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Trump's protectionist ambitions under the microscope

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- Donald Trump has threatened to impose higher tariffs on imports from China and the NAFTA countries Canada and Mexico. There has also been talk of higher import tariffs across the board.
- In this paper we find that bilateral trade linkages are relatively small from the point of view of the US. Thus, few – although important – US industries would be hit by higher tariffs on imports from China, Canada, and Mexico.
- Trade exposure is much higher in the aggregate and a number of industries would be significantly affected by protectionism. This would be particularly the case for machinery and equipment, chemicals and pharmaceuticals, as well as water and air transport services.

Assessing the effects of protectionism

According to the standard general equilibrium (GE) analysis of an import tariff, which is commonly used to evaluate the impact of trade liberalization¹, there are four sets of effects on the economy, namely, the production effect, the consumption effect, the effect on the volume of trade and the fiscal revenue effect.

Under the *production effect*, the domestic output of the sector producing the imported good increases, given that the import tariff protects domestic producers from foreign competitors.

At the same time the domestic output in the rest of the sectors (be it exporters, importers or sectors producing exclusively for domestic needs) decreases.²

The *consumption effect* results in the decrease in domestic consumption of the protected good, as consumers are subject to higher domestic prices of the imported good. Given that the relative price of the other goods in the economy declines, consumers tend to increase their consumption there.

¹ For an example of general equilibrium quantitative assessment of the effects of TTP, see Peter Petri and Michael Plummer (2016), "The economic effects of the Trans-Pacific Partnership: new estimates", Peterson Institute for International Economics, Working Paper No. 16-2.

² This is because the underlying assumption of full employment of production inputs requires that – due to a shift in the relative prices between protected and unprotected sectors – resources be moved from the rest of the economy to the sector of the imported good.



The effect on the *volume of trade* affects both imports and exports. Due to higher import prices, imports decrease. But exports decrease as well due to a joint effect of increased domestic consumption and decreased domestic production in the unprotected sectors. The net effect is thus a reduction in the volume of trade.

Finally, the *fiscal revenue effect* is positive, given that the government collects a tax on the imported good.

There exist clear limits to this general equilibrium analysis, so that it often fails to provide an accurate guide to the expected outcomes. This is due to the many simplifying assumptions, like the one of full employment and the perfect factor mobility across sectors and regions. It ignores, moreover, the underlying structure and interdependences of the industrial system and thus the possible feedback and spillover effects across industries. Finally, it blends out the reactions of the trading partners and of exchange rates. This notwithstanding, this schematic analysis gives a useful picture of the main effects.

What can be (not) expected from import tariffs?

The extent of the economic benefit or damage on the US economy from the imposition of an import tariff should first and foremost depend on the import dependency of the US industries. This is what we aim at analyzing by using the World Input Output Database (WIOD). These tables provide a comprehensive map of supplier-customer relationships between 56 industries across 43 major economies for the period 2000 to 2014. In our analysis, we concentrate on the latest table available. Although this table dates back to 2014, we assume that domestic production and trade patterns do not vary substantially in the short-term, so that we can treat

our results as a sufficiently good illustration of the current situation.

Among all the input output tables for the year 2014, we focus mainly on three tables, namely, those registering bilateral relations between the USA, on the one hand, and Mexico, Canada, as well as China, on the other hand. From these tables, we calculate, for each of the three pairs of countries, import- and export-dependency coefficients. They can be defined as:

$$imp_dep_{c,i} = \frac{(int_imp_{c,i} + fin_imp_{c,i})}{output_{US,i}}$$
$$exp_dep_{c,i} = \frac{(int_exp_{c,i} + fin_exp_{c,i})}{output_{US,i}}$$

