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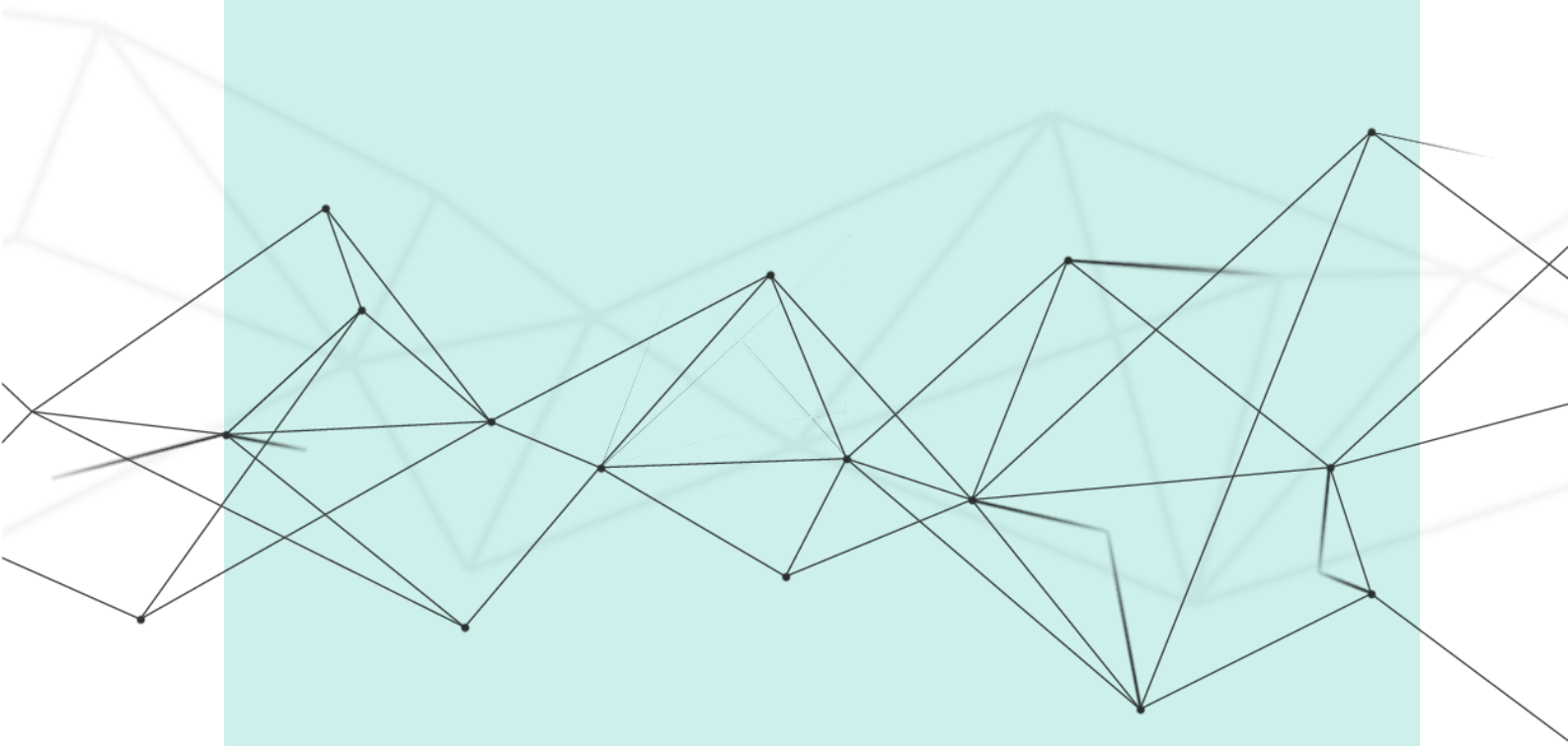
The impact of foreign industrial policy on the Swiss economy



Grundlagen für die Wirtschaftspolitik

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The impact of foreign industrial policy on the Swiss economy

Summary

The American Inflation Reduction Act (IRA) of 2022 and the EU's Green Deal Industrial Plan (GDIP) of 2023 have sparked discussions on industrial policy. This study explores the impact of such policies on Switzerland using a combination of methodologies, including a literature review, business survey, simulations within a trade model, econometric analysis, and case studies of recent foreign industrial policies.

We identify five key channels that transmit the effects of foreign industrial policy to the Swiss economy:

- **Competition in target markets**: Subsidies of trade partners can make foreign firms more competitive, affecting Swiss competitors that are active in the same markets. The EU's "Juncker Plan" showed negative (but insignificant) effects on indicators such as turnover and numbers of employees of Swiss competitors. Additionally, policies like IRA and GDIP increase production capacities abroad, leading to lower world prices and potentially reduced Swiss exports. However, consumption subsidies could counteract this effect by increasing foreign demand.
- **Demand from upstream industries**: Subsidies of trade partners can create more de-mand for raw materials and intermediate goods. This can be both beneficial, as in the case of Swiss firms supplying German solar panel manufacturers, and detrimental, if it makes it more difficult for Swiss companies to source certain raw materials.
- **Investments abroad**: Swiss firms might increase their foreign investments to capitalize on subsidies and fulfill local content requirements in public procurement. For instance, Stadler Rail expanded in the US in response to "Buy American" rules.
- **Downstream benefits**: Swiss firms and consumers could profit from products at lower prices due to increased subsidies of trade partners. However, excessive demand abroad due to consumption subsidies could raise world prices, impacting Swiss consumers and importers negatively.
- **Technological spillovers**: Policies that advance technology can also benefit Swiss firms. China's EV policy, for instance, has fostered technological developments that Swiss firms have capitalized upon.

While the cumulative effect of these channels is complex, the study concludes that the IRA and GDIP's overall impact on Switzerland is moderate, with potential welfare losses amounting to 0.06% of the Swiss GDP. The business survey shows that Swiss firms remain largely optimistic about these policies, although there are concerns about access to key inputs.

The survey also reveals that many Swiss companies are unaware of the potential positive and negative impacts on their operations. The report therefore recommends that the Swiss government encourages businesses to prepare themselves for the potential challenges and opportunities associated with these policies.

Auswirkungen von industriepolitischen Initiativen im Ausland auf die Schweizer Wirtschaft

Zusammenfassung

Der amerikanische Inflation Reduction Act (IRA) von 2022 und der Green Deal Industrial Plan (GDIP) der EU von 2023 haben eine internationale Debatte über Industriepolitik hervorgerufen. Diese Studie untersucht die Auswirkungen von industriepolitischen Initiativen im Aus-land auf die Schweiz. Die Studie kombiniert hierfür mehrere Methoden, darunter eine Literaturübersicht, eine Unternehmensbefragung, Simulationen innerhalb eines Handelsmodells, eine ökonometrische Analyse und Fallstudien zu aktuellen ausländischen Industriepolitiken.

Wir identifizieren fünf Schlüsselkanäle, über die Auswirkungen von ausländischer Industrie-politik auf die Schweizer Wirtschaft übertragen werden können:

- **Wettbewerb in den Zielmärkten**: Subventionen von Handelspartnern können nationale Unternehmen wettbewerbsfähiger machen. Das wirkt sich auf Schweizer Konkurrenten aus, die auf denselben Märkten tätig sind. Der "Juncker-Plan" der EU zeigte negative (aber nicht signifikante) Auswirkungen auf Indikatoren wie Umsatz und Beschäftigtenzahl der Schweizer Wettbewerber. Darüber hinaus erhöhen Initiativen wie IRA und GDIP die Produktionskapazitäten im Ausland, was zu niedrigeren Weltmarktpreisen und potenziell geringeren Schweizer Exporten führt. Im IRA enthaltene Konsumsubventionen könnten diesem Effekt jedoch teilweise entgegenwirken, indem sie die Auslandsnachfrage erhöhen.
- **Nachfrage von vorgelagerten Industrien**: Subventionen von Handelspartnern können die Nachfrage nach Rohstoffen und Vorleistungen erhöhen. Dies kann vorteilhaft sein wie im Fall von Schweizer Unternehmen, die deutsche Hersteller von Solarzellen belieferten. Auch nachteilige Wirkungen sind jedoch möglich, beispielsweise wenn es für Schweizer Unternehmen schwieriger wird, bestimmte Rohstoffe zu beschaffen.
- **Investitionen im Ausland**: Schweizer Unternehmen könnten ihre Auslandsinvestitionen erhöhen, um von Subventionen zu profitieren und die Anforderungen an den lokalen Anteil im öffentlichen Beschaffungswesen zu erfüllen. So hat beispielsweise Stadler Rail als Reaktion auf die "Buy American"-Regeln in den USA stark investiert und expandiert.
- **Vorteile für nachgelagerte Industrien**: Schweizer Unternehmen und Konsumenten könnten von Produkten zu niedrigeren Preisen aufgrund erhöhter Subventionen von Handelspartnern profitieren. Eine übermäßige Nachfrage im Ausland aufgrund von Konsumsubventionen könnte jedoch die Weltmarktpreise erhöhen und sich negativ auf die Schweizer Konsumierende und Importeure auswirken.
- **Technologische Spillover-Effekte**: Politische Maßnahmen, die die Technologieentwicklung vorantreiben, können auch Schweizer Unternehmen zugutekommen. Chinas Politik zur Förderung von Elektrofahrzeugen beispielsweise hat technologische Entwicklungen vorangetrieben, von denen Schweizer Firmen profitieren.

Die Gesamtwirkung dieser Kanäle ist komplex. Insgesamt kommt die Studie jedoch zum Schluss, dass die Gesamtauswirkungen des IRA und des GDIP auf die Schweiz moderat sind. Basierend auf Simulationen erwarten wir einen potenziellen Wohlfahrtsverlusten in Höhe von 0,06% des Schweizer BIP. Die Unternehmensbefragung zeigt, dass die Schweizer Unternehmen diesen Maßnahmen weitgehend optimistisch gegenüberstehen, auch wenn es Bedenken hinsichtlich des Zugangs zu wichtigen Rohstoffen und Vorleistungen gibt. Die Umfrage zeigt auch, dass sich viele Schweizer Unternehmen der möglichen positiven und negativen Auswirkungen von aktuellen industriepolitischen Initiativen auf ihre Geschäftstätigkeit nicht bewusst sind. Der Bericht empfiehlt daher, dass die Schweizer Regierung die Unternehmen ermutigt, sich auf die potenziellen Herausforderungen und Chancen vorzubereiten, die mit diesen Initiativen verbunden sind.

L’effet de la politique industrielle étrangère sur l’économie suisse

Résumé

L'Inflation Reduction Act (IRA) américain de 2022 et le Green Deal Industrial Plan (GDIP) de l'UE de 2023 ont suscité des discussions sur la politique industrielle. Cette étude explore l'impact de telles politiques sur la Suisse en utilisant une combinaison de méthodologies, notamment une revue de la littérature, une enquête auprès des entreprises, des simulations dans un modèle commercial, une analyse économétrique et des études de cas de politiques industrielles étrangères récentes.

Nous identifions cinq canaux par lesquels les effets de la politique industrielle étrangère se transmettent à l'économie suisse :

- **Concurrence sur les marchés cibles** : Les subventions des partenaires commerciaux peuvent rendre les entreprises plus compétitives, ce qui affecte les concurrents suisses actifs sur les mêmes marchés. Le "Plan Juncker" de l'UE a eu des effets négatifs (mais insignifiants) sur des indicateurs tels que le chiffre d'affaires et le nombre d'employés des concurrents suisses. En outre, des politiques comme l'IRA et le GDIP augmentent les capacités de production à l'étranger, ce qui entraîne une baisse des prix mondiaux et potentiellement une réduction des exportations suisses. Toutefois, des subventions à la consommation pourraient contrecarrer cet effet en augmentant la demande étrangère.
- **Demande des industries en amont** : Les subventions des partenaires commerciaux peuvent créer une demande accrue de matières premières et de biens intermédiaires. Cela peut être bénéfique, comme dans le cas des entreprises suisses qui fournissent les fabricants allemands de panneaux solaires, ou préjudiciable, si cela rend plus difficile pour les entreprises suisses de se procurer certaines matières premières.
- **Investissements à l'étranger** : Les entreprises suisses pourraient augmenter leurs investissements à l'étranger pour profiter des subventions et satisfaire aux exigences de contenu local dans les marchés publics. Par exemple, Stadler Rail s'est développé aux États-Unis en réponse aux règles "Buy American".
- **Avantages en aval** : Les entreprises et les consommateurs suisses pourraient bénéficier de produits à des prix plus bas en raison de l'augmentation des subventions dans d’autres pays. Cependant, une demande excessive à l'étranger due à des subventions à la consommation pourrait faire augmenter les prix mondiaux, impactant négativement les consommateurs et les importateurs suisses.
- **Transferts technologiques** : Les politiques qui favorisent les progrès technologiques peuvent également bénéficier aux entreprises suisses. La politique chinoise en matière de véhicules électriques, par exemple, a favorisé des développements technologiques dont les entreprises suisses ont capitalisé.

Bien que l'effet cumulatif de ces canaux soit complexe, l'étude conclut que l'impact global de l'IRA et du GDIP sur la Suisse est modéré, avec des pertes potentielles de bien-être s'élevant à 0,06 % du PIB suisse. L'enquête auprès des entreprises montre que les entreprises suisses restent largement optimistes à l'égard de ces politiques, bien qu'elles s'inquiètent de l'accès à des intrants clés.

L'enquête révèle également que de nombreuses entreprises suisses ne sont pas conscientes des impacts positifs et négatifs potentiels sur leurs activités. Le rapport recommande donc que le gouvernement suisse encourage les entreprises à se préparer aux défis et opportunités potentiels associés à ces politiques.

L’impatto della politica industriale estera sull’ economia svizzera

Riassunto

L’Inflation Reduction Act (IRA) americano del 2022 e il Piano industriale Green Deal dell’Unione europea (GDIP, Green Deal Industrial Plan) del 2023 hanno dato vita a un dibattito internazionale sulla politica industriale. Questo studio analizza l’impatto di tali politiche sulla Svizzera utilizzando una combinazione di metodologie, tra cui una rassegna della letteratura disponibile, un’inchiesta sulle imprese, simulazioni di un modello commerciale, un’analisi econometrica e casi di studio di recenti politiche industriali estere.

Abbiamo individuato cinque canali principali attraverso i quali gli effetti della politica industriale estera si ripercuotono sull’economia svizzera:

- **Concorrenza nei mercati di riferimento**: i sussidi esteri possono rendere le imprese più competitive, andando a colpire i concorrenti svizzeri che operano sugli stessi mercati. Il "Piano Juncker" dell’UE ha mostrato effetti negativi (ma non significativi) su indicatori quali il fatturato e il numero di dipendenti dei concorrenti svizzeri. Inoltre, politiche come l’IRA e il GDIP aumentano le capacità produttive all’estero, determinando un calo dei prezzi mondiali e una potenziale riduzione delle esportazioni svizzere. Tuttavia, i sussidi al consumo potrebbero contrastare questo effetto facendo aumentare la domanda estera.
- **Domanda da parte dell’industria a monte (upstream)**: i sussidi esteri possono gene-rare una maggiore domanda di materie prime e beni intermedi. Ciò può essere vantaggioso, come nel caso delle imprese svizzere che riforniscono i produttori tedeschi di pannelli solari, o pregiudizievole, quando per le imprese svizzere diventa più difficile procurarsi determina-te materie prime.
- **Investimenti all’estero**: le imprese svizzere potrebbero aumentare i loro investimenti all’estero per sfruttare i sussidi e soddisfare i requisiti di “contenuto locale” negli appalti pubblici. Ad esempio, Stadler Rail si è espansa negli Stati Uniti in risposta alle norme "Buy American".
- **Vantaggi per l’industria a valle (downstream)**: le imprese e i consumatori svizzeri potrebbero beneficiare di prodotti a prezzi più bassi grazie all’aumento dei sussidi esteri. Tuttavia, una domanda eccessiva all’estero, sorretta dai sussidi al consumo, potrebbe far lievitare i prezzi mondiali, con un impatto negativo sui consumatori e sugli importatori svizzeri.
- **Ricadute tecnologiche (spillover)**: anche le politiche che fanno progredire la tecnologia possono avvantaggiare le imprese svizzere. Per esempio, la politica cinese in materia di veicoli elettrici ha favorito sviluppi tecnologici che le imprese svizzere hanno sfruttato.

Sebbene l’effetto cumulativo di questi canali sia complesso, lo studio giunge alla conclusione che l’impatto complessivo dell’IRA e del GDIP sulla Svizzera è moderato, con perdite potenzia-li di benessere economico fino allo 0,06% del PIL svizzero. Dall’inchiesta sulle imprese emerge che le aziende svizzere rimangono ampiamente ottimiste riguardo a queste politiche, pur manifestando preoccupazioni sull’accesso a fattori produttivi chiave.

L’inchiesta rivela anche che molte aziende svizzere non sono consapevoli dei potenziali impatti positivi e negativi sulle loro attività. Gli autori del rapporto raccomandano quindi che il go-verno svizzero incoraggi le imprese a prepararsi alle potenziali sfide e opportunità associate a queste politiche.

Content

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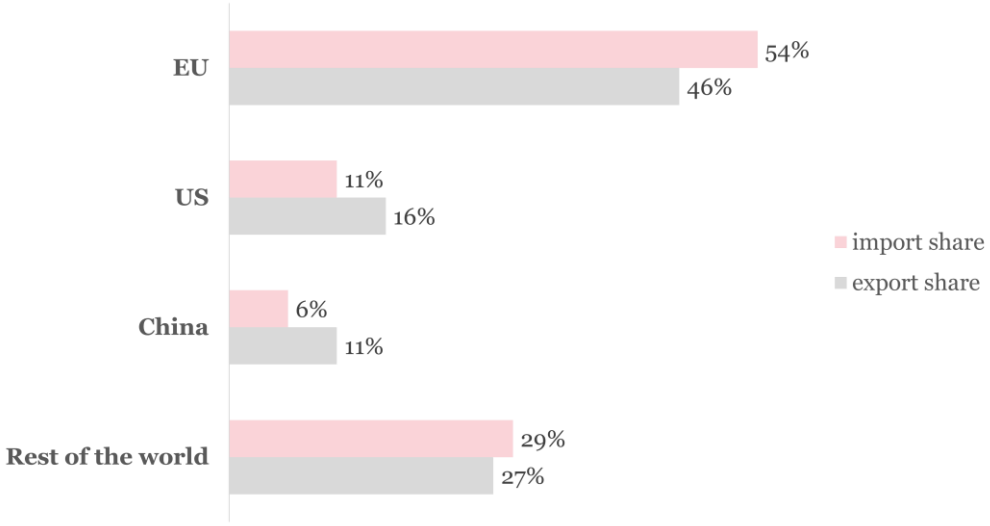
1. Introduction

1.1 Background

Foreign trade is fundamental to the success of the Swiss economy. In 2021, Switzerland exported goods and services worth 63 percent of its GDP. Conversely, the value of its imports represented 52 percent of its GDP (World Integrated Trade Solutions, 2023). Swiss firms are deeply embedded in global value chains. As a small open economy, Switzerland also does not have the size and resources to host complete value chains in many critical sectors. Hence, the country is exposed to the policy decisions of its major trading partners. Switzerland's main trading partners are the European Union, the US, and China. As shown by Figure 1, these partners account for 73 percent of total exports and 71 percent of total imports.

Figure 1: Swiss import and export shares



Source: Figure by BSS based on Bundesamt für Statistik (BFS) 2023a, BFS 2023b

Among all three, industrial policy has made a big political comeback (Hausmann, 2023). All three have launched large-scale industrial policy initiatives to strengthen their domestic production: the EU has initiated the Green Deal Industrial Plan (GDIP) in early 2023. The US States launched the Inflation Reduction Act (IRA) last year, which includes subsidies for climate-friendly industries on an unprecedented scale. China has a longer history of active industrial policy. Its latest initiative, Made in China 2025 (MIC25), is an ambitious plan to become a leading producer of high-tech products, enabled by a wide range of subsidies.

These initiatives form a new generation of industrial policies. In the past, economic arguments such as productivity growth and job creation were the motivation to engage in industrial policy. However, the new wave of industrial policy is driven by two additional motivations (Hausmann, 2023): The first motivation is the fight against climate change. To meet their commitments under the Paris Agreement, countries need to decarbonize their economies. This requires massive in-

vestments in new technologies and production processes. Industrial policy is presented as a tool to achieve this goal, especially when market-based instruments are politically difficult to implement (USA).

The second motivation is to address geopolitical tensions. The war in Ukraine has exposed the West's heavy dependencies on energy supplies from autocratically ruled countries. At the same time, geopolitical tensions between the US and China have raised concerns about Chinese control of critical value chains in sensitive sectors. Industrial policy is therefore used to boost domestic production, to reduce dependance on potentially unreliable trading partners. China had already previously pursued to isolate its internal market from foreign dependencies ("dual-circulation strategy", see Kohlmann, 2020). More generally speaking, a motivation for industrial policy might be to increase the resilience of supply chains.

How will the industrial policies of the US, EU and China affect Switzerland? We do not know. In general, scientific studies of industrial policy programs are rare (Lane, 2020). And the few studies that do exist typically focus on the domestic policy impacts. The uncertainty is further compounded by the fact that a wide variety of measures with different characteristics are typically combined in industrial policy (Cimoli, Dosi, and Stiglitz, 2015; Evenett and Fritz, 2021). This complicates possible studies, as a large number of possible interactions creates a great deal of complexity. Consequently, we are facing a profound knowledge gap regarding the impact of industrial policy on third countries in general and on Switzerland in particular. Hence, studies investigating the impact on third countries are rare. With the present study, we want to fill that gap.

Swiss industry associations have already expressed concerns about the uncertainty created by the new policy initiatives (Schweizerischer Bundesrat, 2023). For example, Swiss companies could lose market share to their international competitors that benefit from state subsidies. The National Council's Foreign Policy Committee has therefore instructed the Federal Council to investigate these initiatives (Nussbaumer & Walder, 2023). With this study, we want to provide guidance on how Switzerland is potentially affected by the new wave of industrial policies.

1.2 Aims of this study

Our main goal within this report is to examine the impact of the Inflation Reduction Act (US) and the Green Deal Industrial Plan (EU) on the Swiss economy[1].

However, studying the impact of these measures is methodologically difficult for several reasons:

- Many details of the implementation as well as the actual volume of these programs are still unclear.
- We do not have any evidence on the impacts of these programs on the domestic economy.
- And as most industrial policy programs, the current industrial policies of China, the US and the EU combine a wide variety of measures with different characteristics (Cimoli, Dosi, and Stiglitz, 2015; Evenett and Fritz, 2021). This complicates possible studies, as a large number of possible interactions creates a great deal of complexity.

[1] In addition to the GDIP, several EU members such as France and Germany have launched own industrial programs. Moreover, the EU and the USA have also implemented programs to support chip production in their regions. While noteworthy, these programs are beyond the scope of this study.

Given these methodological difficulties we combine a wide mix of methodologies:

- A simulation of the impact on the Swiss economy with a structural model of international trade.
- An econometric analysis of the impact of past industrial policies on Switzerland.
- In-depth case studies of past industrial policies.
- A survey of Swiss companies in which we ask them what impacts they expect from the current industrial policies.
- This combination of different methods allows us to triangulate and to approach the question (What is the impact on Switzerland?) from different perspectives.

Structure: We begin by introducing the topic of industrial policy, including its foundations and instruments in Section 2. Based on this understanding, we develop a framework to classify the potential impacts for third countries like Switzerland. Section 3 outlines and unpacks two of the most important contemporary industrial policies of Switzerland's main trading partners: The Inflation Reduction Act enacted by the US and the Green Deal Industrial Plan implemented by the EU. Section 3 also presents results from a survey across Swiss firms which we asked about their expectations and reactions to these programs. Finally, we simulate the impact of the IRA on the Swiss economy within a structural model of international trade. Section 4 studies the consequences of past industrial policies whose effects have already materialized. More specifically, we conduct an econometric analysis to examine the effect of the Juncker Plan on the Swiss economy. Furthermore, three case studies provide concrete examples of the consequences of industrial policies. They encompass German renewable energy subsidies, Chinese support for electric vehicles (EVs), and US public procurement rules. Section 5 synthesizes the findings of the different analyses and draws relevant conclusions for Switzerland.

2. The scope of industrial policy: Instruments and transmission channels

2.1 Definitions and justifications

The term «industrial policy» lacks a standard definition, but several common characteristics can be identified. Johnson (1982, p. 19) uses the term in a broad sense to describe a "strategic, or goal-oriented, approach to the economy". Pack and Saggi (2006) emphasize the motivation of an industrial policy, which is "to alter the structure of production in favor of sectors that are expected to offer better prospects for economic growth in a way that would not occur in the absence of such intervention". Similarly, Criscuolo et al. (2022) define industrial policies as "interventions intended to improve structurally the performance of the domestic business sector". Following Criscuolo et al. (2022), a useful distinction is between horizontal policies which includes activities that do not target particular firms or sectors (e.g. R&D tax credit), and vertical policies which are restricted to a finite set of businesses (e.g. investment credit for new car production plants). Although "industrial policy" has been closely associated with industrial production, it can also be applied to promote other economic activity, such as tourism or agricultural production.

Recent industrial policies such as the IRA are motivated by a variety of arguments. First, industrial policies may provide a tool to achieve a sustainable transformation of the economy. Subsidizing products and technologies that reduce carbon emissions, for instance, can contribute to decarbonize the economy[2]. Second, private firms' sourcing decisions may only consider firm-specific risks arising from supply chain relationships, ignoring geopolitical risks. Governments may therefore seek to reduce such risks by providing incentives for domestic production, especially in the presence of geopolitical tensions. Third, the "classic" arguments of industrial policies to create new production and jobs are still very powerful. The crux of industrial policy is whether governments can adequately implement policies that eventually fulfil these ambitions and whether they are better at fulfilling these ambitions than the private sector.

2.2 Instruments

What instruments can governments use to pursue industrial policy? Juhász et al. (2022) investigate the prevalence of industrial policy since 2008 based on the Global Trade Alert (GTA). The most widely used policy instruments are as follows:

1. *Subsidies* are the most common instrument and take various forms but always involve a sum of money granted by the government. A common distinction is between subsidies for the consumption of final products and subsidies granted to businesses, e.g. to reward certain activities (e.g. research or production). They include state loans and financial grants to firms, but also loan guarantees and direct production subsidies. Production subsidies provided to companies provide a financial advantage over competitors, enabling them to gain market share. An example of a subsidy for the consumption of final product arises when the government pays a portion of the purchase price. To qualify as an industrial policy, subsidies must be targeted towards specific sectors or activities. They may also involve additional constraints, such as the usage of domestically produced inputs.
2. *Export-related measures* are an industrial policy instrument to support domestic firms succeeding in global markets. These measures comprise a wide array of instruments, including trade finance instruments, export taxes, and financial assistance in foreign markets, such as export credit guarantees.
3. *Trade-related investment measures* aim to promote domestic industries by imposing regulations that restrict foreign direct investment (FDI) in the host country. For example, host countries may impose technology transfer requirements, licensing requirements, or foreign exchange restrictions in order to nurture homegrown industries.
4. *Tariff measures* are a classic form of industrial policy. Tariffs essentially act as a tax on non-domestically produced goods, crowding out imports in favor of domestic producers. Tariffs have become less important due to international agreements restricting their use (Goldberg and Pavcnik, 2016). Nevertheless, they remain a notable part of the industrial policy toolkit, especially under the Trump administration.
   Government procurement restrictions are a less widely known but important channel because governments are large consumers of goods and services. Hence, governments can use these restrictions to directly steer the economy in their desired direction. Such restrictions include

[2] The economics textbook solution would be to organize a market for carbon emissions that endogenously determines the price to emit carbon. It thereby ensures that carbon emissions are avoided where it is cheapest to do so. However, the organization of an emissions market is difficult to organize and enforce.

provisions to only procure products using certain technologies (e.g. buses with electric drive) and local content requirements[3]. The latter specifies the degree to which the procured goods or services must be produced domestically. In economic terms, this corresponds to a partial or sometimes complete ban on imports in public procurement.

In addition, industrial policy instruments may also include less common measures, such as capital controls, licensing- and intellectual property restrictions. Governments typically combine multiple instruments when implementing industrial policies. However, these instruments may be used for different purposes beyond industrial policy. For example, restrictions on non-domestic content in public procurement may be purely imposed due to security concerns, rather than to contribute to an industrial policy. The focus in our report is on subsidies and government procurement restrictions as they feature prominently in recent industrial policy initiatives by the US and the EU.

Data Sources on Industrial Policy

Data on industrial policies are scarce and difficult to collect as governments have little inherent incentive to disclose any public support to private firms. The following data sources collect industrial policy measures at the international level:

- For all trade-related policies, WTO member countries are supposed to report their measures to the WTO Secretariat. However, Evenett and Fritz (2021) note that member states commonly do not comply with this standard and even when they do, they report with a delay. The data is available through the WTO's Trade Monitoring Database. It contains nearly 12,000 entries since 2008.
- The Global Trade Alert (GTA) is an independent initiative of the St. Gallen Endowment for Prosperity Through Trade. It collects trade-related policy interventions from public sources since 2008 and contains more than 40,000 entries.
- The United Nations TRAINS database of non-tariff measures contains a similar number of public policy interventions implemented since 2008. Unlike the GTA, it focuses on technical barriers as well sanitary and phytosanitary measures, which include health and environmental regulations. These instruments are reported by member states to the WTO.

These databases have three limitations: First, they do not cover measures that existed before the databases' inception dates. Second, their core collections include only the number of measures and in the case of the GTA, the subsidy size or tariff size (but not their trade impacts). Third, the databases also include interventions that do not constitute industrial policies, such as trade restrictions imposed during the COVID-19 crises that were motivated purely by public health concerns. With respect to subsidies, some of these limitations are overcome by the new **Joint Subsidy Platform (JSP)** by the IMF, OECD, World Bank Group, and WTO. However, the platform constitutes an inventory of the existing data collection efforts in various subject areas by the organizations involved, rather than a new unified data source on subsidies.

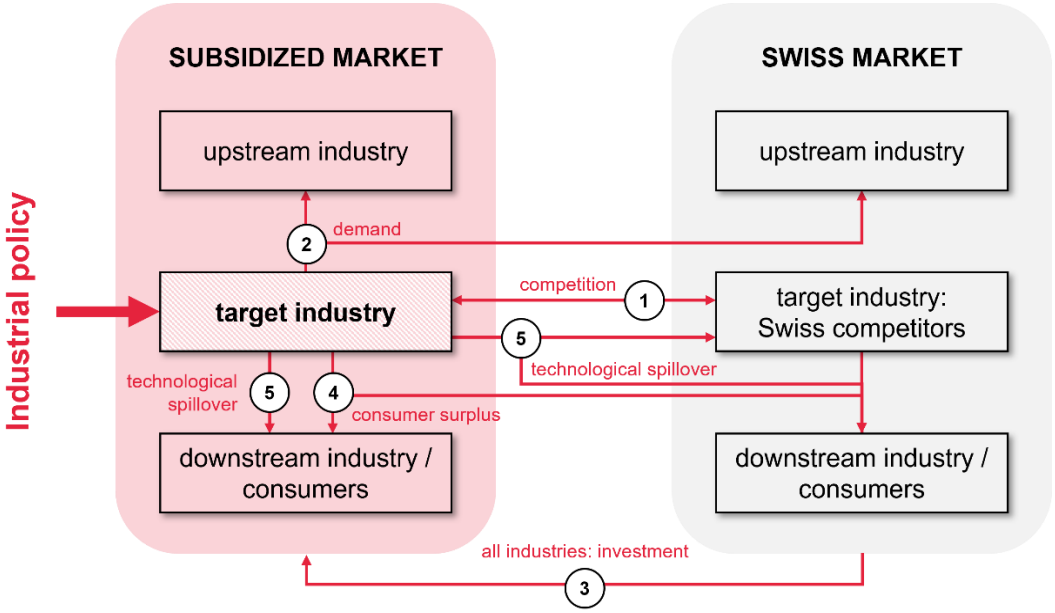
[3] Local content requirements are not exclusive to government procurement restrictions. They may also be used as a precondition for firms to receive subsidies, for instance.

2.3 Impact of industrial policy on third countries

How can industrial policy affect other economies? Given that the primary target of industrial policy is to promote domestic industries, it is reasonable to expect that industrial policies produce repercussions among the implementing country's trading partners or beyond. To guide our thinking about these repercussions, we would ideally rely on an impact model from the academic literature. However, academic research on the impact of industrial policy on foreign countries is lacking. Lane and Juhász (2023) criticize that our understanding of industrial policy is "inadequate across nearly every dimension". This criticism is directed at the literature studying the primary impact on the subsidized markets in the implementing country. This literature is scarce, and its results are mixed at best. With little evidence on the primary impacts, the criticism by Lane and Juhász (2023) is even more valid for second-round effects on other economies, which has been studied less often.

We therefore develop our own model of transmission channels in the presence of foreign industrial policy. To this end, we have reviewed the recent academic and policy-related literature to check which potential channels are discussed that may spread an industrial policy impact on other countries. Based on these discussions, we synthesize five transmission channels (see Table 5 in the Annex for the sources used).

Figure 2: Transmission channels of foreign industrial policy



Source: Own compilation

Figure 2 summarizes our model to describe how foreign industrial policy might affect third countries, which in our case is Switzerland. We start on the left-hand side by assuming the implementation of a new industrial policy (e.g. a production subsidy). If the grant is effective, it increases the competitiveness of the target industry by lowering production costs or product prices and by

increasing productivity. Consequently, the global market share of companies in the target industry increases. The increased market share of subsidized companies is accompanied by a decrease in the market share of their Swiss counterparts (see Arrow 1). Lower market share reduces revenues and employment of Swiss firms. Therefore, this is the transmission channel most commonly discussed in public debates and in the studies that were part of our review (see Table 5 in the Annex). Switzerland's exposure to this channel depends on the extent to which Swiss firms are involved in the target market and the extent to which subsidized firms are active in the Swiss market. However, even Swiss firms that are affected as direct competitors could successfully adapt to benefit from the industrial policy, as the next channel shows.

Second, the higher market share of companies in the target industry generates demand for additional raw materials (e.g. steel) and intermediate goods, which could be sourced either in the same country or from other suppliers, including Swiss firms. The additional demand for Swiss raw materials and intermediate goods thus represents a second transmission channel[4]. However, this channel could be dampened by local content requirements, i.e. regulations that prescribe local sourcing in order to be eligible for the support from the industrial policy.

Third, Swiss firms might respond to the industrial policy by investing in production facilities in the foreign market targeted by industrial policy. Swiss firms thereby become beneficiaries of the industrial policy themselves, dampening the loss of market share against foreign firms or even lead to an increase in global market shares. The effect for the Swiss economy depends on whether the investments abroad substitute or complement investments planned in Switzerland, as well as the size of the expected future profits flowing back to Switzerland.

As a fourth transmission channel, Swiss and foreign consumers may benefit by sourcing from firms in the industry targeted by industrial policy to the extent that the target industry passes on their financial advantage to its clients. For instance, Swiss robotics firms can benefit from cheaper microchips produced with production subsidies in the US. In the same way, Swiss consumers could benefit from cheaper EVs subsidized by the Chinese government.

As a fifth channel, the Swiss economy may also benefit from technological spillovers. If foreign industrial policy succeeds in scaling up the target industry, this process may also bring about technological innovations. Firms and consumers buying these products benefit from such technological improvements. The Swiss robotics firm importing American microchips, for instance, may directly benefit from higher computing power of the chips as it allows to process data faster and developing more demanding routines. But even Swiss firms directly competing with the foreign target industry may incur technological spillovers by learning from the technological advancements observed in the market.

This scheme is subject to several assumptions. All channels assume that the industrial policy is effective in reaching its intended target, which is not the case if the measure only generates deadweight loss, for instance. Furthermore, the analysis excludes dynamic and general equilibrium effects which could also impact the Swiss economy. For instance, a large stimulus package in the form of firm or consumer subsidies may increase the spending behavior in the subsidized

[4] In case of inelastic supply of certain raw materials, at least in the short term (e. g. certain rare earths but also specialized labor), the increased demand could raise global prices for these inputs and thus dampen other sectors requiring the same inputs. This may lead to crowding out of other sectors by channeling resources to the subsidized sector. However, this transmission channel will not be further explored in this study, as the impact would primarily focus on the domestic and not Swiss industry.

economy also through second- and third-round effects, thus increasing the demand also for Swiss exports not related to the subsidized sector. At the same time, large stimulus packages could overheat an economy leading to inflationary pressures or in the long-term weaken an economy fiscally through high sovereign debt. The analysis also abstracts from impacts of subsidies that lower electricity prices as a second-order effect and thereby may distort production costs in favor of the subsidizing market.

Overall, the effect of industrial policy in foreign countries on the Swiss economy is inconclusive: It depends on the relative size of the effects operating through these channels. Therefore, it is an empirical question whether Switzerland is a net loser or beneficiary of foreign industrial policy, which we will investigate further within this study. Table 1 summarizes the transmission channels that will be assessed in each of our analyses.

Table 1: Overview of the transmission channels considered in the analyses of this study

Channel	1 Competition effect	2 Demand effect (upstream)	3 Investment effect	4 Consumer effects / surplus (downstream)	5 Technological spillovers
Business survey (Ch. 3.2)	X	X	X	X	
Trade model (Ch. 3.3)	X			X	
Econometric analysis “Juncker Plan” (Ch. 4.1)	X	X			
Case study 1: China (Ch. 4.2.1)		X	X	X	X
Case study 2: Germany PV (Ch. 4.2.2)		X		X	X
Case study 3: Buy American (Ch. 4.2.3)		X	X		X

Source: Own compilation.

