession to the sum of these items, with the money needed to replenish the minimum reserves being lent without interest. ELA, ANFA and government bonds purchased by the national central banks under the PSPP participate, as explained above, in the pooling of interest income at the main refinancing rate, as a result of sophisticated internal calculations, irrespective of their actual income. Since the aggregated interest income is transferred back to a single NCB in proportion to its size (according to the capital key), this implies that interest on Target liabilities (5) and disproportionate bank note issues (2) is paid. The task of interest pooling is to burden a NCB for having issued more local money creation credit than central bank money is circulating in its territory, because part of the money created:

- Has physically flown to other countries (banknote liability, 2) or
- Has been withdrawn locally and recreated by another NCB upon carrying out net payment orders (Target liability, 5), without this other NCB, as would be customary in a closed economy, accruing interest-bearing claims against the local commercial banks for the money issued.

In proportion to its Target liability and its banknote liability, a NCB has more own interest income than if it had granted only those money creation credits necessary to endow the local economy with sufficient liquidity. Accordingly, other NCBs, in whose territory outside money (created by fulfilling payment orders from abroad or came in physically *via* bank note imports) is circulating, have an own interest income that is falling short of the interest income they would have generated had they lent out all central bank money to local banks themselves. *It is exactly these surplus interest returns of the Target and banknote debtors and the missing interest returns of the respective Target and banknote creditors that are compensated for by pooling the returns. Given the sum of all money creation credits of the entire Eurosystem, the interest income of a NCB is thus independent of the Target balances and the*

*balances from a non-proportional banknote disbursement, and it is precisely for this reason that a shift in the money creation credits between NCBs means that interest is paid on these balances. Although money creation credit, and thus interest income is shifted between the NCBs, each individual NCB still receives as much interest via pooling as would have been the case without such a shift. Unfortunately, this is often overlooked by those who claim that the Target balances do not earn interest. In fact, interest pooling ensures that interest on the Target balances and the balances from disproportionate banknote issues is paid. This interest immunizes the national interest income from money creation, the so-called seignorage, against shifting money creation credits between countries to compensate for shortages of private funds.*

Interest pooling only implies no interest on the Target and banknote liabilities if the Target and banknote liabilities arise from an international transfer of surplus reserves, which commercial banks sustain with their respective NCBs, that is not replenished with new money creation credit (4). But this is the case of a liquidity glut with unnecessary local liquidity, in which there is no interest anyway. We will not consider this case here. Instead, we assume that Target and banknote liabilities, which by definition imply a transfer of liquidity from one country to another, are always accompanied by corresponding changes in national money creation credit.

#### **JOINT LIABILITY DESPITE DISCLAIMER AND THE ROLE OF TARGET BALANCES**

Although the principle of risk sharing is not provided for in the Statute of the Eurosystem and is excluded by various measures that are intensified during the crisis, risk sharing can nevertheless be enforced if a NCB has issued disproportionately large amounts of money creation credit, while liability is limited due to a lack of performing assets. This is precisely the case (Statement III), as we now want to demonstrate, when the assets of a NCB fail and it has a cash obligation and/or a Target obligation *vis-à-vis* other central banks. In such a scenario, banknote and Target liabilities do indeed constitute a risk for other central banks; even if the euro continues to exist with all countries and these liabilities formally still apply.

We call the Target liability  $T$ . It is defined as the sum of the net loss of liquidity in the form of cross-border payment orders for the purpose of acquiring assets and goods and also for the purpose of repaying debt. The banknote liability  $B$  is defined as the disproportionate issuance of banknotes in excess of what would be implied by the size of a country as measured by the respective ECB capital key for paid-in capital. As explained above, we assume that the banknote liability measures a net physical outflow of cash to other countries, which serves purposes similar to cross-border payment orders.



The evidence of Statement III can be presented in several steps, as specified in below by letters. It is based on the assumption of the interest pooling described above with insufficient collateral. The steps of proof include:

- a) Let us first assume a symmetrical situation in which a single country A, whose size share (capital key) is  $\alpha$ , adds as much interest income into the interest pool as it receives back. All NCBs grant money creation credit to the commercial banks in their respective territories in proportion to their size. The sum of all money creation credits and thus the volume of central bank money is  $G$ . In the amount of the legal minimum reserves  $M$ , these credits are interest-free. Loans in excess of the minimum reserves are subject to interest at the main refinancing rate  $r$ . Then  $Z = r(G - M)$  is the sum of the interest receipts from the monetary policy operations of all national central banks. Country A transfers the amount  $\alpha Z$  to the pool and receives the same amount back.
- b) In the next step, it is assumed that all assets of NCB A and the collateral securing them are at risk of default due to a national financial crisis and that the ECB's Governing Council will convert the entire money creation credit already granted to ELA as it did in the Greek crisis to protect the other NCBs (insofar as this credit did not already consist of ELA, PSPP, ANFA or other types of assets whose returns are not subjected to risk sharing). The exception to risk-sharing in these forms of money creation credit was, as explained, not realised in the Eurosystem by suspending interest pooling, but by imposing an obligation to transfer interest at the main refinancing rate to the pool, irrespective of which interest rates the corresponding assets actually deliver. The obligation does not expire in the event of a default of the assets. Let  $r^*$  be the actual interest rate that the money creation credits issued by country A generate on a permanent basis, and  $r$  still the main refinancing rate that we assume the other central banks will still achieve. In our example, central bank A now has to pay interest of  $r(G - M)$  into the pool, although it generates  $\alpha r^*(G - M)$ , and receives the same amount back, i.e.  $\alpha r(G - M)$ . If the assets of central bank A fail,  $r^* = 0$  will hold forever. The central bank now can just barely meet its payment obligations in the Eurosystem by giving up the interest reflow from the pool forever and never again having an interest income itself, which it can transfer to its owner, usually the respective nation state.
- c) Now we assume that there will be outflows of liquidity, whether caused by a flight of capital or by the fact that the local money creation credit is made available on more favourable terms than the capital market requires for similar private credit.

The liquidity outflows either lead to payment orders to other countries, and thus give rise to a Target liability  $T$ , or they take the form of physical cash transports, as measured by a disproportionate banknote issue  $B$ , i.e. the banknote liability described above under (2). It is assumed that the loss of liquidity will be compensated by the NCB through new money creation credit  $E$  in order to prevent local money circulation from drying up. The new money creation credit, typically new ELA credit, but possibly also credit in the form of new purchases of government securities such as in the PSPP programme, is equal to the sum of the Target liability and the liability from a disproportionate issue of banknotes:

$$E = T + B$$

Central Bank A must now transfer further interest  $r(T + B)$  to other NCBs, and it must do so permanently and in net terms, i.e. in addition to the interest return  $\alpha r(G - M)$  from the pool it already had to renounce. But it cannot do so if it has lost all of its assets. In this respect, the sum of the Target liability and the banknote liability by NCB A now measures the present value of the potential loss of the other NCBs due to a collapse of the financial system in country A. This ends the proof.

## COMMENTS

### Comment 1

The risk of loss exists with regard to the contractual agreement between the NCBs. NCB A must pay interest on  $T + B$  to other NCBs, but cannot do so. However, the risk of loss also exists in comparison to a situation without the liquidity outflows as measured by  $T + B$ , because these outflows mean that the commercial banks operating in the jurisdictions of the other NCBs use the liquidity flowing to them, which they do not need, to repay their existing refinancing credit because this reduces their interest obligations. This in turn means that the other NCBs lose  $r(T + B)$  of income for which they can no longer get a replacement *via* interest pooling.

