



Opportunities of job automation in Hungary

Increased automation and digitalisation is regarded today as one of the most important phenomena of labour market change. Research concerning possible impacts usually start out from the presumption that for some existing tasks, human power will be replaced by machines as a result of technological development, so in those fields the demand for labour will decrease. In other fields – e.g. in the design and operation processes of new technologies – demand is expected to increase. According to estimates, the pace of automation will be above the European average in Central Eastern Europe, and its effects on the labour market will most probably appear in the region. HCIC IEER examined the automatability of jobs in Hungary and compared them with employment figures. The early findings of that research are presented in the following summary.

According to the results of the first research papers on the topic, automation primarily affects routine tasks that are made up of clearly describable and easily programmable sub-tasks. With tasks that are not repetitive, and thus can only be done by humans, robots and computers can only help in auxiliary roles. Routine tasks that are mostly manual, e.g. production, assembly of parts, conveying, sorting, etc. are the most easy to substitute, followed by more cognitive tasks like measuring, data registering, customer service etc. What is more, now even some complex tasks can be automated - made possible by the development of technologies such as machine learning and 3D printing.

However, in some fields automation has still not been solved, there are technical obstacles described that make it virtually impossible to automatise certain tasks. Such tasks are non-repetitive and/or abstract/complex, and they generally need skills which are non-mechanisable, such as dexterity, creative intelligence and social skills.

Employment categories in the FEOR register

As part of our research we defined the level of automatability for each job appearing in the Hungarian FEOR (Standard Classification of Occupations) register. To achieve this, we categorised the tasks listed in the FEOR job descriptions as automatable (-1) and not automatable (1). As the first step of such categorisation, we tagged automatable tasks and hindering factors with key words, and ran Zurvey, a text analysing programme, on the job descriptions to find matches for our key words. If a task contained a key word suggesting that automation may be hindered, we categorised it as not automatable. If there was a match for a key word describing automatability, the task was categorised as automatable. For uncategorised tasks, the keyword-based analysis was amended with manual coding.

Based on the automatability of tasks, jobs were placed in five categories by their

automatability levels. Category 1 thus contains jobs with zero automatable tasks, whereas all the tasks are automatable in job category 5. This categorisation underlines that automation doesn't necessarily result in the elimination of respective professions: for most jobs it is true that there are certain tasks with a considerable automation potential, but there are many others that can't be automated at the present technological level.

Based on our coding, most jobs listed by FEOR belong to the non-automatable category. 122 jobs in the register couldn't be automated at all, in 79 jobs there are some tasks that could be automated but they still fall into the non-automatable category; 93 jobs are partially automatable, meaning that about a half of the tasks could be done by machines; 90 jobs would be automatable as far as the majority of the tasks are concerned, and finally, there are 26 fully or almost fully automatable jobs. The jobs in the last two categories can be considered the most exposed to the probable future impacts of automation.

Employment figures

As the next step, the categories of automatability were compared with the national tax authority's (NAV) employment figures. Based on the 2018 figures, of the 3 743 689 employees there were 164 496 employees working on automatable jobs and 567 313 employees are employed at workplaces where most of the tasks could be automatised. So about one in five of all employees works jobs that are fully or predominantly automatable. People with fully automatable jobs make up only 4%. About 1 million people, that is, 28% of the Hungarian labour force are employed at workplaces where machines can only take auxiliary roles, and there are only a smaller part of the tasks that could be automatised. In 2018 a further 9% of jobtakers did mostly non-automatable tasks, whereas 18% were employed to do jobs that were not automatable at all.

Table 1: The number of employees and their rate in relation to the total of employees in each automation category

	Employees	
	N	%
Not automatable	665 282	18
Mostly not automatable tasks	339 843	9
Partly automatable tasks	1 043 612	28
Predominantly automatable tasks	567 313	15
Fully automatable	164 496	4
<i>Not applicable</i>	963 143	26
Total	3 743 689	

Source: IEER 2019

The rate of people employed to do automatable jobs is the highest in the category of simple unskilled labour. 15% of these people (about 69 000 employees) fill fully automatable positions, 24% (about 99 000 employees) do automatable tasks, and another 24% (about 99 000 employees) are at workplaces where most of the tasks could be mechanised. The majority of the 167 000 employees concerned (135 000 employees) are doing „simple services, transportation services, and similar” (including e.g. dockyard workers, manual packers, couriers, carriers etc.)