3. Current industrial policy programs

3.1 Introduction to the Inflation Reduction Act and the Green Deal Industrial Plan

3.1.1 Inflation Reduction Act

Design

On 7 August 2022, the US Senate passed the IRA. It is a landmark legislation that combines the goals of reducing domestic inflation with tackling climate change. It includes the largest ever US fiscal package to mitigate climate change, providing massive subsidies to green industries. However, the law also contains several other projects and rests on three main pillars:

1. Corporate tax reforms to increase tax revenues
2. Regulation to lower prescription drug prices
3. Subsidies for green industries (Baur et al., 2023)

Most provisions became effective at the beginning of 2023 and will span until 2032. Over this period, the Congressional Budget Office (CBO) expects the IRA to generate additional financial means for the state budget totaling $739 billion (2.3 percent of US GDP). This will be achieved primarily through a minimum tax of 15 percent for large corporations and savings in healthcare costs. At the same time, an estimated total of $433 billion will be spent. The bulk of the expenditures, amounting to $390 billion, will be allocated towards promoting sustainable energies and decarbonizing the economy. Annually, this amounts to 0.16 percent of US GDP. Additional expenditures finance the extension of the Affordable Care Act (US Senate, 2022).

In this study, our focus are the expenditures on sustainable energies and decarbonization, the Energy Security and Climate Change (ESCC) package. The ESCC is relevant not only because of its size, but also because it contains several industrial policy instruments. Table 1 provides a breakdown of the ESCCs target areas. A substantial $160 billion is earmarked for tax incentives to stimulate the production of clean electricity and foster investments in sustainable energy sources. Additionally, an estimated $36 billion is allocated to boost the production and use of clean vehicles and fuels. The ESCC also sets aside approximately $37 billion in subsidies to produce environmental-friendly goods, such as batteries, solar panels, and wind turbines. Another subsidy of a similar scale is dedicated to incentivizing households to invest in clean energy and to improve their energy efficiency. Beyond this, a further $120 billion is intended for a diverse array of other energy and climate-relevant initiatives, which includes matters of transportation, infrastructure, air pollution mitigation, and power transmission.

Table 2: Expenditures specified in the Energy Security and Climate Change (ESCC) package of the IRA

Area	Budget (in bn USD)
Tax credits: clean energy	**160**
Clean energy: production	76
Clean energy: investment	51
Nuclear energy	30
Carbon capture	3
Clean fuels	**36**
Clean fuels	22
Clean vehicles	14
Tax credits: industry	**37**
Production of environmental goods	31
Investments in production sites for environmental goods	6
Incentives for households	**36**
Clean energy: households	34
Energy efficiency	2
Other	**121**

Source: Baur et al., 2023

However, these figures should be taken with caution. About two-thirds of the funds are disbursed through uncapped tax credits. This means that the total volume of payouts increases with corporate investments. A report by Credit Suisse (2022) anticipates that total climate spending by the government until 2032 would amount to $800 billion, while Goldman Sachs (2023) foresees a total spending of $1.2 trillion.[5]

With regard to the various tools of Industrial Policy discussed in Chapter 2.2, the IRA particularly relies on a combination of subsidies and other discriminatory measures. Production subsidies frequently form the foundation, supplemented by a bonus if local content requirements are fulfilled.[6] This bonus is especially significant in the manufacturing of solar panels, EVs, and other manufacturing credits. For example, in the area of clean manufacturing and energy, a bonus of up to 10 percent of the original tax benefit applies if steel, iron, and more than 40 percent of manufactured products are made in the US. Even more stringent is the clean vehicle credit which

[5] However, in a comparison of different projections, Evenett and Hufbauer (2023) caution against placing too much reliance on these estimates because of the underlying uncertainties. According to them, the average amount of subsidies per year is between $28 billion and $120 billion. This is equivalent to about 0.11 percent to 0.47 percent of US GDP.

[6] In addition to the eligibility requirements mentioned above, there are a number of others, such as the use of qualified personnel or being located in an Energy Community (see US Environmental Protection Agency 2023). Since these provisions are of secondary importance for this report, they will not be discussed further.

initially requires that half of the battery components must be manufactured or assembled in North America. By 2029, this percentage increases to 100 percent. Moreover, EVs that are imported or built with critical materials from foreign countries only receive 50 percent of the possible subsidy (Credit Suisse, 2022; US Department of the Treasury, 2023).[7]

Impact on the US market

The impact of the ESCC package on the American market is currently marked by a high degree of uncertainty. This is partly due to the wide array of measures introduced, and partly because of the uncertainty of the total spending due to the uncapped tax benefits. Despite these uncertainties, several effects on the US market can be discerned:

- *GDP:* So far, there are no studies on the macroeconomic impact of the ESCC package on US GDP. However, studies by Huntley and Chen (2022) and Huntley et al. (2022) suggest that the climate and energy provisions will have a small positive impact on GDP. The authors cite two reasons: an increase in private capital investment combined with productivity gains.
  Other studies looking at the overall impact of the IRA show a more mixed picture: Mulligan (2022) predicts up to 900,000 job losses and a 1.2 percent drop in GDP. In contrast, Zandi et al. (2022) project a 0.2 percent increase in GDP. The authors attribute their estimates to different impact channels: reduced investment in the short run due to higher corporate taxes, but increased investment in the long run due to subsidies for green investments, reduced incentives to work due to the expansion of health care subsidies, and negative effects on new drug development due to new federal price controls on the pharmaceutical industry.
- *Power:* Due to the subsidization of production facilities for, and the manufacture of clean electricity, additional production capacities of between 34 and 115 gigawatts are expected annually. This significantly reduces electricity prices for solar, wind, and nuclear power. Renewable hydrogen prices could even fall close to zero by 2030, as production costs converge to the level of subsidies (Bistline, Mehrotra & Wolfram, 2023; Jansen, Jäger & Redeker, 2023; Nationaler Wasserstoffrat, 2022).
- *Solar/Wind Manufacturing:* According to estimates by Credit Suisse (2022), solar modules will become 60-80 percent cheaper compared to unsubsidized costs. Wind turbine costs are also expected to drop by up to half. The associated local content requirements are likely to result in a significant build-up of domestic production capacities over the medium term.
- *Transport:* The $7,500 credit for EVs will enhance their appeal compared to petrol-powered alternatives. Provided that the charging infrastructure is expanded accordingly, market penetration of EVs is expected to increase significantly (Slowik et al., 2023).
- *Battery Manufacturing:* The broad subsidization of battery production in conjunction with local content requirements for EVs promotes the establishment of a local value chain for battery manufacturing. According to Henze's (2022) estimates, US battery capacity will grow by over 600 GWh/year by 2030, six times the capacity of 2022. However, there are two caveats: first, this is only the case if supply chains are effectively reshored to America. If this is not profitable, producers are likely to forego the $7,500 credit. Second, according to the EU, the local content requirements violate WTO rules. There are likely to be exceptions for partners with Free Trade Agreements (Credit Suisse, 2022).

[7] However, the U.S. has already backtracked and opened access to partners with an FTA through Section 45W subsidies for leased vehicles.

– *Building:* The funds for increasing the energy efficiency of buildings create incentives for heat pumps, solar power, and home energy efficiency upgrades (Hanley, 2022).
– *Greenhouse gas emissions:* The US climate target for the year 2030 is to reduce net greenhouse gas (GHG) emissions 50 percent below 2005 levels. As a result of the IRA spendings, it is estimated that net US GHG emissions could be reduced to 32-42 percent by 2030. Without the IRA, the reduction would be only 24-35 percent (Jenkins et al., 2022, Larsen et al., 2022).

Impact on non-US markets

Due to its vast budget and various industrial policy instruments, the IRA is likely to have an impact on the global economy. According to a global expert survey by Gründler et al. (2023), 46 percent of the surveyed experts outside of the US rate the potential effects on their national economy as negative, 30 percent as positive, while 24 percent see no impact on their economy. Interesting is the geographical distribution of these opinions: more experts from countries with a high GDP rate the measures as negative, particularly Germany and France. 76 percent of Swiss experts rate the effects as negative.

LCRs are of particular concern for US trading partners, including Switzerland, because they act as a discriminatory barrier at the border that would reduce US import demand for their products (Arrow 2 in Figure 2) (Bown, 2023), thus acting as a quasi-import tariff on foreign inputs used for the subsidized production. In addition, these requirements promote domestic production, which could lead to the relocation of companies to the US (Arrow 3). Investment in emerging value chains such as green hydrogen and battery production could be drawn to America. This could lay the foundation for the emergence of industrial ecosystems in a second step (Deloitte, 2023; Bown, 2023). However, two things should be noted: First, the discriminatory nature of LCRs makes them illegal under Article 3.1(b) of the WTO Agreement on Subsidies and Countervailing Measures. Second, the IRA's implementing regulations have allowed to circumvent the discriminatory nature of local content requirements for EVs in Section 30D of the IRA by allowing final consumers of leased vehicles to benefit from the exceptions given to commercial buyers under section 45W of IRA (Bown, 2023). Nevertheless, there are already first examples illustrating potential effects of LCRs, like Tesla's decision to scale back its battery production in Germany or Meyer Burgers decision to invest in US solar production capacities (Neuhann, 2023, Waldersee, 2023). These examples are reflected in the survey of Gründler et al. (2023): 29 percent of experts from Europe estimate that companies could migrate due to the IRA. 33 percent of Swiss experts agree. The numbers for experts from France (78 percent) and Germany (51 percent) are even higher. Despite these concerns, so far there is little empirical evidence of FDI diversion from Europe to the US States (Evenett, 2023).

In addition to shifting production, the IRA also influences other countries through the competition channel (Arrow 1). Due to local content requirements, domestically produced goods become particularly attractive for the domestic market, which is likely to make imports from abroad less competitive. The build-up of production capacities is also likely to make American exports to other countries more competitive. Lower energy costs also contribute, making energy-intensive industries in particular more competitive.[8] However, the impact through the competitiveness

[8] Jansen et al. (2023) illustrate the impact of lower electricity prices using the glass industry as an example. According to the authors, energy costs in the EU account for about 10 percent of total production costs. If energy costs in the EU are twice as high as in the US, then glass production in the US has a cost advantage

channel depends on the reaction of other countries. If they retaliate, for example by introducing import tariffs or their own subsidy schemes such as the Green Deal Industrial Plan, competitive advantages could be reduced. In addition, local content requirements could be challenged through the WTO (Bown, 2023).

The downstream industry and end consumers could ultimately benefit from a consumer surplus (Arrow 4) and technological spillovers (Arrow 5). For example, Baur et al. (2023) point out that European and Swiss consumers can also benefit from inexpensive, subsidized solar panels from America. Verma & Harper (2022) further show that technological spillovers are indeed possible. Subsidies, for instance, enable the further development of previously expensive technologies such as green hydrogen and emerging technologies like carbon capture, partly at the state's expense. If technological advancements cannot be fully protected, Swiss firms could potentially benefit from first-mover companies in the US.

3.1.2 Green Deal Industrial Plan

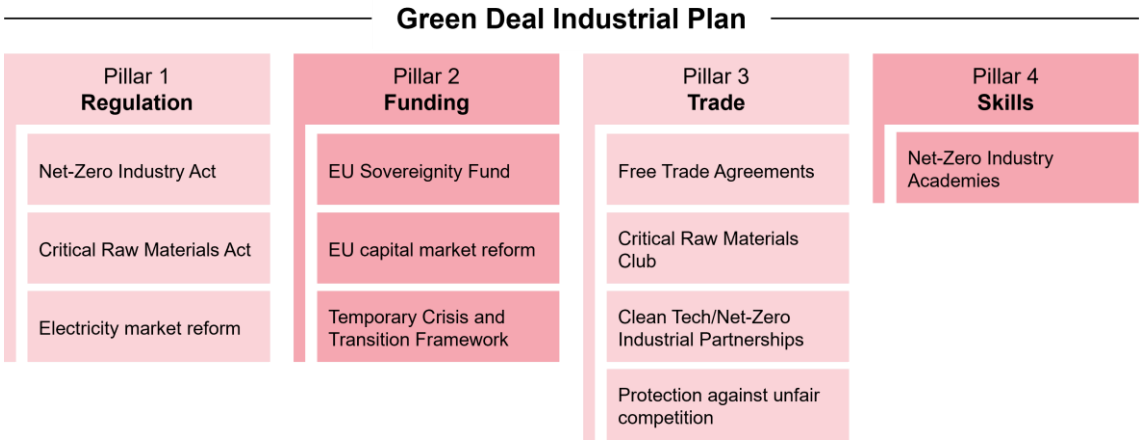
Design

In reaction to the IRA, the European Commission announced the Green Deal Industrial Plan (GDIP) on February 1, 2023. The GDIP is set to supplement ongoing initiatives such as the RE-PowerEU, with the principal aim of transitioning towards a carbon-neutral industry (EU Commission, 2023a). It is currently estimated that the EU will redirect €250 billion from existing funds to the GDIP (Esade, 2023). The program's duration is not entirely clear yet, with some parts (such as the Temporary Crisis and Transition Framework) already in place and others still awaiting adoption. Latest adoption is expected by the end of 2023 and the program is expected to run until 2030 (Blenkinsop, 2023a). This would indicate annual spendings of €35 billion (0.2 percent of EU GDP). Additional resources may come from newly created funds and from relaxed state aid rules allowing member states to expand their own financial incentives (Fischer & Roharova, 2023) as well as a more flexible bundling of funds from different instruments.

of 5 percent. However, the underlying assumption that the same sectors have the same energy intensity may not be true, especially since the energy efficiency of the Swiss industry is generally lower in sectoral comparisons.
Additionally, this is only partially relevant for Switzerland: the Swiss value-added share of energy-intensive industries has fallen from 34 to 24 percent over the past 20 years (Credit Suisse, 2023b).

The Commission's strategy rests on four pillars:

Figure 3: Pillars of the GDIP



Source: Own illustration.

1.

   1.1 The «Net-Zero-Industry-Act» aims to expand production capacities for key technologies and products, including batteries, heat pumps, solar equipment, electrolyzers, windmills, and carbon capture and storage technologies. For the expansion, the EU is relying on two main instruments: First, it sets industry targets to manufacture at least 40 percent of key net-zero technologies in Europe by 2030. Second, it simplifies and harmonizes the regulatory environment.
   1.2 Additionally, the EU aims to ensure access to critical raw materials through its Critical Raw Materials Act. The act aims at fostering the extraction, processing, and recycling of critical raw materials in the EU. Additionally, it aims at diversifying their sourcing through international engagement with trade partners.
   1.3 These measures are complemented by the Commission's proposals for reforming the electricity market, aiming to protect consumers from price fluctuations and allowing them to benefit from the low production costs of renewable energies.

2. Accelerating access to finance: The second pillar of the GDIP focuses on financing the production of clean technologies in Europe. To stimulate private investments, funding will be made available from existing mechanisms such as the Recovery and Resilience Facility (RRF) or new entities like a Sovereignty Fund. There are also plans to advance the European Capital Markets Union. In addition, the simplification of state aid rules through the «Temporary Crisis and Transition Framework» will enable individual states to provide tax incentives for sustainable production. The adaption of state aid rules further extends the Important Projects of Common European Interest (IPCEIs), which sets rules for providing state aid when several member states work together.
3. Open trade for resilient supply chains: The third pillar recognizes the role of trade in facilitating the green transition. It proposes to expand free trade agreements and other similar collaborations with different associations or countries. Moreover, the Commission will explore the creation of a club for critical raw materials and the establishment of industrial partnerships for clean technologies.
4. Enhancing workforce skills: To address the shortage of skilled workers, employees will be able to participate in qualification and retraining programs in strategic green industries. Third-

country nationals will be given easier access to the labor market in strategic sectors (Deloitte, 2023; Ernst & Young, 2023; Lafrance & Wehrmann, 2023; Rödl & Partner, 2023).

Impact on the EU market

The impact of the GDIP on the EU market is difficult to assess for several reasons: The program is adopted in parts and it is not specified how much funding will go to the different key industries. In addition, there are other programs running in parallel, such as REPowerEU that follow similar goals. Finally, much of the funding will come from individual states due to relaxed state aid rules, making it harder to assess the impact of individual measures.

Despite these uncertainties, a Credit Suisse study (2023a) concludes that the macroeconomic impact is likely to be small. Nevertheless, the EU's green industry will benefit from significant public funding. In addition, streamlined approval procedures and supportive state aid measures will help leverage private investment more quickly. The bulk of the funding is expected to go to the target industries defined in the Net-Zero Industry Act, namely batteries, heat pumps, solar equipment, electrolysers, wind turbines, and carbon capture and storage technologies (Esade, 2023; Kleimann et al., 2023). Similar to the effects of the IRA on US companies, these subsidies are likely to expand production capacity and lower product prices.

The relaxation of state aid rules has sparked considerable debate across the EU. While all states have the freedom to offer investment incentives, it is important to understand that their ability to do so varies. An article by Stavros Makris (2023) highlights that Germany and France together accounted for 77% of the €672 billion in approved subsidies. By further relaxing EU state aid guidelines, the TCTF could exacerbate existing disparities between member states and entrench structural imbalances within the single market. As a result, a more permissive approach to state aid risks jeopardizing the single market initiative, potentially encouraging «national champion» strategies and creating national markets with different degrees of competitiveness.

Impact on non-EU markets

As the impact on the EU market is still uncertain, the impact on non-EU markets is even less predictable. While the EU is encouraging investment in local production capacity, there is no evidence that products from non-EU markets will be excluded, for example due to local domestic requirements. Nevertheless, the EU has also announced that it will «protect the Single Market from unfair trade in the clean tech sector and will use its instruments to ensure that foreign subsidies do not distort competition in the Single Market, also in the clean-tech sector» (EU Commission, 2023b). For example, the EU already has significantly higher import tariffs on environmental goods than the US (Baur et al., 2023). Expanding these tariffs further could put other countries at a disadvantage.

Based on an ex-ante assessment, the production targets should reasonably increase European production capacity. This should reduce product prices in the target industries and improve the underlying technologies in the medium to long term. Swiss importers and consumers will benefit. Swiss exporters of intermediate goods should also benefit given that there are no local content requirements. Only Swiss exporters active in the target market are likely to suffer. As with the IRA, they will face subsidized competition. Given the geographical proximity, the temptation to build up production capacity in the EU to benefit from the subsidies themselves is likely to be

strong. Another aspect that is likely to have an impact outside the target markets is the Critical Raw Materials Act. Among other things, the EU wants to secure access to critical raw materials through partnerships. This implies that access to these raw materials could become more difficult for Swiss firms. This is also reflected in our survey: as we will show in Chapter 3.4, 15 percent of companies believe that access to raw materials will become more difficult due to the IRA and the GDIP.

3.1.3 IRA and GDIP: Similarities and differences

The IRA and the GDIP share several similarities:

- Both aim to bolster domestic green industries
- Both have similar planning horizons
- Both plan to provide similar total subsidy amounts

Also, when it comes to the actual subsidy amounts, both programs harbor significant uncertainties. For example, estimates suggest that IRA spending could exceed Congressional Budget Office projections by two to three times due to uncapped tax credits. Meanwhile, for the EU, it is pivotal to recognize that the GDIP represents just a segment of the broader initiative. Programs like REPowerEU also stride towards similar goals. Kleimann et al. (2023) project that the EU's commitment to renewable energy between 2022-2031 will be around €800 billion.

While these similarities stand out, there are also differences between the two:

- The IRA focuses exclusively on financial incentives, such as lowering production costs, to promote green industries. On the other hand, the GDIP takes a more general approach as the EU´s own budgetary power is more limited. The approach includes subsidies but also additional elements, such as a simpler regulatory framework. Beyond the GDIP, measures like carbon pricing instruments play a role in the EU (Rusch et al., 2023).
- The impact of the IRA is likely to materialize faster because the credit-based system provides simple and clear access to subsidies. The impact of the GDIP, on the other hand, may potentially take longer. This may be partly due to its slower implementation, as the EU does not have a unified tax system, making access to subsidies more complex.
- The IRA relies in part on protectionist elements, such as local content requirements, to onshore production of clean-tech industries and maintain energy security. The EU also sets benchmarks for local production under the Net Zero Industry Act but refrains from directly trade-distorting measures.
- The IRA focuses on subsidizing proven technologies. The EU has a less narrow focus on technologies that may also benefit new technologies.

Despite these differences, the two programs can be expected to have similar impacts because they are similar in key respects, such as size and focus. In Section 3.5, we take advantage of this fact and simulate the previously unknown effects of the GDIP based on the effects of the IRA (European Parliament, 2023; Keating, 2023; Keller & O'Neal, 2023; Kleimann et al., 2023).

3.2 Expectations and reactions of Swiss enterprises: Results from a business survey

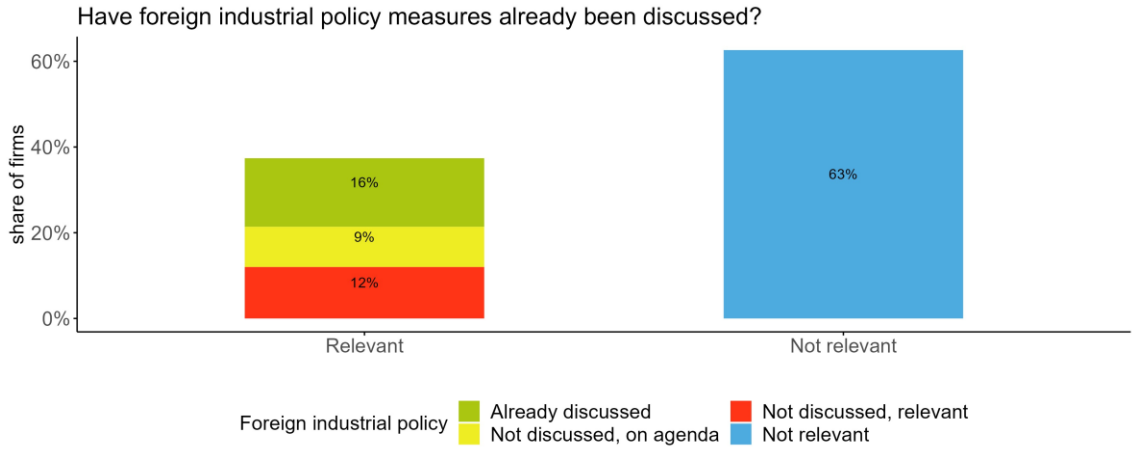
As the impact of recent industrial policy initiatives such as the IRA and GDIP are still unknown, we conduct a business survey to infer how Swiss businesses are perceiving them. For this purpose, we want to elicit how relevant these policies are perceived to be, how these policies are going to impact their businesses and how they are planning to respond to these new challenges.

We implemented the survey as follows: In late June of 2023, 2'000 Swiss enterprises received a mail invitation to participate in our online survey. These firms were selected based on a random sample drawn from the Business and Enterprise Register (BUR) that is administered by the Federal Statistical Office. We restricted the sampling to the sectors most likely affected by industrial policy, that is mining, manufacturing as well as industry-related services. The latter category comprises transport, information and communication, financial and insurance activities, and professional, scientific, and technical activities. The selection excludes companies with less than 50 employees. The survey was implemented by our field partner LINK (Zurich). We collected responses until the end of July, reaching 650 complete responses leading to a remarkably high response rate of 32 percent. Inspecting industries and firm size categories of responding firms reveals that the responses are very similar in composition to the full population of firms in the business register (see Figure 24, Appendix C). This is an indication that the survey results enable a representative view of the targeted firms. In what follows, we provide an overview of the main results of the survey. More detailed results are available in Appendix C.

IRA/GDIP relevant for more than one third of all firms

Do recent industrial policy initiatives matter for firms? **Fehler! Ungültiger Eigenverweis auf Textmarke.** shows that more than one third of all firms (37 percent) in our sample consider the topic as relevant to them (sum of the stacked bar on the left in **Fehler! Ungültiger Eigenverweis auf Textmarke.**). However, only 16 percent of the firms have discussed the issue so far in their internal meetings (green bar). When looking at more specific subgroups of firms, such as firms that have investments abroad, 48.7 percent of them view the topic as relevant, yet only 20.7 percent have discussed it (Figure 64 in Appendix C). Similarly, the greater the proportion of a company's exports, the more relevant the topic becomes for the company. 77 percent of companies that generate less than 10 percent of their revenue from exports indicate that they do not consider this topic as relevant. In contrast, 68% of companies that generate more than 50% of their revenue from abroad say that this topic is in some form relevant to them (results also in the Appendix C Figure 35).

Figure 4: Assessment of whether industrial policy initiatives are relevant to the company and whether internal discussions have taken place



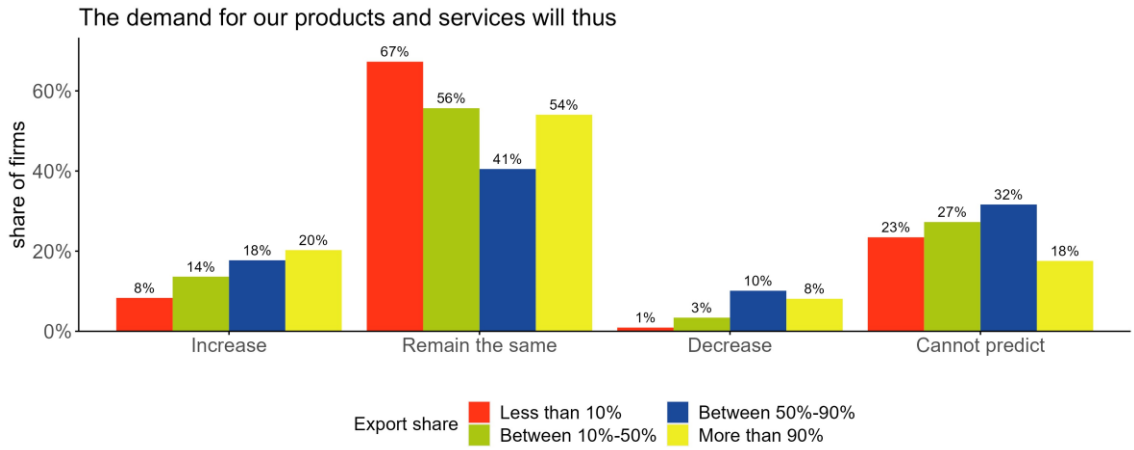
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Firms are rather optimistic about the impact of IRA/GDIP on their demand

The demand for a firm's products involves two channels in our model. The first channel is through competition effects (Arrow 1), and the second is demand for inputs (Arrow 2). Taken together, companies believe that foreign industrial policies are more likely to improve demand rather than deteriorate it. 11.4 percent of the firms anticipate an increase in demand, 3.7 percent expect a decrease in demand. 56.9 percent expect no change, and 28 percent are unable to assess the question (Figure 27 in Appendix C).

This tendency is more pronounced for firms that are more involved in international trade. The higher the share of exports, the more companies expect an increase in demand. Figure 5 shows that among companies that generate less than 10 percent of their revenue from exports, 8 percent expect an increase in demand. When exports make up between 10 percent and 40 percent of their revenues, 14 percent of firms expect an increase. If they have an export share of 50-90 percent, 18 percent expect an increase, and for those with more than a 90 percent export share, 20 percent anticipate an increase in demand.

Figure 5: Expected change in demand for products by export share



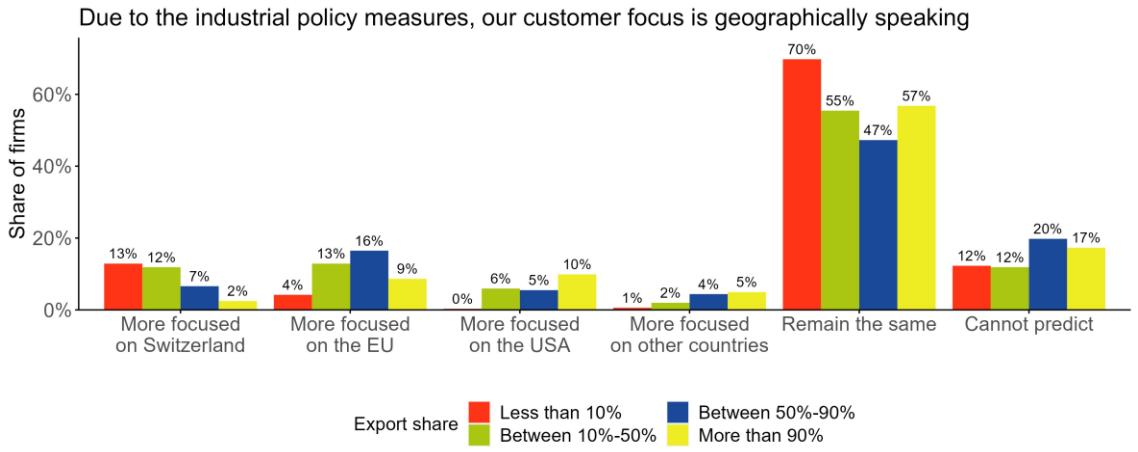
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Customer focus shifts towards the EU and Switzerland

What are the implications of the changing demand? Figure 32 in Appendix C indicates that the Swiss firms are expecting to shift their customer focus increasingly towards the EU and Switzerland. 10.5 percent of companies state that their focus will shift more towards Switzerland, 8.2 percent towards the EU, 3.1 percent towards the USA, and 2.3 percent towards other countries. 63.8 percent say it will remain the same, and 19.1 percent are unable to assess the issue. Among those firms that have already discussed the topic, there is a stronger expectation that their customer focus is going to shift (Figure 63 in Appendix C), in particular towards the EU (14.2 percent) and to the US (7.5 percent).

When companies have a smaller export share of their revenue, their customer focus also shifts more towards Switzerland. The larger the export share, the more the customer focus shifts towards the EU or the USA.

Figure 6: Expected shift in customer focus by export share

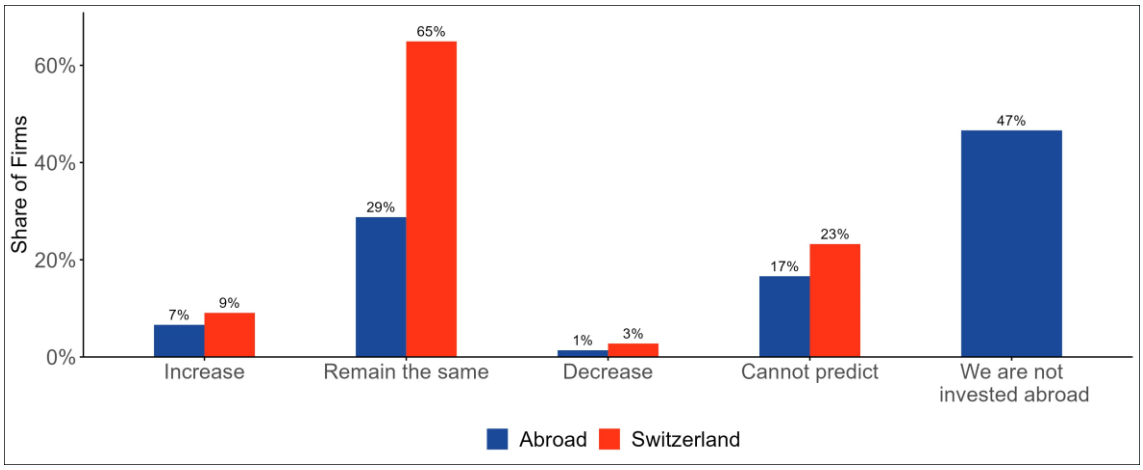


Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Investments in Switzerland are expected to increase

Next, we assess whether firms respond to these industrial policy initiatives by adjusting their investments. This type of response can be seen as part of the channel 3 in our transmission model of foreign industrial policy.

Figure 7: Expected change in investments in Switzerland and abroad



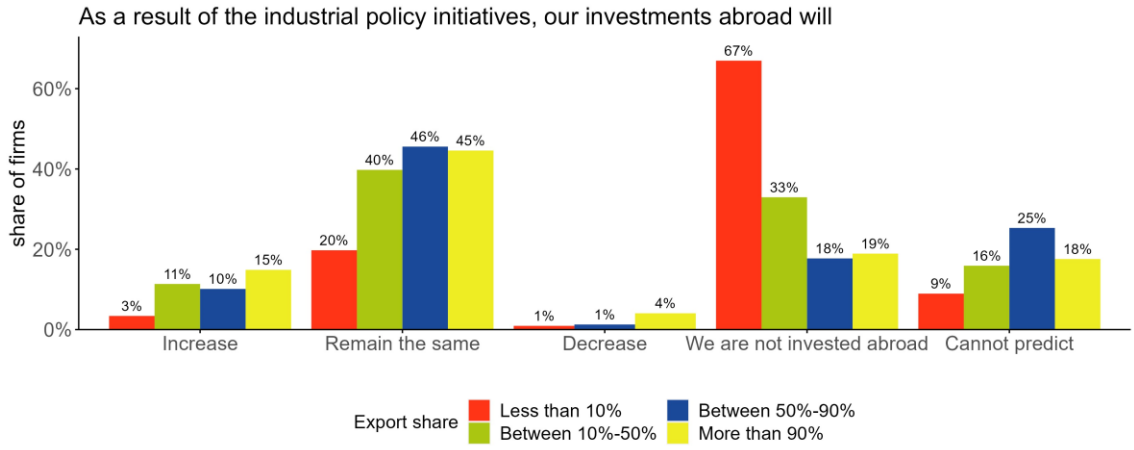
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

More companies in the business survey indicate that they will increase investments in Switzerland (9.1 percent) than abroad (6.6 percent). This is mostly because some companies are not investing abroad. Among firms who do invest abroad, 12.4 percent say that investments abroad will increase. In general, more companies state that they will increase their investments domestically,

suggesting that firm are planning to serve the expected demand increases mostly through additional domestic capacities.

Figure 8 shows that the likelihood of planned increases in foreign investment increases in a company's export share. For companies with less than 10 percent export share, 3 percent indicate an intention to increase foreign investments, 11 percent for those with 10 percent-50 percent export share, 10 percent for high export shares (50-90 percent export share), and 15 percent for companies with a very high export share exceeding 90 percent. Across all companies, regardless of their export share, 8-12 percent express a desire to increase investments in Switzerland.

Figure 8: Expected change in investments abroad by export share



Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

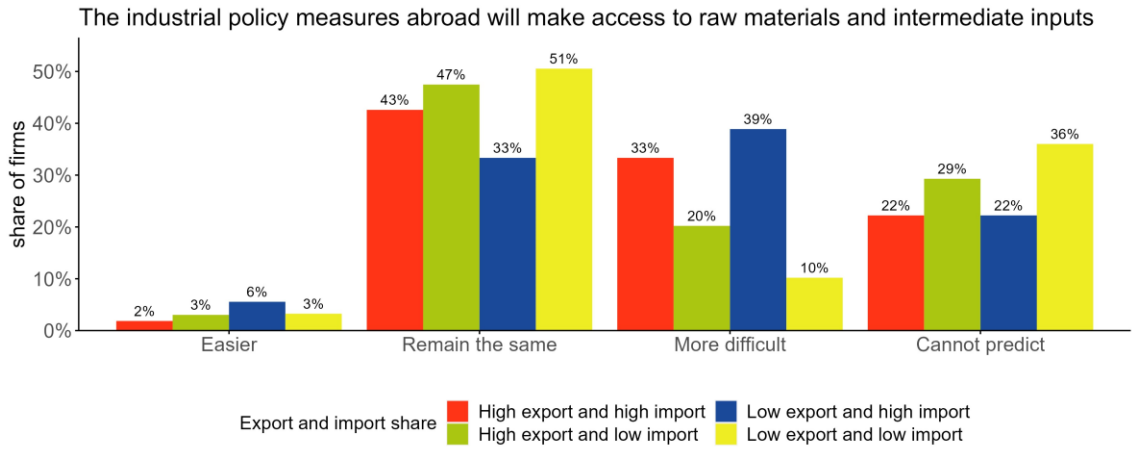
The competition for raw materials and intermediate inputs is expected to intensify

After assessing potential demand changes, we turn to the question how foreign industrial policies might impact firms' sourcing. Across all firms, 15 percent believe that access to foreign raw materials will become more difficult, whereas only a tiny fraction of firms (3 percent) believes that access will become easier. When companies have already internally discussed industrial policies, over a quarter (28 percent) believe that access will become more difficult (Figure 62 in appendix C).

These numbers are potentially worrying and may be the result of two developments. First, firms might worry about fulfilling local content requirements if they are relying on inputs that may not qualify as "domestic" content. Second, foreign industrial policy might increase the competition for sourcing adequate inputs as foreign competitors now supported by industrial policies are increasing their input demand and can afford higher prices. To resolve these competing explanations, we split firms according to their export and import shares (more vs. less than 50 percent) as the first explanation might be particularly relevant for firms that are strong exporters but not necessarily strong importers. The factor competition explanation should be particularly salient for firms with high import shares but not necessarily high export shares. In Figure 9, we can see that among companies with a high import share but a low export share, 39 percent say it will

become more challenging. For companies with both a high import share and a high export share, 33 percent of them believe it will become more challenging. This suggests that there is a factor competition effect at play. In other words, companies anticipate that the demand for input materials will increase, making it more difficult to meet their own needs.

Figure 9: Expected development regarding access to preliminary products by export share

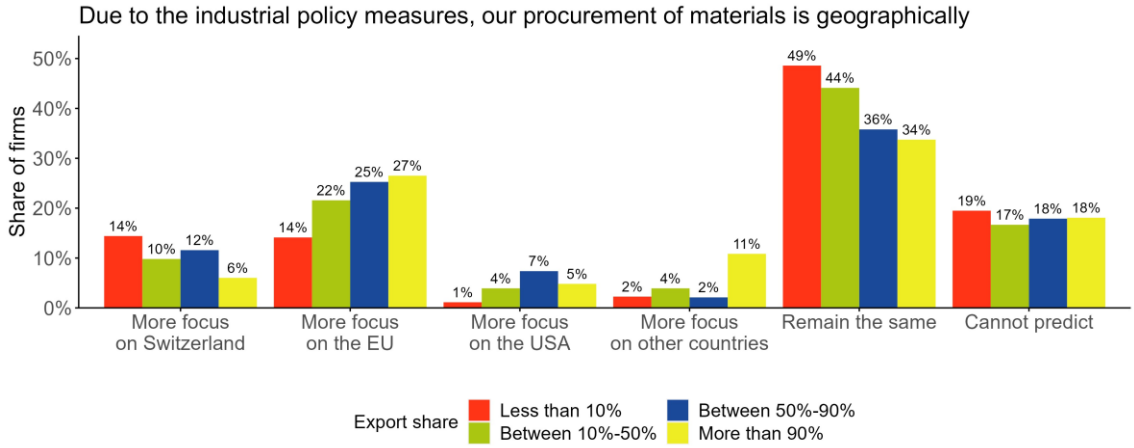


Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

These concerns about sourcing may be related to adjustments in the purchasing behavior of companies. Due to industrial policy measures, Swiss companies are expecting to focus their sourcing more on the EU (18.9 percent) and Switzerland (12.8 percent) and rarely more on the US (2.9 percent) as well as other countries (3.7 percent). Among the remaining firms, 47.2 percent expect no change, and 25.2 percent do not know.

