International competition, protectionist measures and their impact on Austrian firms*

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Abstract   The aim of this study is to assess the impact of two distinct but interrelated challenges for Austrian firms resulting from Austria's integration in global trade. In particular, it provides micro-empirical evidence on the extent to which Austrian firms were affected by the increase in Chinese competition over the last decade and by the U.S. trade policy actions during U.S. President Trump's first term. Furthermore, this paper attempts to characterize how Austrian firms have reacted to these challenges from abroad. The results indicate that Austrian firms have demonstrated considerable robustness in the face of these recent challenges. Neither increased Chinese competition nor the U.S. tariffs introduced in 2018 exhibited significantly negative effects on employment, labor productivity and aggregate exports of Austrian firms. Increases in Chinese competition did, however, to a small extent, induce structural change via changes in specialization among continuing firms and market exit of some of the least productive firms. Within firms I find that increasing Chinese competition discourages R&D spending while protectionist measures in export destinations discourage large investments, which may undermine the ability of Austrian firms to withstand foreign competition and protectionist trade policy in the future.

Keywords: trade policy, protectionism, import competition, China, structural change, productivity, R&D, investment, exports

JEL Classification: D22, D24, F13, F14, F61, J23, J24, L16, L25, L60, O31

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Executive Summary

Aim:

This study assesses the impact of two distinct but interrelated challenges for Austrian firms resulting from Austria's integration in global trade. In particular, it provides micro-empirical evidence on the extent to which Austrian firms were affected by the increase in Chinese competition over the last decade and by the U.S. trade policy actions during U.S. President Trump's first term. Furthermore, this paper attempts to characterize how Austrian firms have reacted to these challenges from abroad.

Main results:

1. Effects of Chinese competition and U.S. import tariffs on firm performance:

   - The results indicate that Austrian firms have shown considerable robustness in the face of increasing competition from China and the U.S. import duties introduced in 2018.

   - Firms particularly subject to increases in Chinese competition in their product markets do not show significantly different patterns with respect to the evolution of employment and labor productivity between 2013 and 2022 than less exposed firms. Chinese competition has, however, contributed to a slight increase in firm closures among the least productive firms.

   - Similarly, the U.S. import duties introduced in 2018 did not reduce employment, labor productivity or firm survival among firms exposed to these tariffs. In terms of exports, Austrian firms seem to have reacted differently to the terms-of-trade shock than the existing evidence across all affected exporting countries suggests. While the average pass-through of tariffs on prices was virtually complete across all exporters, Austrian firms seem to have avoided significant declines in export quantities to the United States by reducing the price of goods shipped. However, since the U.S. import duties introduced in 2018 primarily targeted EU exports of aluminum and steel, drawing conclusions about the impact of the universal tariffs on EU exports introduced in 2025 is only possible to a limited extent.

2. Austrian firms' responses to increased Chinese competition and U.S. import tariffs:

   - The study reveals that increasing Chinese competition induced structural change within firms. In particular, larger increases in Chinese competition are associated with an increased probability of changes in specialization among continuing firms, potentially to escape increased foreign competition. Overall, such changes in specialization are, however, fairly seldom in Austria.

   - Stronger growth in Chinese competition in export markets seems to provide incentives to increase investment and raise labor productivity, potentially as means to deal with the intensified competitive pressure. With respect to R&D spending, however, the so-called discouragement effect of increasing competition seems to dominate for Austrian firms. This reduction in productivity-enhancing expenditure of firms raises concerns that the ability of Austrian firms to withstand foreign competition may decrease in the future.

- Austrian firms particularly exposed to the U.S. import duties introduced in 2018 tended to enter new export markets, an adjustment to potentially reduce the impact of tariffs. Concurrently, the U.S. import tariffs led to declines in investment by affected Austrian firms which were, however, primarily driven by reductions in large investments.

1   Introduction

Austria is a small open economy and, as such, highly exposed to developments abroad. In 2019, the value added exported — and thus directly influenced by foreign import demand — amounted to 36.2% of Austria's total domestic value added (OECD Trade in Value Added indicators). As highlighted in the Draghi Report (European Commission, 2024), the European economy is facing a multitude of challenges resulting from its global trade linkages. These include geopolitical uncertainties and, in this context, problematic dependencies in key technologies as well as with respect to the supply of energy and raw materials. Additionally, there has been a global increase in protectionist measures (Fajgelbaum et al., 2020). This trend is particularly pronounced in relation to China, whose growing focus on technology-intensive products accompanied by extensive industrial policy is viewed as a threat to European industry[1].

