

Impact of strict vendor screening as part of NIS2's implementation in Poland

FINAL REPORT

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This note¹ sets out some of the costs of that could result from the implementation of new cyber security regulation in Poland. It will help policy makers effectively design cyber regulations, and ensure that Poland is protected from cyber threats in a way that is appropriate and proportionate to the risks.

Executive summary

Poland's proposed new cyber security law (Act on the National Cybersecurity System² ("CS LAWCS LAW"), amending the National Cybersecurity Act) will help protect Poland against cybersecurity threats. However, it will impose compliance costs of approximately €2bn p/a on affected firms in Poland. These costs will have different impacts on affected sectors. The manufacture of food (€470m incremental costs), manufacture of motor vehicles (€170m incremental costs), and manufacture of machinery and equipment (€160m incremental costs), being the most affected sectors. While cybersecurity measures are clearly important, policy makers should ensure that the costs that are imposed through regulation are proportionate to the objectives of the policy.

The CS LAW also introduces the concept of a High Risk Vendor (HRV) for affected sectors. This will inevitably add costs and frictions to economic activity in Poland and add barriers to trade. It could particularly affect imports of some high tech products used in Polish industry. For example Poland is particularly reliant on imports from China for certain products such as photo-voltaic (PV) cells which are vital to meet Poland's ambitions to transition to a Green Economy.

The increase in trade barriers as a result of increased HRV vendor screening could mean that Polish exports will decline. Extra-EU exports (i.e. exports from Poland to non-EU countries) could decline by €237m per year (or up to €2.9bn cumulatively over ten years). Furthermore HRV screening may lead to a retaliatory trade response. Poland has deep trading ties with China to whom it exported €3.1bn (US\$3.2bn) of goods in 2022. These could be put at risk

¹ This report was commissioned by [SinoCham](#), the Polish-Chinese General Chamber of Commerce.

² Ustawy o Krajowym Systemie Cyberbezpieczeństwa

(up to the value of China's lost exports) if China were to impose retaliatory trade responses on Poland.

Policy makers should therefore carefully design policy in a way that is proportionate to the costs.

1. Poland's proposed implementation of NIS2 Directive implies a strict form of vendor screening

The Polish government is consulting on a new law (CS LAW) that will implement the EU NIS2 Directive on cyber security. The scope of CS LAW now classifies firms as either 'essential' or 'important' entities, with the definition being dependent on the criticality, in terms of the economy and society, of the sector in which the firm operates ("CS LAW sectors"). The CS LAW increased the number of sectors that are subjected to cybersecurity regulations and these new sectors include waste water, manufacturing, food production, digital providers and research organisations among other sectors.³

In addition to implementing the EU NIS2 Directive, the CS LAW will also, inter alia, define suppliers as HRV for the CS LAW sectors. The concept of the HRV was developed to assess risk for 5G networks but is being proposed to be extended to all CS LAW sectors. HRVs can be defined using substantive evidence of the perceived risks, but also "non-technical" factors (i.e. factors that are not based on substantive assessment of product risk but wider concerns, such as country of origin of the vendors outside EU or NATO). Once an entity is classified as a HRV, the respective Polish firms that uses the supplier's products or services are obliged to immediately stop buying and "swap out" any inputs supplied by the HRV from the production or supply process.

The use of "non-technical" factors to assess risk could add costs and uncertainty to firms across the CS LAW sectors. This is because firms will not know which countries could be classified as indicating HRV status (the formulation of HRV in the law could apply to vendors from a wider set of countries such as India or Brazil as well as China). Firms will therefore not have assurance when making decisions about their suppliers whether they could, in the future, be deemed to be HRV.