When companies are divided by their export share, a more pronounced pattern emerges as firms engaged in international trade are less likely to leave their sourcing focus unchanged. Companies with more than 90 percent export share indicate that only 5 percent of them want to increase their focus on the US. This represents the lowest proportion. Just ahead of that, there is a 6 percent response for increasing focus on Switzerland, 11 percent for other countries, and 27 percent for the EU (Figure 10).

Figure 10: Expected shift in the focus of the origin of preliminary products by export share



Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Conclusion

The results of our company survey paint a rather optimistic view of Swiss firms on recent foreign industrial policies. More than one third of the surveyed companies consider industrial policy measures as not relevant to them, although not all of them have discussed the topic in their internal meetings. Generally, most Swiss companies seem to be unaffected by the foreign industrial policies. From those that are affected, more companies expect demand for their products to increase rather than decrease. The focus of customers is expected to shift slightly towards Europe (including Switzerland). Regarding investments, the surveyed companies plan to increase investments both domestically and abroad. The companies express concerns about future access to raw materials, as they expect it to become more challenging. Additionally, the companies observe a shift in the sources of raw materials and inputs towards Europe.

Given that foreign industrial policy is commonly discussed as a threat to the domestic economy, these results may seem surprising. However, the Swiss economy does not only consist of firms that may be directly competing with foreign rivals that are backed by industrial policies (Arrow 1). It also includes firms that may benefit as suppliers to foreign firms (Arrow 2) and firms that process promoted products from abroad. Moreover, Swiss firms are not passive victims of foreign policies but will be actively trying to identify opportunities and adjust to potential obstacles, for example by investing in new production capacities abroad (Arrow 3) to benefit from industrial policies themselves.

A limitation of this survey is our focus on larger companies with more than 50 employees. Therefore, it is likely that we surveyed a larger share of firms directly competing with foreign rivals benefiting from industrial policies, as SMEs tend to be less engaged in international trade. Conversely, this means that small businesses not affected as direct competitors that source subsidized products as inputs (Arrow 4) may be underrepresented. Take the example of the photovoltaic industry: When production is subsidized abroad, and products become more affordable in Switzerland, even the installers of photovoltaic systems in Switzerland benefit. However, we are likely to

underreport these firms, hence the impact of foreign industrial policy on Swiss firms in their entirety might be even more favorable.

3.3 Simulation of the impact of IRA and GDIP on the Swiss economy in a partial equilibrium model

We develop a structural trade model to assess the impact of the IRA on Switzerland through the competition channel (Arrow 1 in Figure 2) as well as the surplus channel accruing to downstream industries and consumers (Arrow 4 in Figure 2). In the model, IRA subsidies affect Swiss trade of affected goods in the following way:

1. IRA subsidies lower US consumer prices and production costs of affected goods.
2. Lower consumer prices and production costs affect US imports and exports.
3. Changes in US imports and exports affect the world price.
4. Changes in world prices affect Swiss imports and exports.

Model description

The methodology of our model is based on the trade model of Kee, Nicita and Olarreaga (2007), which uses prices, export and import volumes, and trade elasticities to simulate trade. We extend this framework by introducing industrial policies. In particular, we introduce two types of subsidies: 1) consumption subsidies, such as the Clean Vehicle Tax Credit, which lower the price of affected goods in the US market[9], and 2) production subsidies, such as the Advanced Manufacturing Production Credit, which lower the cost of production of affected goods, also in the US market. To reflect the local content requirements of the IRA, we initially assume that consumption subsidies are discriminatory (cf. local content requirements) and thereby only benefit domestically produced goods. Consequently, the introduction of these subsidies will affect trade as follows:

Table 3: Impact of production and consumption subsidies on US trade and world price

Subsidy type	Impact on US imports	Impact on US exports	Impact on world price
Consumption subsidy	Demand shifts to domestic products, reducing imports	More domestic products are consumed in the US, reducing exports[10]	Ambiguous. Lower imports lower world price, lower exports raise it
Production subsidy	More products are made in the US, reducing imports	More products are made in the US, increasing exports	Lower import demand and higher export supply both lower the world price

The magnitude and direction of the impact on world prices depends on two factors: 1) the US share of world imports and exports of the affected products, and 2) the elasticity between price changes in the affected products and imports and exports. Based on the change in the world price,

[9] The domestic market is the market directly affected by the subsidy. In the case of the IRA, this would be the United States. In the case of the GDIP, it is the European Union.
[10] Local production is likely to increase but targeting the domestic market.

we again apply the corresponding trade elasticities for Switzerland to derive the effects on Swiss imports and exports. Basically, the model assumes that Swiss exporters of affected products benefit from higher world prices while importers suffer (and vice versa for lower world prices). We provide a more detailed description of the model in Appendix B.

Our approach has some limitations that we would like to address:

- It is important to note that our model focuses exclusively on the goods sector, leaving out areas such as services. However, we believe that this model is still of considerable value because most of the subsidies in the IRA's ESCC package are specifically targeted at the goods sector rather than services. Therefore, we capture most of the impact.
- The structure of the model does not allow for direct estimates of the impact on investment, R&D expenditure, or employment. Relying on a general equilibrium model, for example, could incorporate the above factors. However, we argue that there is a positive correlation between investment, R&D, and employment with the flow of goods. For example, observing positive outcomes in the export of certain goods may be a precursor to favorable shifts in investment and job creation in the respective industries. Additionally, relying on a general equilibrium model would greatly complicate the analysis and understanding of impacts. In particular, it would have been impossible to accurately allocate some of the IRA subsidies to their respective sectors because, for example, there is no general equilibrium model that distinguishes between electric and internal combustion engines in describing the intersectoral relationships in the automobile sector. We decided to take a simpler approach with causal relationships that are easy to measure and understand. As we do not take into account impacts on investment, R&D expenditure and employment, the PE model focuses solely on the short- to medium-term effects of subsidies.
- It is also important to note that focusing on subsidies alone does not go far enough. According to Erraia et al. (2023), subsidies are not the only determinant of investment decisions. Other factors such as the regulatory environment, tax policy, political uncertainty, and energy prices also play a role. We do not include all these aspects in our model.

Model inputs

The calibration of the model relies on three inputs: trade data, trade elasticities, and the ad-valorem equivalents of consumption and production subsidies. Each input is discussed in more detail below:

Trade data: We obtain unit prices and trade values from the United Nations Comtrade database at the six-digit level of the Harmonized Commodity Description and Coding System (HS). This allows us to distinguish 5000 different products. Since industrial policies sometimes target very specific products (e.g. heat pumps), it is fundamental for our approach to be able to capture as much heterogeneity between products as possible.

Trade elasticities: We use price-import and price-export elasticities from Kee et al. (2008) and Nicita et al. (2018).

Subsidy shocks: The most important input to the model is the ad-valorem equivalent of consumption and production subsidies, measured as the reduction in consumer prices and production costs for each of the affected products, again on the six-digit HS level. This is a challenging task given the size and diversity of the measures included in the IRA. A list of the individual programs

from the ESCC package serves as starting point (Bluegreen Alliance, 2022; Congressional Research Service, 2022). We select all relevant programs above $2.5 billion total subsidy amount for which at least some of the affected products can be inferred. This allows us to cover approximately $248 billion or 63 percent of the total subsidy amount of the ESCC package. For the relevant programs, we 1) identify the products affected, 2) classify whether the subsidy is a consumption or production subsidy, and, if possible, 3) estimate the ad-valorem value per product. The ad-valorem value is the central subsidy shock in the model and expresses the percentage by which the price or cost of the product is reduced by the subsidy. For example, in the case of new EVs, the average purchase price of ~$50,000 is subsidized by a maximum of $7,500. This equals an ad-valorem value of 15 percent. For many subsidy programs, such a clear calculation is not possible. Therefore, we rely on additional literature to estimate the cost reduction from the subsidies. Table 4 shows the estimates of the ad-valorem equivalents of the subsidies for the main product groups. We provide additional information in Appendix B.

It should be noted that not all products in the highlighted product groups are affected by the IRA, meaning that not all HS 6-digit tariff lines in the product group "Batteries" are affected by IRA subsidies. We only assign the ad-valorem values to the ones affected. Also, we only assign values when the HS codes are granular enough. For example, we do not assign most of the steel products any ad-valorem values because their use is not specified, and we cannot distinguish what percentage of imports or exports are affected by the subsidy.

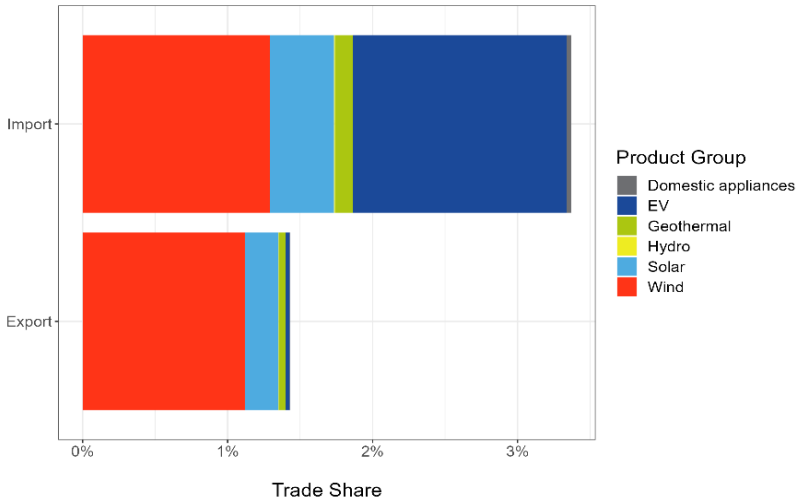
Table 4: Ad-valorem estimates for affected product groups

Product group	Ad-valorem value
Batteries	30%
Domestic appliances	10%
Electric Vehicles	15%
Geothermal	36%
Solar	60%
Wind	50%

In total, we cover 88 affected products at the six-digit HS level. Together, these affected products account for 2.38 percent of world imports and 2.93 percent of world exports. For Switzerland, these products represent 3.37 percent of imports and 1.43 percent of exports.[11] Thus, the share of Swiss imports and exports being affected by the IRA is small. Most Swiss imports are in the areas of EVs (43 percent), wind (38 percent), and solar (13 percent). Most exports are in the areas of wind (78 percent) and solar (16 percent).

[11] Of the 3.37 percent of Swiss imports in 2022, 71.5 percent are imported from the EU, 12 percent from China, and 5.7 percent from the US. Of the 1.43 percent of Swiss exports, 66.4 percent are exported to the EU, 8.7 percent to the US, and 6 percent to China (Source: Comtrade).

Figure 11: Affected products' share in Swiss trade (2022)



Source: Comtrade data, own analysis

Results

We simulate the trade and welfare impacts of the following three scenarios:

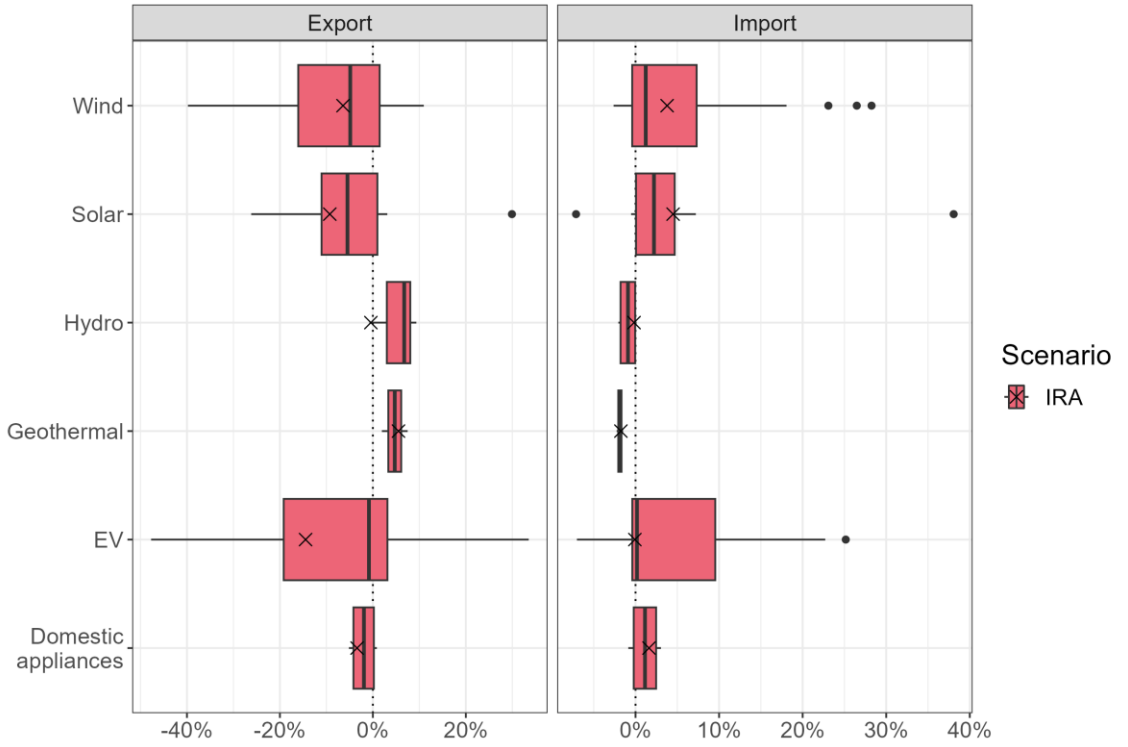
1. IRA subsidies (including discriminatory consumption subsidies)
2. IRA subsidies and GDIP matching aid (including discriminatory consumption subsidies)
3. IRA subsidies and GDIP matching aid (including non-discriminatory consumption subsidies)

Baseline scenario: IRA (including discriminatory consumption subsidies)

We first examine the impact on Switzerland based on the scenario that exclusively considers the implementation of the IRA and that the included consumption subsidies are discriminatory. Later, we extend the model to include potential retaliation by the EU through the GDIP and by relaxing the assumption that consumption subsidies are discriminatory.

Figure 12 summarizes how the IRA affects the Swiss exports and imports of the key industries:

Figure 12: IRA's impact on Swiss trade of affected product groups



Note: The whisker plot shows the distribution of the impact of the subsidies on the different products included in a product group. The figure exclusively considers the implementation of the IRA under the assumption that the included consumption subsidies are discriminatory. The box shows observations between the first and third quartile (i.e., within the interquartile range) in each sector. The line in the middle of the box is the median percentage change. The "x" is the average percentage change, weighted by the import/export share. The whiskers represent the upper and lower adjacent values. The upper adjacent value is the largest observation that is less than or equal to the third quartile plus 1.5 times the interquartile range. The lower adjacent value is the smallest observation is that is less than or equal to the first quartile minus 1.5 times the interquartile range. The black dots are the outliers, i.e., observations that are beyond the whiskers. Consider an example: exports of wind products. The most negatively affected product in the is electrical transformers with almost -40 percent. The most positively affected product is engines and parts thereof with +28 percent. On average, exports of wind products are negatively affected by -7.1 percent.

Figure 12 shows that the overall impact of the IRA on Swiss trade is modest. On average, exports are negatively affected by -6.6 percent. Imports, on the other hand, are positively affected by 1.9 percent. The impact of IRA on average exports varies between -7.1 percent (for wind) and +5.1 percent (for hydro). The impact on average imports varies between -2 percent (for geothermal) and +5 percent (for EVs and wind). In general, exports tend to decline with IRA subsidies, while imports tend to increase with IRA subsidies. This can be explained by the impact of the IRA on the world prices: On average, subsidies reduce the world price of the goods concerned by 1.8 percent.

Looking closer, however, there's considerable variation across product groups. For example, exports of some products, such as those linked to hybrid vehicles, are expected to increase by as much as +33 percent, while others, such as battery waste, could decrease by as much as -47 percent. Similarly, imports of products such as photovoltaic generators could increase by up to +38 percent, while others such as air heaters could decrease by up to -7 percent.

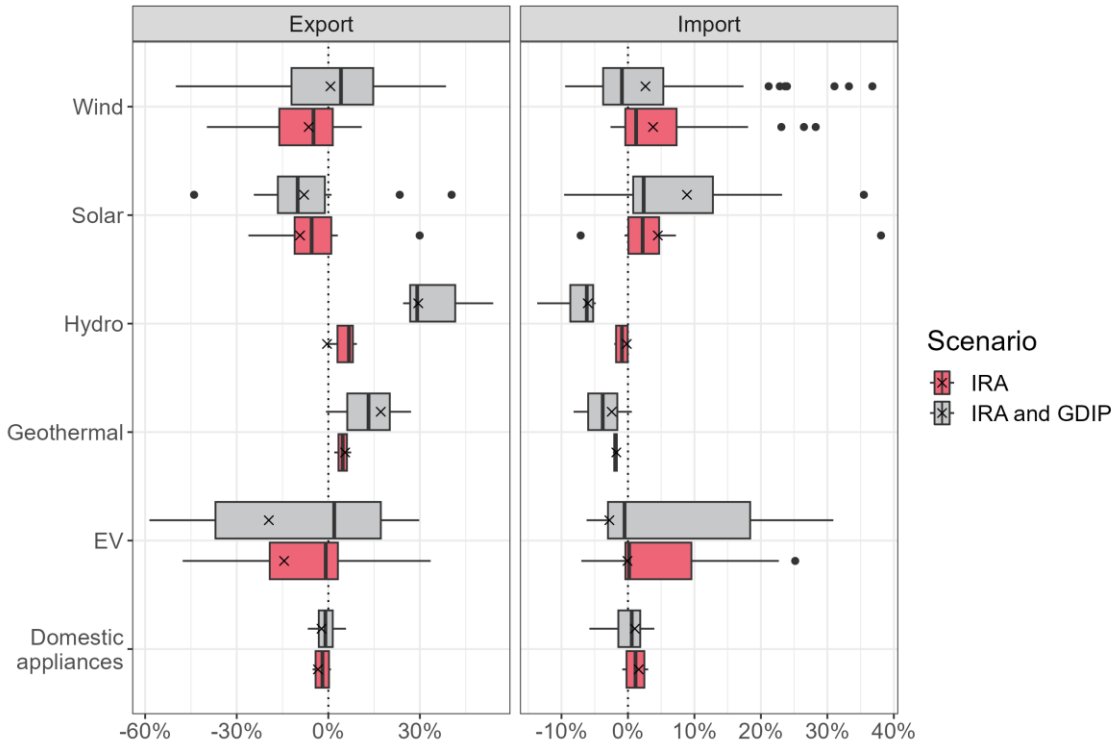
Taken together, these figures imply a welfare trade-off between lower import costs and lower export revenues. Taking into account the import and export shares of the affected good, we quantify this trade-off. According to our calculations, the welfare loss in the baseline scenario is $7 million. Compared to the Swiss GDP of ~$800 billion, the overall welfare impact is close to zero. There are three main reasons for the small impact: First, the impact of the IRA on world prices is relatively small. Second, the products affected account only for a small share of Swiss trade. Finally, the effects on exports and imports tend to work in opposite directions. As a result, the effects partially offset each other.

Scenario: IRA and GDIP, discriminatory subsidies

In a next step, we extend the baseline model by factoring in a potential equaling of the IRA subsidies by the EU using its new "matching aid"-instrument included in the GDIP. As highlighted in Chapter 3.1.2, the exact configuration of the GDIP remains uncertain and will be largely enforced by the member states. Therefore, for the model, we assume that product prices are impacted identically under the GDIP as they are under the IRA.

Figure 13 compares the impact on Swiss exports and imports of the key industries for the baseline and the extension scenario:

Figure 13: Two scenarios: impact on trade of affected product groups



Note: The whisker plot shows the distribution of the impact of the subsidies on the different products included in a product group. The figure considers the implementation of the IRA and the EU equaling the subsidies via the "matching aid"-instrument included in the GDIP. It still assumes that the included consumption subsidies are discriminatory. The box shows observations between the first and third quartile (i.e., within the interquartile range) in each sector. The line in the middle of the box is the median percentage change. The "x" is the average percentage change, weighted by the import/export share. The whiskers represent the upper and lower adjacent values. The upper adjacent value is the largest observa

tion that is less than or equal to the third quartile plus 1.5 times the interquartile range. The lower adjacent value is the smallest observation that is less than or equal to the first quartile minus 1.5 times the interquartile range. The black dots are the outliers, i.e., observations that are beyond the whiskers. Consider an example: exports of wind products. The most negatively affected product is electrical transformers with almost -50 percent. The most positively affected product is multimeters for measuring voltage with +38 percent. On average, exports of wind products are positively affected by +6.3 percent.

Figure 13 provides three insights:

- The overall impact on exports and imports is smaller than in the scenario where only the IRA is implemented. On average, exports are negatively affected by -0.5 percent. Imports are positively affected by 0.9 percent.
- The average impact on different product groups is not necessarily in the same direction as in the baseline scenario. For example, exports of wind products, on average, are negatively affected by IRA subsidies, but positively affected by the combination of IRA and GDIP. While the IRA subsidies lower the world price for wind products, the GDIP works in the opposite direction. This can be explained by the composition of imports and exports: the US is a net importer of all affected product groups, while the EU is a net exporter of EVs, geothermal, hydro and wind products. Assuming that discriminatory consumption subsidies reduce exports by increasing domestic consumption, the GDIP will have a positive effect on world prices in these sectors. This is reflected in the average effect of the two programs on the world price. Whereas under the baseline scenario the world price for all affected products falls on average by -1.8 percent, it is now only -0.2 percent.
- The variation in the impact on individual products increases. For example, while in the baseline half of the EV exports ranged from -20 percent to +5 percent, this range now widens to -40 percent to +20 percent. Again, we explain this impact by the trade composition of the US and the EU: if both regions have a similar composition of exports and imports for products, the impact on the world price will be in the same direction. Since the combined effect of IRA and GDIP on the world price of this particular good will be stronger we see larger impacts.

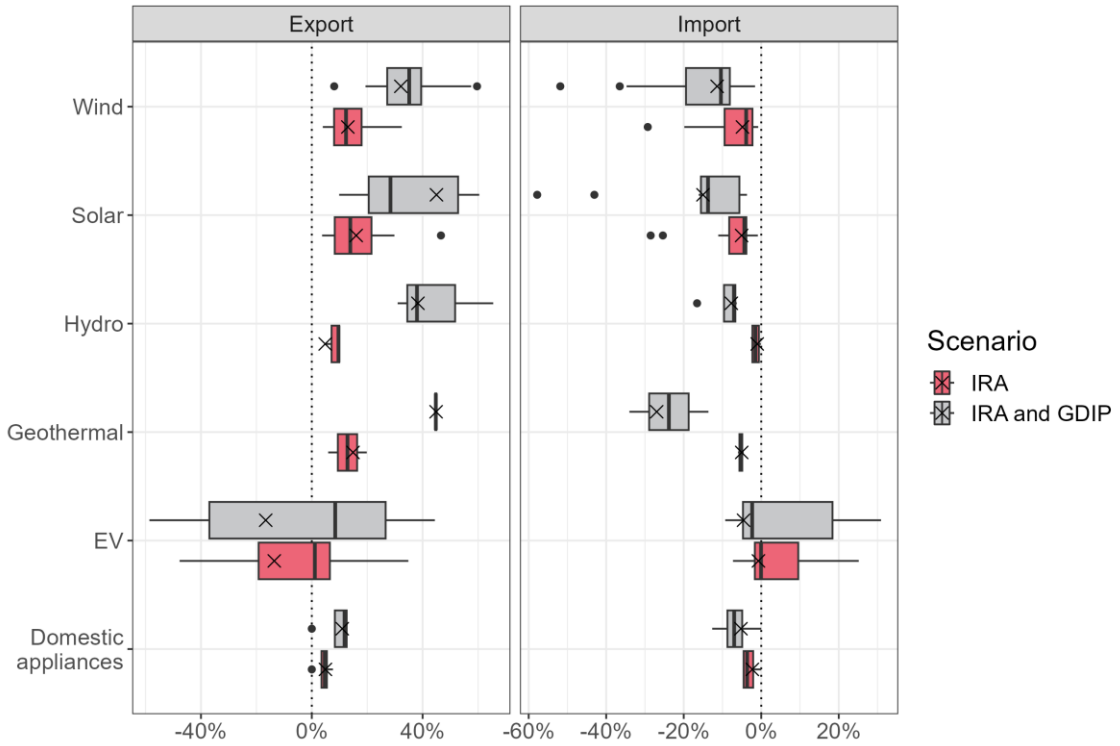
Finally, we also consider the welfare impact for this scenario. Interestingly, we see a higher welfare loss for Switzerland of $238 million. Compared to the baseline scenario, we attribute this to a significant drop in imports in two key product categories: EVs and wind technologies. This decline surpasses that of the baseline scenario, a result of substantial surges in import prices. However, the impact is still negligible compared to Switzerland's GDP of ~$800 billion, around 0.029 percent.

Scenario: IRA and GDIP, non-discriminatory subsidies

Finally, we adapt the model by characterizing consumption subsidies as non-discriminatory. This makes sense for the GDIP in particular, as the EU has not yet announced protectionist elements that would exclusively favor domestically produced goods. This scenario could also be relevant for the IRA, as individual local content requirements can be circumvented, for example, by leasing EVs. It is also questionable whether the existing requirements will be upheld against WTO rulings.

Figure 14 compares the impact on exports and imports of the key industries for the case of discriminatory and non-discriminatory consumption subsidies:

Figure 14: Non-discriminatory consumption subsidies: impact on trade of affected product groups



Note: The whisker plot shows the distribution of the impact of the subsidies on the different products included in a product group. The figure considers the implementation of the IRA and a potential retaliation of the EU via the "matching aid"-instrument included in the GDIP. It now assumes that the included consumption subsidies are non-discriminatory. The box shows observations between the first and third quartile (i.e., within the interquartile range) in each sector. The line in the middle of the box is the median percentage change. The "x" is the average percentage change, weighted by the import/export share. The whiskers represent the upper and lower adjacent values. The upper adjacent value is the largest observation that is less than or equal to the third quartile plus 1.5 times the interquartile range. The lower adjacent value is the smallest observation is that is less than or equal to the first quartile minus 1.5 times the interquartile range. The black dots are the outliers, i.e., observations that are beyond the whiskers. Consider an example: exports of wind products. The least positively affected product is regulating or controlling instruments with +8 percent. The most positively affected product is multimeters for measuring voltage with +59 percent. On average, exports of wind products are positively affected by +34.2 percent.

Figure 14 shows that the new assumption changes the results of our model quite dramatically. Under non-discriminatory consumption subsidies, imports in the US and the EU now increase as domestic demand increases due to the subsidies. This increases the average world price by 3.2 percent due to the two industrial programs. Trade volumes reflect these changes: all product categories exhibit export increases, while imports decline. On average, exports are positively affected by 33.7 percent, while imports are negatively affected by -9.4 percent.

For export-oriented economies like Switzerland, this scenario appears positive at first glance. The results of the business survey, in particular Figure 5 confirm that export-oriented companies in particular expect an increase in demand. However, this view is deceptive: Our model predicts that welfare losses are highest in this scenario, at $451 million. This is explained by the fact that the import share of the affected products is 3.37 percent of total imports, which is significantly higher

than the 1.43 percent share of exports. Thus, while exporters benefit, Swiss consumers suffer from higher prices due to increased foreign demand.

Nevertheless, we should put the welfare losses into perspective with Switzerland's GDP of ~$800 billion. Even in the worst-case scenario, the welfare losses amount to only 0.06 percent of GDP.

Conclusion

Our simulations show that the impact of industrial policy programs on trade flows is modest. In general, these programs reduce the global price of the affected goods, leading to a decrease in exports and an increase in imports. However, the magnitude of these effects varies considerably across product categories. Swiss exports of hydroelectric and geothermal products actually benefit as world prices tend to increase as a consequence of IRA subsidies, while exports of solar products, wind products, and EVs are negatively affected as world prices decline with IRA subsidies. Because world prices of hydroelectric and geothermal products increase and world prices of solar products, wind products and EVs decline, imports of the former decline and imports of the latter increase.

Assuming IRA consumption subsidies that discriminate against foreign producers, the projected welfare losses for Switzerland are estimated at $7 million when considering only IRA subsidies. This figure could rise to $238 million if the EU matches the US subsidies with the GDIP.

If we assume that IRA's consumption subsidies will not discriminate against foreign producers, the dynamics change. Higher, non-discriminatory global demand means that all product categories experience a boost in exports. Conversely, imports experience a decline due to an increase in global prices of the affected goods. In this scenario, welfare losses could rise to $451 million if the IRA and GDIP were enforced together because of higher world prices. However, this amount is still marginal relative to Switzerland's total GDP.

Looking at the results of our business survey, it appears that Swiss firms consider the latter scenario of non-discriminatory subsidies to be more likely. As shown in Figure 5, Swiss firms with a high export share are more optimistic about future demand for their products than firms with a lower export share. Conversely, Swiss firms with a high import share are more pessimistic about access to raw materials and intermediate inputs. In light of ongoing disputes over local content requirements, the model highlights an important perspective for countries that are net importers of affected products. While opting for non-discrimination could benefit Swiss exporters, it likely hurts Swiss importers and consumers. Therefore, perhaps counterintuitively, if IRA consumption subsidies and EU's retaliation discriminate against rest-of-the world producers, including Switzerland, this leads to smaller welfare losses for Switzerland than if consumption subsidies were not to discriminate against foreign producers. The reason is that Switzerland is a net importer of the affected products and the higher increase in world prices in the case of non-discriminating consumption subsidies will hurt Swiss importers.

However, these effects are focused on the short to medium term through price effects. For example, if EU and US industrial policies lead to more efficient industries that produce affected products at lower prices and better quality, this could also benefit Swiss importers and consumers in the long run (not captured by the model). Another welfare effect not included in the model is the climate benefit: As the industrial policies promote more efficient manufacturing, cleaner energy production, and ultimately the decarbonization of the economy, the IRA and GDIP will reduce

carbon emissions and the countries' contributions to climate change. For example, experts estimate that the IRA could reduce US carbon emissions by an additional 7 percent (Jenkins et al., 2022, Larsen et al., 2022). Ultimately, Swiss citizens will benefit from these efforts.

One conclusion about the transmission channels shown in Figure 2 is that there is a trade-off between the benefits to Swiss exporters and importers. For example, if world prices fall as a result of increased production of the products in question, Swiss consumers and potential importers benefit. On the other hand, Swiss exporters suffer. Conversely, if world prices rise as a result of increased demand due to consumption subsidies, exporters benefit at the expense of Swiss importers and consumers. Although the original idea of the model was to focus only on the competition channel, further conclusions can be drawn for the second (demand) and fourth (consumer surplus) Arrows. According to our simulation, the effects on these channels point in different directions, indicating a certain balancing of the effects.

To sum up, the partial equilibrium model simulations suggest that the overall welfare impact is small, and therefore, should not raise significant concerns for Switzerland. This is partly because these industrial policies increase some world prices while reducing others, and partly because Switzerland is a net importer of some of the affected products, and a net exporter of others.

4. Insights from past industrial programs

Studying historical examples of industrial policy offers a valuable perspective since the outcomes of these policies have been already realized. Hence, they provide observable outcomes that we can evaluate today to better understand the impact of foreign industrial policy on Swiss firms. In this section, we proceed in two steps. First, we perform an econometric analysis to analyze the impact of the so-called “Juncker Plan”, a major EU investment initiative. This analysis enables us to check whether Swiss competitors of EU firms gaining from the initiative have been affected in a statistically meaningful way. The Juncker Plan covered a broad range of industries, with some overlaps to the GDIP. As a second step, this section provides three case studies that focus on more specific programs within a diverse set of contexts. They include the German program to develop its solar industry, the Chinese initiative to boost its EV sector, as well as the “Buy American”-rules implemented by the US administration.

4.1 Impact of the “Juncker Plan” plan on Swiss firms – an econometric investigation

Most debates about foreign industrial policy are centered around the potential harm to domestic firms that suffer from increasing competition from state-supported foreign rivals (Arrow 1). Within an econometric analysis, we seek to find evidence for the relevance of this channel and estimate the causal impact of past foreign industrial policy measures on Swiss firms. Our example is the “Juncker Plan”, an EU flagship policy initiative that provided loan guarantees to strategically important sectors. To study this program, we use a difference-in-differences approach (DiD) that is comparing affected Swiss industries with unaffected industries (De Chaisemartin and d'Haultfoeuille, 2020; Roth et al., 2022). With this approach, we achieve high internal validity, meaning that detected effects are credibly attributable to the industrial policy.

Policy Background

As a response to the sluggish economic development that followed the global financial crisis 2008, the EU commission initiated a new flagship policy. It became widely known as the "Juncker Plan", after the commission president Jean-Claude Juncker, though it was officially named the "Investment Plan for Europe". Its simple aim was to boost investment in the EU. The Juncker Plan's main innovation was the European Fund for Strategic Investments (EFSI). This fund was administered by the European Investment Bank (EIB) and provided loan guarantees to secure financing projects that would otherwise be too risky. Economically, loan guarantees are equivalent to a subsidy on firms' investments as it lowers their costs of financing. Firms had to demonstrate that their projects were economically sound, technologically viable and contribute to EU objectives. This implied that investments targeted four areas: the energy sector, R&D investments, infrastructure development, and projects related to education, health, and ICT. Hence, sectoral restrictions were in place, but they were broadly defined.

The EFSI's initial budget for the 2014-20118 period totaled € 21 billion, of which € 16 billion stemmed from the EU budget and € 5 billion came from the EIB. By mid-2018, the EFSI guarantees had triggered € 315 billion of additional investment, according to the EIB's own calculations. Due to its favorable outcomes, the program was extended, and its budget increased. In 2022, the InvestEU Fund succeeded the EFSI and became part of the GDIP. The InvestEU Fund will boast a wider array of financial instruments as well as a larger budget of € 38 billion.

We study the Juncker Plan for three reasons: First, the plan initiated substantial investments and may therefore generate an impact on Swiss firms that is statistically measurable. Second, its focus on energy transition projects parallels the current generation of industrial policies. Third, the program has features that are well suited for evaluation. For one, the program generated a stark contrast between the time before and after its introduction since there was no predecessor program. This contrast facilitates a before-after comparison. For another, the selectivity of the program with respect to its target areas created variation in the extent to which certain sectors were boosted through additional investments. This contrast facilitates comparisons across affected and unaffected industries.

Data and setup

To conduct the analysis, we need two types of information: First, we need data to define the industries exposed to the EFSI. Second, we provide information on the performance of Swiss firms before and after the EFSI's inception.

We retrieve the first type of information from the database of EFSI projects that is publicly available from the EIB's website. The EIB database lists the date when the support for a project started, the total funding that was granted to the project, the recipient firm, as well as a short description of the project. For the period between 2015 and 2018, it contains more than 400 projects. Based on the firm information as well as the project description, we manually assign up to three sectors (NACE level 2 classification) which are affected by the EFSI project. We then aggregate the EFSI funds granted at the industry-year level[12].

[12] We use a slightly adjusted version of the WK08 classification based on NACE Divisions (2-digit)

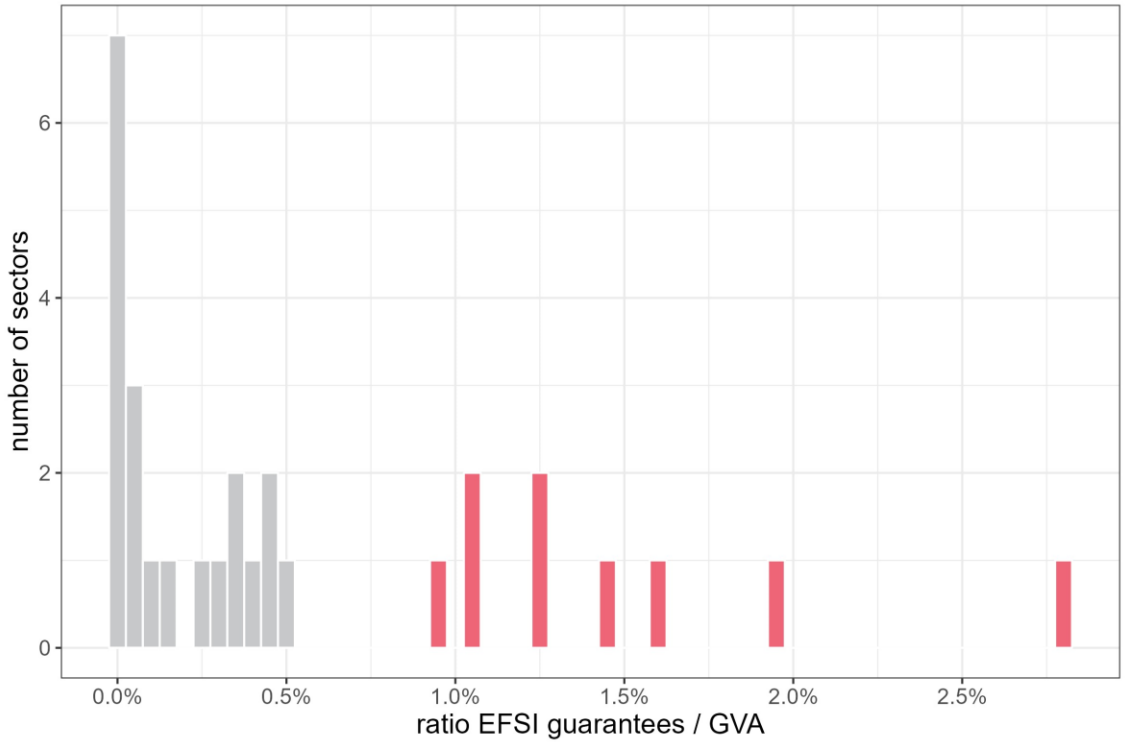
Second, we retrieve data covering the performance of Swiss firms from the KOF Innovation Panel (Spescha and Wörter, 2022). The KOF Innovation Panel is based on a firm survey that takes place every two years, with the most recent data available for 2021. The data contains information on firms' turnover, employment, investment, and R&D activities, amongst others (see e.g. Beck et al., 2020). The main export market and the share of intermediate inputs purchased from abroad are also surveyed. Although the survey is designed as a panel study, more than 70 percent of all firms are only observed once in the data. Hence, we use the respective sample weights and aggregate the firm data at the sector-year level to obtain a panel structure. This step leads to a loss of granularity. However, as the exposure to the EFSI program occurs at the sectoral level as well, the aggregation does not necessarily lead to a loss in precision. Table 8 in the appendix provides summary statistics for the resulting dataset.