The aim of this study is to analyze if, in the recent past, the performance of Austrian firms particularly exposed to selected economic challenges from abroad evolved differently from performance indicators of less exposed firms. In particular, this analysis focuses on two separate but intertwined challenges that have been at the center of trade policy debates in recent years. Firstly, I examine how increasing competition from China affected Austrian firms over the period 2013-2022, during which Chinese competition intensified particularly in technology-intensive product markets. Secondly, the impact of the recent rise in tariff-related trade barriers is examined, using the wave of U.S. import duties introduced during U.S. President Trump's first term as a case study. In addition to assessing the impact of these developments, this study also explores if and how exposed firms have responded to these challenges thus far. The remainder of this paper is structured as follows. Chapter 2 more thoroughly describes the research agenda while also providing a short review of the literature related to the research questions addressed in this paper. Chapter 3 describes the analysis on the firm-level impacts and responses to increased competition from China. Chapter 4 discusses the evidence gathered on the impact of recent protectionist measures on Austrian exporters. Finally, Chapter 5 concludes.

2   Important challenges resulting from Austria's integration in global trade

2.1   Increasing Chinese competition in technology-intensive product markets

In a globalized world, intensifying competition from foreign producers is expected to influence the behavior and outcomes of domestic producers, irrespective of the source country of the competition. However, the trade literature has put particular emphasis on analyzing the impact of competition from China. There are a multitude of reasons for this choice of focus. One of these reasons is China's size and economic importance which has increased substantially since its accession to the World Trade Organization (WTO) in 2001. Since 2000, China's share of global manufacturing value added has increased from about 6.1 to 28.9 percent in 2020 (OECD Trade in Value Added Indicators). This rise of China as the dominant producer of manufactures has been accompanied by extensive industrial policies. These industrial policies together with the Chinese institutional setting have been argued to distort competition by, for example, forcing technology and knowledge transfers, creating overcapacities through subsidies and decoupling productivity growth

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[1]Implementing regulation (EU) 2024/2754, Recital 76, October 29, 2024.

from the growth in wages (Barbieri et al., 2019; Barwick et al., 2019; Tian, 2020; Zhang and Gallagher, 2016). This policy framework is the primary reason why it is commonly argued that Chinese competition is different from competition from other economies (Mion and Zhu, 2013).

These observations have contributed to the emergence of a strand within the trade literature focusing specifically on the effects of the rapid expansion of Chinese exports following its accession to the WTO. This "China Shock" literature has revealed fundamental impacts of Chinese competition on the manufacturing sector of industrialized economies, particularly in the United States. Studies by Autor et al. (2013) and Acemoglu et al. (2016), among others, document significant declines in industrial employment among U.S. firms particularly exposed to Chinese competition during the decade following China's WTO accession. These employment declines were both due to increased closures of establishments in import-competing industries (Asquith et al., 2019) and employment declines within continuing establishments in these industries. The results of Autor et al. (2014, 2015) further point to significant impact heterogeneity with respect to characteristics of workers and jobs. They find that less educated workers and jobs involving routine tasks were more strongly affected by the expansion of Chinese imports. The results of Magyari (2017) and Bloom et al. (2024) further point to a purely statistical explanation for part of the measured employment decline in manufacturing. In particular, these authors show that Chinese competition also led to changes in the specialization of plants and entire firms, which in turn resulted in the reclassification of continuing establishments (and their workers) from manufacturing to services.

The adverse effects of the China shock in the U.S. were, however, not restricted to employment outcomes. Pierce and Schott (2018) find that more exposed firms experienced a relative decline in investment while Autor et al. (2020) document a negative effect on firm-level innovation and patents.

The effects of the post-2001 China shock on European economies were somewhat different. In particular, Bloom et al. (2016) document a productivity-enhancing and innovation-inducing effect of the early China shock in Europe. Caselli et al. (2021) confirm this finding for French firms. In line with the findings for the U.S., most studies on European economies document adverse employment effects (Balsvik et al., 2015; Bloom et al., 2016; Utar, 2018)[2]. Basco et al. (2020) further show that workers initially employed in occupations more intensively used in French industries exposed to larger increases in Chinese competition experienced relative declines in earnings and tended to move away from these industries.

Much of the existing literature has, however, focused on the impacts of Chinese competition in the decade after the WTO member states lifted most barriers to Chinese imports in 2001. After its WTO accession, China initially specialized in producing and exporting labor-intensive goods with low technological intensity. This specialization pattern has, however, changed substantially over the last two decades along with a shift in Chinese industrial policy objectives. This transformation began with the publication of the "Outline of the National Medium- and Long-Term Plan for the Development of Science and Technology (2006-2020)" by the State Council of the People's Republic of China. For the first time, this plan emphasized the importance of domestic innovation and the technological upgrading of China's manufacturing industry. This focus was further reinforced by the "Made in China 2025" strategy , which aims to transform China into a global

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[2] Dauth et al. (2017) is is a notable exception in this regard.