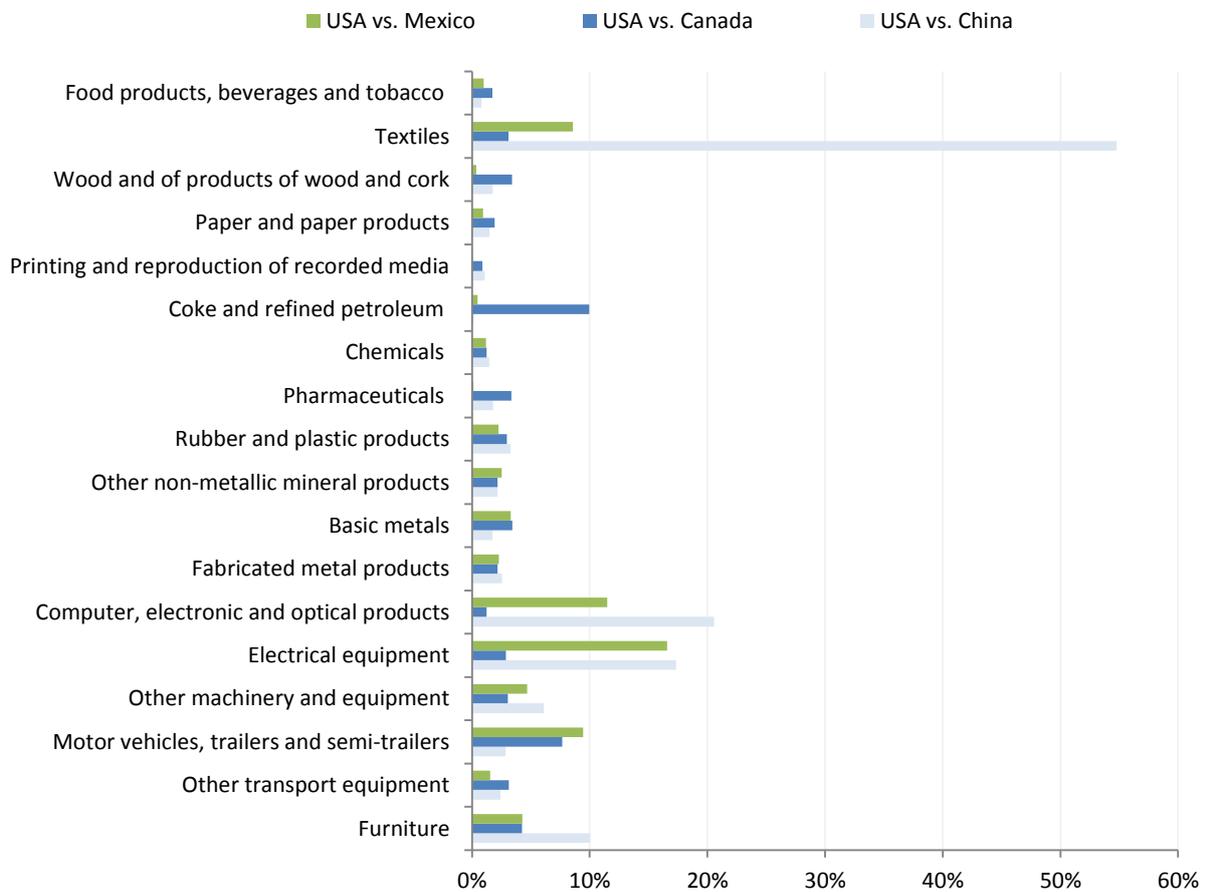
where $int_imp_{c,i}$ and $int_exp_{c,i}$ are the values of intermediate imports/exports of the US sector i from/to country c (Mexico, Canada or China). Moreover, $fin_imp_{c,i}$ and $fin_exp_{c,i}$ are the values of the US imports/exports from/to country c of the final demand sectors (consumption of households, of non-profit organizations, of government, as well as expenditures on gross fixed capital formation and changes in inventories and valuables). Finally, $output_{US,i}$ is the total value of production generated by the US sector i . In this way, we can capture the relative importance of bilateral imports and exports over the total production of each manufacturing and service sector in the USA.

Bilateral trade linkages

Figure 1 summarizes the results of our calculations for import dependency towards China, Mexico and Canada. We show the results only for manufacturing sectors, given that import dependency for services is negligible. The figure shows clearly that for manufacturing sectors import dependency towards all three trading partners is rather small: 7% on average with China, 4% with Mexico and 3% with Canada. This implies that, should an import tariff be



Figure 1. US bilateral import dependency versus China, Canada and Mexico



Note: Full names of sectors are listed in the Appendix.