In our baseline approach, we estimate the effect of the EFSI loan guarantees on Swiss firms operating in the same sector. Creating a binary treatment definition reflecting whether a Swiss sector is exposed to EFSI-backed competitors comes with two main challenges. First, the loan guarantees issued by the EFSI likely do not have an immediate effect on economic outputs in the same year that they are issued but need a certain time to translate in real effect. Therefore, we define the sum of EFSI loan guarantees between 2015 and 2018 as the absolute exposure to the EFSI program. As the KOF Innovation Panel is a biannual survey, we set the year 2017 as the first year of our treatment period, leaving us with three pre- and three post-treatment periods. We expect the early EFSI loan guarantees to have become effective at this point in time. The second challenge lies in the fact that both the EFSI loan guarantees as well as the size of the sectors themselves differ. To overcome this challenge, we set the sector's sum of EFSI loan guarantees in relation to the respective gross value added (GVA) in the European Union before the start of EFSI program[13].

Figure 15 depicts the ratio between the sum of EFSI loan guarantees and GVA for each sector, revealing two lessons: First, many sectors were directly exposed to the EFSI loan guarantees but most of them only obtained rather minor amounts. Second, there is a natural break between sectors with a ratio below 0.5 percent and sectors above 0.9 percent. We use this natural break to formulate our baseline treatment definition: A Swiss sector is treated if the ratio of the sum of EFSI loan guarantees between 2015 and 2018 and the GVA in 2014 exceeds 0.9 percent. This leaves us with nine treated sectors and 20 untreated sectors in our baseline specification. In a final step, we match the performance information for each sector with the respective information on whether a sector is exposed to EFSI-backed competitors or not. To test the robustness of our results, we later repeat the analysis with a higher threshold which also allows to assess the intensive margin of the effects. Table 9 in the appendix lists all sectors and indicates whether they are treated in one of the specifications.

[13] The data is retrieved from Eurostat (europa.eu). The relevant year is 2014. If no values were available for 2014, they were imputed with values from previous years. Choosing 2014 avoids potential endogeneity since sectors could grow/shrink due to the EFSI program.

Figure 15: Distribution of EFSI guarantees across sectors



Note: The plot shows the distribution of the ratio between EFSI guarantees and GVA across Swiss sectors competing with EFSI-backed competitors. The sectors with a ratio exceeding the threshold of 0.9 percent are in red.

This approach captures the competition effect (Arrow 1), and partly investment, and technological spillovers effects on the same industry (Arrow 3 and Arrow 5). It ignores downstream effects through consumer surplus (Arrow 4). To investigate upstream effects (Arrow 2), we take the EFSI budgets received by each EU industry and redistribute these sums to those industries that supply the industries directly receiving EFSI funds. For this step, we use the first-round input shares provided by the Eurostat input-output matrix[14]. We then sum up the funds that are going to each industry, again divide them by the value added of the sector and apply the 0.9 percent threshold to define the supplying sectors. We thereby exclude sectors from the analysis that were already defined as being direct competitors to EFSI recipients. Figure 68 depicts the ratio of indirect EFSI loan guarantees to suppliers relative to the GVA in the respective sectors.

Methodology

We use a difference-in-difference framework to assess the impact of the Juncker Plan on different outcomes for Swiss firms (revenues, employment, investments, R&D expenditures) at the industry level. In particular, we rely on the Synthetic Differences-in-Differences (SynthDiD) method

[14] The input-output matrix is retrieved from Eurostat (europa.eu). The relevant year is 2014. To calculate shares per industry, we use the values of inputs of all EU countries at basic prices.

proposed by Arkhangelsky et al. (2021). SynthDiD combines the attractive features of both Synthetic Control Methods (SCM) and conventional DiD approaches. DID methods are widely used in policy evaluations. On a high level, DID compares the difference between untreated comparison group and a treated group before the treatment (first difference) and after the treatment (second difference). The deviation between these two differences is then the causal effect of the policy intervention. In panel data settings, unit and time-fixed effects are included. This accounts for unobserved time-invariant differences between units (unit fixed effect) and for common time trend that affect all units uniformly (time fixed effect). This means that DID is able to estimate causal effects as long as the trends in the treated and control units would have evolved in parallel in absence of the treatment (parallel trends assumption). This assumption implies that there are no transitory shocks other than the policy intervention that affect the units differently during the observation period. For the period before the introduction, this assumption can be tested by assessing whether the EFSI exposed and non-exposed sectors moved in parallel. If this assumption is given and no other industry-specific regulations have entered into force at the same time, a causal effect with high internal validity can be assumed.

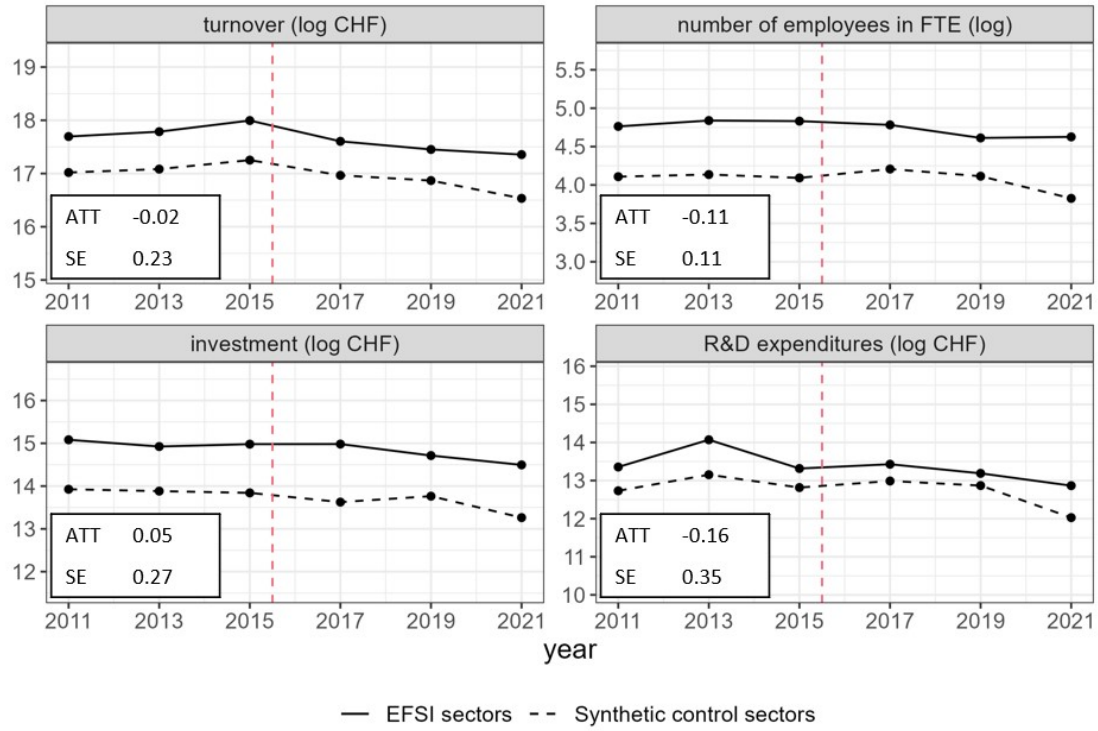
The combination of SCM and conventional DID in SynthDID bears the following advantages: As in SCM, control units are weighted to match the pre-treatment outcome of the treated unit. As in DID, SynthDID allows for unit- and time-specific effects, which typically account for a large amount of variation caused by unobserved factors. In addition, time weights are assigned to those pre-treatment periods of control units whose outcomes are similar to their post-treatment outcomes. The SynthDID estimator is then calculated by using the weighted panel in a DID regression.

Taken together, the weighting in SynthDID makes the DID strategy more plausible. Rather than manually selecting appropriate control units and time periods to satisfy the parallel trend assumption, SynthDID uses a data-driven approach to weight "similar" control units and time periods. As shown by Arkhangelsky et al. (2021, p. 15), SynthDID performs better or at least as good as DID in terms of both accuracy and robustness. However, transitory shocks that affect units, e.g. sectors, differently could bias the estimates, as the unit weights are chosen based on pre-treatment outcomes. We use an observation window of ten years, from 2011 to 2021. In this period multiple transitory shocks occurred, posing a potential threat to identification in our analysis. We address two main shocks: the Swiss Franc Shock in 2015 and the Covid-pandemic beginning in 2020. As we include time-fixed effects in our SynthDID approach, these transitory shocks only pose a threat to identification if they affect sectors differently. Inspecting various industry definitions shows that our distinction of industries that are either exposed or non-exposed does not overlap with distinctions of industries affected and unaffected by the Swiss Franc Shock (Bannert et al, 2015; Brunhart and Geiger, 2022). This implies that the Swiss Franc Shock may equally apply to our treatment and comparison group. In the case of the COVID-pandemic, the restaurant and accommodation sector is more affected than other sectors due to temporary closures. We therefore excluded this sector from the control group. For the other sectors, we assume that treated and untreated units were affected in a similar way. Within our robustness analyses, we also confirm that our findings are unaltered when excluding all observations from the year 2021.

Results

We start by assessing the pre-reform trends of the exposed and non-exposed sectors for our main outcomes in Figure 16. The figure presents the evolution of turnover, employment, investments, and R&D spending for Swiss firms operating in sectors targeted by the EFSI (solid line) or other sectors (dashed line). A visual inspection confirms that both groups of sectors followed a similar development path ahead of the EFSI's inception, indicating that the weighting of control sectors worked effectively. The average treatment effect on the treated (ATT) and respective standard errors (SE) are provided by the boxes in the bottom-left corner. They reveal that the EFSI implied negative tendencies for turnover (-2 percent), employees (-11 percent) and R&D expenditures (-16 percent) and an increase of investments (5 percent). These mostly negative tendencies are consistent with the hypothesis that foreign industrial policies harm domestic competitors. However, as indicated by the standard errors, the underlying variation is too large to distinguish the effects from a null effect. Hence, we abstain from drawing strong conclusions from the estimated effect on the four outcome variables. Moreover, our estimates are likely to provide an upper bound of the effect because we do not include downstream effects, which we expect to be positive.

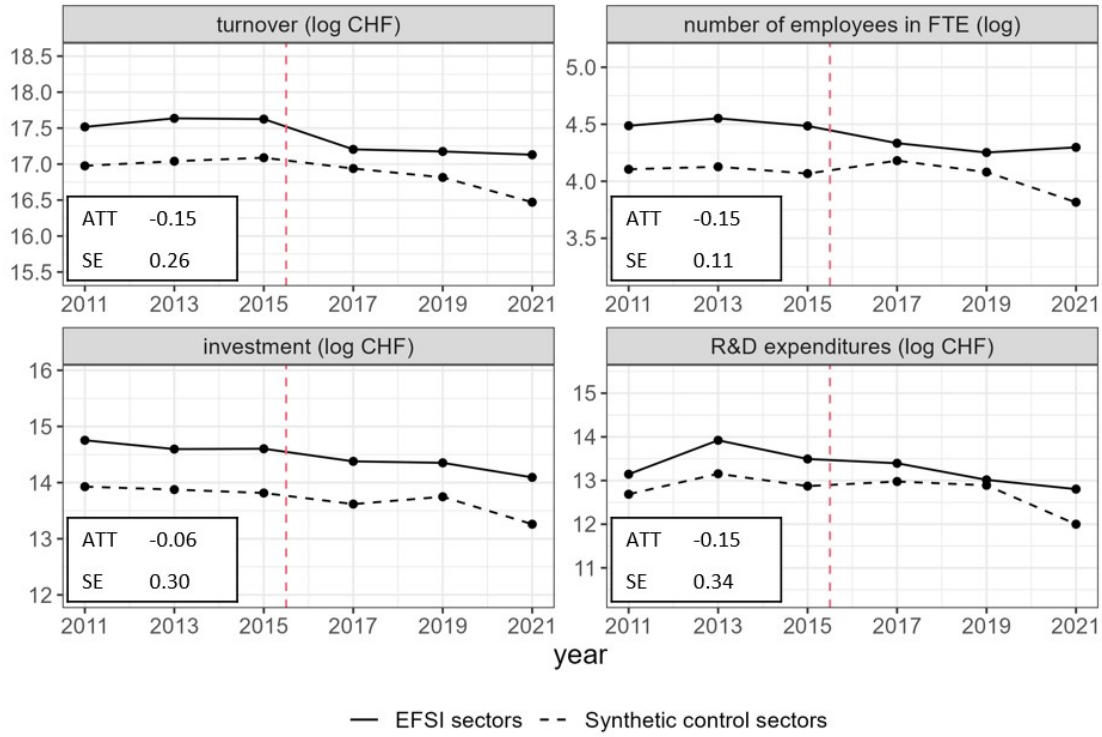
Figure 16: Effect of the Juncker Plan on direct competitors



Note: This compares the evolution of sectors exposed to the EFSI (solid line) with unexposed sectors (dashed line) that are weighed according to the SynthDiD procedure. Abbreviations: ATT denotes the average treatment effect on the treated and SE the heteroskedasticity-robust standard error (placebo method). Treatment definition: Direct exposure with a threshold for a sector being treated is the ratio of EFSI loan guarantees and GVA exceeding 0.9 percent for the competing sector in the EU. Data sources: EFSI, KOF Innovation Panel.

Next, we assess the robustness of this finding. We start by investigating whether our previous findings also hold once applying a standard DiD estimation and the standard synthetic control approach. Table 10 (appendix) shows how the signs, magnitudes, and statistical significance of the average treatment effects are very similar across alternative methods that are applicable in our setting. We then check whether the aftermath of the Covid pandemic may influence our findings. Hence, we omit the observations from 2021 in an additional specification, though the results available from Figure 65: Direct effects of the Juncker-Plan, excluding 2021 (appendix) suggest that this is not the case.

Figure 17: Effect of the Juncker Plan on direct competitors (higher threshold)

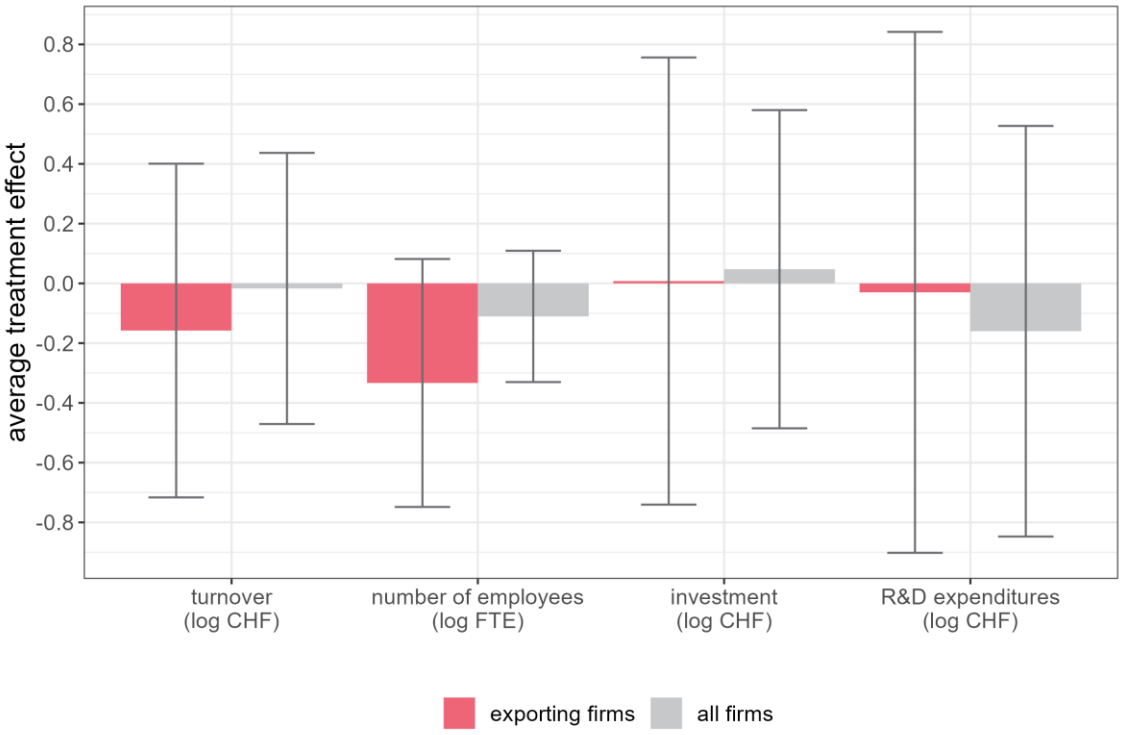


Note: ATT = Average Treatment Effect on the treated, SE = Standard Errors (heteroscedasticity-robust). The solid lines are the trajectory of our four outcome variables for sectors competing with EFSI-backed foreign sectors. The dashed line is the synthetic control sector. The standard errors are calculated using the Placebo method. The threshold for a sector being treated is the ratio of EFSI loan guarantees and GVA exceeding 1.2 percent for the competing sector in the EU. Sectors with a ratio between 0.9 percent and 1.2 percent are excluded. Data sources: EFSI, KOF Innovation Panel.

We then assess whether the EFSI exposer particularly affects certain groups of industries and firms by focusing on (i) industries that received high subsidy amounts, (ii) firms that are exporters, (iii) omitting individual industries from the analysis. Figure 17 presents the results when we narrow our definition of EFSI exposure to industries that received particularly high subsidy amounts (more than 1.2 percent of GVA, excluding industries between 0.9 percent and 1.2 percent from our sample (see Table 9 in the appendix for an overview of the definitions). Compared to our main results from Figure 16, industries with a particularly strong EFSI exposure experience stronger declines in turnover, employees, and other outcomes. However, the estimated effects still do not reach conventional levels of statistical significance, highlighting the need for a cautious interpretation of the results. Second, we assess the impact of EFSI exposure to exporting firms as

they might be particularly susceptible to foreign subsidies. For this purpose, we rebuild our industry-level dataset only considering firms that are indicated as exporters when they enter the survey for the first time. As Figure 18 shows, exporting firms indeed experience stronger drops in turnover and employment, though less so for investments and R&D expenditures. Statistically, the effects are again not distinguishable from zero at conventional levels. Third, we check whether our results are driven by particular industries. We do so by repeating our standard estimation model multiple times, each time omitting one of our EFSI-exposed sectors. Figure 67 summarizes these results, indicating that omitting an individual industry does not alter our main results in most cases. However, omitting the electrical equipment industry would lead to more favorable effects of the EFSI, suggesting that the impact for this industry might have been more pronounced.[15]

Figure 18: Direct effect of the Juncker Plan for exporting firms



Note: The red bars indicate the average treatment effect on the treated when excluding firms who are exporting as opposed to the whole sample (grey bars). The error bars indicate the 95% confidence interval. The standard errors are calculated using the Placebo method. Data sources: EFSI, KOF Innovation Panel.

Finally, we analyze whether the Juncker plan also affected Swiss suppliers of EFSI-exposed industries. These suppliers might be equally harmed by foreign industrial policy if the direct competition effects trickle down to the suppliers of intermediate goods and services. Nonetheless, these suppliers might also be able to attract new orders from abroad, thereby benefitting from the EFSI. Figure 69 (appendix) suggest that the negative effects prevail for suppliers of EFSI sectors in our observation period as turnover and employee numbers are decreasing relative to the comparison group. However, as we exclude industries directly exposed to the EFSI from the analysis,

[15] The effect of excluding the electrical equipment industry is most pronounced for employment, where it exceeds one standard error.

the number of observations in the analysis decreases and leads to further imprecision in the estimation.

Conclusions

We find tentative evidence that foreign industrial policy as exemplified by the EFSI can harm domestic competitors that are active in the same industry. We show that exporting firms as well as firms operating in sectors that received particularly large amounts of funding are particularly susceptible. However, these effects are imprecisely estimated and therefore cannot be distinguished from zero. Consequently, we are cautious about drawing strong conclusions from this analysis. Statistical power is difficult to attain in our setting due to the limitations of the data which lacks a full panel structure at the firm-level and more detailed industry information. However, given the scarcity of evidence in the literature, this analysis offers first insights into the importance of the direct competition channel, which should be studied in more detail.

4.2 Case studies

In three case studies, we provide a qualitative in-depth analysis of the impact of foreign industrial policies on Switzerland. The aims of the case studies are to validate and learn more about the hypothesized transmission channels and to generate new hypotheses that can then feed into the other work packages. The objective of the case studies is thus to *understand*, rather than *explain,* the impact of foreign industrial policies on Switzerland.

In consultation with SECO, we have decided to select the following cases:

1. China's EV policy
2. German solar subsidies
3. The US's buy American rules

We have selected these case studies because they focus on Switzerland's largest trading partners and share a number of similarities with the industrial policies that Switzerland faces today. The case study of China also allows us to compensate for the fact that statistical analyses of Chinese industrial policies are difficult due to a lack of access to data.

In each case study, we will follow three steps:

1. We first describe the industrial policy, background, and political motivations.
2. We then assess the domestic impact of the industrial policy. For this purpose, we rely on relevant literature.
3. Finally, we assess the impact on third countries and specifically on Switzerland. To the extent that studies are available, we rely on existing evidence. Moreover, we determine whether and what kind of impacts are theoretically possible and plausible. We conducted interviews with experts and potentially affected actors. The list of interview partners is in appendix D. We analyze trade data, and we try to research data on the potential production and consumption of the affected products in Switzerland.

4.2.1 Case Study 1: Electrification of the Chinese vehicle industry

Background and political context

China is the largest emitter of greenhouse gases. In 2019, China's emissions exceeded those of all advanced economies combined (Larsen et al, 2023). At the same time, the country is highly vulnerable to climate change. The Chinese government has recognized the climate risks that the country is facing and has committed itself to an ambitious climate policy. Part of this ambition is the electrification of its vehicle industry.

As early as 2001, the Chinese government made EV technology a priority science research project in its Five-Year-Plan. Subsequent governments further developed EVs as a top priority and implemented a series of subsidy schemes. In 2009, for instance, the national government launched the "Ten Cities, Thousand Vehicles" program that provided subsidies for the government procurement of public transport EVs: The government awarded state contracts to EV companies for public transport systems. This early income stream enabled the industry to survive, improve technology, and reduce mass production costs even before the private market started to demand EVs (Crothers, 2021). A year later, in 2010, the subsidies by the central government were expanded to the private passenger EV market and scaled up at the national level. These sales subsidies were directly paid to the producers, though cars only qualified for the subsidy if they were domestically produced, and the intellectual property rights were at least partially owned by a domestic manufacturer (Mazzocco, 2020). The subsidies were also tied to the driving range of EVs. This was meant as an incentive for manufacturers to innovate and improve the range of their vehicles. In 2023, China phased out its consumption subsidies, reflecting the growing competitiveness of EVs. However, the Chinese government now promotes the adoption of EVs through a new program: Domestically produced and imported EVs will be exempt from the sales tax until 2025, with a maximum exemption per vehicle at 30,000 yuan ($4,170; Li & Lee, 2023).

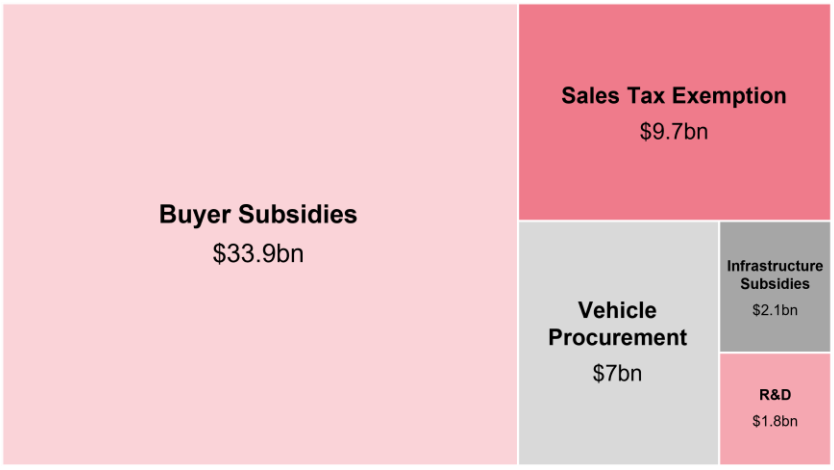
Complementing national measures, local governments had considerable leeway in creating their own subsidy programs. Consequently, a wide array of subsidy policies emerged. Some regions promoted both, the development of a private market and the conversion of public vehicles to EVs, while others excluded the private market. The technical requirements also differed across regions. Often, local governments promoted their regional electric car industry and prevented other regions' EV producers from receiving local subsidies. This created non-tariff barriers to trade that promoted the sale of «own» brands. For example, in the city of Shenzhen (Guangdong province), consumers received a discount of up to one-third when buying an EV from the region's leading manufacturer BYD in 2014. This led to a situation where, at least in the early period, there were various local producers and not immediately a few large national producers.

The central and local governments have supplemented the subsidy schemes with a wide range of non-subsidy incentives. These incentives include discounts on charging, EV-dedicated road lanes, lower insurance fees, and more. In cities like Beijing and Shanghai, there were initially no restrictions on the number of issued number plates for EVs, unlike conventional vehicles (Hao et al., 2014). However, this changed over time. As of 2023, the local government has implemented quotas on the number of newly issued number plates. The local government of Beijing plans to issue 100,000 additional license plates, with 70,000 of them reserved for EVs. These measures

provide additional support to EV owners and manufacturers, encouraging the transition to cleaner transportation alternatives.

The estimated total government expenditure to support the new EVs industry is around $60 billion (Yuan 400 billion) between 2015 and 2020 (Mazzocco, 2020). According to the Center for Strategic and International Studies (CSIS), China has spent more than $101 billion on research incentives, government contracts and consumer subsidies between 2009 and 2019 (Chang and Bradsher, 2023). Considering both sources, China spent between 0.33 and 0.72 percent of its total annual fiscal budget on the initiative. Figure 19 shows what type of subsidies might have accounted for what share and is based on Kennedy and Qui (2018), whose figures cover a different time period than the sources mentioned earlier.

Figure 19: Chinese Government Spending (national level), 2009 to 2017



Source: Kennedy and Qiu, 2018

Impact on the domestic market

What has been the impact of China's industrial policy on its EV industry? First and foremost, China has created a market for EVs. In 2009, fewer than 500 EVs were sold worldwide; by 2022, the number has grown to more than 6 million EVs, with China accounting for more than half of global EV sales (Yang, 2023). 2022 marked the eighth consecutive year in which China was the world's largest market and producer for EVs.

Has China achieved its objective of greening the mobility sector? In 2022, almost 30 percent of all new vehicle registrations in China were EVs (plug-in hybrids included). By 2030, EVs are projected to surpass conventional cars with combustion engines. By comparison, market shares of EVs in the EU are at 12 percent, 7 percent in Switzerland (Pang and Luman, 2023). These numbers indeed put China as a forerunner in fossil-free mobility.[16]

A broad mix of policy instruments appears to have contributed to the high Chinese EV sales, spanning subsidies, public procurement, and regulatory measures (e.g. license plates). Therefore, isolating the impact of individual measures is difficult. Nevertheless, several attempts to estimate

[16] The EU plans to ban the sale of new cars that emit CO2 from 2035.

the individual contributions have been made. Subsidies are considered to have played a crucial role in developing China's EV market. Li et al. (2022) find that subsidies explain about 55 percent of EV sales. However, EV subsidies alone do not explain the rise in sales. When comparing subsidies to other interventions, Li concludes that investing in charging infrastructure has been four times more effective than purchase subsidies, which is in line with other studies of the Chinese EV market. Li et al. (2019) demonstrate that a 1 percent increase in government subsidies leads to a 0.4 percent increase in the EV market share, while dedicated license plates for EVs increase market share by 1 percent and a purchase tax exemption contributes to a 0.9 percent increase. Hence, the subsidies and tax exemptions plausibly contributed to the high EV sales in China, although quantitative evidence is limited. The Chinese EV market may still have surged without discriminatory subsidies.

With its EV policy China pursued the goal to establish a domestic EV industry with local suppliers that is internationally competitive. Has this goal been achieved? It is probably still too soon to tell. The largest Chinese auto maker BYD sells most EVs in China, where domestically produced EVs are still exempted from the sales tax until 2025. Foreign auto makers like Tesla are still in the market. Many non-Chinese manufacturers, like GM and VW, have joined forces with Chinese companies. It seems highly likely that the discriminatory subsidies have contributed to the rise of Chinese EV makers. Without the discrimination, foreign manufacturers likely would have competed rather than teamed up with the Chinese EV makers. Nonetheless, the rise of Chinese EV makers cannot be attributed to the discriminatory subsidies alone. Other factors will also have played a role. During the period from January to July 2022, Chinese manufacturers accounted for 3.4% of the market share in the battery-operated electric vehicle market in Europe. By January to July 2023, this market share had almost doubled to 6.7% (Blenkinsop, 2023b).

The most valuable component of an EV is its battery. China has been successful in establishing a domestic battery value chain. China is the largest producer of batteries, accounting for 74 percent of global battery production capacity in 2022. China is still projected to maintain a significant share of 69 percent of global production capacity despite of policy initiatives by other countries (BloombergNEF, 2022). One of the reasons for China's leading position is its substantial control over the entire value chain. Regarding rare minerals necessary for battery production, the CRU Group data shows that China controls 41 percent of the world's cobalt, 28 percent of lithium as of 2022. China also plays a leading role in processing these minerals. Additionally, China is the largest producer of battery components, and it also produces the majority of battery cells, accounting for 66 percent of global production (Chang & Bradsher, 2023). The EU and the US are attempting to establish own battery production capacities and gain more market share. Given China's control over a significant portion of raw materials in battery manufacturing, it is unclear whether these goals can be achieved (The Economist, 2023a; The Economist, 2023b).

Nevertheless, the global transition towards fossil-free transport is still in its infancy. It therefore remains an open question whether the Chinese EV industry will flourish in the long run, eventually rationalizing the strong contributions from Chinese state budgets from an industrial policy perspective.

Impact on the Swiss economy

How has the Chinese EV policy influenced Switzerland? Switzerland lacks a major car manufacturer directly competing with Chinese companies (Arrow 1). However, Switzerland is home to a

wide range of suppliers to the automotive industry, which makes potential supplier effects particularly salient (Arrow 2): Approximately 600 Swiss firms employing around 34,000 individuals produce car components and technologies, although many of them also serve clients outside of the automotive sector. Swiss suppliers traditionally have strong ties with German automakers. To a certain extent, Switzerland's success in the domain of EVs is contingent on the achievements of the German automotive industry.

Investments in Chinese production sites could be a possibility to adapt to discriminatory market barriers and engage in cooperations with Chinese car makers (Arrow 3). Some Swiss suppliers, such as Georg Fischer and Feintool, have notably expanded their production capacities in China (Feldges, 2023). The industry survey by SwissCAR (Schulze et al., 2019) demonstrates that Swiss firms are willing to invest in China. It can be assumed that Chinese EV subsidies contributed to these developments. Establishing a presence for Swiss car part suppliers in the Chinese market is highly challenging due to cultural and regulatory barriers. Still, several large Swiss suppliers have gained a foothold in the Chinese market and are participating in the growth of the EV sector. Three examples illustrate these activities:

The first example is Georg Fischer (GF). The Swiss company based in Schaffhausen operates in a sector focused on the production of cast and additively manufactured components. GF has 15,000 employees worldwide, with 3,000 of them located in China (Georg Fischer AG, 2023). For GF, the Chinese market is of great importance. So far, GF has built two production sites in China, both are strategically positioned near clients' plants, such as those of BMW. 50 percent of GF Casting Solutions (section in which the automotive part is also attached) new business is generated by EVs. The company operates in over 60 countries for production, but its research centers are located in Switzerland and China. This underscores the significance of the Chinese market for GF and that a big part of innovations in the EV market comes from China. The second example is Feintool, a company based in Lyss, in the canton of Bern. The company specializes in precision cutting and forming, particularly for materials like steel sheets. Feintool manufactures, for example, components for the electric drive system of the Chinese automobile manufacturer NIO. Feintool hopes that this contract will lead to follow-up orders and bring the opportunity for orders from other manufacturers. One goal has already been achieved as NIO has extended the initial collaboration, which was planned until 2027, until 2030 (Feintool, 2023).

A challenge related to Chinese subsidies is that 40 percent of Swiss suppliers primarily adapted to the production of vehicles with combustion engines (Schulze et al., 2019). EVs generally require fewer and less complex components than traditional cars, which can harm firms and their workforces even when successfully adjusting to electric mobility Example: Autoneum is among other active in the field of heat and sound insulation for vehicle bodies. Currently, 8 percent of their revenue comes from the EV business. Autoneum aims to increase this share to 44 percent within 5 years, by 2028. To achieve this goal, among other strategies, Autoneum is making efforts to strengthen its position in China. According to the CEO, Eelco Spoedler, Autoneum is currently "lagging behind" in regard of its presence in the Chinese market (Feldges, 2023).

Swiss consumers as well as firms using EVs plausibly benefit from Chinese subsidies (Arrow 4) in two ways. The first gain is that Swiss consumers and firms can now choose among a wider array of vehicles as new brands have emerged. In addition, the price of EVs has decreased such that EVs become a viable alternative to internal combustion engines. The surge in demand for Chinese EVs is already visible in Swiss trade data: According to the Swiss-Impex, in 2022, Switzerland imported cars from China worth over 410 million CHF, accounting for approximately 21.1 percent

of the total value of all imported EVs that year. In contrast, back in 2017[17], Switzerland's car imports were worth 244 million CHF, with the USA being the largest source country for EVs, constituting over 83 percent of the total value at that time. The value of imported cars from China was only 271,000 CHF in 2017, which corresponds to 0.11 percent of the total value of imported cars. This indicates an enormous growth in a very short time, which is expected to continue. The EU's market share increased by 56.5 percentage points between 2017 and 2022 (Germany by 44.4 percentage points). In contrast, the USA lost 82 percentage points and now holds a market share of less than one percent, which is partly due to Tesla's decision to relocate production to Europe and China.

Has the Swiss industry benefited technologically from Chinese subsidies for EVs (Arrow 5)? Swiss companies have, in some cases, been able to benefit technologically from Chinese subsidies. One example is TE Connectivity, headquartered in Schaffhausen, which is a manufacturer of connectors and sensors. TE supplies components for automotive electronics, among other things. In 2017, TE was recognized by the business magazine "fast company" as one of the 50 most innovative companies in China (TE Connectivity, 2017). TE operates 5 factories and employs over 6000 people in China, including many engineers working in research and development (Zhong, 2023). As seen in the field of consumer electronics, China is a leading country in terms of innovation. Therefore, it is not surprising that developments from the Chinese market are also relevant in the global market. In this context, there is indeed a technology transfer from China to the rest of the world, including Switzerland.

In sum, the Chinese EV subsidies have created substantial opportunities for Swiss firms but mainly for those large enough to comply with localization restrictions. Suppliers that are unable to move away from internal combustion engine vehicles and with strong ties to German legacy carmakers are facing structural problems as the transition to sustainable transport modes is gaining momentum. Consumers and firms requiring vehicles for their businesses unequivocally gain from the technological push and lower prices for EVs that the Chinese policy has induced. The European Commission announced in September 2023 that it will be conducting an antidumping investigation into China's subsidies in the electric vehicle (EV) market. The European Commission has alleged that Chinese subsidies have depressed car prices by 20% (Süddeutsche Zeitung, 2023).

4.2.2 Case Study 2: Subsidizing the German solar industry

Policy background

Since the turn of the millennium, feed-in tariffs (FiT, German: Einspeisevergütungen) have driven a massive expansion of electricity generated from renewable energy sources in Germany. Starting in 2000, the Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz, EEG) guarantees the purchase of electricity from renewable energy sources at fixed prices to compensate for the cost disadvantages compared to conventional energy sources. The predecessor of the EEG, the Electricity Feed Act (German: Stromeinspeisungsgesetz, SEG), required grid operators from 1991 on

[17] The Swiss-Impex data codes are based on the Harmonized System (WTO), in which the EV subgroup was introduced only in 2017.

wards to purchase green electricity at a minimum price, which was calculated as the average consumer price for electricity in the previous years. With the introduction of the EEG in 2000, the FiT drastically increased - especially for solar photo voltaic (PV) - from 8.23 cent/kWh in 1999 to 50.6 cent/kWh in 2000 (Dirr et al., 2014). The technology-specific FiTs are designed to ensure that the costs of generating electricity are covered. Economically, these feed-in-tariffs provide subsidies for the generation of renewable energy. As the FiTs are guaranteed for 20 years, the investment risk is minimized. To incentivize innovation and reflect falling production costs, FiTs for new installations are periodically reduced. The FiTs are funded by a levy on electricity consumers (German: EEG-Umlage), which is equal to the difference between the FiTs and the revenue from the electricity fed into the grid. The German provisions did not include any conditions on the extent to which content had to be sourced locally. This contrasts with FiTs implemented in Ontario (Canada), Indonesia, Turkey, and South Africa, amongst others, which stipulated conditions on the locally sourced content (Hogan, 2021).

The EEG has been amended seven times since its introduction. For the solar industry, the most relevant change is the 2012 amendment to the EEG, which was motivated by rising costs of electricity for consumers and firms. The reform drastically reduced the FiTs and increased the degression rate on a one-off basis and linked it to the expansion rate of the solar capacities. Due to the drastic cut of the FiT, 2012 is typically thought of as the end of German solar subsidies, even though the underlying support schemes remained in place.