In the main category of „office, administration and customer relations workplaces” there are only 3000 employees (1%) doing fully automatable jobs. However, 166 000 employees (75% in this category) do tasks the vast majority of which could be automated; so in total 76% of administrative workers spend their office hours with work that is fully or predominantly automatable. This figure is the highest in the main labour categories. Most of the employees concerned (157 000 people) work in „office and administration”.

14% (approx. 54 000 employees) and 24% of machine operators, assembly hands and drivers are employed at fully automatable and

predominantly automatable workplaces, respectively. The rate of automatable employment at industrial and construction companies is also above average, with 15% (approx. 17 000 employees) of workers at fully automatable and 43% (approx. 111 000 employees) at predominantly automatable workplaces.

In the main category of commercial and service jobs, 18% of employees (77 000 people) are at fully or predominantly automatable workplaces. Out of this group, 58 thousand (14% in this category) work jobs that can most probably be automated.

In agriculture and forestry there are fewer than one thousand employees on automatable jobs, which is a mere 3% in this category, however, there are 42% (10 000 employees) more at workplaces where most of the tasks may be automatable.

Professions needing tertiary education are the least automatable. Out of the jobs that require the autonomous application of advanced skills or the usage of intermediate/advanced skills we couldn't find any that could be fully automated. However, in the latter category there are 28 000 employees (8%) whose jobs include tasks that are mostly automatable.

Table 2. – Fully automatable workplaces and jobs with predominantly automatable tasks in the main employment categories

	Predominantly automatable tasks	Automatable	Number of employees in the most concerned professions	Total employees in the employment category
Jobs requiring the autonomous use of advanced skills	0	0	0	469 797
Jobs requiring miscellaneous advanced or intermediate skills	28 310	0	28 310	471 224
Jobs in the commercial and service sectors	58 432	18 582	77 014	420 311
Agricultural and forestry jobs	10 340	831	11 171	24 574
Office, administrative and customer relations employees	166 169	3 128	169 297	222 185
Machine operators, assembly hands, drivers	94 549	54 427	148 976	388 265
Jobs in industry and construction	110 726	18 656	129 382	326 370
Simple labour requiring no skills	98 787	68 872	167 659	457 821