This mechanism is by no means irrelevant, as the conditions during the crisis years 2012 and 2013 in Germany and Finland showed. At that time, the entire money creation credit of the NCBs of these two countries had been displaced by the outside money flowing in from other countries, because the Target claims of the two NCBs had reached the level of the total stock of base money issued there (central bank deposits, minimum reserves, statutory holdings of banknotes (1) and disproportionate banknote issues (2)). At that time there was only central bank money left in these countries, which the NCBs of Germany and

Finland had had to create by way of fulfilling payment orders from other NCBs.<sup>13</sup>

### Comment 2

If NCB A, contrary to what was previously assumed, still has interest bearing assets that are not in default, the risk of the other NCBs is smaller than  $T+B$ , because the income from these assets can be used to pay at least some interest on  $T+B$ . However, this is hardly to be expected when the financial system in A collapses. Even gold reserves would not really help, because a NCB does not have to transfer capital gains or fictitious returns on gold to the pool. In principle, it should be possible to force a NCB to sell its gold to feed the pool, but whether there is a legal basis for this option is unclear.

### Comment 3

If, contrary to our assumption, the earnings of some of the assets of NCB A are subject to international risk sharing, the potential losses of the other NCBs will be greater than just  $T+B$ . Not only do the other NCBs permanently miss out on interest on this sum, because to this extent their own money creation credit has been shifted to A, without them now receiving the corresponding income from A *via* interest pooling. Rather, they now have to transfer part of their remaining income from their own issues of money creation credit to A because of the risk sharing. If  $a$  measures the size share of central bank A (of the Eurosystem's paid-up capital), then the other central banks may lose the share  $1-a$  of the income subject to risk sharing in addition to the income on  $T+B$ .

### Comment 4

One might think that the risk of loss that we have calculated cannot exist simply because the respective national government now has to support its central bank A because it has an institutional liability (*Anstaltslast*). However, the EU treaties do not provide for recapitalisation of the NCBs in the case of asset losses, and it is cheaper for country A to let its own NCB go bankrupt and set up a new NCB with new equity capital than to revive the old one, given that the additional funds injected by the state would first have to be used to meet the NCB's Target and banknote liabilities.

Of course, a surplus country like Germany would probably recapitalise its NCB if it were to lose its equity by writing off the German share of the Target and banknote liabilities of country A. This is not economically necessary, because the Bundesbank will probably still generate enough income to be able to gradually replenish its equity. However, in such a

case a loss to the full extent of the present value of the losses will nevertheless occur in terms of reduced profit distributions to the German federal budget, and because this is the case, Germany might prefer to recapitalise the Bundesbank right away with tax financed injections.

However, the same does not apply to the Target debtor countries. It is true, according to the German Constitutional Court (*Bundesverfassungsgericht*) and the ECB, recapitalisation may be necessary to ensure proper business operations of the Bundesbank.<sup>14</sup> However, these are only opinions and not yet legally binding facts. In fact, there is a danger that the crisis countries will find ways to evade recapitalisation if push comes to shove. In such a scenario losses in the amount of the Target and banknote liabilities would be inevitable for the other NCBs.

It has occasionally been argued that the international community could now press country A to meet its payment obligations, as there would be no orderly political relations with the rest of the Eurozone otherwise. However, this view is very optimistic in view of the fact that in the case under consideration, a sovereign bankruptcy of A can be assumed. In such a case, Germany in particular can more likely expect that the collapsing country will counter the German claims with reparation claims, or other claims that have hitherto been kept under the table.

In such a case, it is more likely that the ECB's Governing Council will itself decide to recapitalise NCB A in order to avert its insolvency in accordance with Article 32.4 of the Statute by forcing the other NCBs to assume the losses. In this sense, both the plaintiffs' legal representatives and the EU legal representative, who had otherwise always represented the ECB's position, expressed themselves astonishingly unanimously at the hearing of the PSPP programme before the European Court of Justice on 10 July 2018.<sup>15</sup> In this case, the other NCBs directly incur a loss in the amount of the Target and banknote liabilities.

### SHOULD RISKS FROM TARGET BALANCES BE LIMITED, AND IF SO HOW?

If it is true that rising Target balances imply growing risks for creditors, then the question arises as to whether, and if so how, these risks can and should be limited. Potential measures include absolute limits on the Target balances or collateralisation, perhaps in the form of the NCB regularly transferring gold holdings equal to the increase in the Target balance to the ECB at the end of each year to secure the claims.

It is often claimed that free and uncollateralised Target balances are an indispensable part of the European Monetary Union; and that any limitation of these

<sup>13</sup> See Sinn (2014), Figure 6.8, p. 207.

<sup>14</sup> See German Constitutional Court (2017), Rn. 131, as well as European Central Bank (2016a), p. 25.

<sup>15</sup> Own testimony by H.-W. Sinn who was present at the hearing.

balances would mean the end of a single monetary policy in the euro area. A euro in a Greek bank would then no longer be the same as a euro in a German bank under all circumstances.

The question, however, is why a euro should have the same value in all bank accounts of the euro countries, even if a NCB and the commercial banks of its jurisdiction can no longer be considered safe? For years, for example, the market value of deposits at Greek banks was ten to twenty percent lower than that of corresponding deposits at German banks, precisely because those Greek banks were perceived by the markets as less secure and the ECB was no longer willing to allow the Greek central bank to compensate the liquidity losses due to international payment orders by reprinting unlimited amounts of money. Thus, Greece was forced to impose capital controls on its commercial banks, which was equivalent to limiting the Greek Target balances. Things were temporarily similar in Cyprus. Although this situation revealed regrettable weaknesses in the EU's supervision of commercial banks and fiscal policy in the Greek speaking countries of the Eurozone, it did not undermine the existence of the euro itself or the rules of functioning capital markets; indeed quite the contrary was the case.

In fact, the limitation of Target balances, as was enforced by the ECB in Greece and Cyprus, is perfectly compatible with a single monetary policy. It is incompatible with the requirement that the same nominal interest rates and unlimited access to cheap central bank credit should apply throughout the monetary union, irrespective of country-specific risks. However, it is not the task of European monetary policy to create such a situation. Monetary policy is not intended to ensure that risk premiums converge across Europe, despite the fact that actual risks differ according to assessments by market participants. For if it does so, the effective, expected interest rates will differ, which must be calculated taking into account the default risk. In a market economy, the postulate of uniform interest rates can only meaningfully apply to the latter. Limiting the Target balances would lead to monetary conditions in a country approaching the upper limit becoming more restrictive and would push up interest rates there. The rise in interest rates would make it more attractive for private capital to flow into the country. So it is by no means normally the case that the country would be cut off from credit, loans to it would merely be properly priced.

It is true that, in extreme cases, capital markets may deny a country access to credit due to a loss of all confidence in its creditworthiness. In this case, the affected country would have to limit its expenditure on imports and impose the aforementioned capital controls to avoid net payment orders to other countries.

Normally, however, such a development would be unlikely, because the very presence of upper

limits would ensure that NCB make timely efforts to prevent net liquidity outflows through international payment orders by limiting the asymmetric national allocation of money creation credit at an early stage to curb the balances through rising national interest rates that induce capital imports.