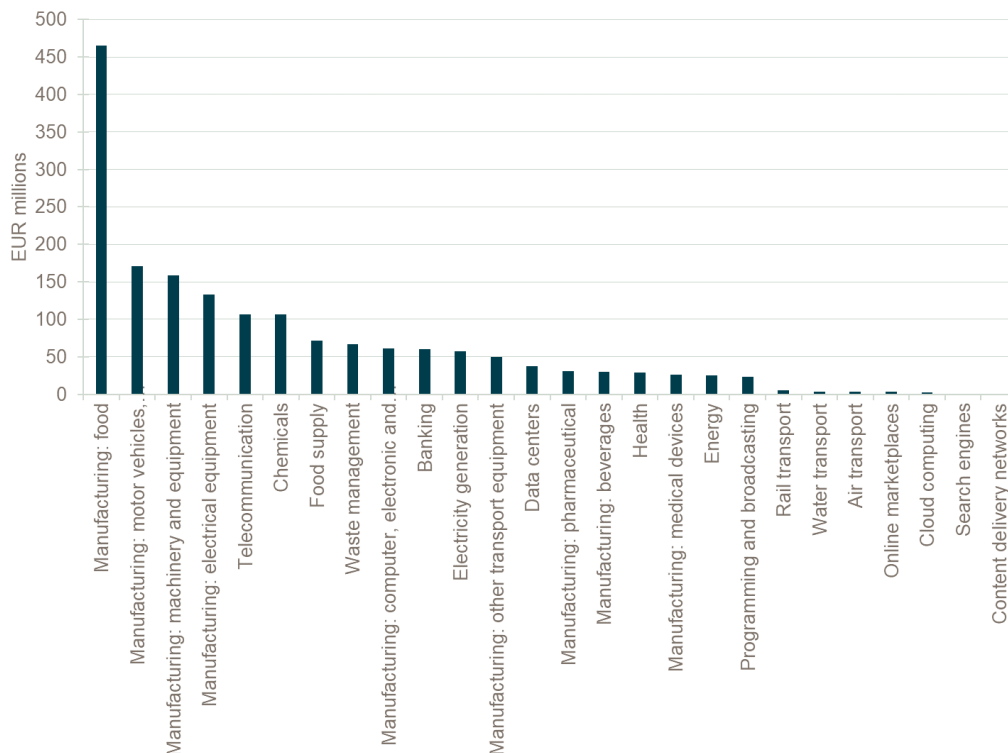
³ The affected sectors in the CS LAW ("CS LAW sectors") include: energy (hydrogen, energy producers; nominated electricity market operators; electricity market participants providing aggregation, demand response or energy storage services; district heating or district cooling, referred to elsewhere on the promotion of the use of energy from renewable sources), transport (air, rail, water, and road), banking and financial market infrastructure, healthcare (including labs and research on pharmaceuticals and medical devices), drinking water supply and distribution, sewage, digital infrastructure, ICT service management, outer space, public administration, production, production and distribution of chemicals, food production, processing and distribution, manufacturing and production, postal services, waste management, digital service providers, research.

2. CS LAW will be costly to implement

The implementation of CS LAW will impose significant compliance costs across a range of sectors. It will require businesses to implement new measures (e.g. incident response and crisis management measures) and it expanded the focus of these regulations from the existing requirements (e.g. making specific requirements on vulnerability management, obligatory audits every two years, cybersecurity risk management processes, cybersecurity training, encryption, information security policies, the use of multi-factor authentication or other secure authentication). CS LAW also requires entities to implement cybersecurity risk mitigation requirements related to third party supplier / service.

In total Polish firms will face incremental compliance costs of approximately €2bn p/a to implement the measures relating to NIS2 within the CS LAW. These will reflect increased staff, new services (legal and advisory), software and hardware. However, different sectors will face different levels of costs, with these depending on factors such as the size of firms within the sectors, and the specific level of risk within each sector. Figure 1 shows the costs of implementing CS LAW in Poland (note that the costs relate to the implementation of NIS2, as implemented by the CS LAW, and in the case of the Telecoms sector exclude the costs of mandatory replacement of 5G equipment since this was not required by NIS2).

Figure 1 The costs of implementing CS LAW in Poland (€millions)



Source: Frontier Economics

Note: Incremental costs are calculated in a bottom up approach by identifying the incremental activities required by NIS2 as implemented by CS LAW (but exclude costs of mandatory replacement of 5G equipment as this was not required by NIS2). These will vary by sector (with different sectors facing different risks) and firm size; the existing capacity of Polish suppliers to undertake cybersecurity activities. See Frontier Report Assessing the Economic Impact of EU Initiatives on Cyber Security <https://www.frontier-economics.com/uk/en/news-and-insights/news/news-article-i10389-carefully-designing-cyber-security-regulation/>

While cybersecurity measures are clearly important, the scale of costs involved in implementing policies means it is incumbent on policy makers to ensure that the costs that are imposed through regulation are proportionate to the objectives of the policy and the risks of inaction.