Source: IEER 2019

Chinese MNCs in Europe and in Hungary

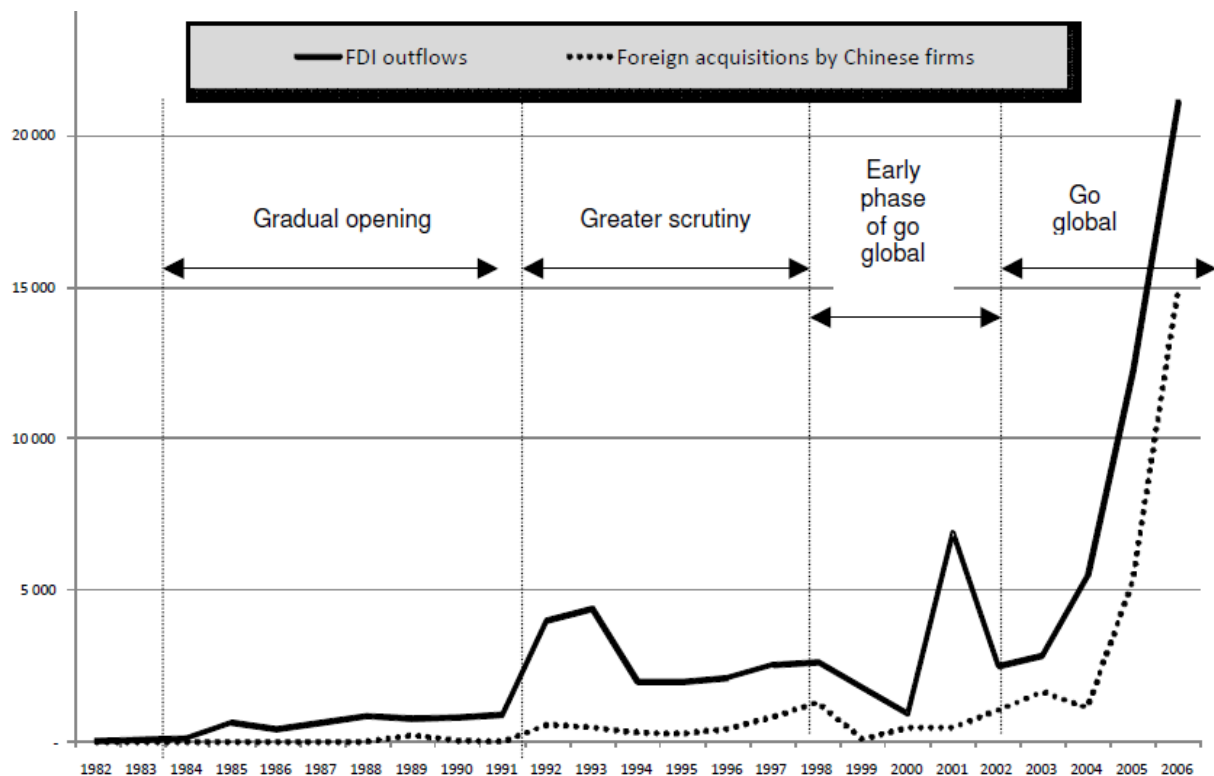
It has been noted that the Chinese business expansion abroad is a recent phenomenon, which became meaningful only in the last one and a half decade when China has appeared as a net exporter of capital. A remarkable feature of the Chinese cross-border business expansion is the essential role of the state in the internationalization of Chinese MNCs which was supported by official policy instruments, including the famous “go global” strategy that encouraged thousands of Chinese firms to invest abroad especially in Europe. The driving motive of Chinese firms to go abroad aimed at acquiring new skills, advanced technology, brands and supply chains that would enhance their competitive advantage in international markets. Merger and acquisitions has been the leading market entry mode resulting in huge takeovers characterizing Chinese investments in Europe. To this end, the Chinese OFDI in Europe has generally targeted few but major economies, namely Germany, UK and France despite the investment growth in the Southern and Central European region in recent years, especially after the financial crisis.

Overview of Chinese Business in Europe

The Chinese multinational corporations’ (MNCs) investments have become an issue of a particular importance in the global political economy over the last one and a half decade. Even though China’s contribution to the global outward direct investments was historically small, it has increased

dramatically since the mid-2000s due to *zou chu qu*, or go global, policy of Chinese government that sought to widen opportunity for export markets but also to enhance the capacity and experience of Chinese multinational corporations (MNCs). Figure 1 shows the evolution of Chinese outward foreign direct investments (FDI).

Figure 1: China’s Outward FDI & Acquisitions (in Mill. USD), 1982-2006



Source: Nicolas and Thomsen, 2008.

Following the 'go global' policy, the value of Chinese outward FDI has become 128 billion USD in 2007, as more than ten thousand Chinese MNCs have taken part cross-border investments in more than 170 countries making China one of the top outward investors. Since 2012, after a series of policy adjustments and buoyed by huge state subsidies, several state-owned enterprises (SOEs), private telecom companies, electronics producers and suppliers, and real estate companies have all actively 'gone out'. In the years that followed the global financial crisis, the Chinese firms have already headed to every corner of the globe constituting roughly 10% of global FDI flows, in 2017, making China the world's second largest investor after the USA.