The private capital that would be attracted by higher interest rates would flow into the country as a result of investment decisions by investors from all over the world, but it could also be triggered by international payment orders for any purpose, if these payment orders were to be carried out *via* private international payment systems instead of the public Target system. Such private payment systems have, in any case, enjoyed a great upswing in recent years. If these payment systems create private balances because net transfers from the Target deficit countries have to be absorbed, there is automatically a private capital flow back into these deficit countries, because the payment systems themselves already implicitly grant reverse private credit to the senders of the payment orders. It can be assumed that, in the case of long-term private deficits that can no longer be absorbed by the Target system because of capital controls, the transfer fees would be set in such a way that they would imply an adequate pricing of risks. However, as long as the Target credit is available indefinitely, international payment system operators will prefer to dump their private balances on the Target system, thus accessing public international credit that is available at below market conditions because it is secured free-of-charge by euro area taxpayers.

Critics of limiting Target balances also argue that these balances constitute an important form of liquidity insurance, especially in crisis situations. This may be the case, but an insurance against liquidity shocks for states already exists in the form of the ESM, which at least comes with conditionality and parliamentary control. Similar provisions could be made for the financial system. It would even be conceivable, under exceptional circumstances, to temporarily lift the upper limits for Target balances, but again under parliamentary control and possibly with conditionality. If the balances are secured by gold, this argument is groundless anyway.

Such claims certainly raise the question of why debtor states in particular should agree to such restrictions, as they benefit from the *status quo* of the unlimited availability of Target loans? But conversely, the question also arises as to why creditor states should accept the many other demands currently on the table for extended risk sharing and redistribution in the Eurozone? In the current negotiations over Eurozone reforms both measures to increase risk sharing and measures to limit risk are being discussed. Limiting the Target balances could be one of the risk mitigation measures adopted as part of the overall package.

## FINAL REMARKS

So far, the Target topic has largely been played down by politicians and the media. This does not do justice to the real dangers of the present situation. The sums that have now accumulated in the Federal Republic of Germany correspond to roughly half of its net foreign wealth, which itself accumulated thanks to the export surpluses of previous years. This fact alone makes it unacceptable to trivialise the problem.

We are aware that Target balances are an issue which, given its complexity, is not well-suited to public political debate. However, it is precisely thanks to this veil of high complexity that high asset risks for the Federal Republic of Germany were allowed to accumulate without the timely activation of brakes. The fact that Target balances can lead to massive losses for creditor countries – not only when countries leave the Eurozone, but also if national financial systems collapse in countries that are still Eurozone members – is a threat that politicians cannot ignore.

The Target risks cannot be countered by pointing out that a collapse of a national financial system would result in so many other risks that the loss of parts of the Target claims would no longer matter. In fact, the marginal costs of Target losses are particularly high precisely when further losses in other areas are incurred, because funds are already lacking across the board.

The Target risks are also particularly problematic because they limit the scope for political action and force the surplus countries to keep them in check, at least apparently, by means of mutualising liabilities and redistributing tax revenues. The path to a European transfer union, *via* a chain of negotiations in which more and more mutualisation systems are demanded, is already mapped out if the Target balances cannot be limited.

As committed Europeans, who see no alternative to the progress of European integration, we do not want our analysis to be understood as a fundamental critique of the euro; and certainly not of European integration itself. On the contrary, we believe that continuously improving and correcting the systemic errors that emerge in the course of the unification process is the only way to successfully complete the integration process. We see the ultimately unrestricted extension of Target credits without parliamentary control, based solely on decisions by the ECB's Governing Council, as one such systemic error. It urgently needs to be corrected.

## REFERENCES

Alvarez, I, F. Casavecchia, M. De Luca, A. Duering, F. Eser, C. Helmus, Ch. Hemous, N. Herrala, J. Jakovicka, M. Lo Russo, F. Pasqualone, M. Rubens, R. Soares and F. Zennaro (2017), *The Use of the Eurosystem's Monetary Policy Instruments and Operational Framework since 2012*, European Central Bank Occasional Paper 188, [www.ecb.europa.eu/pub/pdf/scpops/ecb.op188.en.pdf](http://www.ecb.europa.eu/pub/pdf/scpops/ecb.op188.en.pdf).

- Beermann, J. (2018), "Wenn der Euro unverändert fortbesteht, ist Target kein Risiko", *Die Welt*, 20 July, 15.
- Deutsche Bundesbank (2016), "Zur Bedeutung und Wirkung des Agreement on Net Financial Assets (ANFA) für die Implementierung der Geldpolitik", *Monatsbericht der Deutschen Bundesbank* March.
- European Central Bank (2012), *Eligibility of Greek Bonds Used as Collateral in Eurosystem Monetary Policy Operations*, Press Release, 28 February, [www.ecb.int/press/pr/date/2012/html/pr120228.en.html](http://www.ecb.int/press/pr/date/2012/html/pr120228.en.html).
- European Central Bank (2016a), *Convergence Report*, June, [www.ecb.europa.eu/pub/pdf/conrep/cr201606.en.pdf](http://www.ecb.europa.eu/pub/pdf/conrep/cr201606.en.pdf).
- European Central Bank (2016b), *Agreement of 14 November 2014 on Net Financial Assets*, 5 February, [www.ecb.europa.eu/ecb/legal/pdf/en\\_anfa\\_agreement\\_19nov2014\\_f\\_sign.pdf](http://www.ecb.europa.eu/ecb/legal/pdf/en_anfa_agreement_19nov2014_f_sign.pdf).
- Fuest, C. and H.-W. Sinn (2015), "Die Risiken der Notkredite", *Ökonomenstimme*, 13 November, [www.oekonomenstimme.org/artikel/2015/11/die-risiken-der-notkredite/](http://www.oekonomenstimme.org/artikel/2015/11/die-risiken-der-notkredite/).
- Fuest, C. and H.-W. Sinn (2016), "Non tacemus", *Ökonomenstimme*, 18 January, [www.oekonomenstimme.org/artikel/2016/01/non-tacemus/](http://www.oekonomenstimme.org/artikel/2016/01/non-tacemus/).
- German Constitutional Court (Bundesverfassungsgericht, 2017), *Decision of the Second Senate*, 18 July, 2 BvR 859/15, Randnr. 1–137, [www.bverfg.de/e/rs20170718\\_2bvr085915.html](http://www.bverfg.de/e/rs20170718_2bvr085915.html).
- German Council of Economic Experts (2018), *Vor wichtigen wirtschaftspolitischen Entscheidungen*, Annual Report 18/19.
- Graef, Ch. (2018), "Ohne die EZB stünde die deutsche Wirtschaft heute schlechter da", *Welt online*, Letter to the Editor, 16 November, [www.welt.de/wirtschaft/bilanz/article183975300/Lehrbrief-Ohne-die-EZB-stuende-die-deutsche-Wirtschaft-heute-schlechter-da.html](http://www.welt.de/wirtschaft/bilanz/article183975300/Lehrbrief-Ohne-die-EZB-stuende-die-deutsche-Wirtschaft-heute-schlechter-da.html).
- Hellwig, M. (2015a), "Die EZB und die Deutschen in der Griechenlandkrise", *Ökonomenstimme*, 7 July, [www.oekonomenstimme.org/artikel/2015/07/die-ebz-und-die-deutschen-in-der-griechenlandkrise](http://www.oekonomenstimme.org/artikel/2015/07/die-ebz-und-die-deutschen-in-der-griechenlandkrise).
- Hellwig, M. (2015b), "Si tacuissent", *Ökonomenstimme*, 8 December, [www.oekonomenstimme.org/artikel/2015/12/si-tacuissent/](http://www.oekonomenstimme.org/artikel/2015/12/si-tacuissent/).
- Hellwig, M. (2018), "Wider die deutsche Target-Hysterie", *Frankfurter Allgemeine Sonntagszeitung*, 29 July, 20.
- Homburg, S. (2012), "Notes on the Target2 Dispute", *CESifo Forum* 13, Special Issue, <http://www.cesifo-group.de/DocDL/forum-0112-special-9.pdf>.
- Hoffmann, D. (2015), *Die EZB in der Krise*, Berlin: Pro Business Verlag.
- Ilzetki, E. (2014), "Comment" (on Whelan 2014), *Economic Policy* 29(77), 125–130.
- Kaden, W. (2018), "Geldpolitik der EZB hat deutsche Sparer um Milliarden ärmer gemacht", Comment on Graef (2018), *Welt online*, 20 November, [www.welt.de/wirtschaft/bilanz/article184200760/Antwort-auf-Leserbrief-Geldpolitik-der-EZB-hat-deutsche-Sparer-um-Milliarden-aermer-gemacht.html](http://www.welt.de/wirtschaft/bilanz/article184200760/Antwort-auf-Leserbrief-Geldpolitik-der-EZB-hat-deutsche-Sparer-um-Milliarden-aermer-gemacht.html).
- Krahen, J.P. (2018), *Über Scheinriesen: Was TARGET-Salden tatsächlich bedeuten, Eine finanzökonomische Überprüfung*, Research Center SAFE Working Paper 56, Goethe University Frankfurt.
- Mayer, Th. (2018), "Ein Wahnsinn namens Target 2", *Frankfurter Allgemeine Sonntagszeitung*, 15 July, 36.
- Sinn, H.-W. (2014), *The Target Trap. On Bursting Bubbles, Budgets and Beliefs*, Oxford: Oxford University Press.
- Sinn, H.-W. (2015a), *Der Euro. Vom Friedensprojekt zum Zankapfel*, Munich: Hanser, Updated Translation of Sinn (2014).
- Sinn, H.-W. (2015b), *Die Griechische Tragödie*, ifo Schnelldienst, Special Issue, 26 May.
- Sinn, H.-W. (2018a), "Fast 1000 Milliarden Euro", *Frankfurter Allgemeine Zeitung*, 17 July, 16.
- Sinn, H.-W. (2018b), "Fast 1000 Milliarden Target-Forderungen der Bundesbank: Was steckt dahinter" (Extended Version of Sinn 2018a), *ifo Schnelldienst* 14, 26 July, 26–37.
- Sinn, H.-W. (2018c), "Irreführende Verharmlosung", *Frankfurter Allgemeine Sonntagszeitung*, 5 August, 20.
- Sinn, H.-W. and T. Wollmershäuser (2012), "Target Loans, Current Account Balances and Capital Flows: The ECB's Rescue Facility", *International Tax and Public Finance* 19, 468–508.
- Weidmann, J. (2018), "Den Unmut der Sparer kann ich gut verstehen", *Frankfurter Allgemeine Sonntagszeitung*, 19 August, 22–23.
- Westermann, F. (2014), "Comment" (on Whelan 2014), *Economic Policy* 29(77), 117–125 (Long Version: *Discussion of TARGET2 and Central Bank Balance Sheets*, Working Paper 99, Universität Osnabrück, Institut für