Source: Own calculations (Flossbach von Storch Research Institute) based on the World Input Output Tables, 2016 Release.

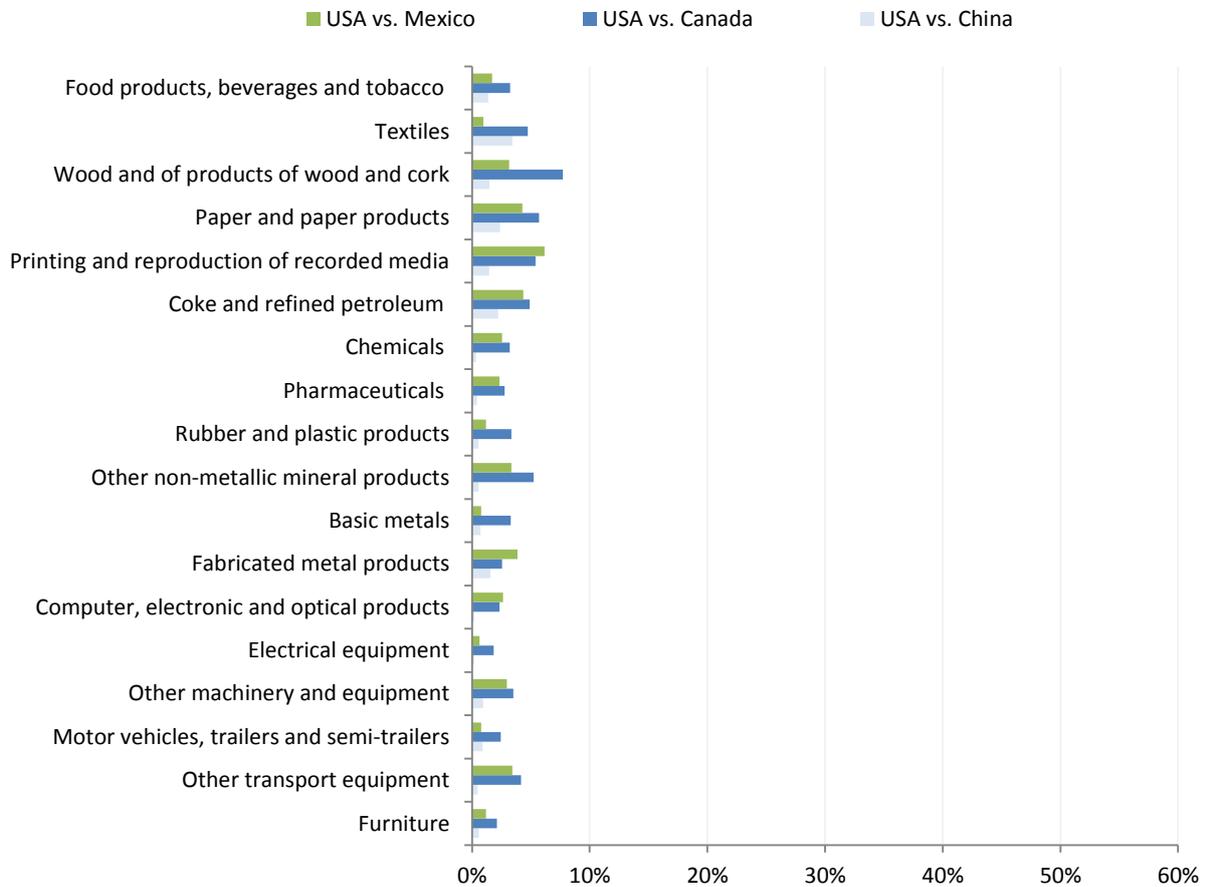
imposed, this should have only a limited economic impact on the US economy, both in terms of trade destruction and jobs creation. This conclusion should not change much, if China, Mexico and Canada retaliate. The US export dependency across all sectors remains far below 10% (Figure 2).