innovation hub and world leader in high-tech industries through government subsidies, the strategic use of state-owned enterprises, and the acquisition of intellectual property. As part of this strategy, ten key industries were explicitly identified in which China seeks to achieve technological leadership. These key industries include information technology, computer-controlled machine tools and robotics, aerospace equipment, shipbuilding technology and advanced ships, rail transport equipment, energy-efficient vehicles, electrical equipment, agricultural machinery, innovative new materials, and biomedicine as well as high-performance medical devices. These sectors largely correspond to industrial segments in which the specialization of the European manufacturing sector lies. For instance, the industries identified by China as key sectors overlap with 6 of the 10 Harmonized System product categories (2-digit: HS2) that accounted for the highest share of Austria's nominal exports between 2018 and 2022 (UN Comtrade: pharmaceuticals, plastics, nuclear reactors and mechanical/electrical machinery/apparatus/devices, non-railway land vehicles and parts thereof, measuring/testing or precision instruments, and medical instruments). They also align with 6 of the 10 NACE 2-digit goods-producing sectors that contributed most to Austria's gross value added between 2019 and 2023 (Statistics Austria).[3]

According to the OECD's Trade in Value-Added indicators, China's share of global value added in the ISIC Rev. 4 industries that can be linked to the key sectors outlined in the "Made in China 2025" strategy rose from 8.5% in 2007 to approximately 20.7% in 2020. In parallel, China's share of global exports in the relevant product categories increased from 11.6% in 2007 to 19.7% in 2023. These figures suggest that China's MiC2025 strategy has been largely successful in evolving China from being the world's factory of cheap and low-tech manufactures to an exporter of technology-intensive products.[4]

In spite of this fundamental shift in specialization patterns and industrial policy focus, the empirical evidence on the effects of Chinese competition during this period of industrial upgrading is limited. Perhaps unsurprisingly, the results of the few studies analyzing more recent periods suggest that the effects of Chinese competition have changed in recent years. Friesenbichler et al. (2024), for example, show that the productivity-enhancing effects of the China shock on firm-level productivity in Europe gradually declined and eventually reversed over time.

In this paper, I provide micro-empirical evidence with respect to several of the channels and effects of increasing Chinese competition discussed in the literature. In doing so, I restrict my attention to the impact on Austrian firms. Due to data restrictions, I focus the analysis on the period 2013-2022 and hence to the period in which China's industrial policy focus had begun to shift toward technology-intensive industries. The analysis is presented in Chapter 3.

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[3] Due to the vague description of the key industries within the "Made in China 2025" strategy and the use of aggregated HS and OENACE categories in the assignment above, the assignment of the MiC2025 key industries to OENACE and ISIC industries as well as HS product categories is not exact and merely serves as an illustration. The assignment of MiC2025 key industries to HS product categories is based on Gopinath et al. (2025). The following industries and product lines have been assigned to MiC2025 key industries: ISIC Rev. 4 & OENACE: 20, 21, 26-30, 32, 33, 49, 58, 62; HS2: 28-30, 38, 39, 84-90.

[4] However, a look at the composition of China's export portfolio casts doubt on this conjecture, as the share of the product categories associated with the MiC2025 strategy in China's total exports has increased by less than 1% over the period from 2007 to 2023. Moreover, the empirical literature (see Branstetter and Li, 2024a,b) documents mixed results regarding the effectiveness of measures under the "Made in China 2025" strategy for Chinese companies.

2.2   The impact of the current wave of protectionism

The extensive industrial policy undertaken by the Chinese government described above has resulted in multiple complaints of other governments over Chinese trade practices at the WTO. Furthermore, it also entailed investigations by national authorities, such as the investigation of the office of the United States Trade Representative into "China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation" in 2017[5]. This investigation ultimately resulted in U.S. President Trump imposing sweeping tariffs on Chinese imports in 2018 (referencing Section 301 of the Trade Act of 1974). Hence, the increase in the incidence of protectionist measures documented in Figure 1 is partially directly related to the increase in Chinese competition and the industrial policy that accompanied it. However, more broadly, the year 2018 saw an increase in protectionist measures, particularly by the U.S. administration, that went beyond China as the target.

In February 2018, the United States implemented import tariffs on washing machines and solar panels. This was followed by increases in import duties on steel and aluminum, citing threats to national security (Section 232 of the Trade Expansion Act of 1962).[6] With few exceptions, these measures targeted all exporting nations, not just China. These trade policy actions triggered retaliatory measures by the affected trading partners, including the European Union, China, Canada and others.[7]

Figure 1: New trade measures introduced globally

Source: Global Trade Alert database.