3. CS LAW sectors will be particularly affected by the HRV vendor screening

CS LAW sectors could be particularly affected by a vendor screening which would classify suppliers as HRV. CS LAW sectors intensively rely on imports of digital and ICT services from China. But as drafted CS LAW could also affect suppliers from a range of other non-NATO countries. For example, vendors from countries such as India, (which exports significant volumes of hardware and software services, and accounts for 11% of global software services⁴), Malaysia and Indonesia could potentially be classified as a HRV.

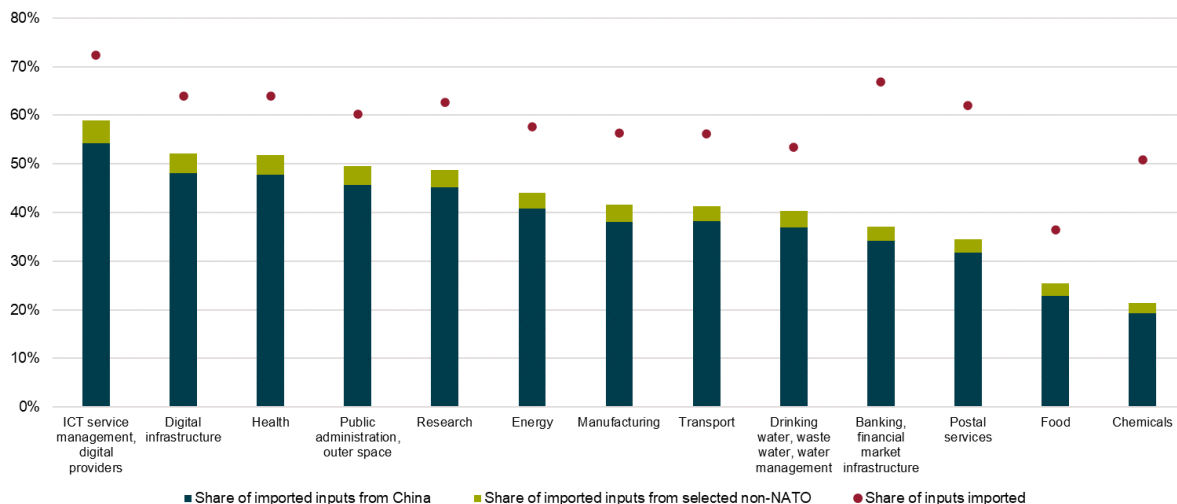
CS LAW affected sectors rely on imports from China

The costs and frictions associated with HRV vendor screening are higher in those sectors which more intensively rely on imports from China. Analysis of multi-region input output (MRIO) tables can illustrate how certain sectors rely on imports from China more than others. Figure 2 shows the proportion of digital Infrastructure⁵ that each CS LAW sector imports from China and selected other non-NATO countries (India, Brazil, Thailand, Vietnam, Malaysia, and Indonesia). It shows, for example, that the healthcare sector imported 64% of its digital infrastructure inputs, and 52% of these imports of digital infrastructure goods and services used in the healthcare sector were imported from China and selected other non-NATO countries. China is by far the biggest supplier of digital infrastructure to Poland's healthcare sector supplying 48% of all imports of digital infrastructure goods and services used in the healthcare sector.

⁴ India's share in global computer services exports jumps to 11% in FY23: Analysis - The Economic Times <https://economictimes.indiatimes.com/news/economy/foreign-trade/indias-share-in-global-computer-services-exports-jumps-to-11-in-fy23-analysis/articleshow/99564838.cms?from=mdr>

⁵ Computer, electronic and optical products (C26), electrical equipment (C27)

Figure 2 Intensity of imported digital infrastructure used as intermediate goods or services (“inputs”) in production across CS LAW sectors



Source: OECD Inter-Country Input-Output (ICIO) Tables

Note: 2020 data. Some NIS2 sectors are aggregated reflecting the data that was available (“Water supply, sewerage, waste management and remediation activities”, which encompasses three NIS sectors; drinking water, waste water and waste management.)