*Empirische Wirtschaftsforschung*, [www.wiwi.uni-osnabrueck.de/fileadmin/documents/public/2\\_institute/2.02\\_I EW/IEW\\_Working\\_Paper/WP\\_99.pdf](http://www.wiwi.uni-osnabrueck.de/fileadmin/documents/public/2_institute/2.02_I EW/IEW_Working_Paper/WP_99.pdf)).

Westermann, F. (2018), "Europe's Target2 Can Learn from US", *OMFIF*, 2 July, <https://www.omfif.org/analysis/commentary/2018/july/europes-target-2-can-learn-from-us/>.

Whelan, K. (2014), "TARGET2 and Central Bank Balance Sheets", *Economic Policy* 29(77), 79–137, <https://doi.org/10.1111/1468-0327.12025>.

Whelan, K. (2017), "Should We Be Concerned about Target Balances?" *European Parliament, In-depth Analysis for the Econ Committee*, IP/A/ECON/2017-04, [www.europarl.europa.eu/RegData/etudes/IDAN/2017/607366/IPOL\\_IDA\(2017\)607366\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/IDAN/2017/607366/IPOL_IDA(2017)607366_EN.pdf).



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# Challenges of Electrification of Heavy and Long-haul Traffic

The transport sector's share of total GHG emissions in Germany was as high as 18 percent in 2015, thus accounting for the second largest volume of emissions, topped only by the energy sector. Moreover, with respect to national climate protection goals, little has been achieved in the transportation sector to date. Final energy consumption has increased from 600 TWh in 1990 to 730 TWh today, and renewable energies as a share of the total energy supply has been stagnating for several years at around a meagre 5 percent (BCG 2018). Given the transport sector's large share of total emissions and the slow progress made to date, realising the national climate goal of cutting total emissions by between 80 and 95 percent with respect to 1990 by 2050 crucially depends on developments in the transport sector. The most promising way of reducing emissions in the transport sector is the continuous substitution of fossil fuels with the increasing amount of emission-neutral electricity generated by renewable energies (30 percent in 2016). Although a purely power-based energy supply in the sector seems improbable and technology neutrality is a central principle in the process of fostering sector coupling, most studies focus on electrification as a key strategy for reducing GHG emissions in the transport sector.

One strategy for reducing emissions in the transport sector is the ongoing substitution of fossil fuels with emissions-neutral electricity generated from renewable energies (about 30 percent of the electricity mix in 2016). Although a purely electricity-based transport energy supply seems unlikely, electrification, or the coupling of the electricity sector with transport in all technology scenarios, is still playing a key role in the reduction of GHG emissions in the sector.

There has been a focus to date on progress towards and the cost degression of battery technology and the slow, but steady proliferation of electric passenger cars and hybrids in many developed countries (see Figure 1). Less attention has been paid to heavy transport: aviation, shipping and road freight

transport. Given forecasts that air travel demand will double by 2050 and the persistent trend towards growth in road freight transport, reducing emissions in those segments of the transport sector is becoming increasingly crucial to the mitigation of climate change. Compared to the passenger car segment, however, there is still a great deal of uncertainty over which technologies are the most cost-efficient, and forecasts are very mixed. This article aims to provide an overview of the different alternative technologies available and the key technological challenges in aviation, shipping and road freight transport.

## ELECTRICITY GENERATION TECHNOLOGIES

The usage of Power-to-X (PtX) fuels is the most energy-intensive type of electrification. Accordingly, future power demand, and thus future power imports, crucially depends on the share of vehicles running on synthetic fuels in the transport sector. To achieve the 95 percent goal, both the BDI-study and the Öko-Institut study deem the use of PtX necessary, making it the largest line item contributing to electricity demand in the 95 percent scenario of the BDI with 124 TWh in 2050. Decisive factors in this increase are aviation and shipping, which still run on conventional fossil fuels in the 80 percent trajectory. To realise the 95 percent goal, fossil fuels would have to be fully substituted by synthetic fuels.