Figure 2 depicts the evolution of the U.S. import tariff rates on EU exports of product lines affected by the Trump tariffs introduced in 2018. In total, these protectionist measures by the United States applied to 5.4 percent of Austria's exports to the U.S. in 2017, raising the export-weighted average ad-valorem import tariff rate levied on Austrian exports to the U.S. from 0.04 percent to 1.23 percent (own calculations based

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[5] https://ustr.gov/issue-areas/enforcement/section-301-investigations/section-301-china/investigation
[6] EU exports of steel and aluminum were initially exempt from the U.S. import tariffs. This exemption ended on June 1, 2018.
[7] see Bown and Kolb (2025).

on UN Comtrade and Fajgelbaum et al., 2020). Aside from minor adjustments, these tariffs remained largely in place until the end of 2021, when the U.S. and the EU reached an agreement to replace the existing tariffs on EU steel and aluminum exports with a tariff-rate quota (TRQ) at the beginning of 2022.[8] According to data provided by the United States Customs and Border Protection[9], the limits set forth in this agreement have, with few exceptions, not been binding for Austria.

Figure 2: Trump-I tariffs on EU exports

Source: Own calculations based on data provided by Fajgelbaum et al. (2020) and the United States International Trade Commission (USITC).
Notes: The figure depicts the evolution of the unweighted averages of U.S. import duties on the product lines targeted by the U.S. tariffs on EU exports introduced during U.S. President Trump's first term.

During his 2024 presidential campaign, U.S. President Trump repeatedly expressed plans to introduce additional protectionist measures. In line with these promises, the first new tariffs were announced in February 2025. These tariffs were specifically targeted at Canada, Mexico and China with national emergencies due to illegal immigration and drug trade from these countries serving as their justification.[10] The first new universally applicable tariffs came with the announcement of 25 percent tariffs on aluminum and steel imports that took effect on March 12.[11] Tariffs on cars as well as car components followed on April 3 and May 3 respectively. On April 2, commonly referred to as "Liberation Day", Trump announced a universal tariff on U.S. imports of 10 percent and substantially higher tariffs for a large number of countries, including the EU. The intention of these additional country-specific tariffs (referred to by the Trump administration as reciprocal tariffs) was to rectify bilateral U.S. trade deficits. While the universal tariff rate went into effect on April 5, the reciprocal tariffs were paused — except for China — for 90 days only a few days after their announcement.

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[8] The stepwise reductions of rates on washing machines and solar panels (see Figure 2) were already stipulated in the initial tariff schedule containing these non-MFN rates.

[9] https://www.cbp.gov/document/report/2022-european-union-tariff-rate-quota-data

[10] The overview of measures presented here was created with the help of the up-to-date timeline provided by the Peterson Institute for International Economics (see Trump's Trade War Timeline 2.0).

[11] On June 3, 2025 U.S. President Trump signed a proclamation to increase the tariffs on aluminum and steel imports to 50 percent, starting on June 4.

For Chinese imports, the minimum tariff rate was temporarily increased to a maximum of 145 percent, leading to an announcement of counter-tariffs of 125 percent on U.S. shipments to China. On May 12, China and the U.S. eventually agreed to reduce these tariffs for a (at first) 90-day period to 30 percent on Chinese exports to the U.S. and 10 percent on U.S. exports to China respectively.

After repeatedly threatening higher tariffs on EU imports, the U.S. administration and the European Commission reached a framework agreement on July 27, 2025[12]. This agreement stipulates an ad-valorem tariff ceiling of 15 percent on most EU exports to the United States. Exceptions include aircraft and aircraft parts as well as generic pharmaceuticals and chemical precursors. This agreement also applies to EU exports of cars and car parts which had been subject to higher tariffs since April and May respectively. EU exports of aluminium and steel are, however, not covered by this agreement and are therefore subject to the 50 percent tariffs that went into effect in June 2025.[13] As part of the framework agreement, the EU is not imposing any counter tariffs vis-à-vis the United States.

Due to the limited time span since the introduction of the Trump II tariffs, a thorough investigation of their effects on Austrian firms is not yet possible. For this reason, this paper analyzes the effects of the Trump tariffs introduced in 2018 to inform the current policy debate, even though the 2025-wave of tariffs differs in important ways from the tariffs introduced during President Trump's first term — namely in terms of coverage and the degree of policy uncertainty. The conclusions to be drawn with respect to the impact of the 2025-wave of tariffs including noteworthy caveats are discussed in Chapter 4.3.