The significance of Chinese MNCs engagement is particularly self-revealing in Europe, which has become the largest destination for the Chinese investors to invest in high-income economies. This was manifested in the "take-off", a decade ago, when annual inflows tripled from 2006 to 2009, tripled again by 2011 to become 10 billion USD. In 2014-15, the EU has already become the largest market for Chinese acquisitions, in terms of value. In 2017, Europe has absorbed more than 40% of Chinese investment stock in the developed countries. Studies conducted by different scholars on geographic distribution of Chinese investments reveal that Germany, the United Kingdom and France are the leading destinations in Europe. In the year 2012 alone, these three economies have received nearly 9 billion USD from China, which amounts to 50% of all Chinese FDI

stock in the EU countries. These countries together with the Netherlands, Italy and Spain have absorbed about 76% of the total of Chinese investments in the EU between 2003 and 2014. During the same period, of all the countries, Germany is, by far, found to be the top destination of Chinese investments, receiving 37% of total investments. The total stock Chinese capital in the five biggest economies (Germany, the UK, France, Italy and Spain) of the EU was 92.3 billion Euros in 2017.

Chinese investments in the European countries cover a wide range of economic sectors: chemicals, energy, mining, internet/software, automotive, finance and construction. While the chemical sector takes the biggest share of Chinese investments in industrial activities in Europe, computer and ICT programming business are dominant in the services sector.

Ownership Pattern of Chinese Investments in Europe

Looking at the ownership patterns, state-owned enterprises (SOEs) have dominated the Chinese investments in Europe. SOEs have made an investment worth 78% of the total investment value between 2008 and 2013. Between 2008 and 2018, out of the total 670 Chinese MNCs investing in Europe, about 100 are state-backed companies or investment funds, which collectively had transactions worth at least USD 162 billion, or 63% of the total deal value. Eight of the 10 largest acquirers (see Table 1) identified were either state-owned or backed by the government including the Silk Road Fund

Co., a sovereign wealth fund connected to China's Belt and Road Initiative.

Table 1: Top Ten Chinese Companies Investing in Europe (2008-2018)

S.N.	Name of the Chinese Company	Value (Bill. USD)
1.	China National Chemical Corp.	58.2
2.	China Investment Corp.	24.2
3.	Aluminum Corp. of China Ltd.	14.1
4.	Avic Capital Co.	11.6
5.	Silk Road Fund Co.	10.5
6.	Tencent Holdings Ltd.	9.9
7.	China Petrochemical Corp.	8.8
8.	China Cinda Asset Management Co.	8.6
9.	Shanghai Pudong Dev. Bank Co.	8.6
10.	China CITIC Bank Corp.	8.6

Source: Adapted from Tartar, Rojanasakul & Diamond, 2018

Although the number of Chinese private enterprises has increased in Europe recently in terms of the number of deals from 30% in 2015 to 74% in 2016, its share in total investment value is still far below that of the SOEs.¹

Motives and Drives of Chinese MNCs Investments in Europe

Chinese direct investments in Europe are driven overwhelmingly by commercial motives *via* appraising opportunities in the European markets. The industries targeted, the high number of enterprises making investments, and the competitive behaviour of companies all point to profit as the greatest

motive in China's outward FDI.² Nicolas & Thomsen (2008) indicated that many Chinese firms investment in Europe has been driven by their interest to maintain their competitiveness globally instead of harnessing locally available advantages. An empirical study conducted by Blomkvist & Drogendijk has revealed that the main motives for Chinese investment in Europe are "market seeking" and "strategic asset seeking".³ In the same vein, other studies have revealed that the desire to obtain advanced technology, brands, management skills, distribution channels in such a way to guarantee themselves direct access to the European markets and acquire cheap assets on sale, especially after the financial crisis of 2008, has attracted the Chinese MNCs to Europe. For many Chinese firms, the acquisition of well-known brands and technological know-how are the fundamental elements for breaking away from a competition back home.⁴ And, in many European countries, access to advanced technologies and established brands has helped Chinese businesses get higher position in the global value chain and become more competitive.

Yet, some scholars posit that the main driver of Chinese business internationalization was 'political' as the government has long been influencing companies' investment strategies taking into account several factors such as level of development, economic prospects, and the interests of individual target European countries. In doing so, the state has affected the overseas investments of Chinese firms in many ways such as through the allocation of credit, the degree of competition in the home market, or *via* its role as the owner of

¹ Dreger, Schüler-Zhou & Schüller, 2017.