However, the electrification of the transport sector does not necessarily mean a reduction of GHG emissions. This only occurs if electrification and the expansion of renewable energies, or increasing their share of the electricity mix, go hand in hand. Fuel cell vehicles, for example, would only be less harmful to the climate than conventional cars if no more than 300 g CO<sub>2</sub>/kWh were to be emitted in the power generation process - in the case of synthetic fuels, the corresponding threshold is even lower. The share of renewables in total electricity generation is currently 30 percent, while brown and hard coal make up another third. With this power mix and average emissions of 527 g CO<sub>2</sub>/kWh, the use of fuel cell vehicles as well as synthetic fuels would not make sense from a climate protection perspective. Battery-powered electric cars, on the other hand, are already less emission-intensive than conventional cars with internal combustion engines (ESYS 2017).

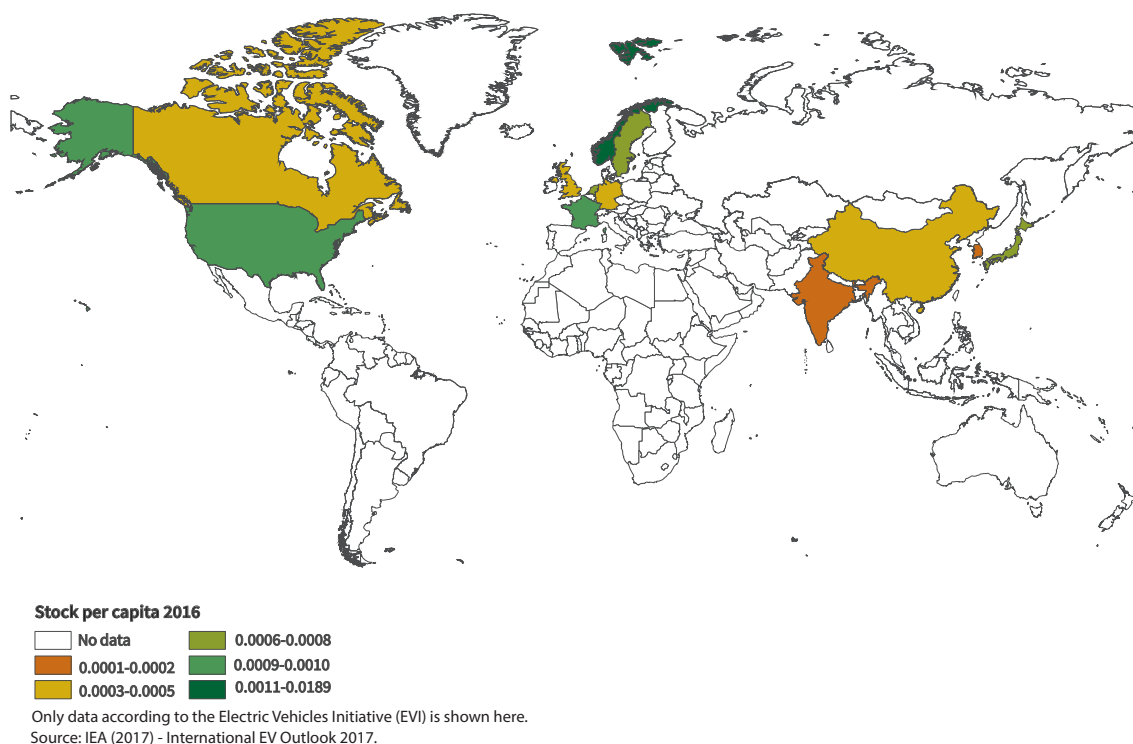
## CHALLENGES FOR EMISSION REDUCTION IN HEAVY AND LONG-HAUL TRANSPORT

### Aviation

At present, emissions from aviation account for only a small proportion of the total volume of emissions, accounting for 3 percent of greenhouse gases in the EU. However, the International Air Transport Association predicts that the number of air travelers world-

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Figure 1  
Worldwide Stock of Electric Cars 2016



wide will double from 4 trillion to 7.8 trillion per year by 2036 (IATA 2017). Since 2012, the European Emissions Trading Scheme (EU ETS) has also included aviation, albeit geographically limited to the area of the European Economic Area. Under the EU ETS, airlines are required to monitor, report and verify their GHG emissions (MRV system: Monitoring, Reporting, Verification) and receive a certain amount of CO<sub>2</sub> allowances.

So far, airlines have been limited in their ability to meet these levels of emissions, primarily through improvements in energy efficiency and CO<sub>2</sub> mitigation measures. Since there is no substitute with the same speed and flexibility as aviation, technological innovation is needed to reduce emissions from aviation (European Commission 2016). The solution to changing the electricity mix, as in the case of road traffic, and directly electrifying the air traffic is difficult to transfer to aviation. For example, the challenge of increasing the limited range of battery-powered vehicles in passenger cars is an insurmountable obstacle to the required distances in air traffic. The simplest solution would be to combine biofuels or synthetic fuels with the fossil fuels used to date. However, the production of biofuel quantities needed for a fuel blend with a biofuel content of 10 percent may cause adverse effects such as crop and drinking water shortages in potentially endangered regions. For synthetic fuels to be an option for reducing emissions, it is necessary to accelerate the expansion of renewable energies to meet the demand of the electricity sector and generate enough surplus electricity to produce large quantities of syn-

thetic fuels. In addition to the substitution of fuel, the International Air Transport Association has proposed various modifications to aircraft design. These include improved engine fans to reduce fuel burn and blended wing body configurations to improve aerodynamics (IATA 2017). Finally, it is important to keep an eye on the emergence of a new type of air traffic: urban air traffic is still in its infancy, but could be introduced more widely by 2020. This transport mode is intended for short distances in urban areas (Agouridas 2017). It is to be operated purely electrically, so that its contribution to GHG emissions will primarily depend on the electricity mix.

### Shipping

Against the background of increased demands on environmentally-friendly and low-emission engines, shipping is also facing new challenges. Due to stricter regulations in the emission control areas of Europe, North America (from 2020) as well as some Asian cities, drives with liquid natural gas (LNG), as well as with electric propulsion, have increasingly come to the fore. In addition to the potential to reduce sulfur dioxide emissions by up to 100 percent using LNG compared with diesel engines, it is also possible to reduce carbon dioxide emissions by approximately 20 percent (World Ports Climate Initiative 2016). The global LNG fleet initially grew slowly, among other things, due to the significant cost of retrofitting existing engines. In 2016, for example, only 90 ships were registered worldwide, but by the end of 2017 this figure had already risen to 119 (The

Maritime Executive 2018). Another hurdle to LNG is the inadequate tank infrastructure in many ports.

In addition to the regulation of pollutant emissions, EU ports have been required to report CO<sub>2</sub> requirements for large seagoing vessels since the beginning of 2018 (VDM 2017). This MRV system was introduced in parallel to the international maritime organisation (IMO) measure that has also been in place since 2018 and requires shipping companies to draw up a monitoring plan. By monitoring CO<sub>2</sub> emissions and introducing new technologies in the field of powertrains and fuels, emissions can be reduced by up to 75 percent (IMO 2009). Electric mobility in shipping has been playing an increasingly important role for some time now. Inland waterway transport in particular has benefited from the development of electric ships such as in ferry operations. In addition, a few ocean-going vessels are to some extent already being developed with fully electric drives. In the EU, this is particularly important in the field of short sea shipping. Due to high costs and the lack of a secure nationwide shore power supply, the majority of purely electrically powered ships can be operated, but only in conjunction with, for example, synthetic fuels or liquefied natural gas. There are also challenges in securing the power supply and dealing with power outages on board.