Generally, it would be desirable to assess the impact of all recent tariff reforms of Austrian trade partners as their effects are likely to vary depending on the type of market and the type of goods exported. Nevertheless, I restrict my attention to the U.S. tariffs implemented in 2018 due to data availability issues. In particular, publicly available datasets (UNCTAD TRAINS, WTO-IDB, CEPII MacMap) on tariff-related trade barriers record Most-Favored Nation (MFN) tariffs as well as preferential tariffs under trade agreements. MFN tariffs represent tariff ceilings per product line that WTO members have agreed upon with one another. However, changes to import tariffs also occur beyond MFN tariffs. These are recorded in the national tariff schedules of individual countries but are not included in publicly available datasets. The tariff increases implemented as part of the trade war between the United States and China since 2018 constitute, for the most part, such non-MFN tariffs. Hence, a comprehensive representation of all recent tariff reforms by Austrian trade partners would require compiling a large number of frequently-changing individual national tariff schedules which goes beyond the scope of this paper.[14]

The trade policy by the U.S. administration since 2018 has spurred the emergence of a large literature on its impacts. While tariffs levied by the U.S. on imports of non-Chinese origin are taken into account in most empirical specifications, the discussion of impacts within this literature is very much focused on the effect on

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[12] see "Joint Statement on a United States-European Union framework on an agreement on reciprocal, fair and balanced trade".

[13] However, the introduction of tariff-rate quota solution including duty-free quantities was announced.

[14] Caliendo et al. (2023) provide comprehensive globally harmonized tariff schedules for the period 1990–2010 through the Worldwide Tariff Database (WTD), but there is no comparable harmonized database that captures the universe of tariff reforms since 2010.

consumers and producers in the U.S. and China (see Fajgelbaum and Khandelwal, 2022 for a review of this literature). Existing studies consistently find that the trade war led to a significant decline in U.S. imports and exports in affected product lines and sectors (Amiti et al., 2019; Fajgelbaum et al., 2020). Yang et al. (2024) document similar results for China. Furthermore, Amiti et al. (2019), Fajgelbaum et al. (2020) and Cavallo et al. (2021), among others, show that the pass-through of duties on prices was virtually complete, causing consumers in the tariff-levying economies to bear most of the price increases caused by the tariffs.

Moving beyond the impact on the U.S. and China, the studies by Alfaro and Chor (2023), Fajgelbaum et al. (2024) and Freund et al. (2024) investigated the extent to which the trade war between the U.S. and China led to shifts in U.S. import demand to non-affected exporting countries. Alfaro and Chor (2023) and Freund et al. (2024) find that U.S. imports from China were primarily replaced with imports from large, developing economies, such as Vietnam and Mexico. Fajgelbaum et al. (2024) document that bystander-economies, on average, increased their shipments of products with higher tariffs levied by the U.S. and China to the U.S. and the rest of the world excluding China. The results of these authors also point to a large heterogeneity in export growth in targeted versus non-targeted varieties across countries. For Austria, these authors report a positive but insignificant change in exports in varieties taxed either by the U.S. or China. The present study is, however, to the best of my knowledge, the first to thoroughly assess the firm-level effect of the Trump I tariffs within an individual country.

2.3   Outline of the analyses

The remainder of the paper is structured as follows. Chapter 3 presents the analysis on the impact of increasing Chinese competition on Austrian firms. More specifically, subchapter 3.1 introduces the measures of Chinese competition used. Subchapter 3.2 presents descriptive sectoral evidence while subchapter 3.3 describes the micro-level analysis conducted within the Austrian Micro Data Center, including the data and methodology used as well as the empirical results. Finally, subchapter 3.4 discusses the findings. Chapter 4 presents the analysis on the impact of the U.S. import duties introduced during U.S. President Trump's first term. Subchapter 4.1 outlines the data used to conduct the analysis and presents descriptive evidence based on publicly available trade data. Subchapter 4.2 outlines the micro-empirical evidence generated by means of firm data from the Austrian Micro Data Center. Subchapter 4.3 discusses the conclusions one might be able to draw from the analysis with respect to the potential impact of the 2025-tariffs on Austrian firms. Finally, Chapter 5 concludes.

3 The evolving China Shock

3.1 Measuring Chinese competition

Following the China shock literature, I measure the product-level intensity of Chinese competition in the domestic market as the value of Austrian imports of product p from China in year t ($M_{p,t}^{CHN \to AUT}$) divided by total imports in a particular base year t_0 (Formula 1), where C_{-AUT} denotes the set of all countries without Austria. The choice of dividing by total imports in a base year t_0 instead of the current year t is rooted in the aim to solicit the effect of the Chinese supply shock net of any potential domestic shocks that may influence domestic import demand (Acemoglu et al., 2016; Bloom et al., 2024). In robustness specifications, I do, however, find that dividing by imports in the current year t instead of t_0 does not qualitatively alter the results (see Tables 2 & 3 for example).

$$IC_{p,t}^{CHN \to AUT} = \frac{M_{p,t}^{CHN \to AUT}}{M_{p,t_0}^{C_{-AUT} \to AUT}} \tag{1}$$