China supplies a particularly high share of Poland’s imports of certain high tech goods

China supplies an ever growing proportion of complex manufactured goods to Poland. In certain sectors it is a particularly important supplier⁶. 28% of all imports from China to Poland were electrical machinery and electronics and machinery; and 19% imports from China were of mechanical appliances and parts⁷. If the suppliers of these goods to be classified as HRV it is likely that Polish importers would face significant costs and difficulties in rapidly finding alternative suppliers given high reliance on Chinese suppliers. The reliance by Polish firms on China for imports of certain products is illustrated for a number of specific products below.

Solar Photovoltaic (PV) panels

Poland is reliant on China for imports of PV panels⁸. 83% of its imports of PV panels in 2022 were from China, with other countries supplying much less: Germany (8%), Netherlands (6%), Czechia (1%) and Greece (1%). Note however, that imports from Germany and the

⁶ Data sourced from Observatory of Economic Complexity. Throughout the 2022 US\$ are converted to EURO at the average 2022 exchange rate of US\$1.05 = €1.

⁷ At the 2-digit level Harmonised System product codes. Source: <https://oec.world/en/profile/bilateral-country/pol/partner/chn?depthSelector=HS2Depth&depthBalanceProductSelector=HS2Depth>

⁸ HS code 854143: Electrical apparatus; photosensitive semiconductor devices, photovoltaic cells assembled in modules or made up into panels. Note this is a sub-category of semi-conductor devices 8541.

Netherlands may include parts that have been ultimately supplied by China to these countries and re-exported and hence may still be prohibited if the ultimate supplier was classified as a HRV.

The solar energy industry in Poland has been experiencing significant growth in recent years, and Poland remains one of the fastest-growing solar markets in Europe. In August 2023 over 26.4 GW of renewable energy was installed in Poland, of which 14.7 GW came from solar PV systems, which is more than 50% of the country's total (Renewable Energy Sources) RES capacity.⁹ The government's commitment to renewable energy will continue to drive growth. The government has introduced several measures to promote the development of the solar industry, including feed-in tariffs, net metering, and renewable energy auctions.¹⁰

Access to PV panels is essential for Poland to meet its environmental ambitions. Solar energy is used worldwide and is increasingly important for generating electricity from renewable sources. In 2023, solar PV alone accounted for three-quarters of renewable capacity additions worldwide. The Polish government's energy policy to transition to a low emission path¹¹ committed to grow the use of solar energy.¹² Moreover, there are time constraints in undertaking this transition. For example Poland received €60bn in funding through the EU Recovery and Resilience Plan¹³, comprising of grants and loans including for energy transition. The regulation requires that all milestones and targets within Poland's national plan be completed by August 2026, therefore any delay could mean that Poland misses out on planned funding.

Broadcasting transmission equipment

Broadcasting transmission equipment¹⁴ is necessary for all radio, TV and other broadcasters to transmit and receive content. It is therefore an essential input into all broadcasting services (TV sector revenue in Poland was €2.8bn (zł12bn)). Poland imported €6.5bn (US\$6.9bn – 2022) of broadcasting transmission equipment of which 33% was sourced from China, by far

⁹ <https://www.solarpowereurope.org/insights/outlooks/eu-market-outlook-for-solar-power-2023-2027/detail>

¹⁰ <https://pvcase.com/blog/the-solar-industry-in-poland-key-facts-and-numbers/#:~:text=The%20solar%20industry%20in%20Poland%20is%20driven%20by%20government%20incentives,to%20its%20overall%20energy%20transition>

¹¹ Energy Policy of Poland Until 2040 <https://www.gov.pl/web/climate/energy-policy-of-poland-until-2040-epp2040>

¹² Energy Policy of Poland Until 2040 "Specific Objective 6. Development of renewable energy sources Poland declares reaching at least 23% share of RES in gross final energy consumption in 2030 (in power generation sector - at least 32% net, in heating and cooling sector - increase of 1.1 pp y/y, in transport - 14%). Further development of photovoltaics is expected, the operation of which is correlated with summer electricity demand peaks,"

¹³ https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/polands-recovery-and-resilience-plan_en

¹⁴ HS code: 8525. Transmission apparatus for radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; television cameras, digital cameras and video camera recorders.