### Road Freight Vehicles

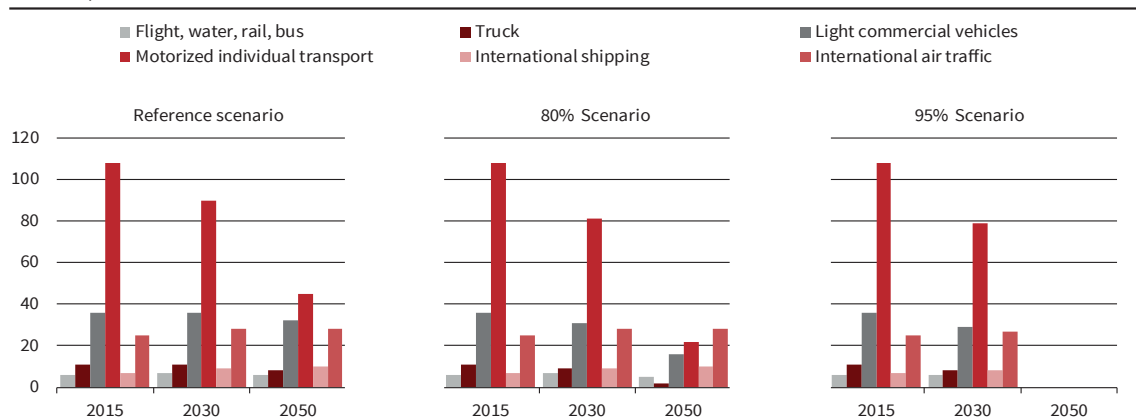
At present, road freight transport accounts for one third of total energy demand in the transport sector. As the major energy sources are petroleum derived fuels (97 percent), global road freight transport is a major contributor to global CO<sub>2</sub> emissions. Since 2000, there has been an upwards trend in emissions from road freight transport, accounting for 8 percent of the increase in global emissions from fuel combustion and thwarting efforts to mitigate climate change. Total emissions due to road freight vehicles amounted to about 7 percent of aggregate CO<sub>2</sub> emissions from total energy use (IEA 2017). Currently, unlike China,

the United States and Japan, there is no binding limit for CO<sub>2</sub> emissions from heavy goods transport in the EU. In 2019, like ship and air traffic, an EU-wide MRV system will be introduced for manufacturers of trucks weighting for than 7.5 tonnes, which will boost competition to increase energy efficiency. This should serve as a basis for further regulations, for which first drafts have been announced this year (European Commission 2017).

From today's point of view, no clear trend towards the domination of one technology in the road freight sector is visible. A study by the Boston Consulting Group entitled: 'Climatic Backgrounds for Germany' estimates the technology mix of the heavy goods traffic of the future for various climatic conditions (BCG 2018). For reduction scenarios of between 80 and 95 percent, the mix is very heterogeneous: among the predicted technologies are fuel cell vehicles, battery drives, truck overhead lines and CNG/LNG, but diesel and gasoline continue to play a central role too (see Figure 2). The various technologies differ in terms of their GHG reduction potential, costs and market maturity.

Since 60 percent of the emissions from German heavy goods traffic are generated on 2 percent of the German road network, the installation of overhead line infrastructure on the busiest motorway kilometers is ideal. In 2017, Germany and Sweden launched a joint pilot project, with the first test lines to be built by the end of 2018 in cooperation with Siemens. Even although, according to several studies, the construction of a catenary network is a cost-effective alternative from today's perspective, this option involves considerable risks. Investment decisions should be taken early, before the middle of the next decade - on the other hand, future cost depressions of alternative technologies could make them a more favorable alternative. In any case, overhead lines would only supply a small part of the entire road network, and would have to be supplemented on the rest of the network with drives via batteries, fuel cells or hybrids.

Figure 2  
Greenhouse Gas Emissions by Transport Mode 2015–2050  
Mt CO<sub>2</sub>-Equivalent



Source: Boston Consulting Group (2018).

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Despite the technical obstacles in the truck battery drive associated with the high energy density required, the big truck manufacturers presented their first models last year: MAN presented its e-truck in February 2017, which was followed by Tesla's 'semi-truck' in November of the same year. An advantage of battery technology is its significantly lower energy costs and far greater energy efficiency (85 percent) compared to diesel and gasoline (30 percent).

The fuel cell drive has faced quite high cost hurdles to date. Fuel cell trucks are also more emission-intensive than ordinary burners in the current German electricity mix. A central advantage over the battery drive with relevance to the truck segment, however, is about six times higher energy density per unit volume compared to batteries. Overall, there are now around 500 fuel cell trucks in various demonstration projects worldwide, but an early marketability appears to be hardly possible, due particularly to the problems associated with the tank size, high material costs and complicated tank processes.

## CONCLUSION

Due to increasing demand for air travel and freight transport, the importance of emissions from air traffic, shipping and truck traffic in terms of climate change is growing. EU regulations are mainly limited to the MRV system without mandatory emission standards. However, long-distance and heavy haulage still faces fundamental technical challenges: far higher weights and longer distances often make solutions in the field of passenger cars difficult to transfer to this segment. From a technological point of view, the use of synthetic fuels to reduce emissions is conceivable, especially for aviation and shipping. However, this is a technology that is not yet ready for the market, which also requires large amounts of electricity for its production. To meet this increased electricity demand would either require a very expensive expansion of domestic renewable energies; or a sharp increase in electricity imports. The import of PtX fuels is also conceivable here. In truck traffic there is greater technological heterogeneity: studies predict a technology mix with lorry overhead lines for the most frequented routes in 2050, in combination with battery drives, fuel cell vehicles and CNG/LNG.

## REFERENCES

Agouridas, V. (2017), *Urban Air Mobility*, <https://eu-smartcities.eu/initiatives/840/description>.

Boston Consulting Group (2018), *Klimapfade für Deutschland*, <https://bdi.eu/publikation/news/klimapfade-fuer-deutschland/>.

European Commission (2016), *Reducing Emissions from Aviation*, [https://ec.europa.eu/clima/policies/transport/aviation\\_en](https://ec.europa.eu/clima/policies/transport/aviation_en).

European Commission (2017), *Reducing CO<sub>2</sub> Emissions from Heavy-Duty Vehicles*, [https://ec.europa.eu/clima/policies/transport/vehicles/heavy\\_en](https://ec.europa.eu/clima/policies/transport/vehicles/heavy_en).

IMO (2009), *Second IMO GHG Study 2009*, <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/SecondIMO-GHGStudy2009.pdf>.

International Air Transport Association (2017), *2036 Forecast Reveals Air Passengers Will Nearly Double to 7.8 Billion*, <http://www.iata.org/pressroom/pr/Pages/2017-10-24-01.aspx>.

International Energy Agency (2017), *The Future of Trucks. Implications for Energy and the Environment*, <https://www.iea.org/publications/freepublications/publication/TheFutureofTrucksImplicationsforEnergyandtheEnvironment.pdf>.

The International Council on Clean Transportation (2014), *Europe's Global Leadership on Vehicle Emission Standards at Risk in the Truck Sector*, <https://www.theicct.org/blogs/staff/europes-global-leadership-vehicle-emission-standards-at-risk-truck-sector>.