Below, I will refer to this indicator related to the domestic market as $IC_{p,t}^{d}$. Most of the China shock literature has exclusively measured the trade shock via changes in Chinese market penetration in the domestic market.[15] However, this approach does not appear adequate for an analysis of a small-open economy such as Austria due to the small size of its domestic market and its strong export orientation. Given that Austria exports a significant share of its value-added (36.2 percent in 2019 according to the OECD Trade in Value Added Statistics), Austrian firms would likely be affected by an increase in Chinese imports in their export markets even if the market penetration in Austria remained low. For this reason, I follow Friesenbichler and Reinstaller (2023) in that I additionally consider a measure of Chinese market penetration in Austria's export markets (see Formula 2).

$$IC_{p,t}^{CHN \to C_{-\{AUT,CHN\}}} = \sum_{c \in C_{-\{AUT,CHN\}}} \frac{X_{p,t_0}^{AUT \to c}}{X_{p,t_0}^{AUT \to C_{-\{AUT,CHN\}}}} \cdot \frac{M_{p,t}^{CHN \to c}}{M_{p,t_0}^{C_{-c} \to c}} \tag{2}$$

In what follows, I will refer to this indicator related to Austrian export markets as $IC_{p,t}^{f}$. As visible from Formula 2, this measure of Chinese market penetration in Austria's export markets weighs the country-specific import intensity measures by the weights of the corresponding country in Austria's product specific exports X_{p,t_0}^{AUT} in a particular base year. Conceptually, this indicator should also include the Chinese market. However, computing the Chinese market share in the Chinese market would require product-level (or at least industry-level) information on Chinese production which, unfortunately, is only consistently publicly available on a very aggregated sectoral level. For this reason, the Chinese market is excluded from the computation of the measure of Chinese competition in Austria's export markets.

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[15] Friesenbichler and Reinstaller (2023) are a notable exception in this regard.

3.1.1 Limitations of chosen measures of Chinese competition

Theoretically it would be preferable to scale imports from China by initial absorption instead of initial total imports. Absorption measures domestic consumption of a certain product and can be computed by adding imports to domestic production and subtracting exports. Using absorption to scale Chinese imports would ensure an adequate measurement of the size of the domestic market by accounting for domestic production as well as re-exports (Acemoglu et al., 2016; Autor et al., 2021; Bloom et al., 2024). A country that produces much of what it consumes and imports little of a certain product — but where nearly all imports originate from China — would, for example, exhibit a very high indicator of Chinese penetration in the domestic market if total imports are used as the denominator (as in Formula 1).

However, data limitations prevent the use of an indicator based on initial absorption in this paper. Firstly, data on domestic absorption is only available at the industry level, not at the product level. In spite of this disadvantage, I prefer the use of product-level data in this analysis due to its far greater degree of granularity. In addition to providing a much more detailed picture of a firm's exposure to Chinese competition, explanatory variables that vary across firms within industries also permit the inclusion of disaggregated industry controls as well as disaggregated industry-time fixed effects in empirical specifications using micro data. In addition, publicly available data on industry-level absorption have a substantial number of gaps. When using the UNIDO Industrial Demand-Supply Balance Database (IDSB), for example, the annual share of country-industry cells with missing information on country-level absorption among Austria's export destinations lies between 74 percent and 90 percent (time coverage considered: 2007-2021). This corresponds to between 47 and 70 percent of annual Austrian exports.

Due to data on sectoral production being available for Austria up to the NACE 4-digit level (structural business statistics), it is possible, however, to compare the evolution of the industry-level indicators of Chinese competition using total imports and absorption in the denominator respectively. The correlation between the alternative measures varies between 81.5 percent and 92.4 percent depending on the aggregation of the NACE industry data. The same exercise for the non-missing cells of the UNIDO IDSB data reveals a correlation of 76.8 percent. This strong positive correlation suggests that the measurement error introduced by not adequately accounting for domestic production and exports in the Chinese competition measures is not too large.

Another data-induced limitation of the measures of Chinese competition used in this paper is their sole focus on goods trade. While international data on trade in services exists (e.g. UNCTAD Trade-in-Services, OECD Balanced Trade in Services), the nomenclature (EBOPS 2010) used to classify services trade hardly allows matching to NACE industries. This is because such a match requires a crosswalk via the CPC product classification which causes EBOPS-NACE matches to be almost exclusively n:n matches.

3.2 Sectoral evidence

Figure 3 plots the change in the indicator of Chinese competition in the domestic market (Formula 1) between 2007 and 2023 by NACE division/section.

Figure 3: Evolution of Chinese competition in the domestic market

Source: Own calculations based on BACI harmonized trade data.

Notes: To compute this industry-level indicator, correspondence tables from Eurostat were used to match the Harmonized System trade data to NACE four-digit industries. The indicators related to NACE sections were computed as the unweighted means of the corresponding NACE divisions (2-digit codes).