Impact on the domestic market

The FiT scheme has triggered massive growth in renewable electricity generation. The share of renewable electricity in Germany increased from 6 percent in 2000 to 46 percent in 2022 (UBA, 2023a). Between 2002 and 2012, installed PV capacity increased from 220 MW to over 32’000 MW (UBA, 2023b). In 2008, the German market accounted for 42 percent of the global PV business (Marinot, 2009). The German company Q-Cells was ranked in first place in terms of the number of PV modules produced (Schmidt et al., 2007). As photovoltaic capacity increased, gross employment in the solar industry grew from 14,300 people employed in 2004 to more than 156,000 in 2011 (BMWK, 2022). By comparison, gross employment in the wind industry only increased less than twofold over the same period.

Figure 20: German solar capacities and employment

Source: BMWK 2022, UBA 2023b

After the German solar industry reached its peak in terms of employment and annual capacity growth in 2011, a sharp decline followed. Newly installed capacity shrank to a third of the previous year's level in 2013, and the number of people employed in the industry fell by more than 100,000 between 2011 and 2015 (see Figure 20). Many promising companies faced negative prospects or went bankrupt. For example, Q-Cells, once the world's largest solar cell manufacturer, filed for bankruptcy and was subsequently taken over by a South Korean competitor. The sharp decline can be attributed to two main factors: Firstly, the reduction in German subsidies and, secondly, the market entry of foreign competitors from China in particular. China's entry into the market was heavily subsidized by the government, which added to the competitive advantage of lower labor costs. In 2007, annual PV production in Germany and China was almost equal at 811 MW and 873 MW respectively, each accounting for around 20 percent of global production. Four years later, in 2012, China's PV production increased to 21,000 MW, accounting for 58 percent of global production, while Germany's production peaked at 2,300 MW in 2011 and then declined to 1,400 MW in 2012, accounting for only 4 percent of global production. The strong expansion of the Chinese solar industry is reflected in the decline of PV module prices by more than 60 percent between 2006 and 2012 (Frondel et al., 2014). The EU Commission subsequently launched an anti-dumping case against China in 2012, which led to punitive tariffs between 2013 and 2018.

Although the EEG and its FiT scheme have effectively promoted the massive expansion of solar capacity in Germany, its cost-efficiency and distributional consequences are controversial. In 2020, the cost of the FiT system reached €25 billion per year. The surcharge paid by electricity consumers amounted to around 20 percent of the average household electricity bill in 2020 (Fischer & Kube, 2020). The burden on consumers is even higher because energy-intensive industries are partially exempt from the levy, adding up to 44 percent of the industrial electricity consumption in 2021 (Wirth, 2023). In 2020, Germany had the highest electricity prices in Europe. This hits poorer households particularly hard, given the low-income elasticity of electricity consumption (Bardt & Niehues, 2013).

Subsidizing solar power accounts for a large proportion of the cost of the FiT scheme, even though solar power has a relatively small proportion of the nation's subsidized green energy. In 2012, for

example, PV accounted for 22 percent of subsidized energy production, or 5 percent of Germany's total electricity production. However, its share of the cost of the FiT scheme was the highest of all technologies at 57.8 percent. By comparison, onshore wind accounted for 42.5 percent of total subsidized electricity generation and received only 8.5 percent of the total FiT in 2012 (Frondel et al., 2014).

In addition to the distributional consequences of the funding, the FiT system itself and the incentives it creates are often criticized. Regarding the incentives for technological innovation, Frondel et al. (2014) criticize the technology-specific subsidization as well as the degression of the FiT. Differentiating the FiTs by technology has allowed «PV to become the big winner in the unlevel playing field, although it is the most expensive and, hence, most subsidized renewable energy » (Frondel et al., 2010, p. 4055). A further argument in favor of the heavy subsidization of renewable energy are innovation externalities. Böhringer et al. (2017) investigate this argument empirically using annual patent counts. Although they find a positive impact of the FiT scheme on innovation, the effects are not statistically different between the EEG and its predecessor, the SEG, which granted lower FiTs. This further highlights the potential cost inefficiency of the high FiT under the EEG.

Impact on the Swiss economy

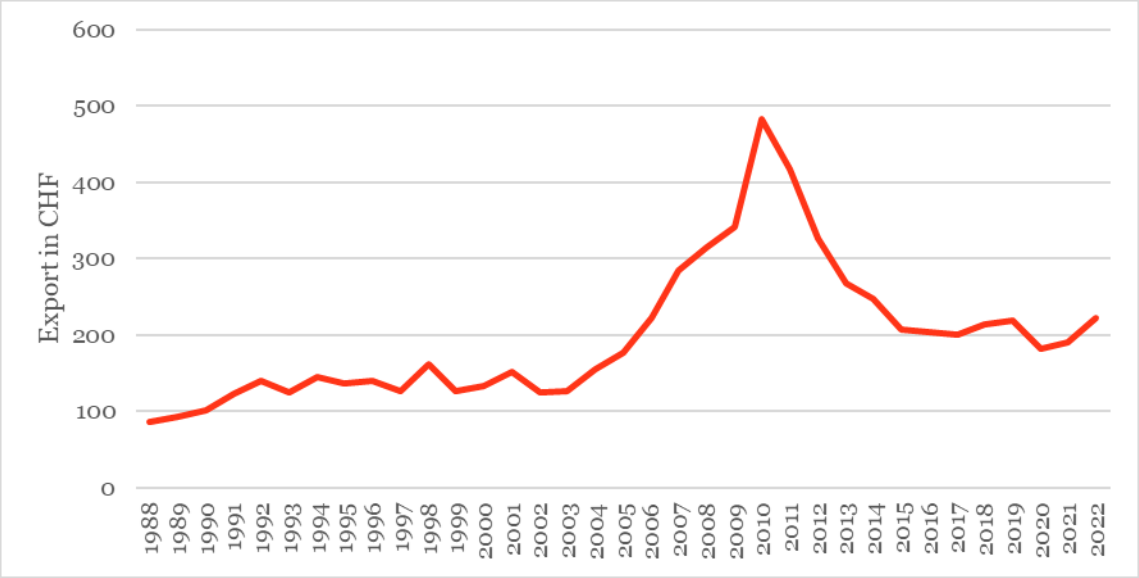
The EEG has had a significant impact on the Swiss PV industry. The EEG was non-discriminatory. Of course, the energy had to be produced within the borders of Germany but there were no constraints on the origin of an energy installation or its components. The first channel in our impact model is competition. Germany's non-discriminatory support through the EEG allowed Swiss producers of PV installations to benefit in the same way as domestic firms.

Still, Switzerland was well-positioned in this sector as a supplier of PV components. Switzerland has two top universities, ETH Zurich and Lausanne, which conduct research in the field of photovoltaics. One example is the collaboration between Meyer Burger and the Swiss Research and Development Center (CSEM), which originated from a partnership with the École polytechnique fédérale de Lausanne (EPFL) in 2008. Hence, Swiss companies both prospered from the industry's growth but were also exposed by the significant downturn following the 2011 EEG reform[18].

An illustrative example is Sputnik Engineering AG (Biel), a producer of inverters, which was founded as a spinoff by two members of the School of Engineering in Biel. In 2001, Sputnik realized the potential of the subsidized German market and launched its first foreign subsidiary in Germany (Solarserver, 2005). The ensuing solar boom enabled the firm to expand its Swiss headquarters to 300 employees (Enkhardt, 2013). In 2008, Sputnik was the fifth-largest inverter manufacturer globally (Pushkarna, 2014). After the boom came the bust. Partly due to the drastic reduction of German subsidies, the European inverter market suddenly deteriorated from 5.5 billion to 1.9 billion US dollars between 2010 and 2013. Sputnik had to file for insolvency and was eventually bought by the German Soma Solar group. Figure 21 shows the Swiss exports of electrical transformers to Germany, which includes inverters. This figure illustrates the above-described trend accurately: Between 2001 and 2010, exports increased strongly, then exports fell until they almost reached the previous level.

[18] The reform was adopted on 30 June and came into effect on the first of January 2012. The EEG reform of 2009 already included a continuous reduction of the EEG remuneration.

Figure 21: Swiss exports of electrical transformers, static converters to Germany



Source: Swiss-Impex (HS code: 8504 Export to Germany), own illustration

The third channel, investments, should not have been influenced by the EEG's incentive measures. Here, the crucial factor remains non-discrimination. There were no EEG advantages to investing in Germany specifically. For instance, Sputnik Engineering produced their inverters in Switzerland and only maintained a services and sales team in Germany. Nonetheless, companies may have chosen to invest in Germany rather than Switzerland due to Germany's direct location-based incentives, which Switzerland lacked.

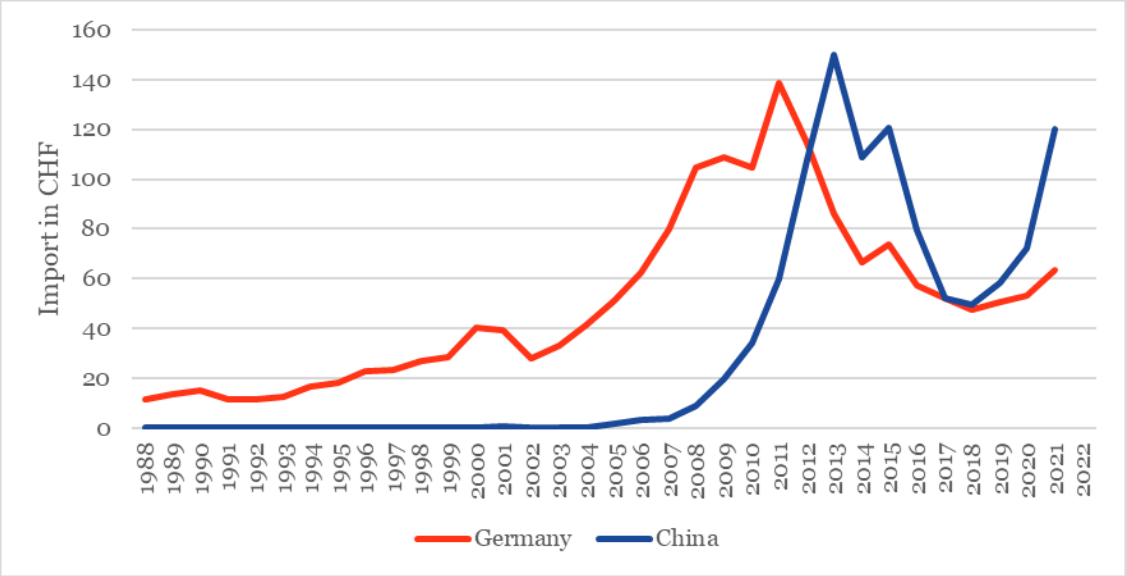
Consumers represent the fourth channel in our impact model, and they benefited in two significant ways. Firstly, prices decreased, and secondly, there were substantial technological advancements during this period. Prices have fallen considerably between 1990 and today. In 1990, a PV system cost about 15,000 euros per kWp (solarbranche.de). In 2023, the price for a kWp is only around 1,650 euros (Burkhardt, 2023). The lowest price was reached in 2020 at 1,350 euros, but due to increased inflation and demand, it has risen slightly. However, prices have fallen by about 90 percent since 1990. It is important to note that German consumers benefited the least, as they had to pay for the promotion of renewable energies through the EEG surcharge. The progress in photovoltaic technology is clearly visible. After the introduction of the Renewable Energy Sources Act (EEG), there was a substantial increase in patent applications filed by individuals and companies based in Germany between 2005 and 2010. In 2005, there were around 100 patent applications, and by 2010, this number had surged to over 600 (Böhringer et al., 2017). However, in the three years following 2010, the number of patent applications decreased again to just under 400. Because patents were also decreasing after the EEG tariff was reduced, this can be seen as an indication that the EEG had an impact on research and patent applications. It is important to note that there were also other shocks during this period, e.g. the financial crisis of 2008.

This trend also affects technology transfer since patent applications require the disclosure of the technology. Using the example of Meyer Burger, one can also observe a particular knowledge transfer. The company used to exclusively manufacture machinery for PV production (also solar). However, in 2020, Meyer Burger decided to undergo a strategic shift, transitioning from being a

supplier of equipment to becoming a manufacturer of solar cells. This transformation was certainly facilitated by the EEG and the knowledge transfer that took place.

Figure 22 shows how imports of semiconductor devices (which include PV systems) from Germany and China to Switzerland developed. German exports to Switzerland strongly increased during the 2000s and decreased again after 2010. China overtook Germany as the leading exporter soon after that.

Figure 22: Import of photosensitive semiconductor devices incl. PV into Switzerland



Source: Swiss-Impex, HS code 854140 (Import from Germany and China), own illustration

The EEG had an impact on all channels except for the direct competition effect (Arrow 1). Since the law was non-discriminatory and did not favor German products, Swiss companies could benefit just as much as German companies. The EEG led to a clear increase in demand (Arrow 2) and also contributed to technological progress from which the entire world benefited. In the end, customers in Switzerland benefited from these subsidies with more cost-effective and efficient photovoltaic systems. However, it would be too simplistic to attribute all these effects solely to the EEG, as for instance also China's expansion played a crucial role.

4.2.3 Case Study 3: Buy American rules

Policy background

Government procurement constitutes a significant share of the GDP in industrial countries, typically ranging between 15 to 20 percent (Rickard and Kono, 2014). Thus, government procurement regulations hold substantial potential to impact industry and trade. In particular, governments might use this instrument to favor domestic industries through local content requirements.

The US States have a long-standing tradition of promoting its domestic industries through government contracts. The archetype is the Buy American Act (BAA), enacted in 1933 during the

Great Depression, with the aim of stimulating domestic manufacturing. This federal law requires the US government to prioritize domestic products in its purchases. To qualify as «domestic» under the BAA, goods must be manufactured or produced in the US States, with at least 50 percent of the component cost sourced domestically. The Act applies to federal government procurement contracts, but the regulations may be waived if goods are unavailable in the US or certain cost and quality standards are not attainable. Additionally, the Act does not apply to all government contracts, as certain exemptions exist, such as those related to national security or instances where compliance would be impractical or against the public interest.

Over the years, the Buy American Act has been supplemented and modified by additional legislation while remaining continuously in effect. For example, the Trade Agreements Act of 1979 establishes exemptions for products originating from designated countries with which the US has trade agreements (e.g. Canada and Mexico). However, even with a trade agreement in place, US government agencies cannot automatically award contracts to foreign firms. A waiver process is required, and it is connected to regulations such as the requirement for agencies to submit an annual report listing all waivers.

During President Obama's tenure from 2009 to 2017, the government implemented several measures to reinforce the Buy American provisions. One significant measure was the American Recovery and Reinvestment Act (ARRA) of 2009, an economic stimulus package of $787 billion. Initially, there were attempts to include various «Buy American» clauses in the law. However, due to concerns raised both within and outside of the US States, these clauses were reduced. Eventually, the Act contained a provision that mandated ARRA-funded projects to exclusively use iron, steel, and other manufactured goods produced in the US States (Rickard & Kono, 2014; Hufbauer et al., 2013; Larch & Lechthaler, 2011). The only exception applied when the overall project cost through this restriction increased by 25 percent or more (Durkin, 2020).

President Trump's administration embraced a trend of increasing nationalism and protectionism, as evidenced by their election slogan «America first»[19]. The minimum share of the American-produced part was increased from 50 percent to 55 percent. In addition, a differentiation was introduced between end products and iron and steel end products (costs of the iron and steel component make up more than 50 percent of the total costs of all components). For these iron and steel end products, the minimum share that must be American was increased from 50 percent to 95 percent. The price «penalty» was also increased. For example, foreign bids were now subject to a price premium of 20 percent instead of 6 percent if the domestic company bidding is a large company, and 30 percent (previously 6 percent) if it is a small company. The current administration under President Biden has continued along a similar path. An example of this direction is President Biden's decision to raise the minimum requirement for a product to be considered American from 55 percent to 60 percent from 2023 onwards, with plans to further increase it to 75 percent by 2029 (Lynch, 2023; White House, 2021). These percentages can be even higher in individual areas. For example, the Federal Transition Administration stipulates that 70 percent of rolling stock and infrastructure procurement must be made in America from 2020 onwards (Federal Transit Administration, 2023).

[19] In this vein, the Trump administration also imposed tariffs on various goods, including steel, against China, as well as other trade partners.

Impact on the domestic market

Measuring the impact of a bill, such as the «American Recovery and Reinvestment Act of 2009», is challenging (Freyrer & Sacerdote, 2011). The effects of Local Content Requirements (LCRs) are considered heterogeneous and difficult to predict as the costs are not easily quantifiable (Hufbauer et al., 2013). There is still limited research on the effects of LCRs (Kuntze & Moerenhout, 2012).

In general, the effects of local content requirements tend to have negative implications for the social welfare (Hufbauer et al., 2013; Larch & Lechthaler, 2011). The costs of this policy of saving jobs with "Made in America" are high. LCRs can increase costs for various reasons. A common example is the protection of the market from foreign competition. When there is a need to resort to more expensive domestic products, this can drive up prices. However, LCRs also can have their advantages. For instance, they can help maintain critical industries, such as in the defense sector, or promote new industries within the country, like green technologies through the IRA. Naturally, this promotion of industries also creates jobs, which can of course also be a goal.

However, the Peterson Institute for International Economics (PIIE) concludes that the cost to the state of a «saved» job in the US is $250,000 per year (Hufbauer and Jung, 2020). Other studies have shown that the cost to "save" one job through protectionism in the steel industry costs more than $900,000 (Long, 2019). Overall, import restrictions on government procurement resulted in an additional cost of $94 billion in 2017. This represents an increase of 5.6 percent in costs, out of a total of $1.7 trillion spent on domestic procurement. Figure 1 shows the total additional costs incurred by various countries due to Local Content Requirements (Hufbauer and Jung, 2020). LCRs may also increase the vulnerability to collusion among suppliers, as the market becomes smaller if foreign suppliers are excluded.

Impact on the Swiss economy

The Buy American Act has significant implications for the Swiss industry. What is the impact of the regulation on direct competitors (Arrow 1) with US firms? To participate in public procurement orders, Swiss companies must adhere to the BAA. In most cases, this necessitates the establishment of production facilities within the US. Given that 60 percent of the value creation must occur in the US, a substantial portion of the necessary inputs and services must also be sourced from there. Although data on potentially affected firms does not exist, it is likely that these restrictions are not feasible for small and medium-sized enterprises. However, Martin Naville, head of the Swiss-American Chamber of Commerce, points out that there is a wide range of Swiss firms that maintain a long-standing presence in the US market and are well-versed in the associated regulations and procedures. For them, Buy American clauses do not constitute a barrier due to the attractiveness of the American market, the transparency of the associated rules and the availability of independent courts to settle potential disputes.

For Swiss suppliers to the US (Arrow 2), the Buy American rules restrict the extent to which they can contribute resources, intermediate goods and services to firms participating in public procurement contracts as the share of non-US content is restricted. Stringent audits combined with high penalties ensure that firms comply with these regulations. Still, the additional LCRs embedded in the ARRA 2009 are not associated with a major shift in Swiss exports of steel products to the US, as Figure 23 demonstrates.

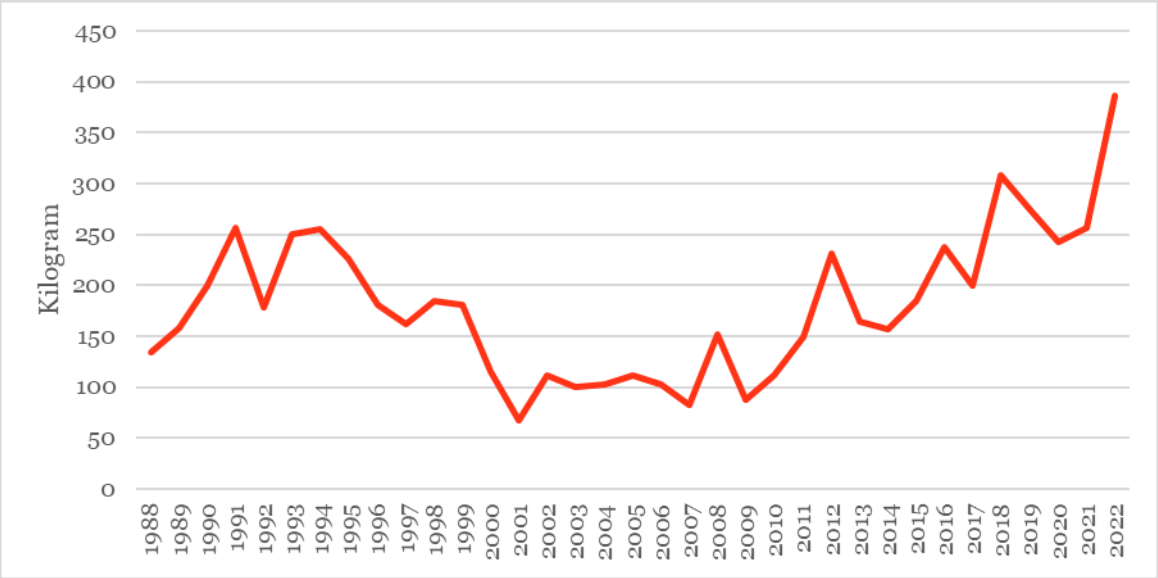
To gain access to public procurement contracts, firms might consider relocating business activities to the US (Arrow 3). For companies that are not solely suppliers of minor components, establishing production facilities in the USA practically becomes a necessity. Some of these investments that then go to the US might have been made in Switzerland or another country. Nevertheless, these US investments may still strengthen the Swiss business locations as some components might still be sourced from Switzerland and the US operations need to be managed also in the Swiss headquarters.

A Swiss example is Stadler Rail, a leading manufacturer of railway rolling stock. Stadler Rail entered the US market in 2002, realizing that US metropolitan areas are increasingly expanding their public transit networks. Since contracts for new rolling stocks often involve funds from the federal budget, the Buy American rules apply. Consequently, Stadler Rail constructed a new facility in Utah that employs 150 people. At the same time, Stadler had to reconfigure its supplier network to fulfill US orders. This proves to be highly complex and costly because trains consist of more than 20,000 components. In many cases, Stadler Rail could not find sufficiently specialized US suppliers for these components. Hence, Stadler Rail convinced some of its Swiss suppliers to enter the US market and open production facilities in the US themselves. Eventually, Stadler Rail must demonstrate that their products are at least 60 percent "made in America" to comply with the BAA. The respective certification process is time-consuming as each component's US origin and import status must be verified with appropriate documentation. Importantly, Stadler Rail's US investments did not replace but enhanced existing production facilities in Switzerland as they serve a new market and key components are still sourced from the headquarters. (Henkel, 2017)

The fourth transmission channel of foreign industrial policy pertains to consumer surplus in Switzerland. However, Swiss consumers are not directly exposed to the Buy America Act. If anything, they might be indirectly affected through the mechanisms underlying our partial equilibrium model of international trade. If the policy reduces American imports from the rest of the world, global demand shrinks and the world market price for these goods should decrease if global supply remains constant. However, Buy American may also reduce American exports as a larger fraction of goods may be consumed domestically. This effect would shrink global supply, thereby increasing world prices. Also, having to move investments to the US increases the prices. Hence, the overall effect on world prices is ambiguous.

Knowledge transfers occur as foreign firms invest in the US. c If companies like Stadler Rail invest in the US, they bring their expertise in train manufacturing with them. One example of how Stadler Rail is applying this knowledge is the hydrogen-powered train they have developed. The US rail network spans 225,000 kilometers, with only about 1 percent currently electrified. At present, the majority of locomotives are powered by diesel. The task of electrifying such an extensive network would not only require substantial investment but also a considerable amount of time. Stadler Rail has recently innovated one of its trains to operate on hydrogen. This development could potentially offer the US market a means to reduce CO_2 emissions when operating these lines. It is plausible that this advancement is in part due to Stadler Rail's promising market presence in the US.

Figure 23: Steel and iron exports from Switzerland to the US



Swiss-Impex, HS code 7326: Articles of iron or steel, n.e.s. (excl. cast articles), own illustration

In summary, investments are the most important channel influenced by the Buy American Act. Due to the Local Content Requirements (LCR), most companies receiving contracts partially funded by federal resources are obligated to invest in the USA and establish production facilities there. This can present an opportunity for larger companies to enter a new market, while restricting small Swiss companies' access to the American market. These consequences are also a likely outcome of the LCRs listed in the IRA. The difference is that new LCRs not only comprise public procurement but also the sourcing of firms benefiting from certain subsidies.

5. Conclusions

Industrial policies are widely discussed, especially since the launch of the American Inflation Reduction Act in 2022 and the EU's Green Deal Industrial Plan in early 2023. However, we know very little about the effect of foreign industrial policies on the Swiss economy. According to our impact model, industrial policy can affect Switzerland through five channels: Competition in the target market, additional upstream demand, investment abroad, benefits for downstream companies and consumers, as well as technological spillovers. What conclusions can be drawn about the channels from our various work packages?

- **Competition in the target market:** Subsidies abroad might increase the competitiveness of firms in the target industry. Consequently, subsidized companies could increase their market share at the expense of Swiss competitors.
  Our analysis of the EU's "Juncker Plan" reveals negative, although statistically insignificant effects through the competition mechanism. Hence, it is unlikely that EU firms benefiting from the Juncker Plan crowded out Swiss firms operating in the same markets. Further (indirect) evidence is provided by our partial equilibrium model of international trade: Industrial policies like the IRA or GDIP encompass production subsidies, which increase the production capacities of subsidized products. The additional supply lowers the world prices. Consequently, Swiss exports of those products decrease, but the magnitude varies across products.
- **Demand from upstream industries:** Subsidies could create additional demand for raw materials and intermediate goods, which may be provided by Swiss suppliers. However, local content requirements may encourage local sourcing.
  Our report shows mixed results regarding the impact on upstream industries. The case study on PV systems in Germany shows that subsidies increased the demand for corresponding inverters and manufacturing equipment. Swiss firms such as Sputnik Engineering and Meyer Burger benefited from this upstream effect by supplying more components and machinery to German solar panel manufacturers. Our business survey demonstrates that Swiss firms expect demand increases resulting from industrial policy initiatives. However, the survey also indicates potential negative effects. As demand rises abroad due to industrial programs, Swiss companies are finding it increasingly difficult to source some raw materials. In our business survey, 15 percent of companies express concern about access to foreign raw materials due to the IRA and GDIP.
- **Investments abroad:** To adapt to local content requirements and to benefit from production subsidies, Swiss firms might invest more in their manufacturing capacities abroad.
  Again, our report finds both positive and negative impacts. The case study on "Buy American" rules, which have introduced protectionist elements into US government procurement, shows that Stadler Rail has managed to adapt to these rules by investing in US production capacity. As a result, the company is strongly expanding its North American business. At the same time, however, this could indicate that some planned or existing production capacity in Switzerland could be shifted abroad. Furthermore, smaller Swiss companies are unlikely to be able to make such investments in the US. In the business survey, 12.4 percent of the companies that invest abroad indicated that they will increase their foreign investments while also expanding investments in Switzerland.

- **Downstream benefits:** Subsidies in the target market could be passed on to Swiss downstream firms and consumers, for example through cheaper products.
  Our analysis based on the PE model shows that the IRA, with its production subsidies, leads to an increase in the world supply of the goods in question and thus to a decrease in their world prices. As a result, Swiss firms and consumers can purchase these products at a lower price. However, the scenario of non-discriminatory consumption subsidies shows that additional demand abroad could actually increase world prices and thus harm Swiss companies and consumers through this channel. The case study of Chinese EV subsidies confirms the first hypothesis. Here, Swiss consumers could benefit from lower prices, as the increased supply of EVs reduced their price.
- **Technological spillovers:** Technological advancement induced by industrial policy may also benefit Swiss competitors, downstream industries, and consumers. Swiss firms and consumers may benefit from improved inputs and products.
  Our case study of China's EV policy illustrates the importance of technological spillovers. Not only has Chinese policy dramatically reduced the cost and increased the range of EVs, leading to technological learning across the industry. Swiss companies like TE Connectivity are also directly involved in these technological advances. TE Connectivity has more than 6000 employees in China, many of them engineers. Together with local customers from the EV industry, they are developing new connectors and charging solutions that can also be of value for other applications and products.

Overall, it is difficult to assess how these individual channels add up. Some firms and industries are harmed, while others may benefit, depending on the type of subsidy and the products concerned - even in the case of discriminatory measures. The actual impact depends on several factors: the size and effectiveness of the measures, the trade share of the products concerned, the net imports or exports of the products concerned by Swiss firms, and the degree of discrimination.

With respect to current industrial policy, as exemplified by the IRA and the GDIP, we expect the impact on the Swiss economy to be moderate. Our simulations, based on a model of international trade, suggest welfare losses of at most 0.06% of Swiss GDP. At the same time, responses to our business survey suggest that Swiss firms are rather optimistic about the opportunities offered by these policies and are willing to make the necessary investments. However, there are concerns about increasing difficulties in obtaining key inputs.

The business survey also reveals that some firms have not engaged with the topic but assess it as relevant. Staying informed about potential business risks and opportunities remains a core task of businesses. The Swiss government could complement such efforts by providing information to Swiss companies about potential opportunities and threats, for instance by partnering with business associations or Switzerland Global Enterprise.

Finally, it should be noted that this report focuses exclusively on the monetary impact of the IRA and the GDIP. However, both programs can potentially form the basis of a transformation towards a more sustainable and environmentally friendly economy. If positive climate effects are included in the analysis, both programs are likely to benefit the entire world, including Switzerland. However, the end does not justify the means, and green policies should not be misused to justify protectionism.

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Appendix

A. Transmission channels

Table 5 lists literature discussing transmission channels of industrial policy on third countries.

Table 5: Transmission channels considered in recent industrial policy literature

No.	Channel	Kalouptsidi (2018)	IMF et al. (2023)	Ambaw & Thangavelu (2022)	BMF (2023)	BCG (2022)
1	Competition effect	X	X		X	X
2	Demand effect (upstream)		X		X	X
3	Investment effect	X		X		X
4	Consumer effects (downstream)	X	X	X	X	X
5	Technological spillovers				X	X

Source: Own compilation.

B. Partial Equilibrium Model

Model structure

Import demand and export supply functions are given by:

$$m_c(p_c, Z_c^m) \text{ and } x_c(p_*, Z_c^x) \quad (1)$$

where m_c is the import demand vector of country c (across all goods g), p_c is the domestic price vector of imported goods in country c, Z_c^m is a matrix of exogenous variables determining imports in country c, x_c is the export supply vector of country c (across all goods g), p_* is the vector of world prices, and Z_c^x is a matrix of exogenous variables determining exports in country c. Thus, each good g is homogenous across all countries, but in each country, it is an imperfect substitute for all other traded goods. World markets for each good clear, so that:

$$\sum_c m_c(p_c, Z_c^m) - \sum_c x_c(p_*, Z_c^x) = 0 \quad (2)$$

The solution of (2) with respect to p_* yields the equilibrium world prices. Assume that all world and domestic markets are perfectly competitive, so that:

$$p_c = p_* \cdot \tau_c^m \quad (3)$$

where $\cdot$ is an inner product, τ_c^m is a vector (across all goods g) of $\tau_{c,q}^m = \left(1 + t_{c,q}^m\right)$ and $t_{c,q}^m$ is the level of tariff protection in country c on good g. For future reference, note that $t_{c,q}^m$ can include tariffs and ad-valorem equivalents of non-tariff measures, barriers to trade facilitation, and domestic subsidies as it will be made clearer later. The Z_c^m and Z_c^x include all other variables than prices that affect import demand and export supply, respectively.

Let us keep production subsidies unchanged for the moment and look at the impact of a change in tariff on the market clearing condition. Substituting (3) into (2) and totally differentiating with respect to changes in tariffs yields:

$$\sum_c \frac{dm_c}{dp_c}\left[\frac{\partial p_c}{\partial p_*}dp_* + \frac{\partial p_c}{\partial \tau_c}d\tau_c\right] - \sum_c \frac{dx_c}{dp_*}dp_* = 0 \quad (4)$$

Rearranging (4) and solving for the vector of percentage changes in world prices, $\hat{p}_*$ yields:

$$\hat{p}_* = [\sum_c E_c^x - \sum_c E_c^m)]^{-1} \sum_c E_c^m \hat{\tau}_c \quad (5)$$

where E_c^m is a diagonal matrix, whose elements are the elasticity of import demand in country c multiplied by the share in world trade of each country's imports of good g. Similarly, E_c^x is a diagonal matrix whose elements are the elasticity of export supply in country c multiplied by the share in world trade of each country's exports of good g.

Equation (5) would be the basis for the estimation of changes in world prices associated with tariff cuts or increases. But the shocks we are interested in this study are not given by tariff changes, but by changes in foreign domestic subsidies. These foreign domestic subsidies affect both foreign import demand and export supply through their impact on domestic demand and supply.

Domestic subsidies will affect the price of imported and exported goods. A consumption subsidy that discriminates between imported and domestically produced goods reduces the domestic price of imported goods by the amount of the ad-valorem equivalent of the subsidy. Indeed, to remain competitive imported goods must match the price faced by consumers when buying domestically produced goods. If the consumer subsidy is non-discriminatory, then the price of imported goods in the subsidy imposing country increases by the amount of the ad-valorem equivalent of the subsidy, as the subsidy increases the demand for both domestically and foreign produced goods.

The consumer subsidy also affects exports in the subsidy imposing country, as the boost to demand reduces residual supply (i.e., exports). The ad-valorem equivalent price reduction for exporters can be approximated by the ad-valorem equivalent of the consumption subsidy.[20]

A production subsidy implies that the price received by exporters in the subsidy imposing country increases by the amount of the ad-valorem equivalent of the production subsidy. As in the case of

[20] It is actually given by the ad-valorem equivalent of the subsidy times 1- $(\epsilon^y/\varepsilon^x)(y/x)$, where ϵ^y is the price elasticity of domestic supply, ϵ^x is the price elasticity of exports, y is domestic supply and x are exports. Thus, using the ad-valorem equivalent of the consumption subsidy will give an upper bound of the impact, which is consistent with the elasticity of export supply being larger than the export supply elasticity. A lower bound for the ad-valorem equivalent of the consumption subsidy on export supply is zero, which is consistent with domestic production being larger than exports. We take the upper bound because there is no data available on domestic supply or price elasticities of domestic supply.

the impact of the consumer subsidy on imports, the ad-valorem equivalent of the subsidy perfectly captures the shock.

The production subsidy will also affect imports as more of the domestic demand is fulfilled by domestic producers. As in the case of the impact of the consumer subsidy on exports, the ad-valorem equivalent price increase for importers can be approximated by the ad-valorem equivalent of the production subsidy.[21]

To summarize, the ad-valorem equivalent of the consumption and production subsidies can be used to shock both imports and exports. Differentiating as in (4) but with respect to consumption and production subsidies instead of tariffs, and rearranging and solving as in (5), yields:

$$\hat{p}_* = [\sum_c E_c^x - \sum_c E_c^m)]^{-1}\left(\sum_c [E_c^m + E_c^x]\hat{s}_c^d + \sum_c [E_c^m - E_c^x]\hat{s}_c^y\right) \quad (6)$$

where $\hat{s}_c^y$ is the percentage change in the ad-valorem equivalent of production subsidies in country *c* and $\hat{s}_c^d$ is the percentage change in the ad-valorem equivalent of the discriminating demand/consumption subsidy in country *c*.

Noting that the terms in squared brackets (the denominator) in equation (6) is necessarily positive, it is then straightforward by inspecting the first term in parenthesis in equation (6), that an increase in the ad-valorem equivalent of a discriminatory demand/consumption subsidy will lead to an increase in world prices through its effect on domestic exports, and a decrease in world prices through its effects on domestic imports. So, the sign of the overall impact of a demand/consumption subsidy on world prices is ambiguous.

Similarly, inspecting the second term in parenthesis in equation (6), it is straightforward that an increase in the ad-valorem equivalent of a production subsidy will tend to decrease world prices through both its effects on domestic imports and exports. Thus, a production subsidy has an unambiguous negative effect on world prices.

Equation (6) needs can be rewritten as:

$$\hat{p}_* = [\sum_c E_c^x - \sum_c E_c^m)]^{-1}\left(\sum_c E_c^m\left[\hat{s}_c^d + \hat{s}_c^y\right] + \sum_c E_c^x\left[\hat{s}_c^d - \hat{s}_c^y\right]\right) \quad (7)$$

To calculate $\hat{s}_c^d$ and $\hat{s}_c^y$ we compute the ratio of the dollar amount of demand/consumption or production subsidy per unit of output with resepct to the average price of exports and imports per unit. Equation (7) is used to calculate the percentage change in world prices.

Changes in imports and exports

The percentage changes in real imports and exports of each country c other than those imposing subsidies are given by:

[21] Again, this will be an upper bound of the impact as the true value is given by the ad-valorem equivalent of the production subsidy times $1-(\epsilon^d/\varepsilon^m)(c/m)$, where ϵ^d is the price elasticity of domestic demand, ϵ^m is the price elasticity of imports, c is domestic demand and m are imports. The lower bound will again be zero. Note also that these two assumptions cancel each other as the production subsidy has a negative impact on world prices through its effect on domestic imports, whereas the demand/consumption subsidy has a positive impact on world prices through its effects on domestic exports. As a robustness check we will cancel these two effects to confirm that the assumptions we made are not driving the results on world prices.

$$\hat{m}_c = [E_c^m \hat{p}_*] \cdot \theta_c^m \quad (8)$$

$$\hat{x}_c = [E_c^x \hat{p}_*] \cdot \theta_c^x \quad (9)$$

where θ_c^m is a vector of the inverse of the share in world trade of country c's imports of each product, and θ_c^x is a vector of the inverse of the share in world trade of country c's exports of each product.

Welfare changes

The welfare changes associated with these reforms can be easily calculated if one accepts the partial equilibrium nature of this model, where prices of goods in the non-traded sector are kept exogenous. Let us start with the income-expenditure identity in each country c:

$$e(1, p_c, u_c) = r(1, p_c, v_c) + t_c\, p_* m_c \quad (10)$$

where e is the minimum expenditure necessary to achieve utility level u_c at domestic prices p_c (1 being the price of the *numeraire* good) and r is the maximum revenue that can be achieved given (fixed) endowments v_c and domestic prices p_c. The last term on the right-hand side is tariff revenue (obtained by taking the inner product of the three vectors).