² Hanemann & Rosen, 2012.

³ Blomkvist & Drogendijk, 2016.

⁴ Hanemann & Rosen, 2012.

corporate assets.⁵ The Chinese government, within the framework of the *Made in China 2025* strategy, is striving for worldwide leadership in key technologies by 2049, the 100-year anniversary of the People's Republic. Looking at this new phenomenon, i.e. China deploying capital beyond its borders, some scholars have even portrayed the country's geopolitical intent as a reason for its overseas investment and as an indicator of Chinese wider international political strategy than merely an economic one.⁶

Entry Modes of China's MNCs in Europe

Studies show that early phase of Chinese FDI of big value began in the form of international joint ventures (IJV). After the implementation of the "go global" policy, however, it appears that the vast majority of China's FDI in Europe comes in the form of merger and acquisitions (M&As) although greenfield projects are also becoming significant. M&As consisted more than 95% of China's outward investment flows to the EU in the year 2015 (see Figure 2).⁷

As indicated in Figure 2, unlike the traditional mode of internationalization, the overwhelming majority of the Chinese MNCs have been involved in acquiring prevailing business companies in Europe. In 2018, Chinese investors owned, partially or wholly, at least four airports, six seaports, wind farms in at least nine countries and 13 professional soccer teams.⁸ As the vast majority of the Chinese firms engagement in Europe has taken the form of M&As, many scholars

question whether such acquisition is one of corporate takeovers to capture of the local economy because it results in the transfer of strategic business companies to foreign investors.

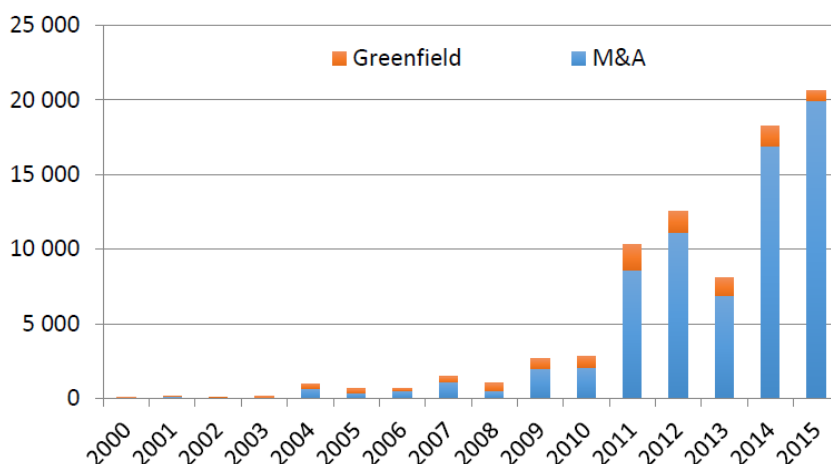
⁵ Dreger, Schüler-Zhou, & Schüller, 2017.

⁶ Clegg, J., & Voss, H. (2012), *Chinese Overseas Direct Investment in the European Union*, London.

⁷ Hellström, J. (2016), *China's Acquisitions in Europe: European Perceptions of Chinese Investments and their Strategic Implications*, FOI.

⁸ Tartar, Rojanasakul, & Diamond, 2018.

Figure 2: Chinese FDI in EU by Entry Mode (Investment in Million USD) 2000-2015



Source: J. Hellström, *China's Acquisitions in Europe*, 2016

Chinese MNCs Investments in Hungary

Chinese investments in Central and Eastern Europe have been comparatively small, but many countries in the region have seen a rapid growth of Chinese investments since 2010. McCaleb and Szunomár argue that Chinese investments in Central and Eastern European countries differ from those of Western companies in terms of specific institutional factors that shape their investment decisions. Worth mentioning, here, is the Sixteen Plus One Framework (16+1), launched at a 2012 summit in Warsaw, that aims to foster regional cooperation by enhancing trade ties and infrastructure integration in sixteen Central and Eastern European countries. The Hungarian government has shown commitment to such initiatives, for instance, *via* signing the joint communique on the Belt and Road Initiative in May 2017. These are meant to allow cross-border cooperation and the finalization of projects like the Budapest – Belgrade railways, while at the same time helping China to effectively structure its investments and engagement to the region. Hungary, in particular, has attracted the