Poland's biggest supplier. Other suppliers include Czechia (19%), Germany (11%), Slovakia (10%) and Vietnam (5%).

Electronic printed circuits

Electronic printed circuits¹⁵ are an essential input into a wide range of manufactured end products from medical devices, consumer electronics, industrial equipment and automotive components. They are therefore essential inputs in many Polish manufacturing exports such as video displays, computing devices and other electronic goods. Poland imported €0.5bn (US\$0.53bn, 2022) of electronic printed circuits. 48% of all Poland's imports were sourced from China. Other countries supplied lower levels of imports: Germany (14%), South Korea (7%), Thailand (5%) and Czechia (2%).

Semi-conductor devices

Semi-conductor devices¹⁶ are another essential input in the manufacturing of electronic devices such as computing and industrial electronic devices. Poland imported €2bn (US\$2.1bn, 2022) to supply inputs to its manufacturing sector. 61% of its inputs were supplied by Chinese suppliers with Germany (19%), Netherlands (6%) and Malaysia (4%) being the next largest, but much smaller suppliers.

4. HRV vendor screening imposes costs on suppliers

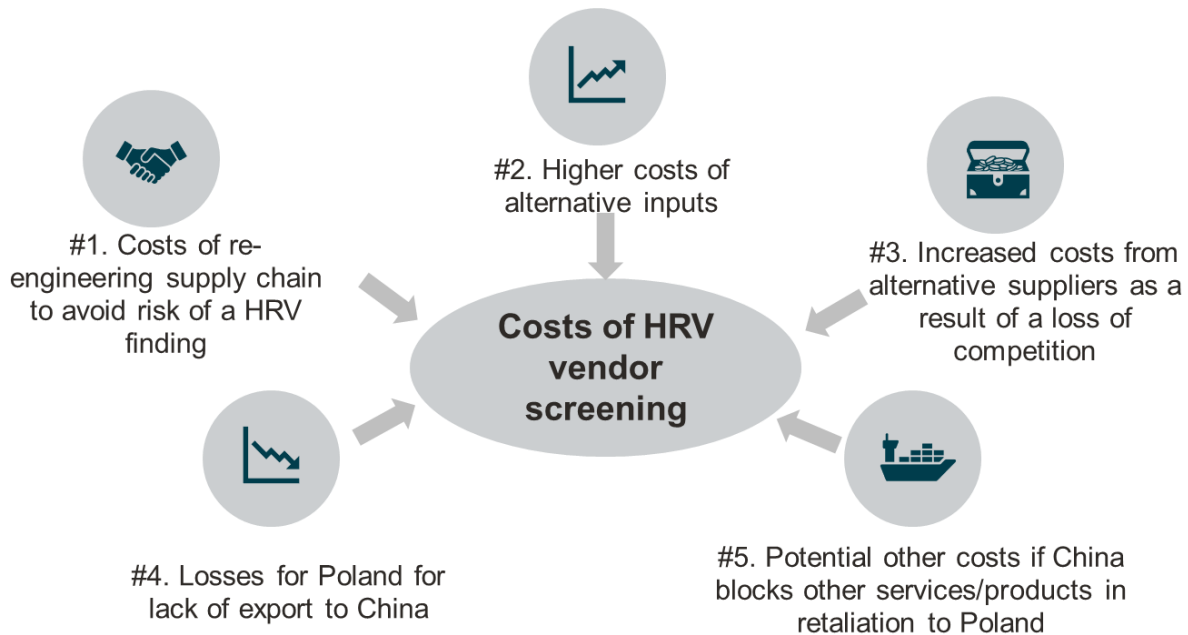
HRV screening imposes costs on Polish firms in different ways. These can be categorised as the following five types of costs.

- #1. Polish firms will incur costs to re-engineer their existing supply chains.
- #2. Firms will have to substitute to alternative inputs that will be higher cost.
- #3. In concentrated markets with few suppliers, excluding vendors with high market share will increase market concentration and increase prices.
- #4. Polish exports will decline as an result of increased trade barriers.
- #5. Vendor screening may lead to a retaliatory trade response.