In order to compute this industry-level indicator, correspondence tables from Eurostat were used to match the Harmonized System trade data to NACE four-digit industries prior to computing $IC_{p,t}^d$ (see Friesenbichler and Reinstaller, 2023). For any NACE activity, a one percent increase in IC^d corresponds to an increase in the value of Austrian imports from China by one percent of total Austrian imports of goods associated with this NACE activity in 2007. As visible from this figure, our measure of Chinese competition intensity has increased substantially for almost all goods-producing (sub-)sectors. The increase from 2007 to 2023 was largest for the manufacturing of computers, electronic and optical products as well as the manufacturing of electrical equipment. For these sectors, the value of Chinese imports increased by more than three-fold during this time period.[16]

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[16] For NACE 26, IC^d increased from 0.08 in 2007 to 0.36 in 2023, for NACE 27 from 0.05 to 0.26.

Figure 4 plots the measure of Chinese import penetration in the Austrian market in 2023 $IC^d_{p,2023}$ against the measure of Chinese competition in Austria's export markets $IC^f_{p,2023}$. This figure reveals several notable patterns. Firstly, there is a strong positive correlation between the two measures, indicating that Austrian imports of Chinese goods have largely followed the global expansion of Chinese exports. However, there are some instances with large deviations between the two measures of Chinese import penetration, such as the NACE four-digit industries highlighted in Figure 4 (1399: manufacturing of other textiles n.e.c., 1420: manufacturing of fur products, 2344: manufacturing of ceramic insulators and insulating fittings, 3213: manufacturing of imitation jewellery and related articles and 3240: manufacturing of games and toys).

Figure 4: Correlation between Chinese competition in the domestic market and in export markets

Source: Own calculations based on BACI harmonized trade data.
Note: The indicator of Chinese competition intensity in the domestic market corresponds to the quotient of the value of Austrian imports from China in 2023 and the value of total Austrian imports in 2007 associated with the corresponding NACE 4-digit industry. The indicator related to Austrian export markets weighs the country-specific indicators by means of product-specific Austrian export weights.

Even though Figure 4 shows disaggregated four-digit NACE industries, it still hides important heterogeneity at the product-level. At the level of six-digit Harmonized System product lines, the Chinese market penetration measure in foreign markets increased for only approximately 64 percent of all product lines between 2008 and 2023, while it did so for 57 percent of products in the Austrian market. Even more strikingly, the changes in the measures of Chinese import penetration in the domestic market and foreign markets only have the same sign in about 71 percent of cases. This observation highlights the importance of measuring the China shock both in the domestic market and in export markets for small open economies such as Austria.

To get a first sense of the potential relationship between the evolution of Chinese competition and firm performance in Austria, Figure 5 plots the changes in our measures of Chinese competition at the level of NACE industries against the sectoral changes in employment, gross value-added and labor productivity taken from the aggregated structural business statistics of Statistics Austria. The left panel shows the correlation of the changes in these sectoral activity indicators with the changes in Chinese competition in the domestic market while the right panel does the same for the change in Chinese competition in Austrian export markets.

Figure 5 reveals a negative correlation for most sectoral activity indicators. Much of this correlation is, however, driven by extreme observations with respect to the sectoral performance indicators. Even when these extreme observations are not excluded, none of the correlations shown in Figure 5 are significant at conventional significance levels. In contrast to what most papers within the China shock literature show, this descriptive evidence therefore suggests that Chinese competition seems to not have had significant negative impacts on sectoral outcomes in Austria since 2008. In the following, this observation will be investigated much more thoroughly by means of the firm-level microdata provided by the Austrian Micro Data Center.

3.3 Firm-level evidence

3.3.1 Data

This research project was conducted with data from the Austrian Micro Data Center (AMDC). In particular, indicators on firm performance were computed with microdata from the structural business statistics available within the AMDC. Data on firms' exports was taken from Intrastat which records cross-border goods transactions within the EU as well as Extrastat recording flows between Austrian firms and entities in non-EU countries. The firm-level data was further supplemented with data on research and development (R&D) expenditure and R&D personnel from the R&D statistics on the business enterprise sector. In addition, the foreign-controlled enterprises statistics (OFATS) was used to assess the evolution of foreign affiliates under the control of Austrian firms as a partial indicator of offshoring activities of Austrian firms.

To calculate the product-level measures of Chinese competition intensity (Formulas 1 and 2), harmonized BACI trade data provided by CEPII was used (Gaulier and Zignago, 2010). These product-level indicators need to be assigned to firms to facilitate the computation of firm-level measures of Chinese competition intensity. This assignment is based on each firm's export portfolio. However, the firm-level trade data in Intrastat and Extrastat is recorded by means of Combined Nomenclature codes while the product-level indicators of Chinese competition are computed for six digit Harmonized System product lines – the most disaggregated product classification available in the BACI data. Hence, concordance tables provided by Statistics Austria[17] were used to aggregate the trade data within AMDC to six digit Harmonized Systems products.