largest Chinese FDI in Central and Eastern Europe, outperforming all Visegrad countries including Poland, which has been regarded as the regional leader in attracting FDI.⁹ Hungary has absorbed 2.1 billion Euros of Chinese investments from 2000-2016.¹⁰ The impact of EU integration, the Chinese diaspora, and the long history of political relations with the Chinese government are reported to have made Hungary the leading recipient of Chinese FDI in the region.¹¹

In Hungary, the most significant Chinese multinationals operate in the manufacturing sector. As far as the entry mode of investment is concerned, the Chinese firms have utilized acquisition as a strategy of their business internationalization (see Table 2). Chinese multinationals, in many cases, have bought the plants of other companies or replaced former partners of electronics manufacturing service (EMS) providers. But unlike the Chinese engagement in Western Europe,

⁹ McCaleb, A. & Szunomár, Á. (2017) Chinese foreign direct investment in central and eastern Europe: an institutional perspective.

¹⁰ Drahokoupil, J. (2017). Introduction. In J. D. (Ed.), *Chinese Investment in Europe: Corporate Strategies and Labour Relations* (pp. 1-17). Brussels: ETUI aisbl.

¹¹ J. Drahokoupil, 2017.

greenfield investments are also significant in Hungary. Table 2 provides a brief summary of the Chinese MNCs investments in Hungary.

Table 2: Summary of the Chinese MNCs in Hungary (Stock, Entry Modes, Sectors)

S.N.	Indicators	Descriptions
1.	FDI Stock	3.5 billion USD/2.5% of the national FDI stock
2.	Entry Modes of Investment	Mostly M&As, Greenfield, Joint ventures
3.	Main Sectors of Engagement	Chemical, ICT, electronics, Pharmaceuticals, banking, hotels & catering, logistics, real estate
4.	Major Chinese MNCs	Wanhua, Huawei, ZTE, Lenovo, Orient Solar, Sevenstar, BYD, Xanga, Canyi, Comlink

Source: McCaleb, A. & Szunomár, Á. (2017) and Tamas Matura (2017)

Although Chinese multinationals represent a relatively small share of total FDI stock in Hungary, they have saved and/or created jobs and contributed to economic growth with their investments and exports during the global economic and financial crisis. Furthermore, many of them (for example, Lenovo, ZTE, Huawei) have turned their Hungarian businesses into the European regional hub of their activities.¹² However not all big Chinese MNCs have success stories in Hungary. A study by Tamas Matura (2017) revealed that, out of the list of 22 big Chinese MNCs that have been investing in Hungary since the early 2000s, only half of them are successful, while the rest have failed and few deals are still in progress. The point being, despite the political rhetoric, China's MNCs

engagement in Hungary remains to be low, the new FDI flow to the country from 2012 to 2017 was only 20 million USD.¹³

¹² A. McCaleb & Á. Szunomár, 2017.

¹³ Tamas Matura (2018) The Misguided Discourse On Chinese Influence in Central Europe, Global Affairs, October 2018.

International trends

Changes in the production, consumption and employment situation in certain major international economies compared with peer expectations and the previous period.