¹⁵ HS code: 8534: printed circuits.

¹⁶ HS code 8541: Diodes, transistors, similar semiconductor devices; including photovoltaic cells assembled or not in modules or panels, light-emitting diodes (LED), mounted piezo-electric crystals

Figure 3 HRV vendor screening will impose costs in different ways



The impact of these costs for Polish firms and consumers are described below.

#1. Re-engineering supply chains is costly

The sectors affected CS LAW will incur incremental costs to re-engineer their supply chains. Even the *risk* of vendor bans will require firms to prepare for supply chain disruption to mitigate potential losses. The policy will add uncertainty to businesses who are unsure as to whether they will be able to rely on their preferred suppliers. While it may be possible to seek clarity from monitoring authorities as to whether an individual supplier, offering a specific input is considered HRV, in practice this can take many months. This can add administrative costs to production, create delays in production, and make Polish supplies less competitive in international markets as a result.

Firms will mitigate risk of HRV bans by diversifying their supply chains, to higher cost alternatives, and to increase the level of inventory stock to ensure production is not adversely affected. One study explained how higher trade barriers affect the operational costs of firms in managing their supply chain. It noted that as a result of trade barriers *"firms hold more inventory (due to advance purchases), these firms bear additional inventory holding, goods-in-transit, and transportation costs. Therefore, the overall cost efficiency would be negatively*

affected.”¹⁷ This finding was echoed by a survey of over 200,000 firms, which indicated that 40% of U.S. firms reported that higher trade barriers between China and the US had increased their operating costs.¹⁸

#2. Alternative inputs will be higher cost which will lower profits or increase prices for consumers

The impact of HRV on Polish firms will be felt as lower profitability or higher prices for consumers. Firms that are affected by the risk of HRV will have to source alternative inputs at higher cost (or lower quality). The impact of HRV vendor screening on Polish firms can be illustrated as an increased trade barrier. A study found that higher trade barriers raised “*the prices charged by both foreign and domestic producers of the affected products, increasing production costs for firms in downstream industries*”¹⁹. Higher costs will be partly absorbed by Polish businesses in a way that will lower their profitability. One study found that the costs of trade barriers between the US and China led to a 3.89% decline in profitability (Return on Assets (ROA)).²⁰

If higher costs are passed on to consumers this will lead to higher prices for the goods that rely on inputs. A study of the impact of tariffs on prices found that a 20% tariff imposed on imports of Chinese washing machines increased prices of both imported and domestically produced washing machines by 11%. It also led to increased prices at a similar level of complementary goods that were unaffected by the tariff (such as driers).²¹

#3. A loss of competition leading to increase pricing power which will increase costs for Polish firms

There is likely to be a particularly pronounced impact on prices in markets where vendors are excluded from sectors that are already concentrated, with few suppliers. This is because the sudden reduction in competitive conditions feeds through to higher prices as remaining suppliers are able to exploit increased pricing power. For example, in markets for 5G equipment, one study found that the loss of GDP as a result of slower economic growth

¹⁷ Fan, D., Zhou, Y., Yeung, A. C. L., Lo, C. K. Y., & Tang, C. (2022). Impact of the U.S.–China trade war on the operating performance of U.S. firms: The role of outsourcing and supply base complexity. *Journal of Operations Management*, 8(8), 928–962. <https://doi.org/10.1002/joom.1225>

¹⁸ Sim, B. (2020, August 18). US-China trade war 'costs UK and US firms \$750bn', says report. *Financial News*. <https://www.fnlonon.com/articles/us-china-trade-war-costs-uk-firms-170bn-says-report-20200818>

¹⁹ Bown, C.P., Conconi, P., Erbahar, A. and Trimarchi, L., 2021. Trade protection along supply chains

²⁰ Fan, D., Zhou, Y., Yeung, A. C. L., Lo, C. K. Y., & Tang, C. (2022). Impact of the U.S.–China trade war on the operating performance of U.S. firms: The role of outsourcing and supply base complexity. *Journal of Operations Management*, 8(8), 928–962. <https://doi.org/10.1002/joom.1225>