Totally differentiating equation (9), using Shephard and Hotelling's lemma, and rearranging, allows us to obtain a first-order approximation of the change in welfare:

$$\Delta W_c = e_u du_c = -n_c dp_c + t_c dp_* m_c + t_c p_* dm_c \quad (11)$$

where e_u is the inverse of the marginal utility of income, and n_c are net imports (i.e. $n_c = m_c$ if the good is imported and $n_c = -x_c$ if the good is exported). Changes in imports and exports can be calculated using (7) and (8). The change in domestic prices is obtained by totally differentiating (3):

$$dp_c = dp_* \tau_c \quad (11)$$

where the changes in world prices can be obtained from (6).

Assuming consumption subsides are non-discriminatory

While IRA's consumption subsidies are discriminatory, there have been steps in their implementation to make them non-discriminatory at least for electric vehicles (see the discussion in Bown, 2023). The EU's potential retaliatory response can also be non-discriminating. It is trival to modify our setup to make consumption subsidies non-discriminatory. Instead of reducing import demand, a non-discriminatory consumption subsidy in the US (or in the EU) would lead to an increase in import demand. This implies that equation (6) becomes:

$$\hat{p}_* = [\textstyle\sum_c E_c^x - \sum_c E_c^m)]^{-1} \left(\sum_c [-E_c^m + E_c^x] \hat{s}_c^d + \sum_c [E_c^m - E_c^x] \hat{s}_c^y\right) \quad (12)$$

The only differences between equations (6) and (12) is that the sign in front of E_c^m is now negative, to capture the fact that import demand will increase with the consumption subsidy.

List of included subsidies

We cover ~$250 billion of IRA subsidies. This is 63 percent of the CBO's $390 billion estimate.

Table 6: List of included subsidies

Sub-Program	Description	Subsidy type	Potential products	Subsidy amount
Clean Energy Investment Tax Credit (ITC) Extension	Investment tax credits for clean energy deployment, including onshore and offshore wind, solar, geothermal, battery storage, and pumped-storage hydro.	CON	Clean energy, including onshore and offshore wind, solar, geothermal, battery storage, and pumped-storage hydro.	13.9
Clean Energy ITC Technology Neutral	Investment tax credit for energy deployment for projects with net zero carbon emissions. This credit will go into effect for new projects placed in 2025 through sometime in the 2030s. This credit is not limited to a particular clean energy technology, but rather any technology that does not contribute carbon emissions.	CON	Any technology that does not contribute carbon emissions.	50.8
Clean Energy Production Tax Credit (PTC) Extension	Production tax credits for clean energy deployment, including solar, offshore and onshore wind, and geothermal to receive a tax credit for the production of electricity based on kilowatt-hour of power produced.	CON	Clean energy, including onshore and offshore wind, solar, geothermal, battery storage, and pumped-storage hydro.	51
Clean Energy Production Tax Credit (PTC) Technology Neutral	PTC for energy projects with net zero carbon emissions. This credit will go into effect for new projects placed in service in 2025 through sometime in the 2030s. This credit is not limited to a particular clean energy technology, but rather any technology that does not contribute carbon emissions.	CON	Any technology that does not contribute carbon emissions.	11.2
Clean Hydrogen Credit	Credit for producing hydrogen where the lifecycle ("well-to-gate") greenhouse gas emissions to make the hydrogen are no more than 4 kg per kg of hydrogen. The full credit can be claimed only if lifecycle greenhouse gas emissions are less than 0.45 kg per kg of hydrogen. Op-tion to claim an ITC on the hydrogen production facility instead.	CON		13
Extension of the Advanced Energy Project Credit (48C)	Investment tax credit for establishing or retooling a factory to produce a wide range of clean technologies (including renewable energy and EV components). The tax credit also is expanded to cover installation of equipment that achieves an at least 20 percent reduction in climate pollution.	PRO	Wide range of technologies	10

Advanced Manufacturing Production Credit (45X)	New production tax credit for manufacturing solar, wind, and battery components and processing critical minerals including aluminum, cobalt, lithium, nickel, and more to incentivize building new US facilities to support clean energy supply chains at a globally competitive scale.	PRO	Solar, wind, batteries, critical materials	30.6
Clean Vehicle Tax Credit (30D)	Encourages the deployment of clean vehicles made in North America with batteries made with North American-manufactured com-ponents and critical minerals sourced from countries with which the US States has a free trade agreement.	CON	Evs and FCVs	7.5
Used Clean Vehicle Tax Credit (25E)	Accelerates the creation of a secondary market for EVs in order to extend EV access and improve affordability for low-income drivers.	CON	Evs and FCVs	1.3
Commercial Clean Vehicle Tax Credit (45W)	Accelerates the deployment of clean vehicles for commercial and other fleets.	CON	Evs and FCVs	3.6
Energy Efficient Commercial Buildings Tax Deduction (179D)	Enables building owners to claim a tax deduction for installing qualifying systems in buildings that reduce energy usage by at least 25 percent. Tenants may be eligible if they make construction expenditures.	CON	Energy efficient home appliances	0.36
Residential energy efficiency tax credit (25C)	Provides home-owners with a 30 percent tax credit for the cost of certain high-efficiency heating, cooling, water-heating appliances, energy-efficient windows and doors, and home energy audits. The maximum annual credit is $1,200. $2,000 for heat pumps. There are sub-limits for particular types of equipment.	CON	High-efficiency heating, cooling, water-heating appliances, energy-efficient windows and doors, and home energy audits	12.45
Home Energy Performance-Based, Whole House Rebates	Provides rebates to homeowners for a host of home improvements, including insulation updates, HVAC system replacements, and retrofits that save whole-house energy use. Larger rebates would be available for lower- ncome program participants.	CON	Home improvements, including insulation updates, HVAC system replacements, and retrofits that save whole-house energy use	4.3
High-Efficiency Electric Home Rebate	Electrification rebates for qualified/ efficient: heat pumps, stoves, insulation, etc; majority of rebates, designated for tribal or low-income communities, are called “qualified electrification project” (QEP).	CON	Heat pumps, stoves, insulation	4.5
Clean Heavy Duty Vehicles	Provides grants to support the replacement of eligible vehicles with zero emission class 6 and 7 vehicles, the purchase, installation, operation, or maintenance of charging or fueling infrastructure, and the provision of workforce development and training to support zero emission vehicle adoption.	CON	EVs and FCVs	1

Greenhouse Gas Reduction Fund	Funding to deploy low and zero emissions technologies, especially in low income and disadvantaged communities.	CON	Low and zero emissions technologies	27
USDA Rural Energy for America Program (REAP)	Deployment of renewable energy for rural business and agricultural producers. Technologies include; solar wind, biomass, geothermal, hydro, hydrogen, and energy efficiency improvements.	CON	Solar wind, biomass, geothermal, hydro, hydrogen, and energy efficiency improvements.	1.9
Low-Carbon Affordable Housing	The US Department of Housing and Urban Development (HUD) to fund projects that implement low-emission technologies, materials, or processes or address climate resilience of multifamily properties.	CON	Low-emission technologies	0.83
USPS Clean Fleets	Deposits funding to the Postal Service Fund for the purchase of zero emission delivery vehicles and the purchase, design, and installation of ZEV infrastructure.	CON	EV and EV infrastructure	3

List of affected products

For most of the affected products, the literature provides only estimates of the total cost reduction or for broad categories of products. For example, in the case of wind power, Min et al. (2023) estimate the reduction in project costs to be 60 percent for onshore projects and 20 percent for offshore projects. Since the majority of projects are onshore (IEA, 2023), we use a weighted average of 50 percent. This ad valorem value is applied to all wind related products.

Further sources for ad valorem values include:

- **Electric Vehicles:** The maximum subsidy amount for new EVs is $7,500. The average price of imports and exports according to COMTRADE is ~$50,000. We apply an ad valorem value of 15 percent.
- **Solar:** According to Min et al. (2023), the price of solar projects will decrease by 60 percent due to a combination of manufacturing and consumption subsidies. We apply an ad valorem value of 60 percent.
- **Wind:** Also here, we rely on the estimates of Min et al. (2023). We apply a weighted average cost reduction for offshore and onshore wind projects of 50 percent.
- **Geothermal and domestic appliances:** Heat pumps and other energy-efficient home appliances are eligible, among other programs, for the Residential Energy Efficiency Tax Credit. The maximum annual credit is $1,200, but $2,000 for heat pumps. However, the individual subsidy amount depends on the income of the household. Adding to the complexity, there are many different products that qualify for the credit. For heat pumps, Moor (2023) states that the average product cost is $5,792. This is in line with the average unit price costs we calculated based on COMTRADE. The author further calculates that middle income households will save an average of $2,896 on a new heat pump and above middle-income households will save $1,737. Consequently, we use the $2,000 maximum credit of the Residential Energy Efficiency Tax Credit Program and divide it by the average price. The resulting ad valorem value is 36 percent.

For all other domestic products, we apply an ad valorem value of 10 percent, as there exists no literature.

Table 7: Ad valorem values of affected products

Category	Subcategory	HS code (2022)	HS description	Ad valorem value	Share CON	Share PRO
Geothermal	Heat Pumps & Exchanger	841861	Heat pumps; other than air conditioning machines of heading no. 8415	36%	100%	0%
Geothermal	Heat Pumps & Exchanger	841869	Refrigerating or freezing equipment; n.e.c. in heading no. 8418	36%	100%	0%
Hydro	Turbines	841011	Turbines; hydraulic turbines and water wheels, of a power not exceeding 1000kW	30%	100%	0%
Hydro	Turbines	841012	Turbines; hydraulic turbines and water wheels, of a power exceeding 1000kW but not exceeding 10000kW	30%	100%	0%
Hydro	Turbines	841013	Turbines; hydraulic turbines and water wheels, of a power exceeding 10000kW	30%	100%	0%
Hydro	Turbines	841090	Turbines; parts of hydraulic turbines and water wheels, including regulators	30%	100%	0%
EV	Cells & Batteries	850650	Cells and batteries; primary, lithium	30%	0%	100%
EV	Cells & Batteries	850660	Cells and batteries; primary, air-zinc	30%	0%	100%
EV	Cells & Batteries	850680	Cells and batteries; primary, (other than manganese dioxide, mercuric oxide, silver oxide, lithium or air-zinc)	30%	0%	100%
EV	Cells & Batteries	854911	Waste and scrap of lead-acid accumulators; spent lead-acid accumulators	30%	0%	100%
EV	Cells & Batteries	854912	Waste and scrap; of primary cells, primary batteries and electric accumulators, spent or not, containing lead, cadmium or mercury, other than lead-acid accumulators	30%	0%	100%
EV	Cells & Batteries	854913	Waste and scrap; of primary cells, primary batteries and electric accumulators, spent or not, sorted by chemical type and not containing lead, cadmium or mercury	30%	0%	100%
EV	Cells & Batteries	854914	Waste and scrap; of primary cells, primary batteries and electric accumulators, spent or not, unsorted and not containing lead, cadmium or mercury	30%	0%	100%
EV	Cells & Batteries	854919	Waste and scrap; of primary cells, primary batteries and electric accumulators, n.e.c. in item no 8549.1	30%	0%	100%

EV	Electric Accumulators	850720	Electric accumulators; lead-acid, (other than for starting piston engines), including separators, whether or not rectangular (including square)	30%	0%	100%
EV	Electric Vehicles	870220	Vehicles; public transport type (carries 10 or more persons, including driver), with both compression-ignition internal combustion piston engine (diesel or semi-diesel) and electric motor for propulsion, new or used	15%	100%	0%
EV	Electric Vehicles	870230	Vehicles; public transport type (carries 10 or more persons, including driver), with both compression-ignition internal combustion piston engine (diesel or semi-diesel) and electric motor for propulsion, new or used	15%	100%	0%
EV	Electric Vehicles	870240	Vehicles; public transport type (carries 10 or more persons, including driver), with only electric motor for propulsion, new or used	15%	100%	0%
EV	Electric Vehicles	870290	Vehicles; public transport type (carries 10 or more persons, including driver), n.e.c. in heading 8702, new or used	15%	100%	0%
EV	Electric Vehicles	870340	Vehicles; with both spark-ignition internal combustion piston engine and electric motor for propulsion, incapable of being charged by plugging to external source of electric power	15%	100%	0%
EV	Electric Vehicles	870350	Vehicles; with both compression-ignition internal combustion piston engine (diesel or semi-diesel) and electric motor for propulsion, incapable of being charged by plugging to external source of electric power	15%	100%	0%
EV	Electric Vehicles	870360	Vehicles; with both spark-ignition internal combustion piston engine and electric motor for propulsion, capable of being charged by plugging to external source of electric power	15%	100%	0%
EV	Electric Vehicles	870370	Vehicles; with both compression-ignition internal combustion piston engine (diesel or semi-diesel) and electric motor for propulsion, capable of being charged by plugging to external source of electric power	15%	100%	0%
EV	Electric Vehicles	870380	Vehicles; with only electric motor for propulsion	15%	100%	0%
EV	Electric Vehicles	870390	Vehicles; for transport of persons (other than those of heading no. 8702) n.e.c. in heading no. 8703	15%	100%	0%
Domestic	Domestic (cooking) appliances	732119	Cooking appliances and plate warmers; for solid fuel and fuels other than gas or liquid, of iron or steel	10%	100%	0%

Domestic	Domestic (cooking) appliances	732189	Domestic appliances; non-electric, (other than cookers and plate warmers), for solid fuel and fuels other than gas or liquid, of iron or steel	10%	100%	0%
Domestic	Domestic (heating)	840310	Boilers; central heating boilers (excluding those of heading no. 8402)	10%	100%	0%
Domestic	Domestic (heating)	840390	Boilers; parts of central heating boilers (excluding those of heading no. 8402)	10%	100%	0%
Domestic	Domestic (heating)	840410	Boilers; auxiliary plant, for use with boilers of heading no. 8402 or 8403 (e.g. economisers, super-heaters, soot removers, gas recoverers)	10%	100%	0%
Domestic	Domestic (heating)	840420	Boilers; condensers, for steam or other vapour power units	10%	100%	0%
Domestic	Domestic (heating)	840490	Boilers; parts of auxiliary plant, for use with boilers of heading no. 8402 and 8403 and parts of condensers for steam or other vapour power units	10%	100%	0%
Domestic	Domestic (heating)	840510	Generators; producer gas, water gas, acetylene gas and similar water process gas generators, with or without their purifiers	10%	100%	0%
Domestic	Domestic (heating)	840590	Generators; parts of producer gas, water gas, acetylene gas and similar water process gas generators, with or without their purifiers	10%	100%	0%
Solar	Air Heaters	732290	Air heaters and hot air distributors, (not electrically heated), incorporating a motor-driven fan or blower and parts thereof, of iron or steel	60%	80%	20%
Solar	Fresnel reflector modules	900290	Optical elements; n.e.c. in heading no. 9002 (e.g. prisms and mirrors), mounted, being parts or fittings for instruments or apparatus, of any material (excluding elements of glass not optically worked)	60%	80%	20%
Solar	Gas turbine or gas engine	841280	Engines; pneumatic power engines and motors, n.e.c. in heading no. 8412	60%	80%	20%
Solar	PV module	854142	Electrical apparatus; photosensitive semiconductor devices, photovoltaic cells not assembled in modules or made up into panels	60%	80%	20%
Solar	PV module	854143	Electrical apparatus; photosensitive semiconductor devices, photovoltaic cells assembled in modules or made up into panels	60%	80%	20%
Solar	PV module	854149	Electrical apparatus; photosensitive semiconductor devices, diodes other than light emitting diodes and photovoltaic cells whether or not assembled in modules or made up into panels	60%	80%	20%

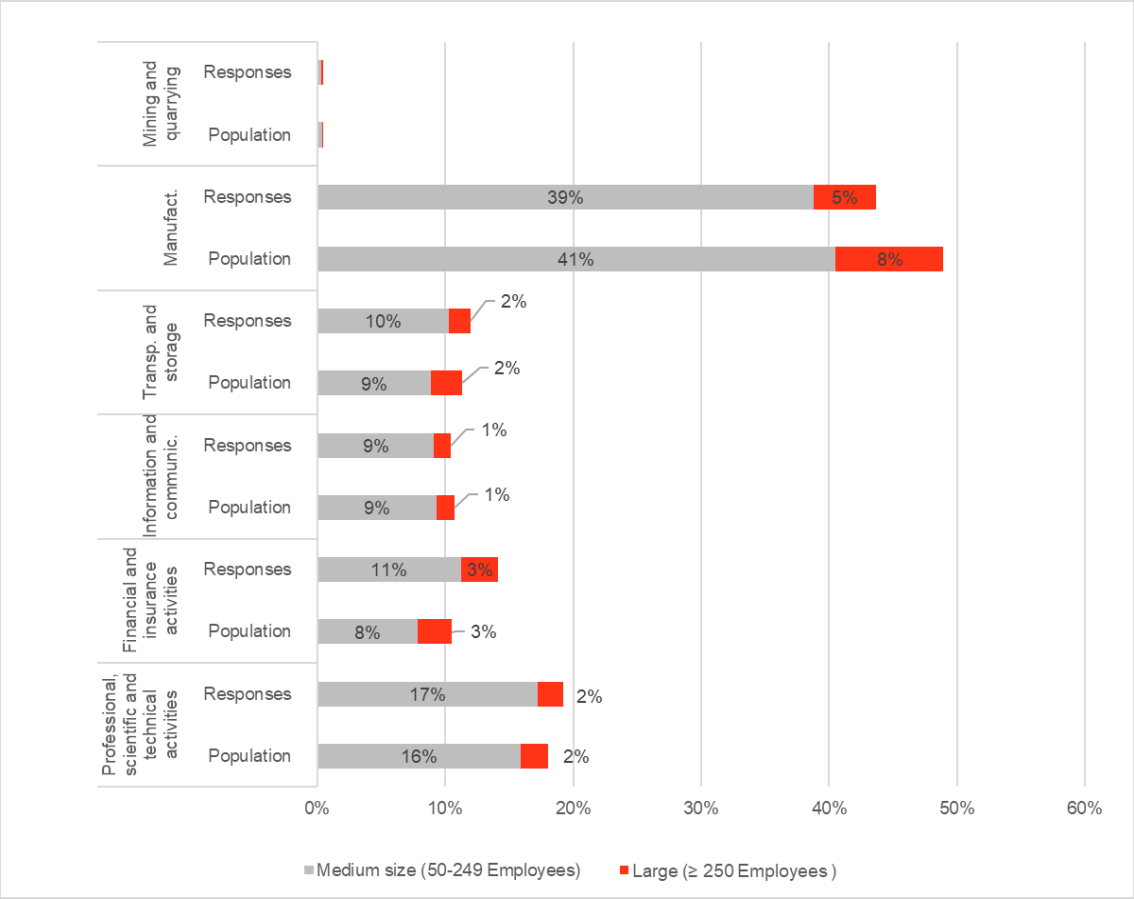
Solar	Power Converter	850440	Electrical static converters	60%	80%	20%
Solar	Solar Water Heating	841911	Heaters; instantaneous gas water heaters, for domestic or other purposes	60%	80%	20%
Solar	Solar Water Heating	841912	Heaters; solar water heaters, non-electric	60%	80%	20%
Solar	Solar Water Heating	841919	Heaters; instantaneous or storage water heaters, non-electric, (other than instantaneous gas or solar water heaters)	60%	80%	20%
Solar	Generator	850172	Electric generators; photovoltaic DC generators, of an output exceeding 50W	60%	80%	20%
Solar	Generator	850171	Electric generators; photovoltaic DC generators, of an output not exceeding 50W	60%	80%	20%
Solar	Generator	850180	Electric generators; (excluding generating sets), photovoltaic AC generators (alternators)	60%	80%	20%
Wind	Blade	841290	Engines; parts, for engines and motors of heading no. 8412	50%	80%	20%
Wind	Control system	853710	Boards, panels, consoles, desks and other bases; for electric control or the distribution of electricity, (other than switching apparatus of heading no. 8517), for a voltage not exceeding 1000 volts	50%	80%	20%
Wind	Control system	853720	Boards, panels, consoles, desks and other bases; for electric control or the distribution of electricity, (other than switching apparatus of heading no. 8517), for a voltage exceeding 1000 volts	50%	80%	20%
Wind	Control system	902830	Meters; electricity supply or production meters, including calibrating meters thereof	50%	80%	20%
Wind	Control system	903020	Oscilloscopes and oscillographs	50%	80%	20%
Wind	Control system	903031	Multimeters; for measuring or checking voltage, current, resistance or power (other than those for measuring or checking semiconductor wafer or devices), without a recording device	50%	80%	20%
Wind	Control system	903032	Multimeters; for measuring or checking voltage, current, resistance or power, with a recording device	50%	80%	20%
Wind	Control system	903033	Instruments and apparatus; for measuring or checking voltage, current, resistance or power, without a recording device (excluding multimeters)	50%	80%	20%
Wind	Control system	903039	Instruments and apparatus; for measuring or checking voltage, current, resistance or power, with a recording device (excluding multimeters)	50%	80%	20%

Wind	Control system	903082	Instruments and apparatus; for measuring or checking semiconductor wafers or devices (including integrated circuits)	50%	80%	20%
Wind	Control system	903084	Instruments and apparatus; n.e.c. in heading no. 9030, with a recording device	50%	80%	20%
Wind	Control system	903289	Regulating or controlling instruments and apparatus; automatic, other than hydraulic or pneumatic	50%	80%	20%
Wind	Forging	732611	Iron or steel; grinding balls and similar articles for mills, forged or stamped, but not further worked	50%	80%	20%
Wind	Generator	850161	Generators; AC generators, (alternators), other than photovoltaic generators, of an output not exceeding 75kVA	50%	80%	20%
Wind	Generator	850162	Electric generators; AC generators, (alternators), other than photovoltaic generators, of an output exceeding 75kVA but not exceeding 375kVA	50%	80%	20%
Wind	Generator	850163	Electric generators; AC generators, (alternators), other than photovoltaic generators, of an output exceeding 375kVA but not exceeding 750kVA	50%	80%	20%
Wind	Generator	850164	Electric generators; AC generators, (alternators), other than photovoltaic generators, of an output exceeding 750kVA	50%	80%	20%
Wind	Generator	850231	Electric generating sets; wind-powered, (excluding those with spark-ignition or compression-ignition internal combustion piston engines)	50%	80%	20%
Wind	Infield and export cables	854442	Insulated electric conductors; for a voltage not exceeding 1000 volts, fitted with connectors	50%	80%	20%
Wind	Infield and export cables	854449	Insulated electric conductors; for a voltage not exceeding 1000 volts, not fitted with connectors	50%	80%	20%
Wind	Infield and export cables	854460	Insulated electric conductors; for a voltage exceeding 1000 volts	50%	80%	20%
Wind	Nacelle	850300	Electric motors and generators; parts suitable for use solely or principally with the machines of heading no. 8501 or 8502	50%	80%	20%
Wind	Power Converter	850421	Electrical transformers; liquid dielectric, having a power handling capacity not exceeding 650kVA	50%	80%	20%
Wind	Power Converter	850422	Electrical transformers; liquid dielectric, having a power handling capacity exceeding 650kVA but not exceeding 10,000kVA	50%	80%	20%

Wind	Power Converter	850423	Electrical transformers; liquid dielectric, having a power handling capacity exceeding 10,000kVA	50%	80%	20%
Wind	Power Converter	850431	Electrical transformers; n.e.c. in item no. 8504.2, having a power handling capacity not exceeding 1kVA	50%	80%	20%
Wind	Power Converter	850432	Transformers; n.e.c. in item no. 8504.2, having a power handling capacity exceeding 1kVA but not exceeding 16kVA	50%	80%	20%
Wind	Power Converter	850433	Transformers; n.e.c. in item no. 8504.2, having a power handling capacity exceeding 16kVA but not exceeding 500kVA	50%	80%	20%
Wind	Power Converter	850434	Transformers; n.e.c. in item no. 8504.2, having a power handling capacity exceeding 500kVA	50%	80%	20%
Wind	Power Converter	850490	Electrical transformers, static converters and inductors; parts thereof	50%	80%	20%
Wind	Power Converter	853510	Electrical apparatus; fuses, for a voltage exceeding 1000 volts	50%	80%	20%
Wind	Power Converter	853521	Electrical apparatus; automatic circuit breakers, for a voltage exceeding 1000 volts but less than 72.5kV	50%	80%	20%
Wind	Power Converter	853529	Electrical apparatus; automatic circuit breakers, for a voltage of 72.5kV or more	50%	80%	20%
Wind	Power Converter	853530	Electrical apparatus; isolating and make-and-break switches, for a voltage exceeding 1000 volts	50%	80%	20%
Wind	Power Converter	853540	Electrical apparatus; lightning arresters, voltage limiters and surge suppressors (for a voltage exceeding 1000 volts)	50%	80%	20%
Wind	Power Converter	853590	Electrical apparatus; n.e.c. in heading no. 8535, for switching or protecting electrical circuits, for a voltage exceeding 1000 volts	50%	80%	20%
Wind	Power Converter	853810	Electrical apparatus; parts (e.g. boards, panels, consoles, desks, cabinets, other bases), for goods of heading no. 8537, not equipped with their apparatus	50%	80%	20%
Wind	Power Converter	853890	Electrical apparatus; parts suitable for use solely or principally with the apparatus of heading no. 8535, 8536 or 8537	50%	80%	20%
Wind	Tower	730820	Iron or steel; structures and parts thereof, towers and lattice masts	50%	80%	20%
Wind	Tower	730890	Iron or steel; structures and parts thereof, n.e.c. in heading 7308	50%	80%	20%

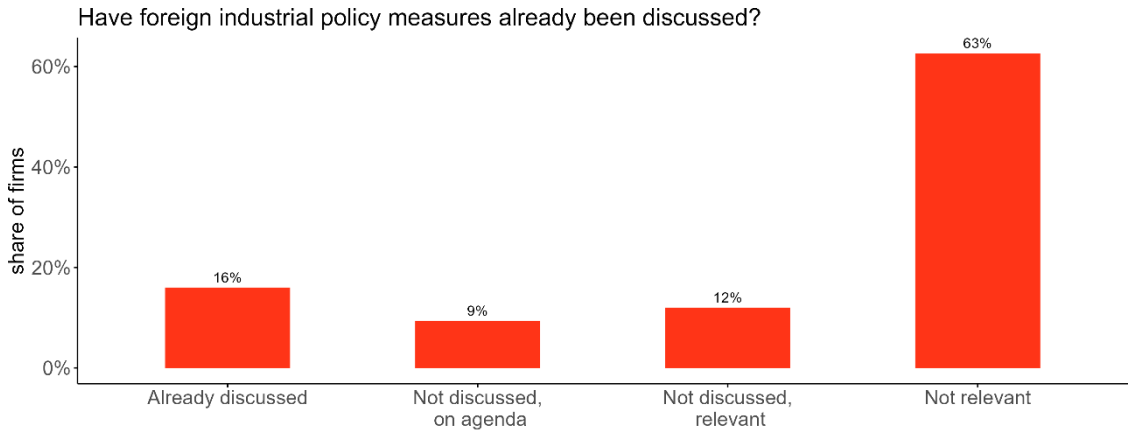
A. Business Survey

Figure 24: Distribution of companies by size and sectors and comparison of response and population



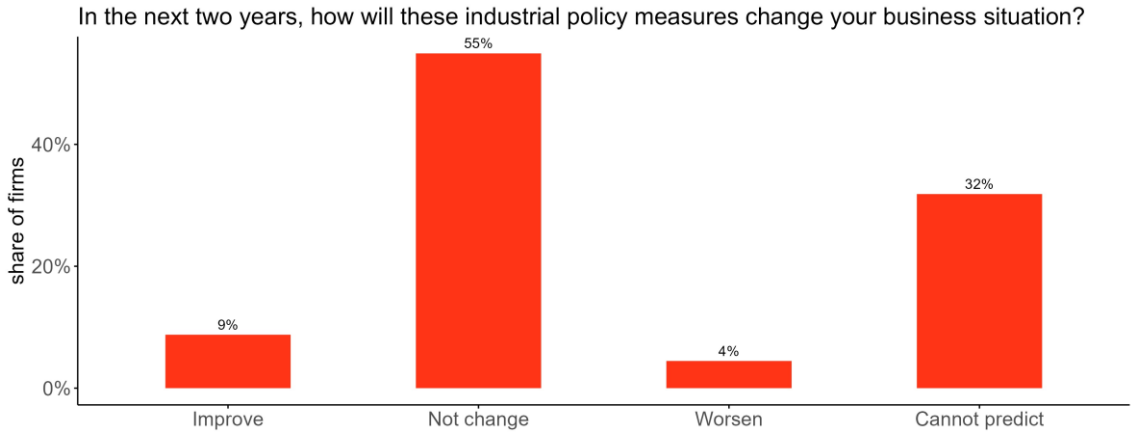
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 25: Internal discussions of industrial policy initiatives



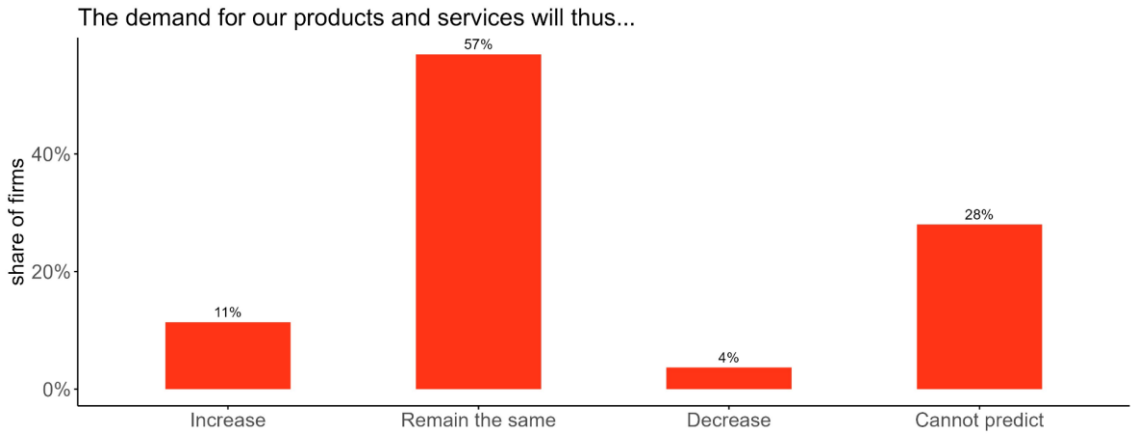
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 26: Expected change of the business situation



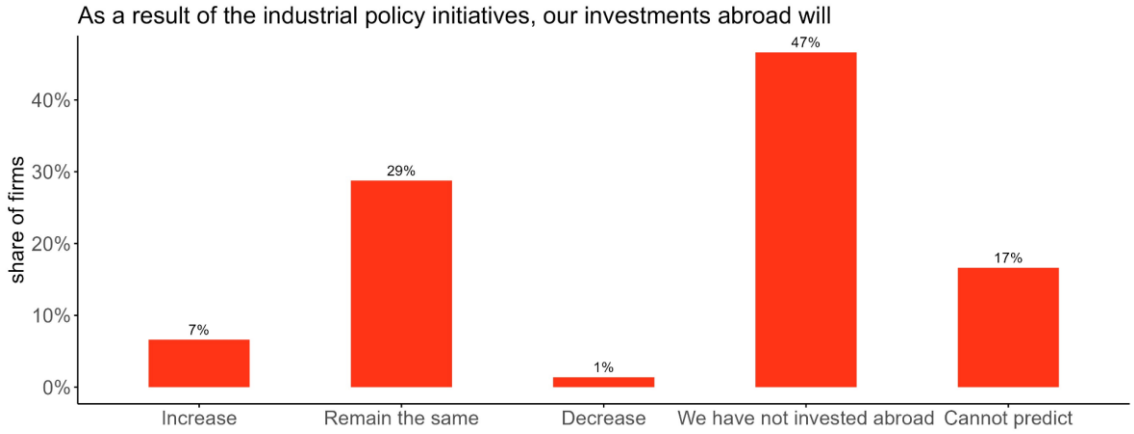
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 27: Expected change in demand for products



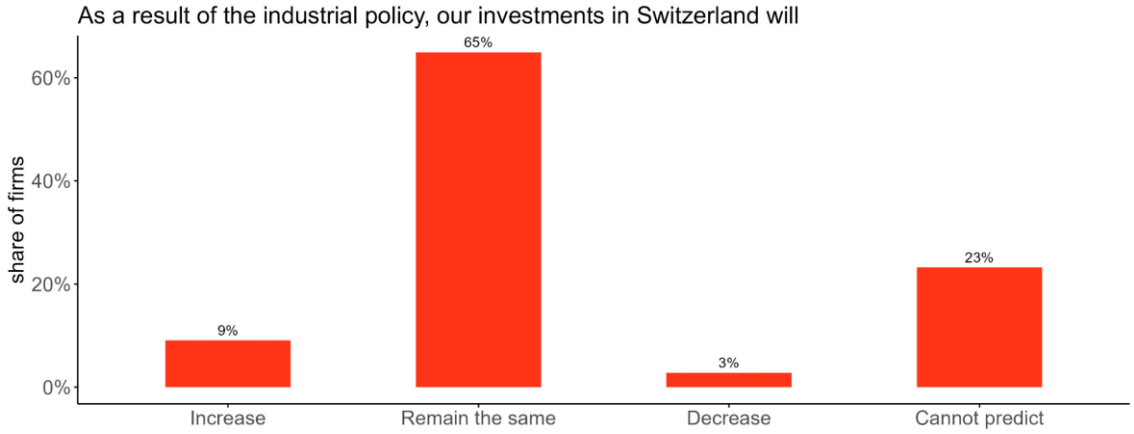
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 28: Expected change in investments abroad



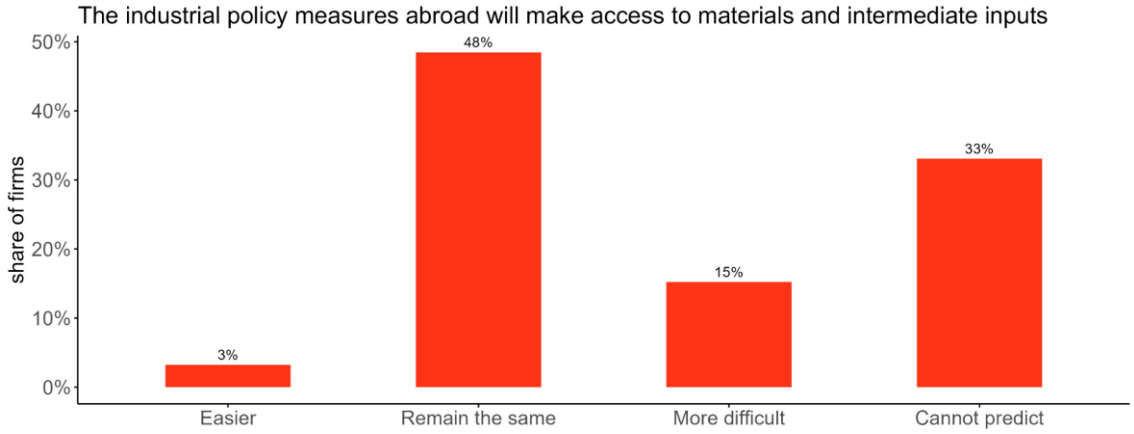
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 29: Expected change in domestic investment



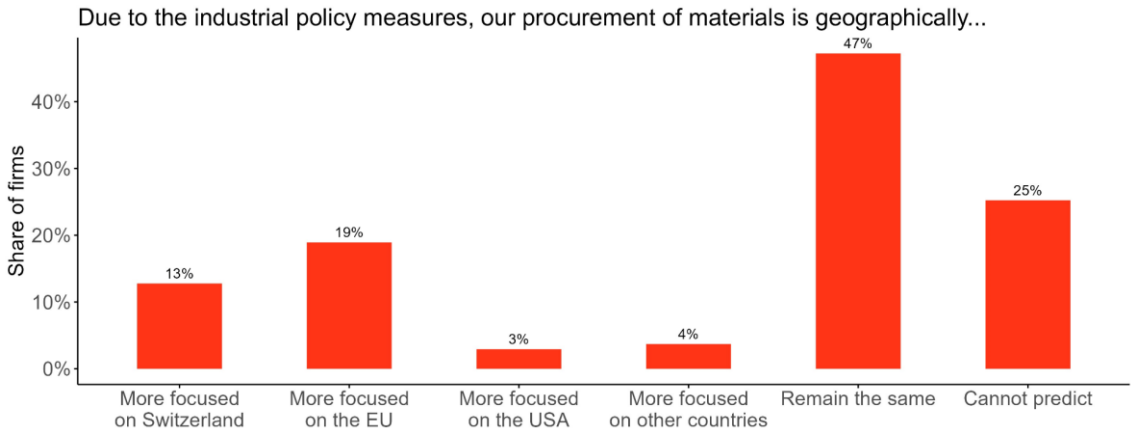
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 30: Expected development regarding access to preliminary products



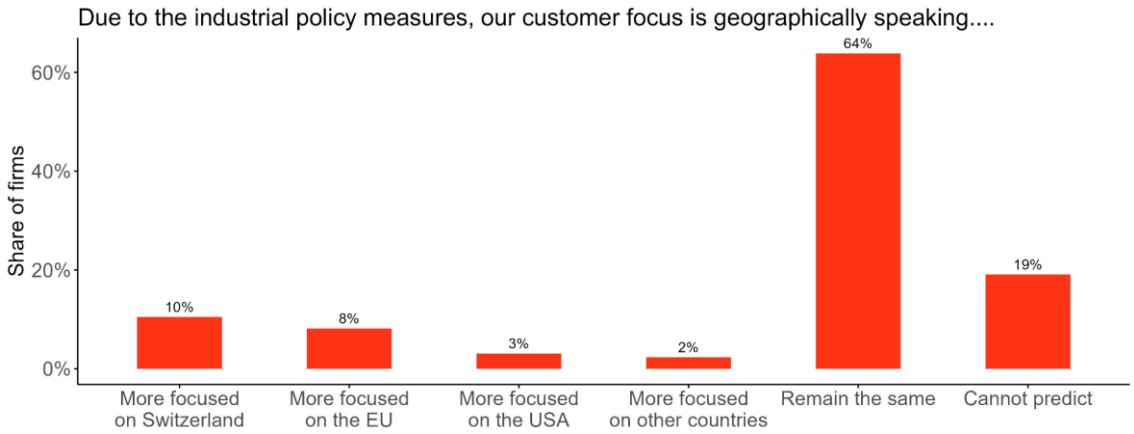
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 31: Expected shift in the focus of the origin of preliminary products