		Period in review	Actual data	Expectations	Previous period
	Unemployment Rate	(Sept)	5.0%	5.0%	5.0%
Germany	Manufacturing Purchasing Managers Index	(Sept)	41.7	41.4	43.5
	IFO Business Climate Index	(Sept)	94.6	90.8	94.3
France	INSEE Business Climate Index ²	(Sept)	106.2		105
	Unemployment Rate	(Sept)	3.5%	3.7%	3.7%
USA	CB Consumer Confidence Index	(Sept)	125.1	134.1	134.2
	Manufacturing Purchasing Managers Index	(Sept)	51.1	51.0	50.3
China	Manufacturing Purchasing Managers Index	(Sept)	49.8	49.5	49.5

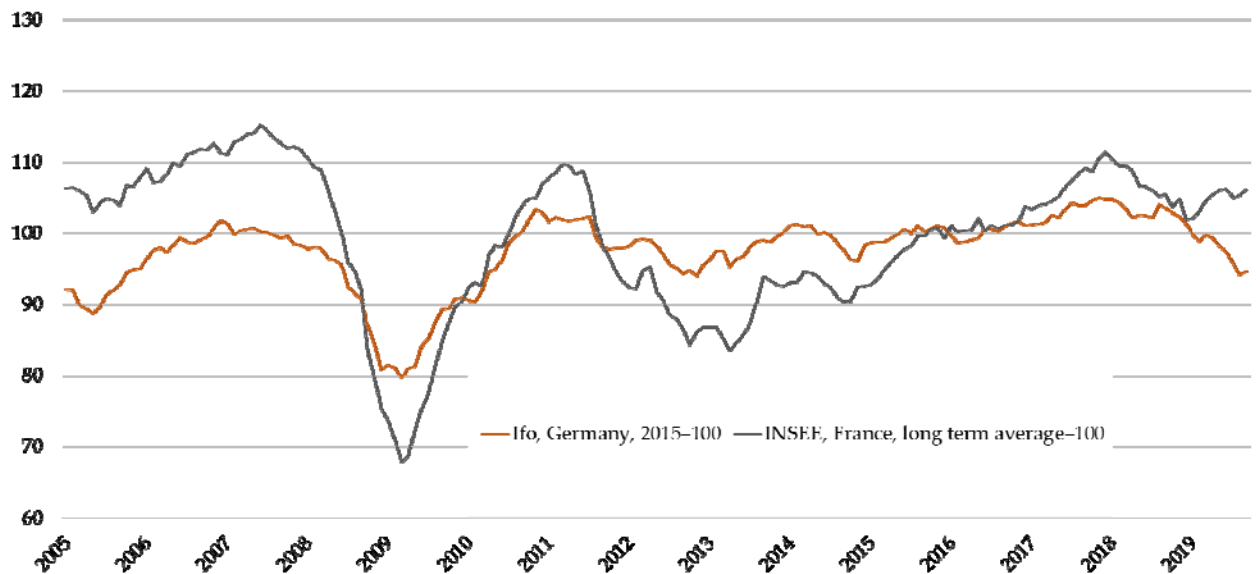
<https://www.cesifo-group.de/ifoHome/facts/Survey-Results/Business-Climate/>

² <http://www.insee.fr/en/themes/indicateur.asp?id=105>

The rest of the data source: <http://worldeconomiccalendar.com>

In Germany, the IFO business climate index shows a very small increase –virtually it remains unchanged - but still doing better than expected. The manufacturing purchasing manager index (PMI) drops, approximating expectations, while the unemployment rate stagnates at the same level. The French INSEE business climate improved to the month prior. In the United States, the CB consumer confidence index dropped significantly in comparison to last month and the expectations. The manufacturing PMI remained virtually unchanged. The unemployment rate dropped and performing better than expected. The Chinese manufacturing PMI is unchanged in September, if not a slight increase.

**Business confidence in Germany and France,
based on the Ifo and INSEE business climate survey,
January 2005 - September 2019**



Sources: www.ifo.de, www.insee.fr

Contact

Address: MKIK GVI
1054 Budapest, Szabadság tér 7.
Tel: 235-05-84
E-mail: gvi@gvi.hu
Internet: <http://www.gvi.hu>

Prepared by:

Csányi Veronika, analyst, MKIK GVI
Fikadu T. Ayanie, intern, IEER
Fruzsina Nábelek, analyst, MKIK GVI

Research manager:

Ágnes Makó, PhD
Managing director, MKIK GVI

In case of publication please cite as follows:

HCCI-IEER: Monthly Economic Bulletin,
September 2019, Budapest,

2019-10-11