²¹ Flaaen, A., Hortaçsu, A. and Tintelnot, F., 2020. The production relocation and price effects of US trade policy: the case of washing machines. *American Economic Review*, 110(7), pp.2103-2127.

in Poland could be up to €1bn by 2035, reflecting both the high concentration in 5G equipment markets, and the central role that connectivity services play in supporting economy-wide productivity. If Poland's GDP was €1bn lower in each year from 2025 to 2035 this would imply that cumulatively, over ten years, Poland's economy would have produced €10bn less (i.e. €1bn each year) than would have otherwise been the case had the vendor ban not been in place, though the profile of GDP losses as a result of foregone productivity is not set out in the report so this estimate is illustrative.

Telecommunications providers would be less inclined to roll out 5G infrastructure where the equipment costs are higher. This means that supply of 5G will be lower, it could delay roll out of 5G networks resulting in lower economy-wide productivity.²²

#4. Trade barriers such as a HRV could harm Poland's exports

Increases in trade barriers as a result of the CS LAW will not just reduce imports to Poland from countries deemed as HRV, but will also reduce exports. Trade barriers (such as the HRV policy in the CS LAW) increase the effective relative price of imported goods relative to exports and thus introduce anti-export bias to the economy. This is a standard result in international trade: an import tax is an implicit export tax. They will also affect the price of intermediate goods used in the production of Polish exports, thus increasing the price of exports. Research undertaken by Frontier Economics found that the vendor screening trade measures could, cumulatively over a ten year period, lead to a **€2.9billion** reduction in extra-EU exports²³ and **€2.3 billion** reduction in extra-EU imports²⁴. This is because the discriminatory vendor screening measures restrict the ability of firms to supply services, create uncertainty among suppliers and reduce transparency in regulatory decision making.²⁵

The trade impacts will in turn affect GDP and productivity. Using relationships observed between openness to trade and productivity, GDP impacts can be estimated. GDP in Poland is estimated to be **€192 million lower p/a due to discriminatory cybersecurity trade measures (such as vendor screening)**, noting the latter estimate is conservative in its sector coverage and its application.

²² Oxford Economics 2020 Restricting competition in 5G network equipment throughout Europe an economic impact study

²³ "Extra-EU exports" refers to exports from Poland to non-EU countries. It is distinguished from intra-EU exports (i.e. exports from Poland to other EU countries).

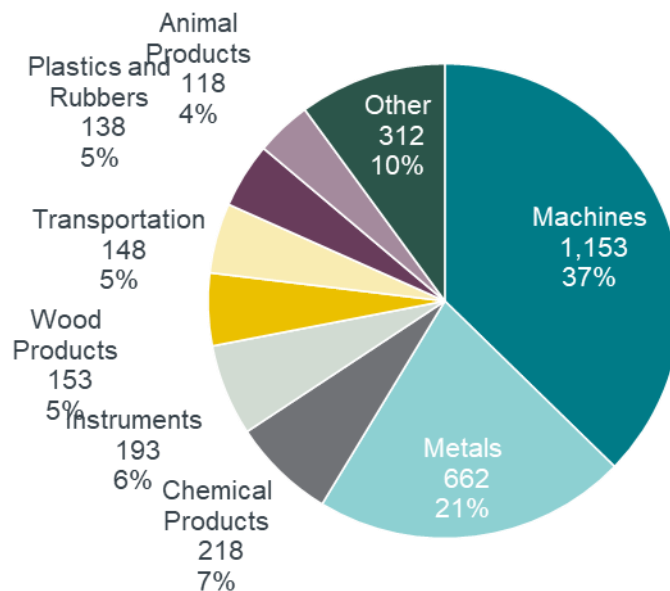
²⁴ 2024 constant prices. This estimate assumes that the impact of Vendor Screening on Polish extra-EU exports in 2022 remains the same as a proportion of total Polish exports for the ten year period. This illustrative estimate provides an assessment of the likely ten year impact, but does not take into account any dynamic responses to the increased trade barriers. Forecast data on Polish exports sourced from IMF World Economic Outlook.