However, there are three sectors that could be disproportionately hit by a tariff, especially if it was imposed on the Chinese and Mexican exports at the same time. This is the case for the manufacturing sectors of textiles, computer, electronic and optical products and of electrical equipment. Tariffs on textiles from China would

mainly affect US consumers. In the case computer, electronic and optical equipment, 81% of Chinese and 66% of Mexican imports are demanded by US producers of the same sector, which are then used as inputs in later production stages along the value chain. Moreover, especially the equipment sectors are important suppliers for several other US domestic sectors. Computers, electronic and optical equipment account for 18.7% of total value of intermediate products in their own sector, 6.9% of manufacturing of other transport equipment and 4.6% of the telecommunications sector. There is thus a strong interconnectedness of production both domestically and internationally. This illustrates



Figure 2. US bilateral export dependency versus China, Canada and Mexico



Note: Full names of sectors are listed in the Appendix.

Source: Own calculations (Flossbach von Storch Research Institute) based on the World Input Output Tables, 2016 Release.

that there may be additional effects should production processes be disturbed by shortages of imported parts.

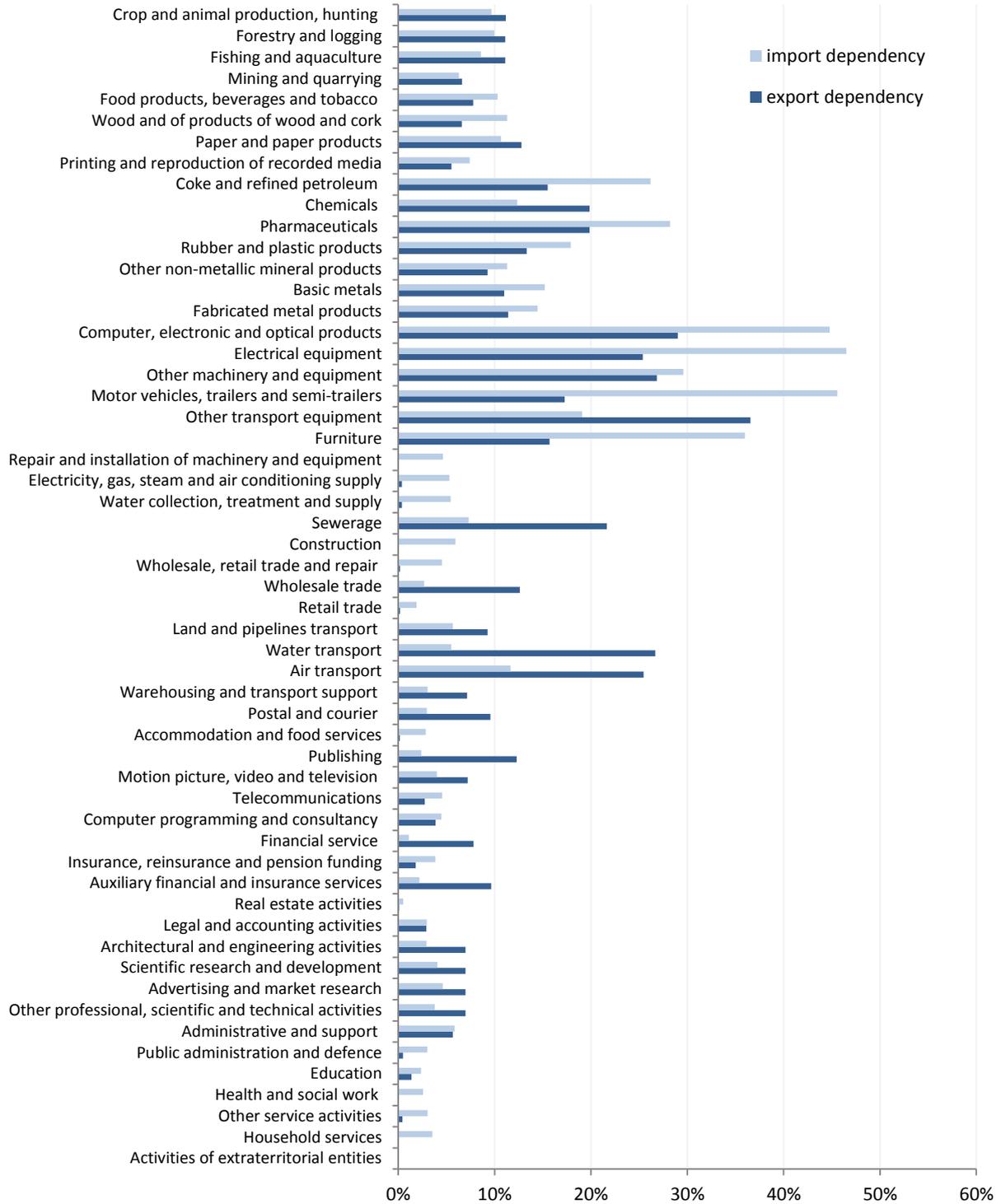