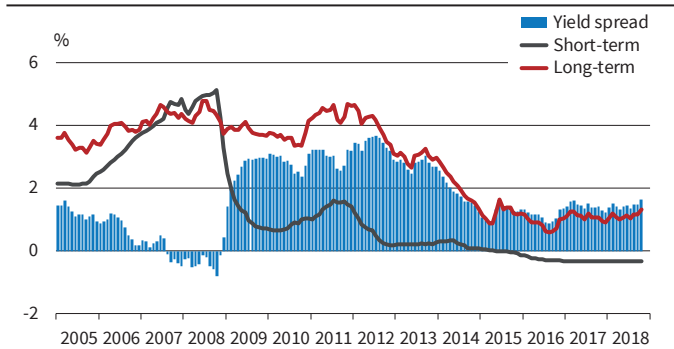
The Maritime Executive (2018), *Will 2018 Be the "Tipping Year" for LNG Bunkering?*, <https://www.maritime-executive.com/article/will-2018-be-the-tipping-year-for-lng-bunkering#gs.92nobkl>.

VDMA (2017), *Ab Januar 2018: CO<sub>2</sub>-Meldepflicht für Schiffe in europäischen Gewässern ab 2018*, <http://mus.vdma.org/viewer/-/article/render/20540007>.

World Ports Climate Initiative (2016), *LNG Fuelled Vessels – Benefits of LNG*, <http://www.lngbunkering.org/lng/environment/benefits-of-LNG>.

# Financial Conditions in the Euro Area

Nominal Interest Rates<sup>a</sup>

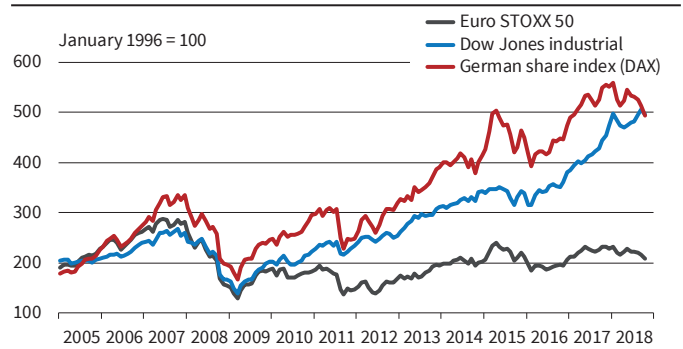


<sup>a</sup> Weighted average (GDP weights).  
Source: European Central Bank.

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In the three-month period from August 2018 to October 2018 short-term interest rates remained stable: the three-month EURIBOR rate amounted to - 0.32% in all these months. In comparison the ten-year bond yields grew from 1.15% in August 2018 to 1.31% in October 2018, while the yield spread also increased from 1.47% to 1.63% in the same period of time.

Stock Market Indices

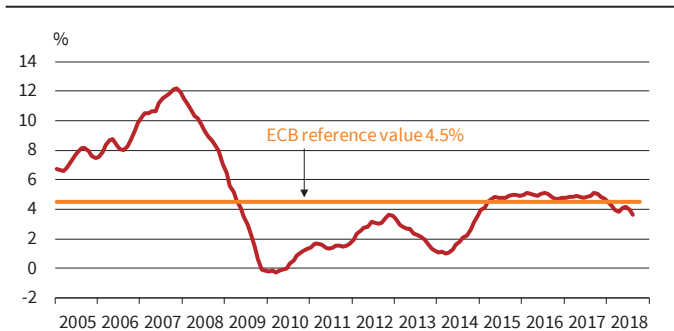


Source: Deutsche Börse; Dow Jones; STOXX.

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The German stock index DAX decreased in October 2018, averaging 11,686 points compared to 12,185 points in September 2018. The Euro STOXX also decreased from 3,365 to 3,245 in the same period of time. The Dow Jones Industrial was not an exception: it also decreased, averaging 25,609 points in October 2018, compared to 26,219 points in September 2018.

Change in M3<sup>a</sup>

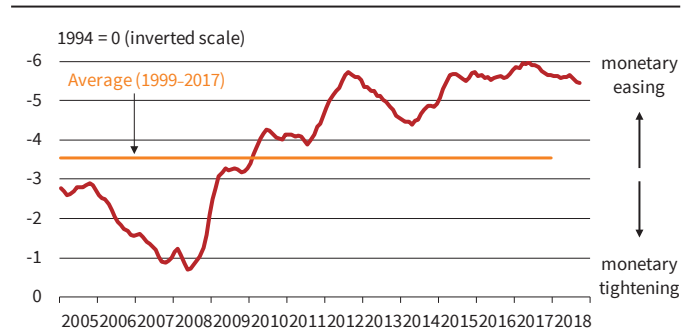


<sup>a</sup> Annual percentage change (3-month moving average).  
Source: European Central Bank.

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The annual growth rate of M3 slightly increased to 3.5% in September 2018, from 3.4% in August 2018. The three-month average of the annual growth rate of M3 over the period from July 2018 to September 2018 reached 3.6%.

Monetary Conditions Index



Note: MCI index is calculated as a (smoothed) weighted average of real short-term interest rates (nominal rate minus core inflation rate HCPI) and the real effective exchange rate of the euro.  
Source: European Central Bank; calculations by the ifo Institute.

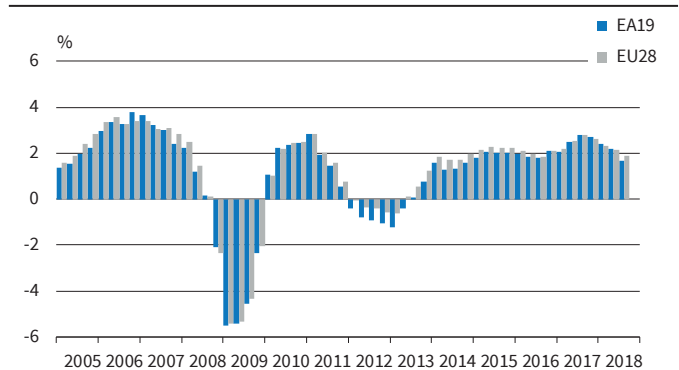
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Between April 2010 and July 2011 the monetary conditions index remained rather stable. This index then continued its fast upward trend since August 2011 and reached its first peak in July 2012, signalling greater monetary easing. In particular, this was the result of decreasing real short-term interest rates. In May 2017 the index reached the highest level in the investigated period since 2004, and its slow downward trend thereafter continued also in September 2018.



# EU Survey Results

**Gross Domestic Product in Constant 2010 Prices**  
Percentage change over previous year



Source: Eurostat.

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According to the Eurostat estimates, GDP grew by 0.2% in the euro area (EA19) and by 0.3% in the EU28 during the third quarter of 2018, compared to the previous quarter. In the second quarter of 2018 the GDP had also grown by 0.4% in the euro area and by 0.5% in the EU28. Compared to the third quarter of 2017, i.e. year over year, seasonally adjusted GDP rose by 1.7% in the EA19 and by 1.9% in the EU28 in the third quarter of 2018.

**EU28 Economic Sentiment Indicator**  
Seasonally adjusted

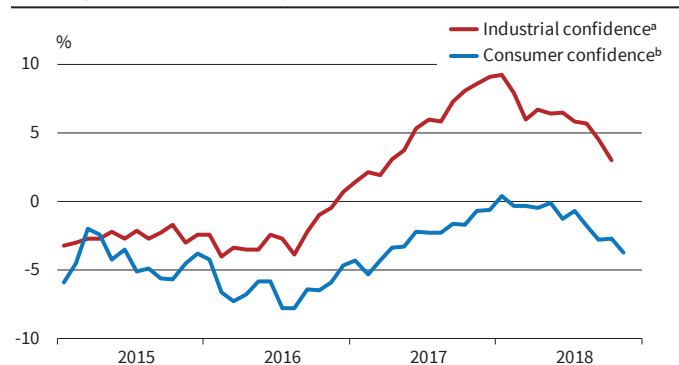


Source: European Commission.