²⁵ For practical reasons, the modelling is only able to analyse discriminatory measures in the "direct" sectoral sense – for example the impact of screening for telecoms and computer services on trade for the same sector. This is in contrast to "cross-sectoral" effects – for example the effect of screening ICT inputs on transport operators – as these effects are much broader than the direct effects analysed, but are much more complex to estimate empirically.

#5. China may apply retaliatory trade barriers targeted on Polish suppliers

If the implementation of the measures by Poland were to lead to adverse effects on China's exports to Poland (or the EU more generally), China may have cause to retaliate. Poland exported €3.1bn (US\$3.6bn) worth of goods to China in 2022 of which €1.2bn (37%) were in high value add machinery and electrical equipment, and €148m related to Vehicle and Vehicle parts and accessories (Figure 4). The value of these exports could be put at risk by increases in trade barriers.

Figure 4 Poland exports to China 2022 (€m)



Source: OEC

The extent of retaliation would be in line with the extent of adverse effects suffered as a result of a trade barrier. For example, if (at the extreme) all Chinese suppliers of digital infrastructure goods to CS LAW sectors were blocked as a result of the HRV status, China could impose retaliatory action up to the level of its loss (Chinese exports to Poland of digital infrastructure amounted to **€4.6bn**²⁶ in 2022). The extent of retaliation would be capped to the level of damages.

Retaliation could, and usually does, take the form of tariffs. The goods sectors subject to retaliation are not necessarily those sectors in which China suffers losses. In principle,

²⁶ Computer, electronic and optical products (C26), electrical equipment (C27)

retaliation may take other forms, such as the introduction of barriers to services trade or the suspension of IP commitments.

5. Conclusion: imposing sudden restrictions on imports of goods from HRV countries will create significant adjustment costs to Polish industry

Enhanced cybersecurity measures are welcomed by all since they protect social and economic digital activities. The new CS LAW will make an important contribution to Poland's cyber security by implementing the requirements of the NIS2 Directive. However, it is important for policy makers to take a proportionate approach to the design and implementation of cyber security regulation. This is because cyber security regulation is costly to implement: in this regard it is estimated that the sectors affected by CS LAW will face an additional €2bn in costs to implement the NIS2 elements of the measure.

Where policy makers choose to implement *stricter* regulation than that set out in NIS2, the costs and benefit should be carefully weighed. In Poland, the current articulation of HRV in the proposed CS LAW, which goes beyond that set out in NIS2, is liable to create uncertainty and a lack of transparency in how cyber risks are assessed. This will inevitably add costs and frictions to economic activity in Poland.

A strict classification of Chinese (and potentially other countries') suppliers as a HRV will require Polish firms to make adjustments to their established supply arrangements. This is particularly the case in CS LAW sectors which intensively rely on Chinese imports of digital goods and services. Chinese suppliers play a particularly important role in the supply of certain sophisticated intermediate goods that are used by Polish firms such as PV panels, broadcasting transmission equipment, electronic printed circuits and semiconductor devices. Given the high proportion of imports that are from Chinese suppliers, it may be difficult and costly to switch to alternative sources.

This note sets out five ways in which the HRV could add to costs to Polish firms:

- #1. Polish firms will incur costs to re-engineer their existing supply chains to mitigate risks. The uncertainty over which suppliers could be classified as a HRV will mean firms incur costs even if individual suppliers are not ultimately deemed HRVs.
- #2. Firms will have to substitute to alternative inputs which will be higher cost. This will lower firm's profitability and increase prices to end users.
- #3. In concentrated markets, excluding vendors with high market share will increase market concentration, and increase prices.
- #4. Polish exports will decline as an result of increased trade barriers. Non-EU exports could decline by €2.9 billion cumulatively over a ten year period.
- #5. Vendor screening may lead to a retaliatory trade response. Poland has deep trading ties with China. Poland imported €43.9bn (US\$44bn) of goods, of which almost half €20bn

(US\$21bn) reflected imports of machine and complex manufactured goods. It exported €3.1bn (US\$3.2bn) of goods to China in 2022. These could be put at risk up to the value of lost exports if China were to impose retaliatory trade responses, which could be significant given that China exports €4.6bn of digital infrastructure goods and services to Polish CS LAW sectors which could be put a risk by the HRV policy.