Aggregate trade linkages

Figure 3 shows the results of our calculations of aggregate trade linkages for all 56 sectors. The average sectoral import dependency of the US economy amounts to around 13% of the total value of its production (10% if manufacturing of textiles is excluded, which is a very special, though relevant case for the US economy). The average export dependency ratio is 9.7%.

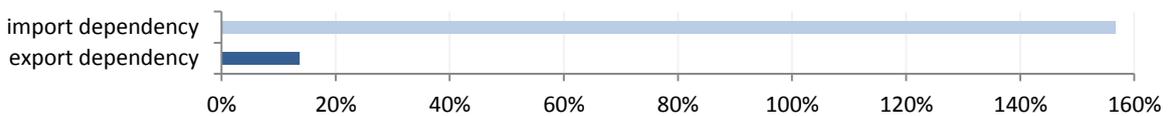
However, there is a strong discrepancy between manufacturing and services. Both import and export dependency is significantly higher in the former. Specifically, trade dependency in manufacturing reaches 29% for imports and almost 16% for exports. For services, it stays at 4% for imports and 6% for exports. The highest import penetration is in textiles (157% of the domestic output value), followed by electrical equipment, motor vehicles, as well as computer, electrical and optical equipment. On the export side, other transport equipment and, again, computer, electrical and optical equipment reach the highest dependency ratios.



Figure 3. US sectoral trade dependency on average against its trading partner



Manufacturing of textiles

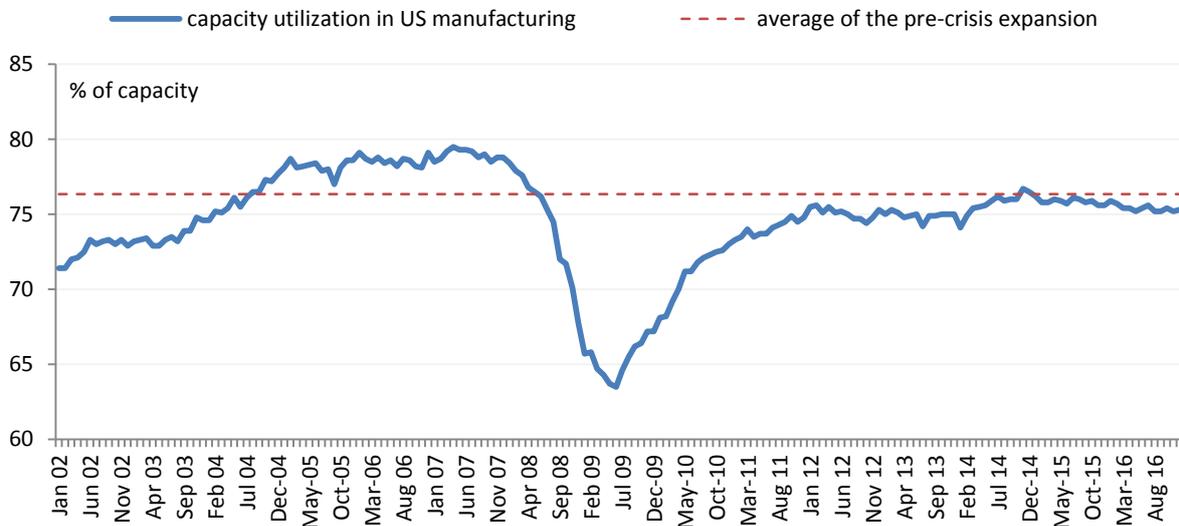


Note: Full names of sectors are listed in the Appendix

Source: Own calculations (Flossbach von Storch Research Institute) based on the World Input Output Tables, 2016 Release.