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In October 2018 the Economic Sentiment Indicator (ESI) decreased in both the euro area (by 1.1 points to 109.8) and the EU28 (by 0.8 points to 110.4). In both zones the ESI stands above its long-term average.

**EU28 Industrial and Consumer Confidence Indicators**  
Percentage balance, seasonally adjusted



Source: European Commission.

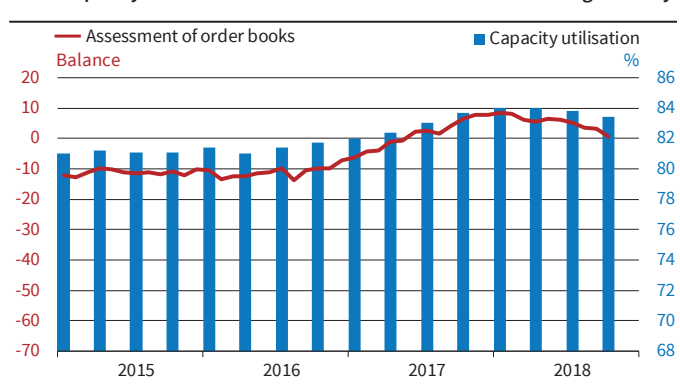
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In October 2018, the *industrial confidence indicator* decreased by 1.5 in the EU28 and by 1.7 in the euro area (EA19). Yet the *consumer confidence indicator* increased by 0.1 in the EU28 and by 0.2 in the EA19 in October 2018.

<sup>a</sup> The industrial confidence indicator is an average of responses (balances) to the questions on production expectations, order-books and stocks (the latter with inverted sign).

<sup>b</sup> New consumer confidence indicators, calculated as an arithmetic average of the following questions: financial and general economic situation (over the next 12 months), unemployment expectations (over the next 12 months) and savings (over the next 12 months). Seasonally adjusted data.

**EU28 Capacity Utilisation and Order Books in the Manufacturing Industry**



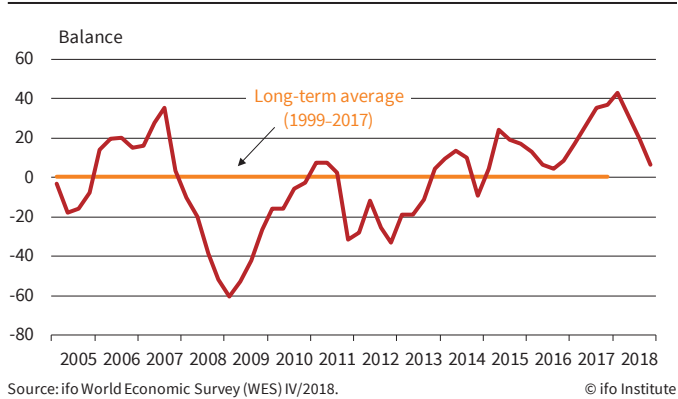
Source: European Commission.

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Managers' assessment of *order books* reached 0.5 in October 2018, compared to 3.2 in September 2018. In August 2018 the indicator had amounted to 3.5. *Capacity utilisation* decreased to 83.4 in the fourth quarter of 2018, from 83.8 in the third quarter of 2018.

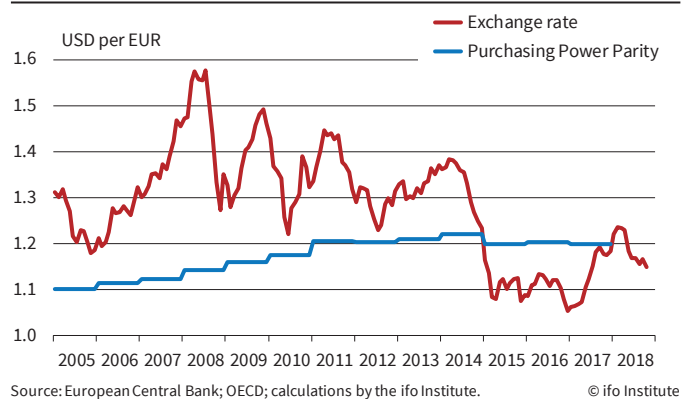
# Euro Area Indicators

## ifo Economic Climate for the Euro Area



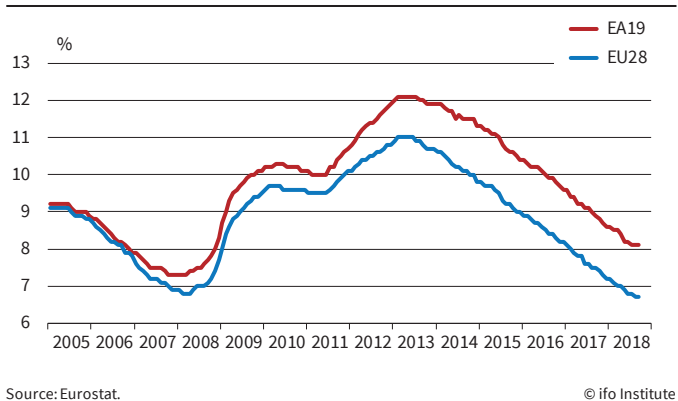
The ifo Economic Climate for the euro area (EA19) fell significantly from 19.6 points in the third quarter of 2018 to 6.6 points in the fourth quarter of 2018, plunging to its lowest level since mid-2016. Experts downwardly revised their assessments of both the current economic situation and their expectations significantly. The euro area's economy is moving into rough waters.

## Exchange Rate of the Euro and Purchasing Power Parity



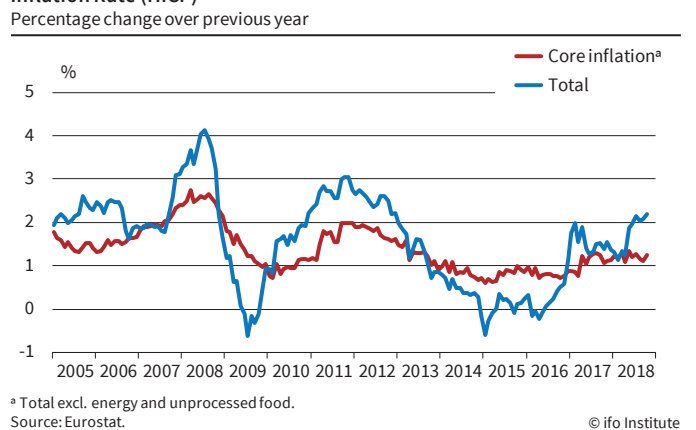
The exchange rate of the euro against the US dollar averaged approximately 1.16 \$/€ between August 2018 and October 2018. (In July 2018 the rate had amounted to around 1.17 \$/€.)

## Unemployment Rate



Euro area (EA19) unemployment (seasonally adjusted) amounted to 8.1% in September 2018, stable compared to August 2018. EU28 unemployment rate was 6.7% in September 2018, also stable compared to August 2018. In September 2018 the lowest unemployment rate was recorded in the Czech Republic (2.3%), Germany and Poland (both 3.4%), while the rate was highest in Greece (19.0%) and Spain (14.9%).

## Inflation Rate (HICP)



Euro area annual inflation (HICP) was 2.2% in October 2018, up from 2.1% in September 2018. Year-on-year EA19 core inflation (excluding energy and unprocessed foods) amounted to 1.2% in October 2018, again up from 1.1% in September 2018.