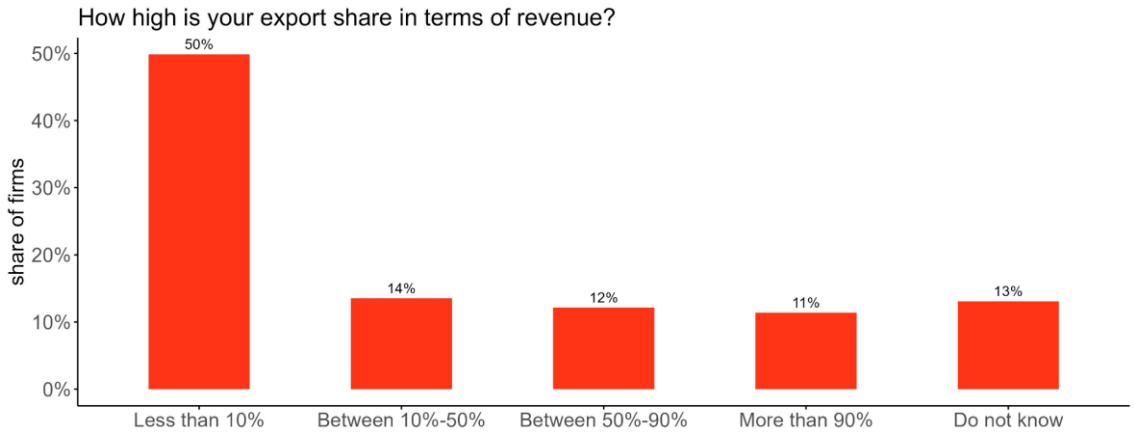
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 32: Expected shift in customer focus



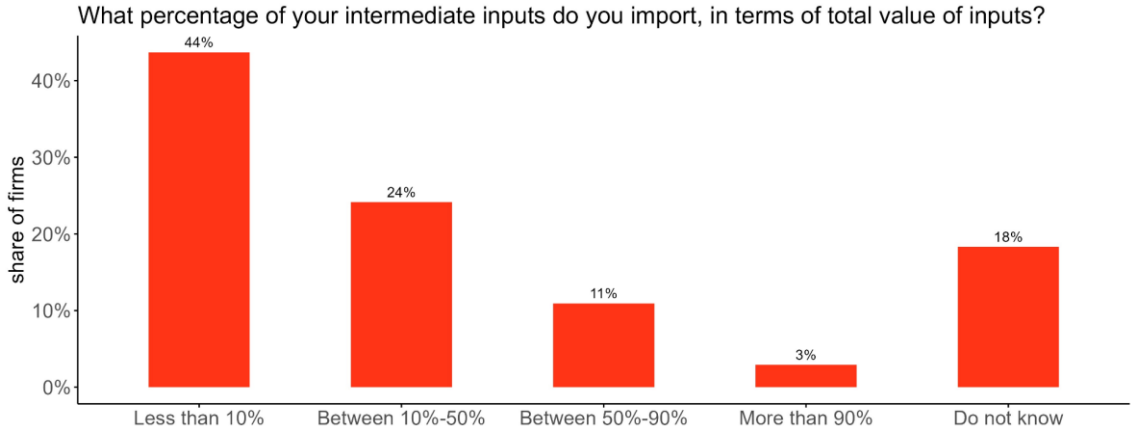
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 33: Export share



Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

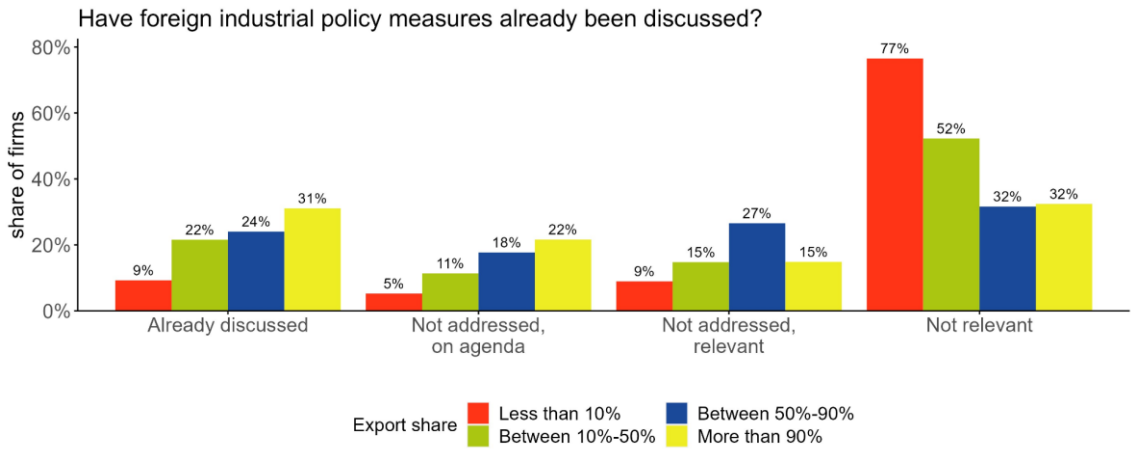
Figure 34: Import share



Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

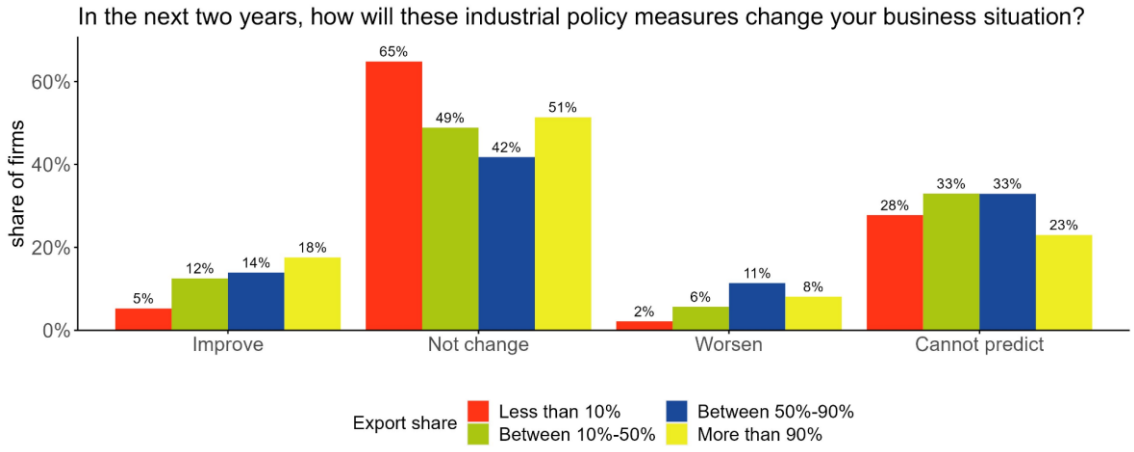
Survey results by export shares

Figure 35: Internal discussions on industrial policy initiatives by export share



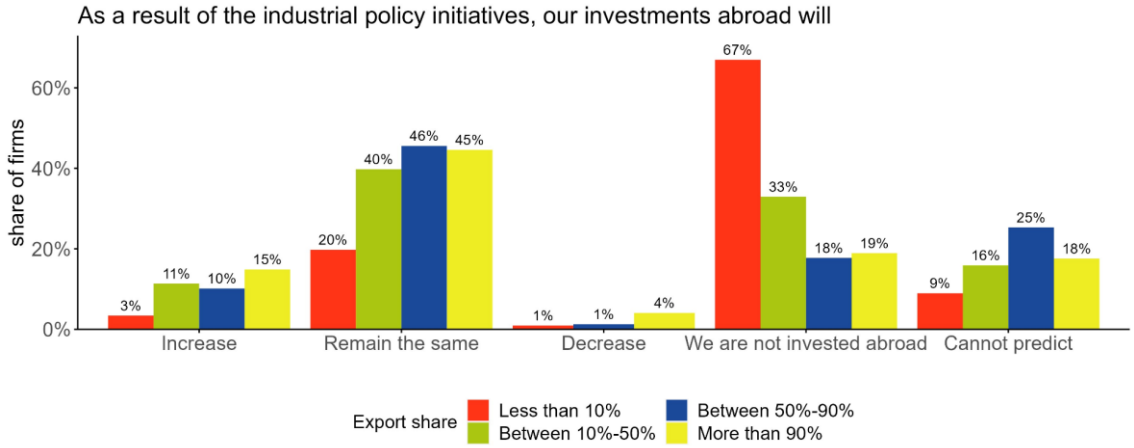
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=565

Figure 36: Expected change of the business situation by export share



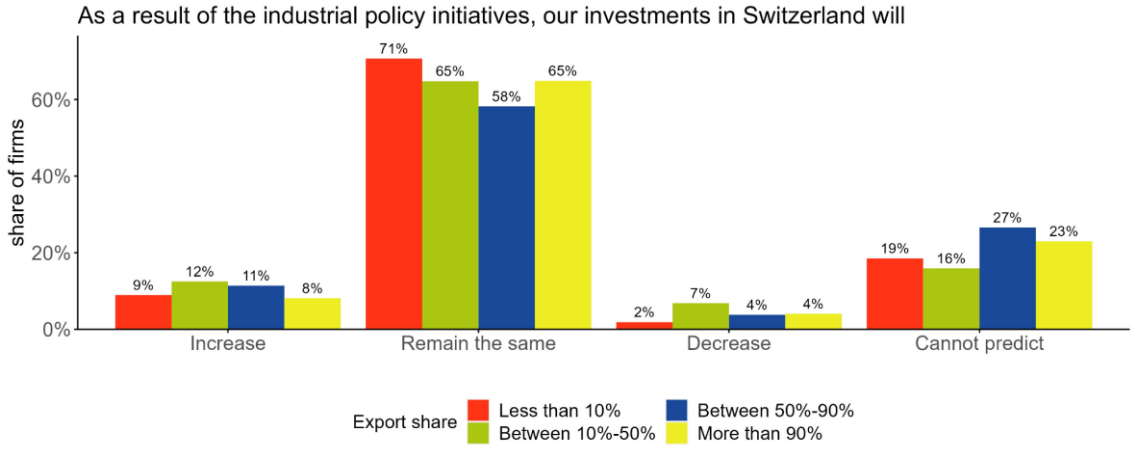
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=565

Figure 37: Expected change in investments abroad by export share



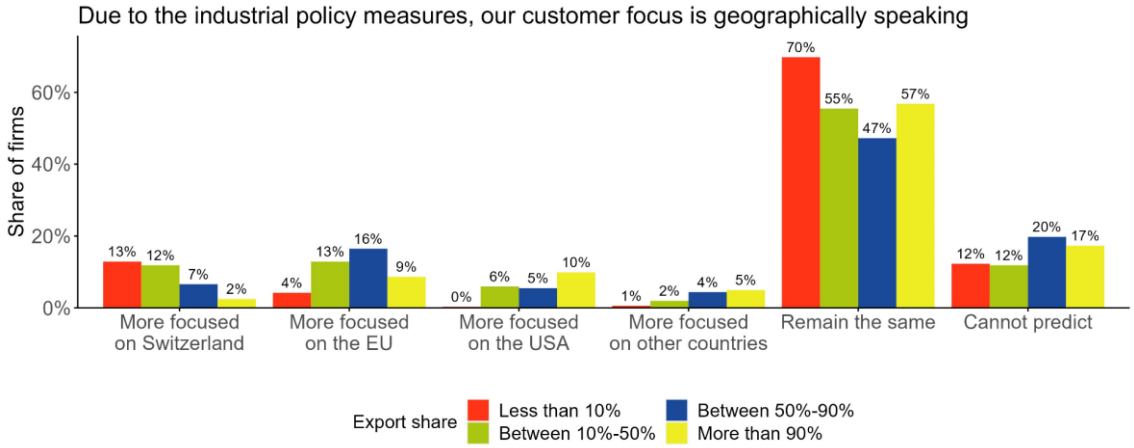
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=565

Figure 38: Expected change in investments in Switzerland by export share



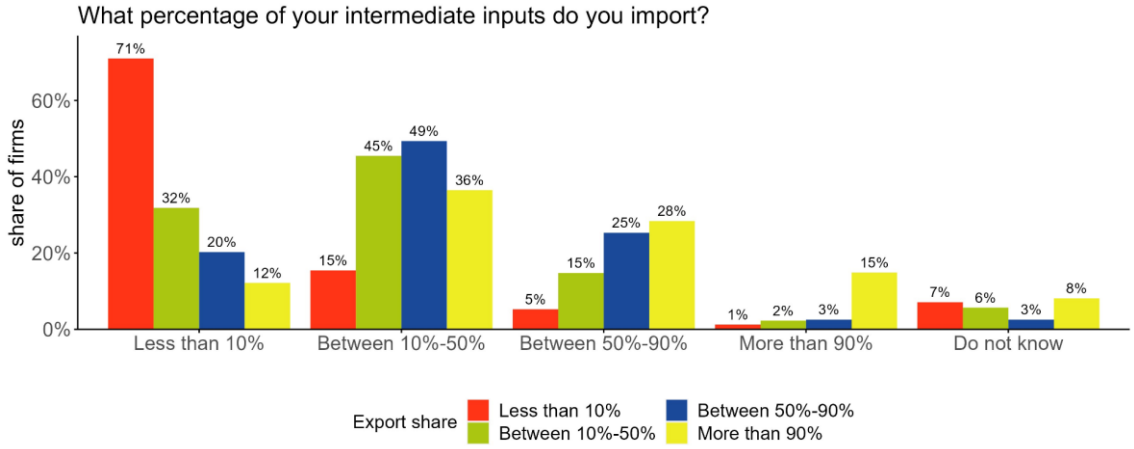
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=565

Figure 39: Expected shift in customer focus by export share



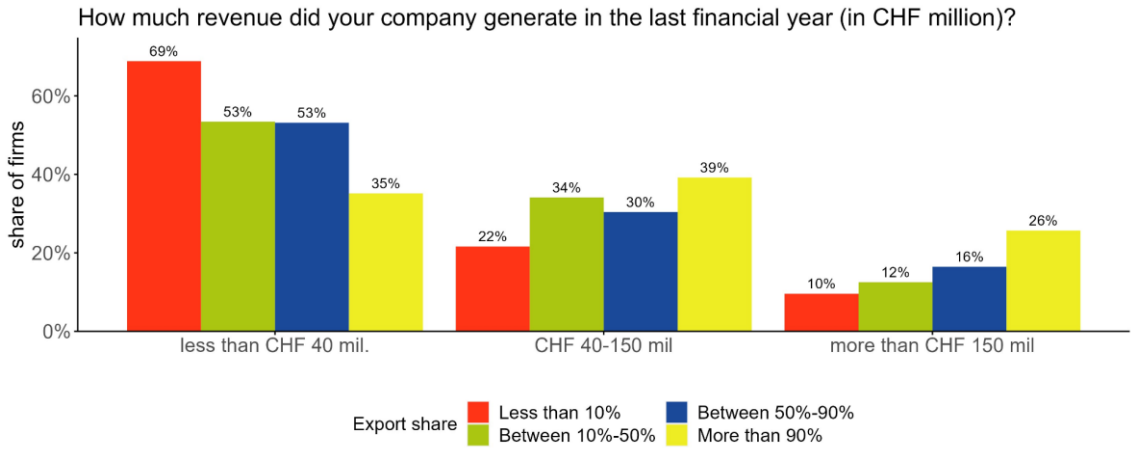
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=565

Figure 40: Import share by export share



Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=565

Figure 41: Revenue by export share

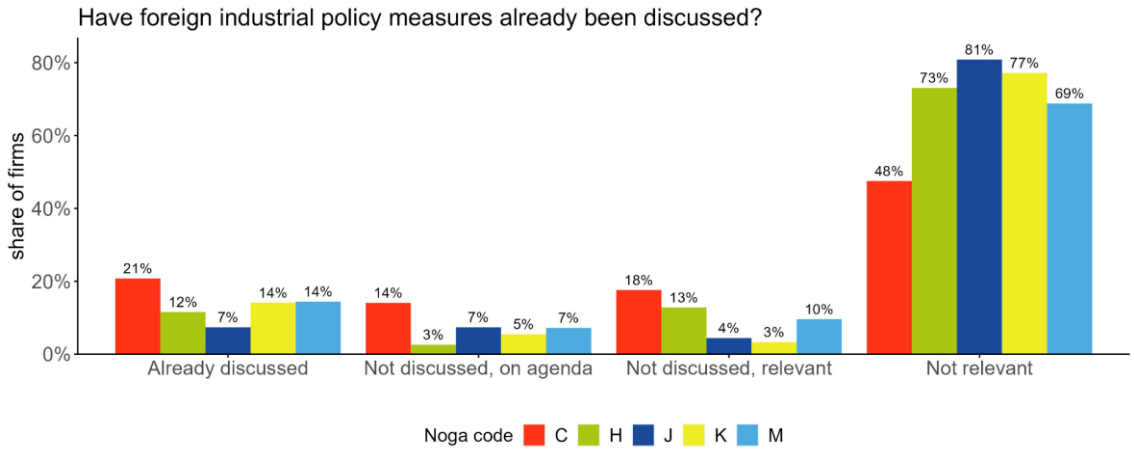


Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=565

Survey results by sectors

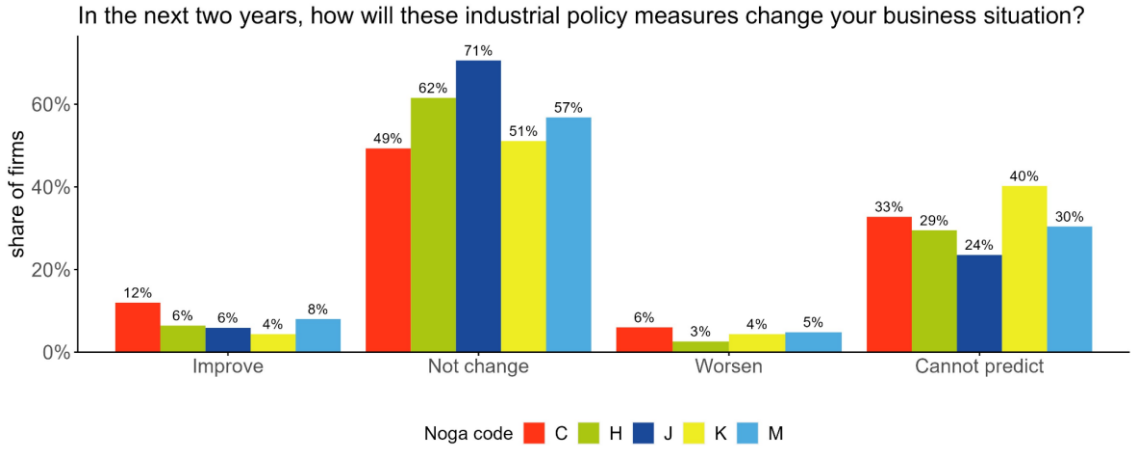
Noga code	Industry
C	Manufacturing
H	Transportation and storage
J	Information and communication
K	Financial and insurance activities
M	Professional, scientific and technical activities

Figure 42: Internal discussions of industrial policy initiatives by sectors



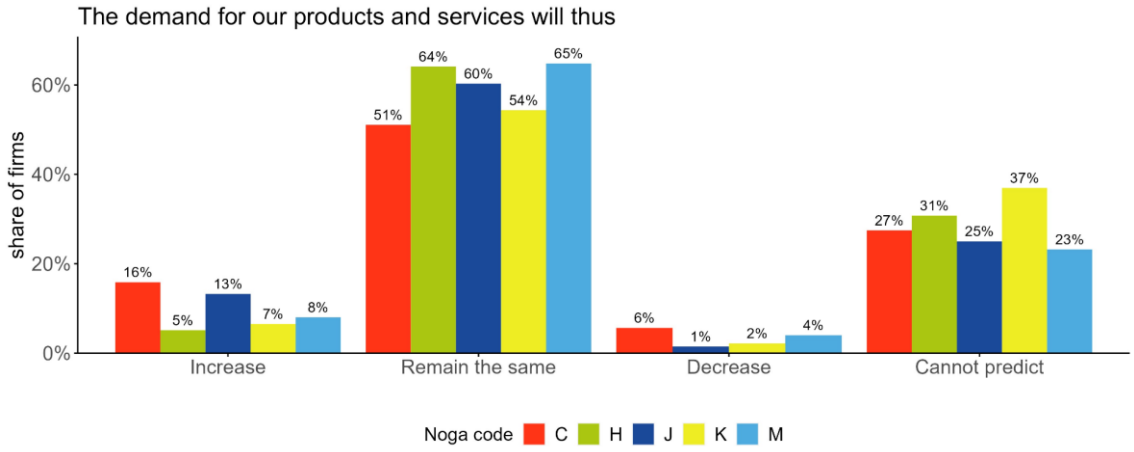
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=647, C = Manufacturing, H = Transportation and storage, J = Information and communication, K = Financial and insurance activities, M = Professional, scientific and technical activities

Figure 43: Expected change of the business situation by sectors



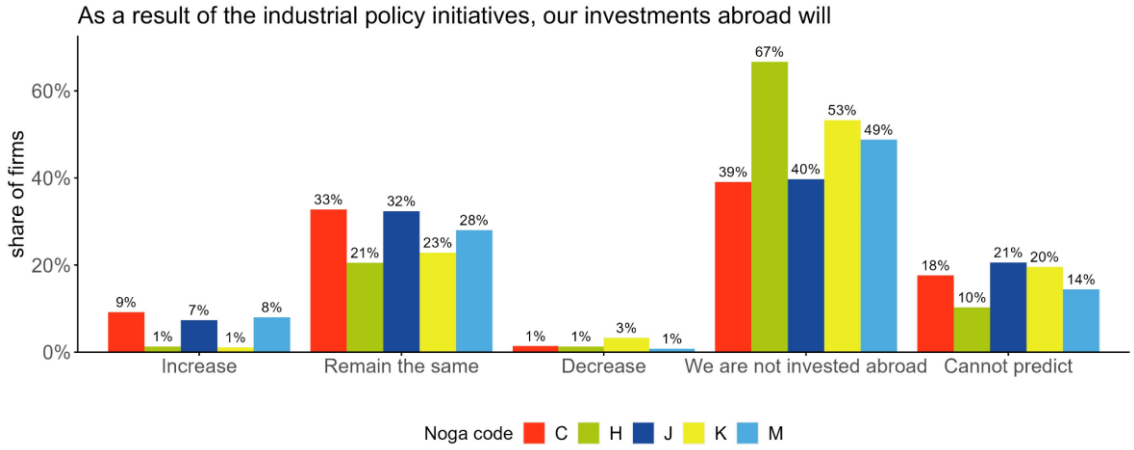
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=647, C = Manufacturing, H = Transportation and storage, J = Information and communication, K = Financial and insurance activities, M = Professional, scientific and technical activities

Figure 44: Expected change in demand for products by sectors



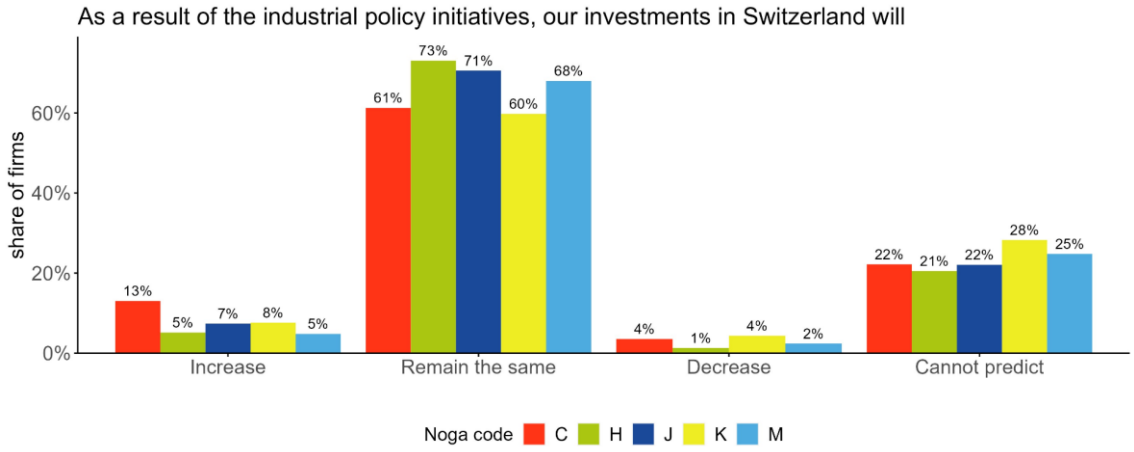
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=647, C = Manufacturing, H = Transportation and storage, J = Information and communication, K = Financial and insurance activities, M = Professional, scientific and technical activities

Figure 45: Expected change in investments abroad by sectors



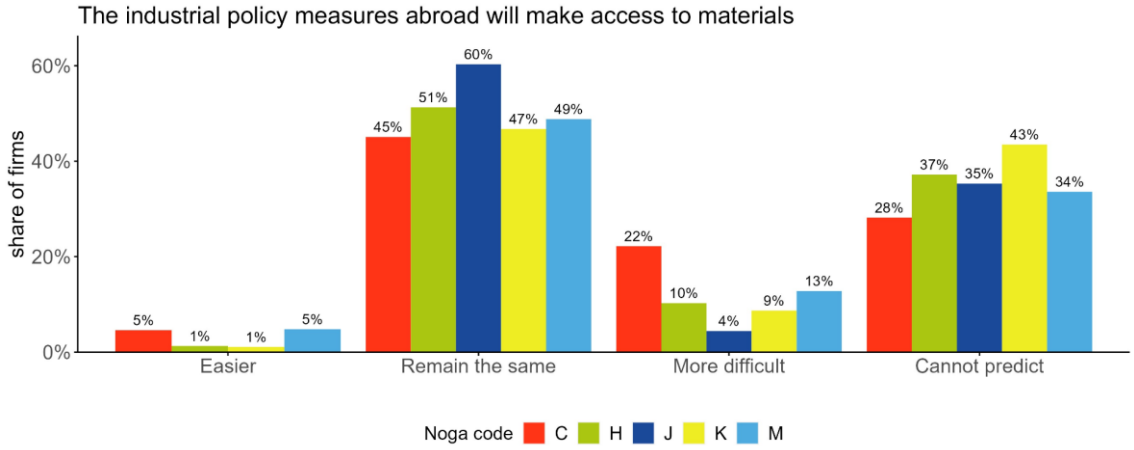
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=647, C = Manufacturing, H = Transportation and storage, J = Information and communication, K = Financial and insurance activities, M = Professional, scientific and technical activities

Figure 46: Expected change in in domestic investment by sectors



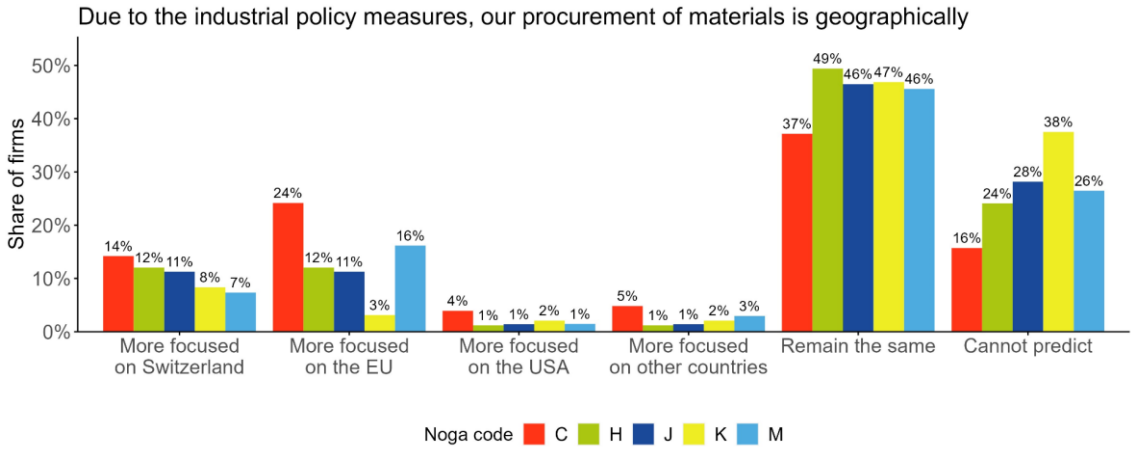
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=647, C = Manufacturing, H = Transportation and storage, J = Information and communication, K = Financial and insurance activities, M = Professional, scientific and technical activities

Figure 47: Expected development regarding access to preliminary products by sectors



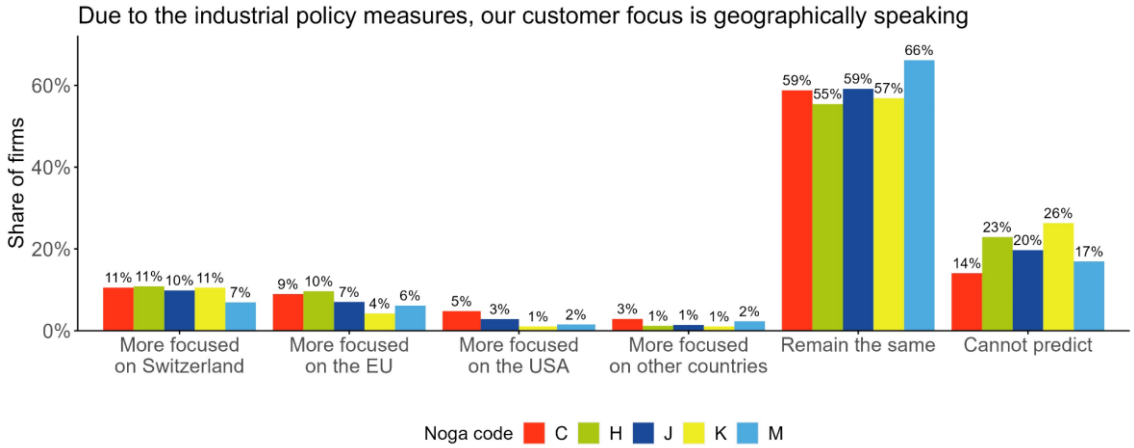
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=647, C = Manufacturing, H = Transportation and storage, J = Information and communication, K = Financial and insurance activities, M = Professional, scientific and technical activities

Figure 48: Expected shift in the origin of intermediate products by sectors



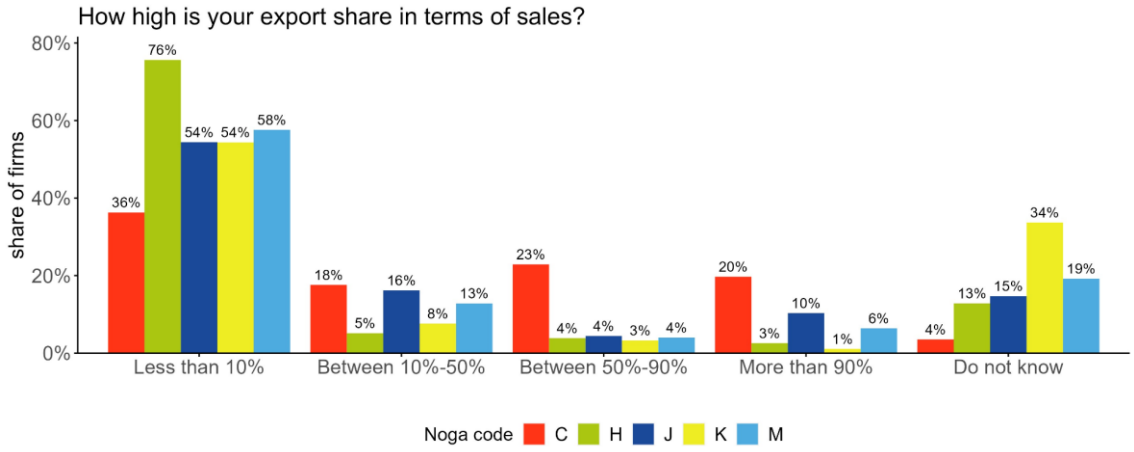
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=647, C = Manufacturing, H = Transportation and storage, J = Information and communication, K = Financial and insurance activities, M = Professional, scientific and technical activities

Figure 49: Expected shift in customer focus by sectors



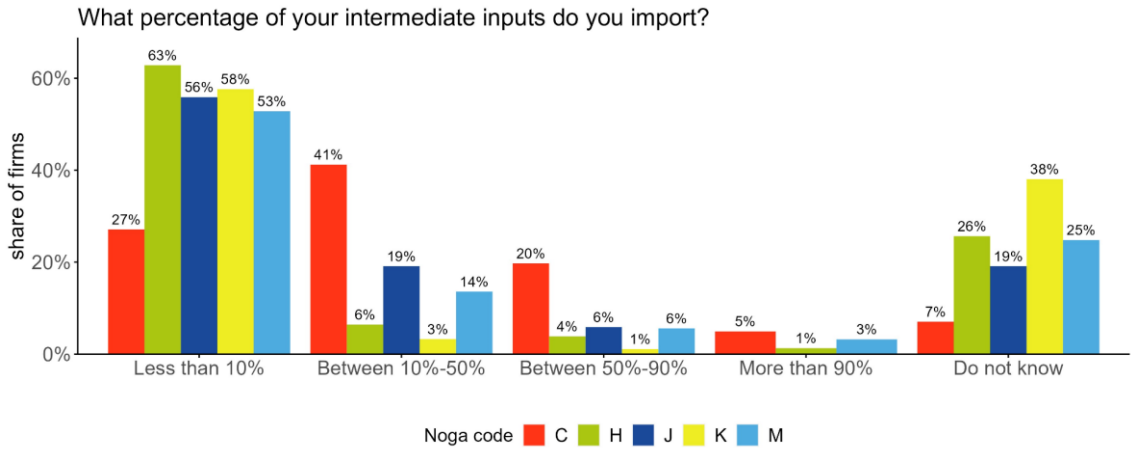
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=647, C = Manufacturing, H = Transportation and storage, J = Information and communication, K = Financial and insurance activities, M = Professional, scientific and technical activities

Figure 50: Export share by sectors



Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=647, C = Manufacturing, H = Transportation and storage, J = Information and communication, K = Financial and insurance activities, M = Professional, scientific and technical activities

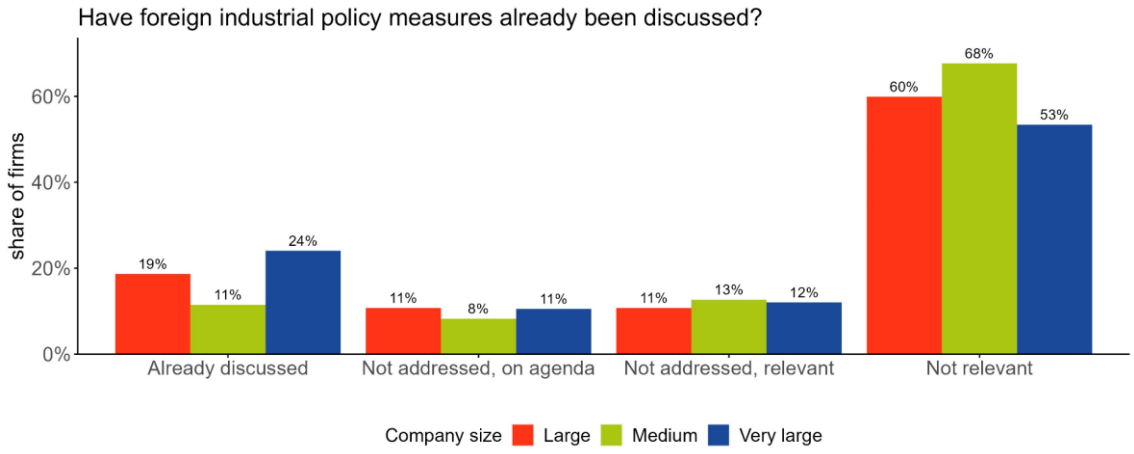
Figure 51: Import share by sectors



Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=647, C = Manufacturing, H = Transportation and storage, J = Information and communication, K = Financial and insurance activities, M = Professional, scientific and technical activities

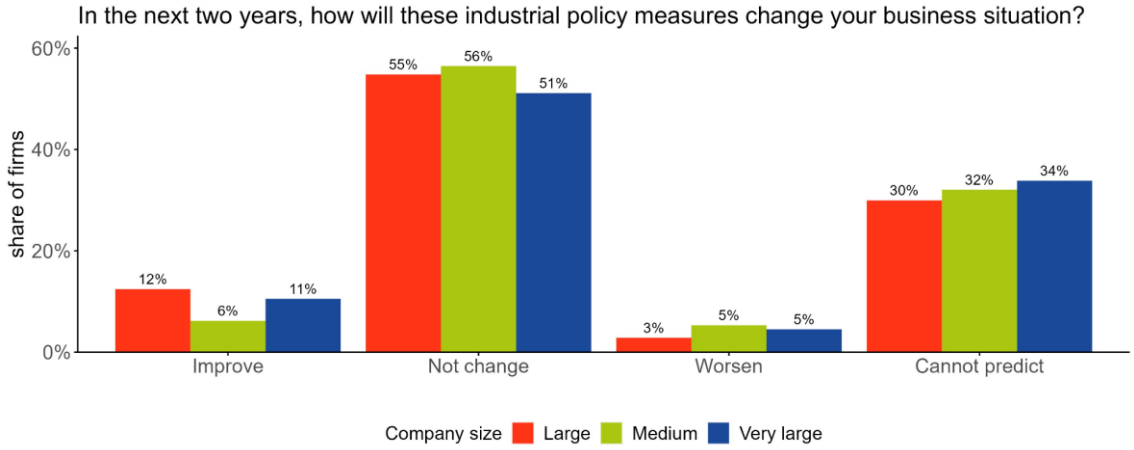
Business survey broken down by company size