Figure 4. Capacity utilization in US manufacturing sectors, as a percentage of available capacity



Note: The average of the pre-crisis expansion refers to the period between January 2002 and December 2007.

Source: Federal Reserve Board/Haver Analytics.

Interconnectedness matters and it is stronger here than in the analysis of bilateral connections: the more single industries are protected, the stronger could be the feedback effects.

It is doubtful that shortages in supply due to lower imports (and possibly exports, in case of retaliation) could be replaced quickly by increasing domestic production, as claimed by President Trump. Manufacturing capacity utilization is close to the average level from the expansion phase of the previous business cycle (Figure 4), and there could be scarcity of skilled workers.

Conclusion

Tariffs on imports from China, Canada or Mexico would be of limited consequence for the US.

However, computers, electronic and optical products and electrical equipment would be affected to some extent. Tariffs on aggregate US trade (on imports by the US and on US exports by trading partners) would obviously have more severe consequences. Especially, manufacturing of all kinds of machinery and equipment (computer, electrical, optical and transport), manufacturing of pharmaceuticals, chemicals, coke and refined petroleum as well as water and air transport services would be affected significantly. Since there is little domestic spare capacity to replace imported products, imposition of an import tariff would probably lead to output losses. Also barriers to US exports would hit the economy negatively.



Appendix: Full names of sectors in the World Input Output Database

1 – Crop and animal production, hunting and related service activities; 2 - Forestry and logging; 3 - Fishing and aquaculture; 4 - Mining and quarrying; 5 - Manufacture of food products, beverages and tobacco products; 6 - Manufacture of textiles, wearing apparel and leather products; 7 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; 8 - Manufacture of paper and paper products; 9 - Printing and reproduction of recorded media; 10 - Manufacture of coke and refined petroleum products; 11 - Manufacture of chemicals and chemical products; 12 - Manufacture of basic pharmaceutical products and pharmaceutical preparations; 13 - Manufacture of rubber and plastic products; 14 - Manufacture of other non-metallic mineral products; 15 - Manufacture of basic metals; 16 - Manufacture of fabricated metal products, except machinery and equipment; 17 - Manufacture of computer, electronic and optical products; 18 - Manufacture of electrical equipment; 19 - Manufacture of machinery and equipment non elsewhere classified; 20 - Manufacture of motor vehicles, trailers and semi-trailers; 21 - Manufacture of other transport equipment; 22 - Manufacture of furniture; other manufacturing; 23 - Repair and installation of machinery and equipment; 24 - Electricity, gas, steam and air conditioning supply; 25 - Water collection, treatment and supply; 26 - Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services; 27 – Construction; 28 - Wholesale and retail trade and repair of motor vehicles and motorcycles; 29 - Wholesale trade, except of motor vehicles and motorcycles; 30 - Retail trade, except of motor vehicles and motorcycles; 31 - Land transport and transport via pipelines; 32 - Water transport; 33 - Air transport; 34 - Warehousing and support activities for transportation; 35 - Postal and courier activities; 36 - Accommodation and food service activities; 37 - Publishing activities; 38 - Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities; 39 – Telecommunications; 40 - Computer programming, consultancy and related activities; information service activities; 41 - Financial service activities, except insurance and pension funding; 42 - Insurance, reinsurance and pension funding, except compulsory social security; 43 - Activities auxiliary to financial services and insurance activities; 44 - Real estate activities; 45 - Legal and accounting activities; activities of head offices; management consultancy activities; 46 - Architectural and engineering activities; technical testing and analysis; 47 - Scientific research and development; 48 - Advertising and market research; 49 - Other professional, scientific and technical activities; veterinary activities; 50 - Administrative and support service activities; 51 - Public administration and defence; compulsory social security; 52 – Education; 53 - Human health and social work activities; 54 - Other service activities; 55 - Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use; 56 - Activities of extraterritorial organizations and bodies.



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