Figure 52: Internal discussions on industrial policy initiatives broken down by company size



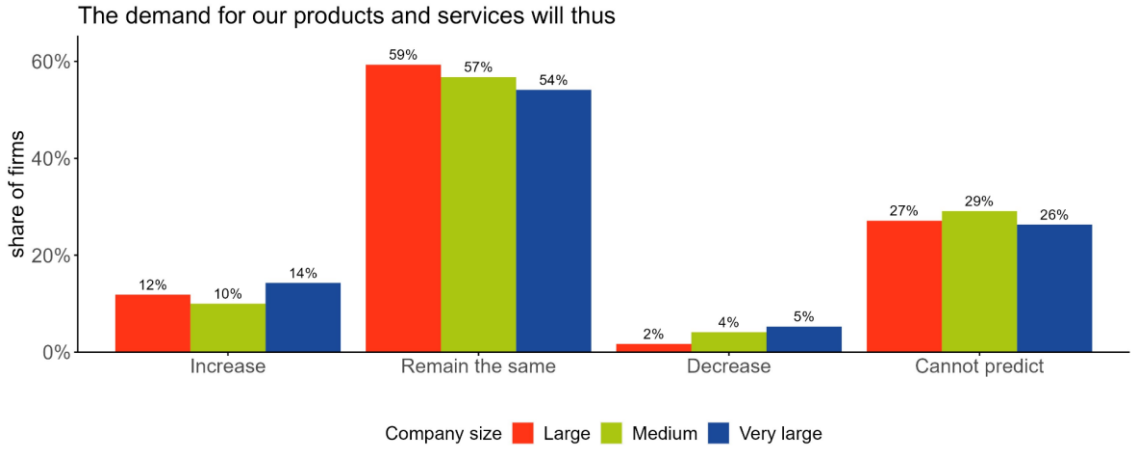
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 53: Expected change in business situation broken down by company size



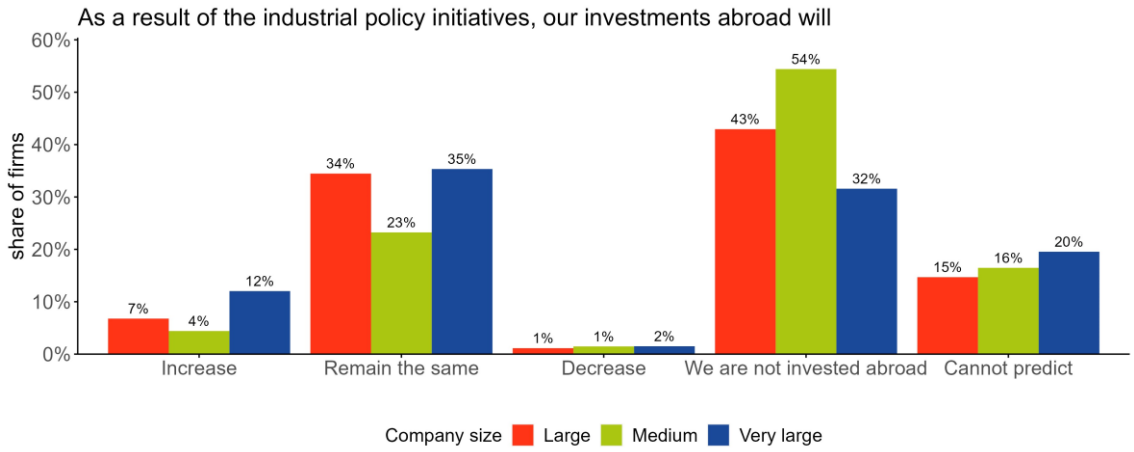
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 54: Expected change in demand for products broken down by company size



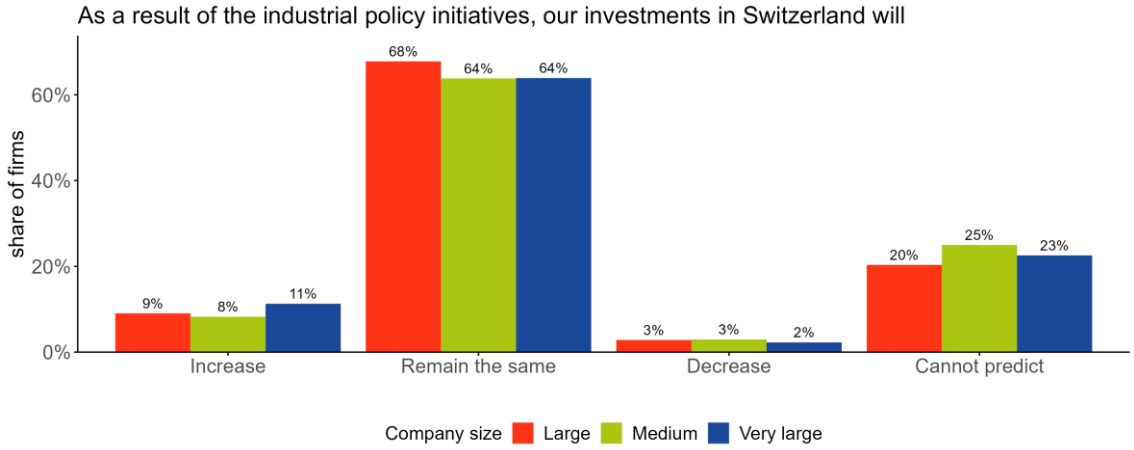
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 55: Expected change in investments abroad broken down by company size



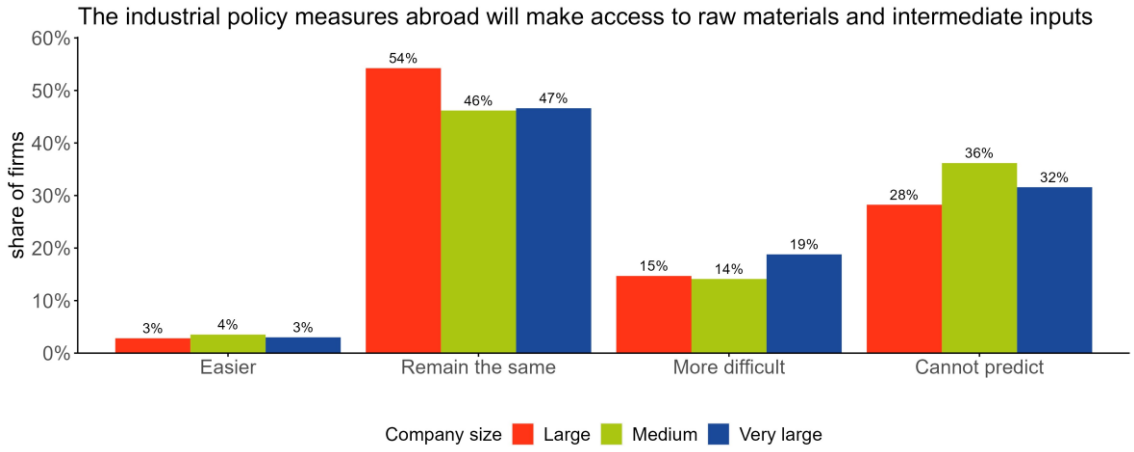
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 56: Expected change in in domestic investment broken down by company size



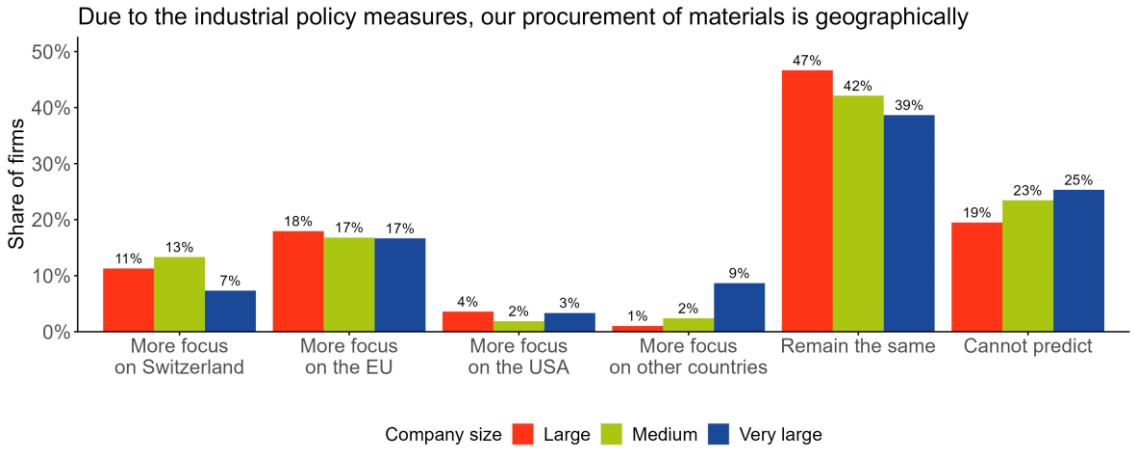
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 57: Expected development regarding access to preliminary products broken down by company size



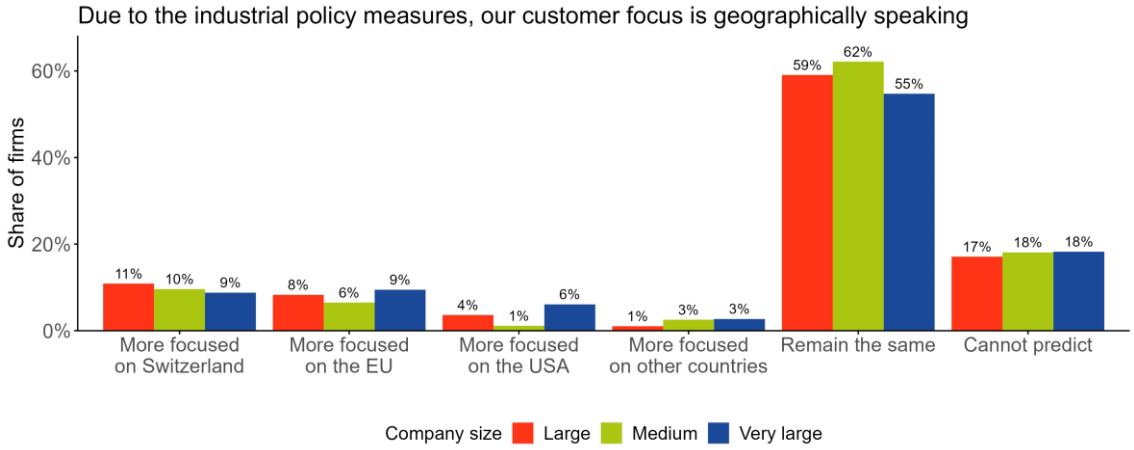
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 58: Expected shift in the origin of intermediate products broken down by company size



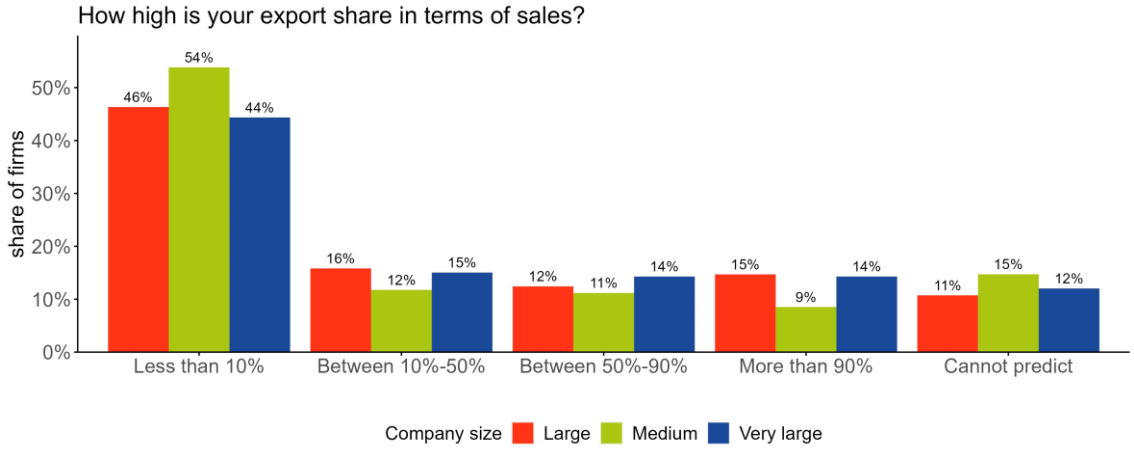
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 59: Expected shift in customer focus broken down by company size



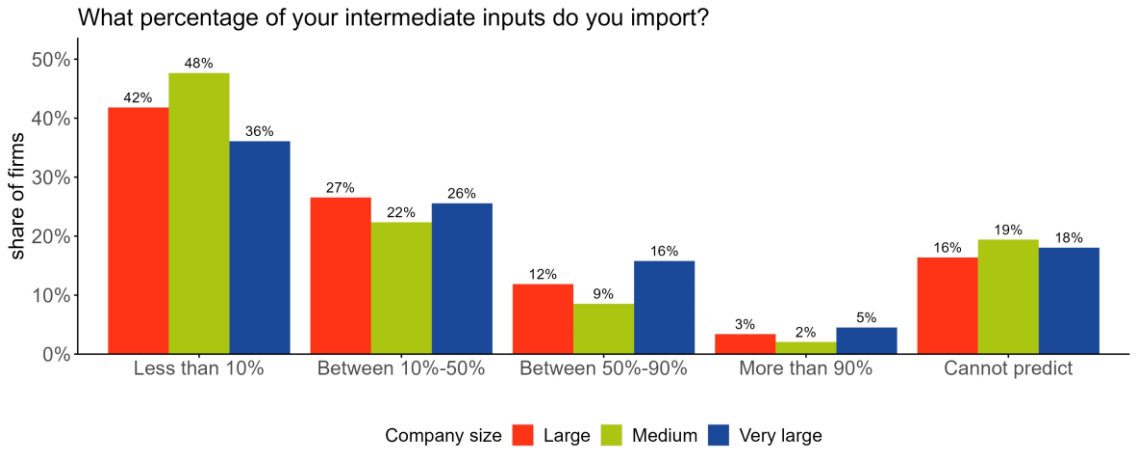
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 60: Export share broken down by company size



Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

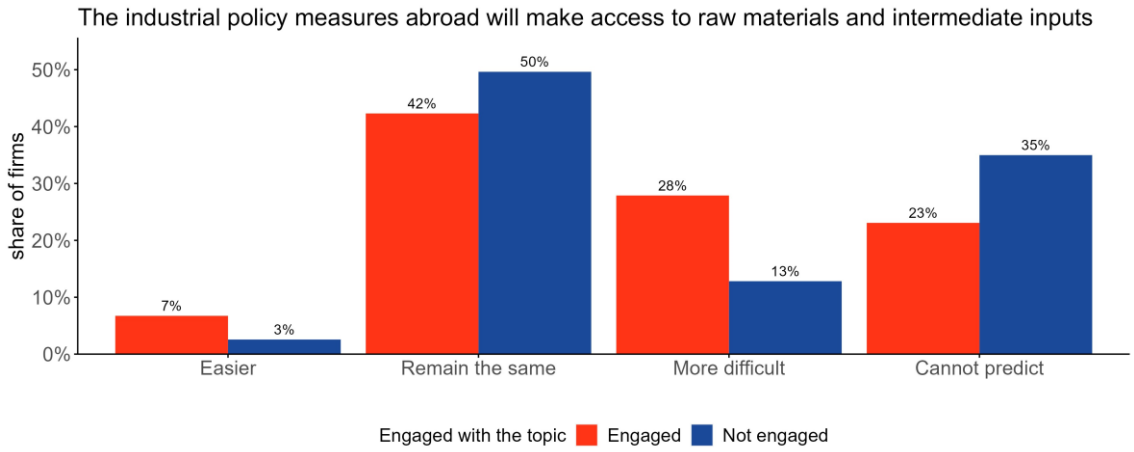
Figure 61: Import share broken down by company size



Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

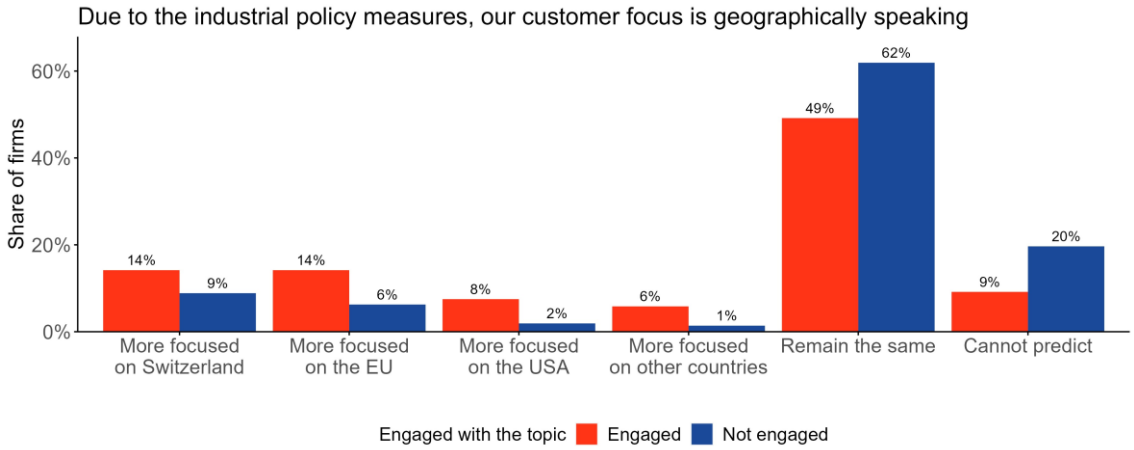
Survey results, variously broken down

Figure 62: Expected development regarding access to preliminary products broken down if the company has discussed the topic



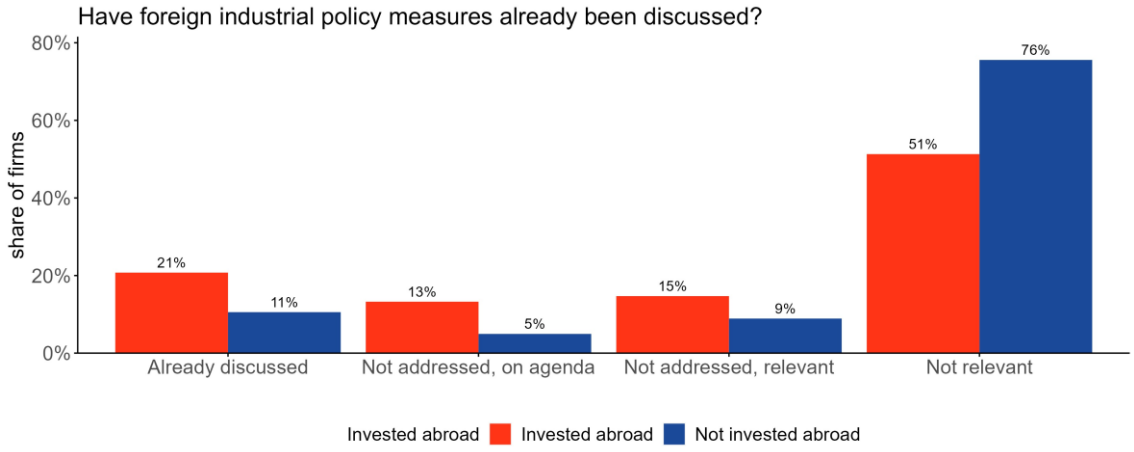
Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 63: Expected shift in customer focus broken down if the company has discussed the topic



Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

Figure 64: Internal discussions of industrial policy initiatives broken down if company is invested abroad



Source: Business survey in the manufacturing sector and manufacturing-related services of firms with more than 50 employees, own illustration, N=650

A. Econometric Analysis of the "Juncker Plan"

Table 8: Summary Statistics KOF Innovation Panel

	Turnover (CHF)	Number of employees	Investments (CHF)	R&D expenditures (CHF)
N	10'083	10'942	9'680	4'049
Mean	160'911'456	256.1	7'265'684	9'337'856
Standard Deviation	191'4375'248	1566.06	65'879'276	138'037'630
Inter quartile range	49'555'836	142	1'925'000	833'333.3
Total number of observations across all waves				10'943
Unique firms				4'816

Note: The item on R&D expenditures has been answered by less than half of all participating firms. Results based on this outcome therefore might be noisier and refer to a more selective subgroup of firms. Data sources: KOF Innovation Panel.

Table 9: Sectors and Treatment Definitions

Industry	Ratio: EFSI guarantees / GVA	Treatment status: Low threshold (main analysis)	Treatment status: High threshold (robustness check)
Energy	0.0281	1	1
Electronic and Optical Products, Watches/Clocks	0.0196	1	1
Water/Environment	0.0161	1	1
Vehicles	0.0146	1	1
Construction	0.0127	1	1
Electrical Equipment	0.0123	1	1
Telecommunications	0.0106	1	excluded
Transportation	0.0104	1	excluded
Basic Metals	0.0095	1	excluded
Other Manufacturing	0.005	0	0
Pharmaceuticals	0.0046	0	0
Publishing/Media	0.0045	0	0

Technical Commercial Services	0.0039	0	0
Chemicals	0.0037	0	0
Paper	0.0033	0	0
Non-metallic Minerals	0.003	0	0
Food/Beverages/Tobacco	0.0023	0	0
Machinery & Equipment	0.0017	0	0
Wood	0.0008	0	0
Retail Trade	0.0007	0	0
Information Technology/Services	0.0006	0	0
Other Commercial Services	0.0004	0	0
Rubber/Plastics	0.0002	0	0
Real Estate/Rental&Leasing	0.0002	0	0
Fabricated Metals	0.0001	0	0
Wholesale Trade	0.0001	0	0
Textiles/Clothing	0	0	0
Printing	0	0	0
Repair/Installation	0	0	0

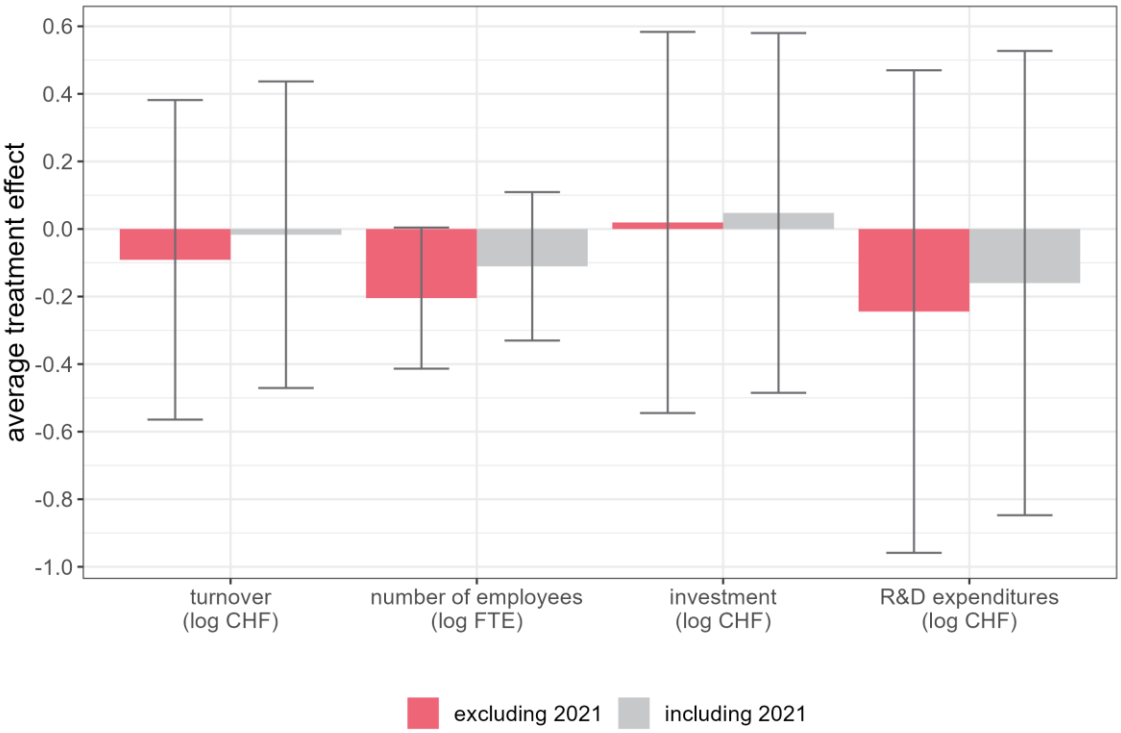
Data sources: EFSI.

Table 10: Direct effects of the Juncker-Plan using alternative methods

	Turnover (log CHF)	Number of employees	Investments (log CHF)	R&D expenditures (log CHF)
Synthetic Difference-in-Differences	-0.02 (0.23)	-0.11 (0.11)	0.05 (0.27)	-0.16 (0.35)
Difference-in-Differences	-0.04 (0.17)	-0.05 (0.12)	0.07 (0.20)	-0.15 (0.27)
Synthetic Control Method	0.12 (0.29)	-0.08 (0.38)	0.11 (0.42)	-0.06 (0.53)

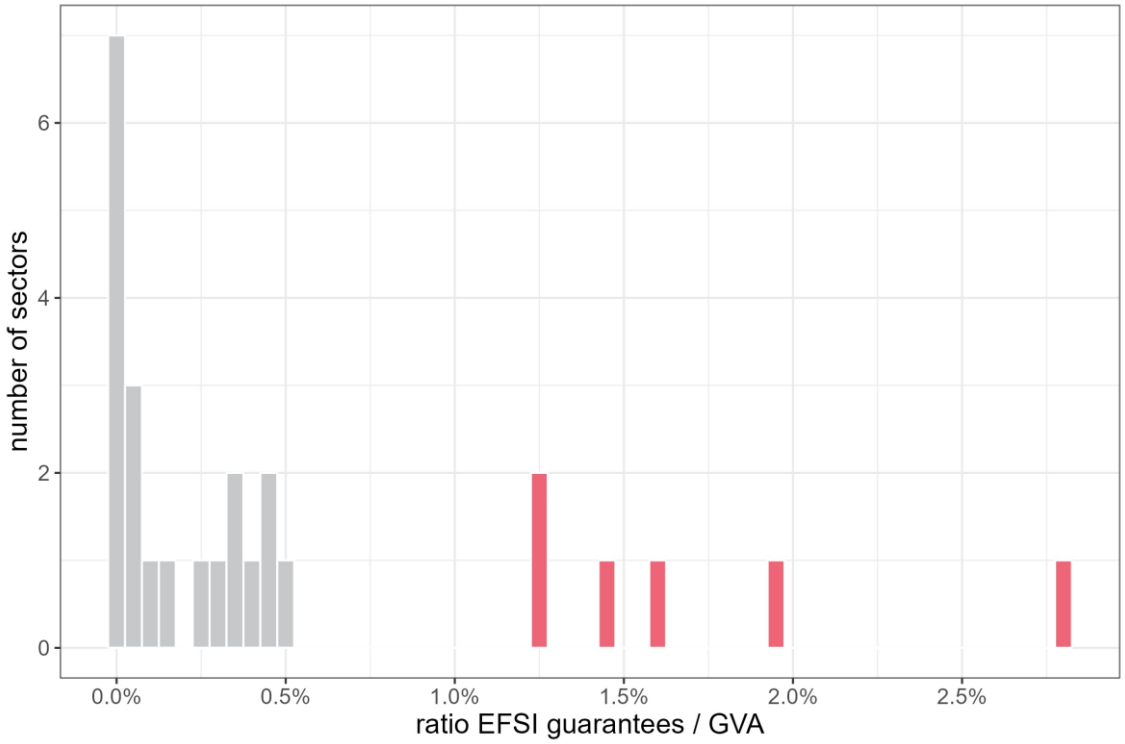
Note: The standard errors are in parentheses below the average treatment effect on the treated. Data sources: EFSI, KOF Innovation Panel.

Figure 65: Direct effects of the Juncker-Plan, excluding 2021



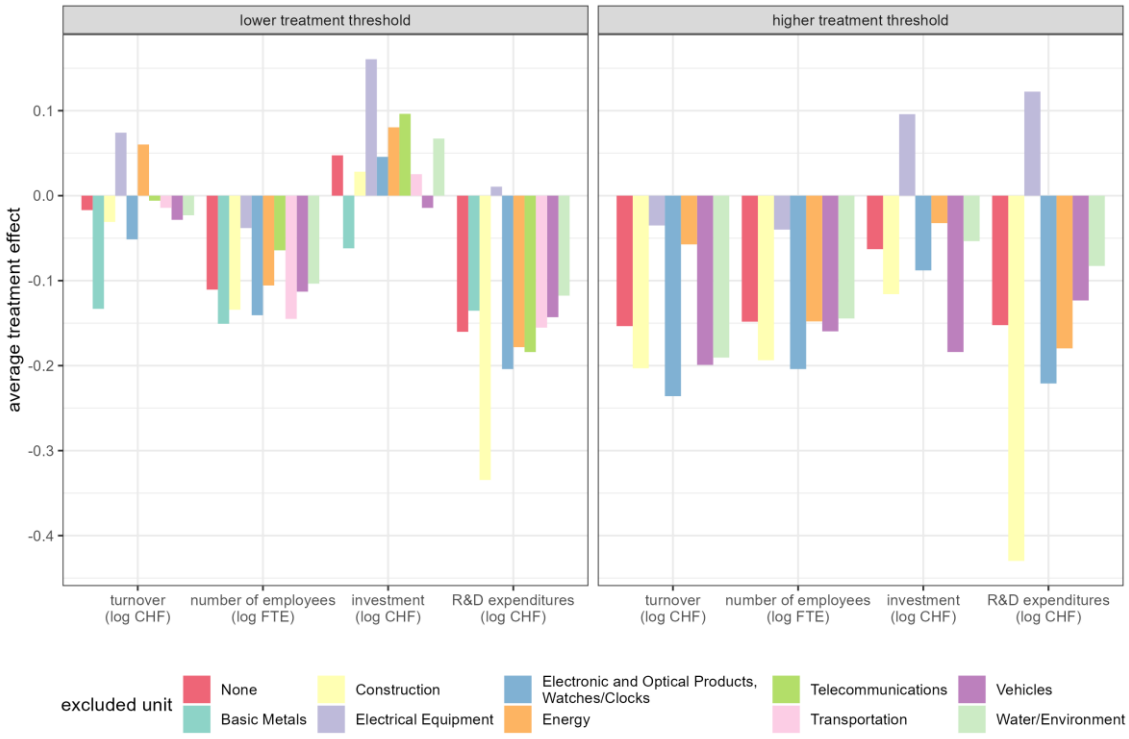
Note: This figure depicts the effect of excluding the year 2021 from the panel. The error bars indicate the 95%-confidence interval which are calculated using the Placebo method. Data sources: EFSI, KOF Innovation Panel.

Figure 66: Distribution of EFSI guarantees across sectors (higher threshold)



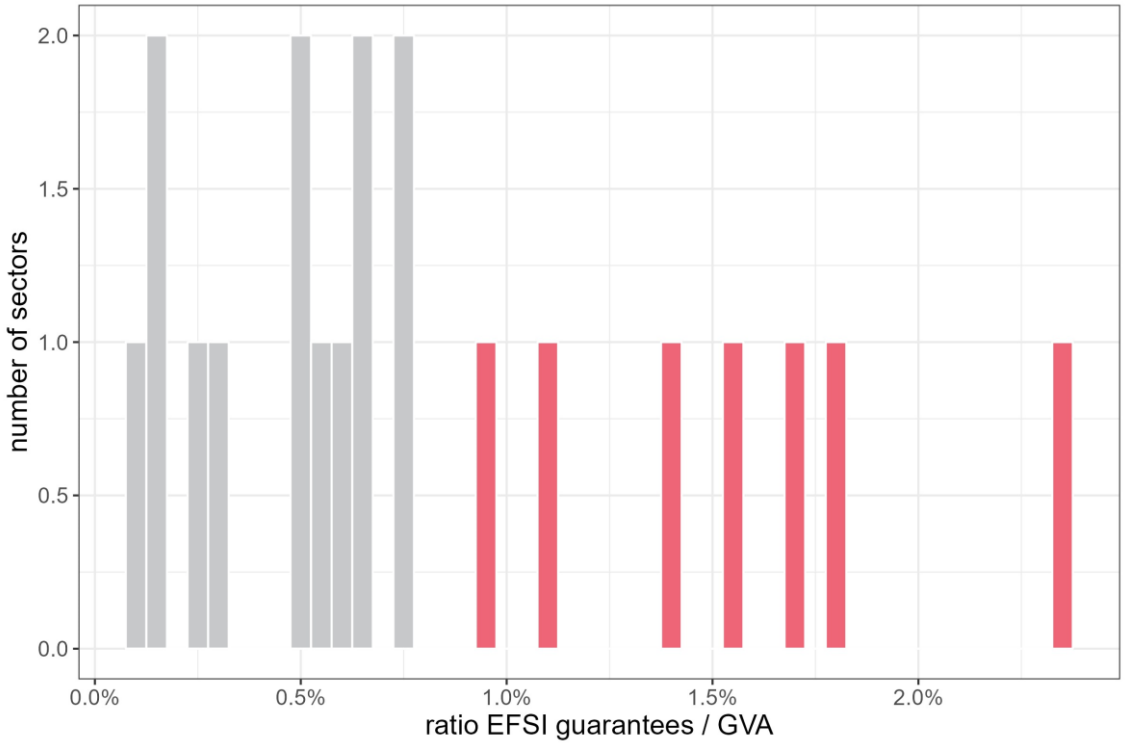
Note: The plot shows the distribution of the ratio between EFSI guarantees and GVA across Swiss sectors competing with a EFSI-backed sector. The sectors with a ratio exceeding the threshold of 1.2 percent are in red. Sectors with a ratio between 0.9 percent and 1.2 percent are excluded. Data sources: EFSI.

Figure 67: Excluding individual sectors



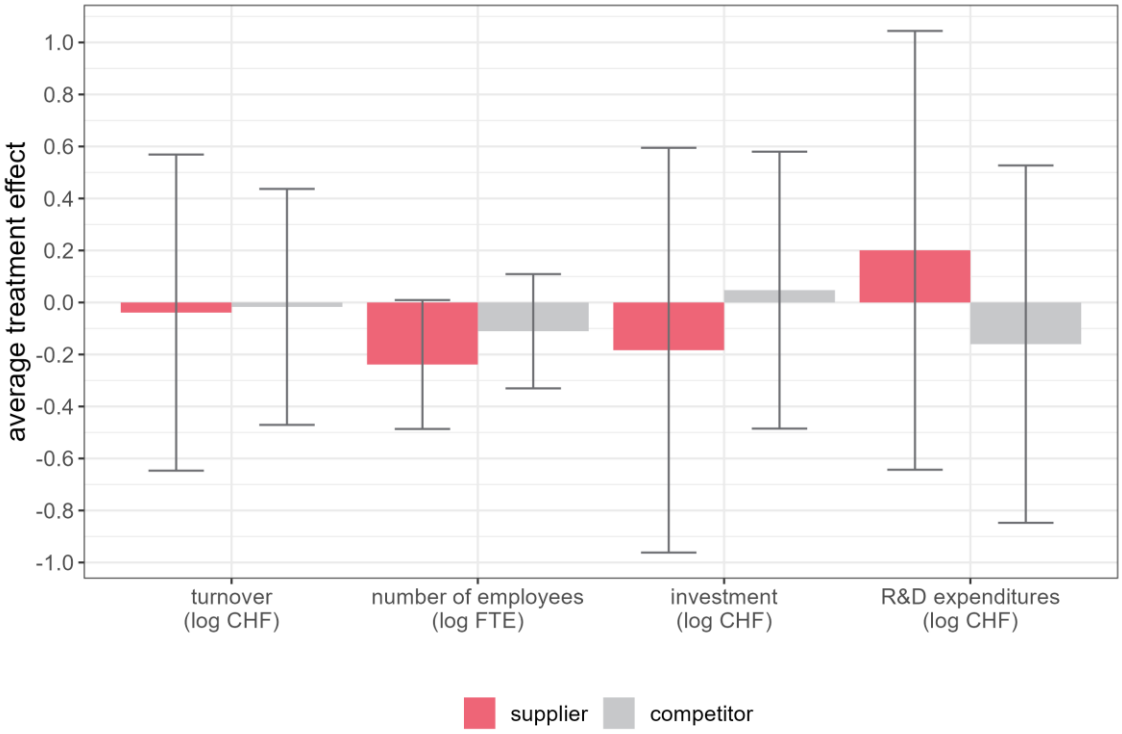
Data sources: EFSI, KOF Innovation Panel.

Figure 68: Distribution of EFSI guarantees across supplying sectors (first-round effect)



Note: This figure depicts the effect of excluding single treated units from the panel. The plot on the left side of the figure shows the effect for the lower treatment threshold (0.9). The right plot for the higher treatment threshold (1.2), excluding sectors in the interval [0.9, 1.2]. Data sources: EFSI, KOF Innovation Survey.

Figure 69: Effect of the Juncker Plan on suppliers



Note: This figure depicts the effect of the EFSI loan guarantees on Swiss supplier firms (red bars). The grey bars are our baseline estimate of the effect on direct competitors. The error bars indicate the 95%-confidence interval which are calculated using the Placebo method.

B. List of interviewees for the case studies

Name		Date of the interview	Case study
Michael Koller	Secretary General Industrial Sectors, Swissmeme	04 August 2023	Case Study 1: Electrification of the Chinese vehicle industry
Anja Schulze	Head of swiss Center for Automotive Research, University Zurich	07 August 2023	Case Study 1: Electrification of the Chinese vehicle industry
David Stickelberger	Head of Market and Policy, Swissolar	21 August 2023	Case Study 2: Subsidizing the German solar industry
Martin Naville	CEO, Swiss-American Chamber of Commerce	03 August 2023	Case Study 3 Buy American rules
Anina Bosshard	Consultant USA & Canada, Switzerland Global Enterprise	07 August 2023	Case Study 3 Buy American rules

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