Finally, to obtain a composite firm-level measure of Chinese competition intensity, the product-level indicators assigned to firms need to be weighted. For this purpose, within-firm product weights are computed based on each product's weight in each firm's export portfolio in the corresponding base year. Each firm's competition intensity indicator is then obtained as the export-weighted sum of the product-level indicators.

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[17] Classification Database of Statistics Austria

Figure 5: Correlation between changes in sectoral intensity of Chinese competition and sectoral activity

Employment

a) Austrian market
b) Export markets

Value-Added

a) Austrian market
b) Export markets

Labor Productivity

a) Austrian market
b) Export markets

Source: BACI harmonized trade data, structural business statistics provided by Statistics Austria, own calculations.
Notes: The trend lines that exclude outliers remove the most extreme 10 percent of observations with respect to each sectoral performance indicator.

Alternatively, it would be possible (and potentially desirable) to assign weights based on each firm's product portfolio. Data on firms' product portfolios is collected through the short-term business statistics (production of manufactured goods statistics — PRODCOM). However, the short-term business statistics are not a full census, thereby substantially reducing the sample potentially usable for the present analysis. Additionally, the PRODCOM product classification used in the short-term business statistics varies annually, such

that most products recorded in the short-term business statistics cannot be matched 1:1 or n:1 to Harmonized System product codes. For these reasons, the firm-level exposure to Chinese competition is computed based on firms' export portfolios instead of their product portfolios in this paper. This entails the notable caveat that the results subsequently presented only speak to the effect of Chinese competition on exporters of goods which do not constitute a representative sample of Austrian firms.

Table 1 provides summary statistics regarding the sample of Austrian firms available for the microdata analysis. The summary statistics on the indicators of Chinese competition shown in Table 1 refer to the firm-specific measures computed based on product-level trade data and each firm's individual export portfolio. In line with the sectoral evidence shown in Figure 3, the median increases in the firm-specific measures of Chinese competition are largest for firms classified in NACE 26 (manufacturing of computers, electronic and optical products) and NACE 27 (manufacturing of electrical equipment). Within the full sample, the median change in the indicator of Chinese competition in the domestic market over a five-year time period is 0.0091. The sample mean change over a five-year time span was 0.0314. This means that, on average over five years between 2013-2022, the value of Chinese imports of products in Austrian firms' export portfolios increased by 3.14 percent of global imports of these products at the beginning of this five-year horizon.[18]

3.3.2 Empirical specification

Motivated by the various effects of the China shock documented in the literature, I regress a number of firm-level outcomes on the measures of Chinese competition in the domestic market and in export markets outlined above. To eliminate time invariant firm fixed effects, I estimate

$$\Delta Y_{i,j,t} = \beta_1 \Delta IC^d_{i,j,t} + \beta_2 \Delta IC^f_{i,j,t} + \beta_3 \Delta IC^d_{i,j,t} \cdot IC^f_{i,j,t} + \eta_{j,t} + \Delta \varepsilon_{i,j,t} \tag{3}$$

with Δ denoting the five-year long difference operator. By using overlapping five-year differences for each firm I follow Bloom et al. (2016) to maximize the use of the data. $Y_{i,j,t}$ denotes the outcome variable for firm i in industry j in year t. The estimates of the coefficients β_1 and β_2 will eventually reveal the effects of changes in Chinese competition in the domestic market and export markets respectively on firm-level outcome $Y_{i,j,t}$. The existing literature would suggest that the estimate of β_1 should be negative and significantly different from zero for most dependent variables, such as employment (e.g. Autor et al., 2013), investment (e.g. Pierce and Schott, 2018) and firm survival (e.g. Bloom et al., 2016). For several other dependent variables, the results in the literature are mixed. With respect to R&D expenditure, Bloom et al. (2016), for example, report positive effects for European firms until 2007 while Cusolito et al. (2023) report negative effects for Chilean firms. Given that this study is, to the best of my knowledge, the first attempt to simultaneously include separate measures of Chinese competition in the domestic market and in export markets, the existing literature does not provide much indication with respect to the expected sign of β_2 (and β_3).

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[18] On average, the increase in the intensity of Chinese competition was larger in Austrian export markets with the sample median of ΔIC^f being 0.0262 and its sample mean being 0.0502.

Table 1: Firm sample for the analysis of the effects of Chinese competition

NACE activity	Number of Firms	Median of			
		IC^d_{2022}	IC^f_{2022}	$\Delta IC^d_{t \to t+5}$	$\Delta IC^f_{t \to t+5}$
B	65	0.014	0.039	0.000	0.002
10	419	0.004	0.009	0.000	0.001
11	124	0.006	0.009	0.000	0.002
13	221	0.060	0.195	0.004	0.03
14	90	0.173	0.284	0.014	0.015
15	52	0.135	0.178	0.001	0.002
16	470	0.003	0.015	0.000	0.001
17	98	0.018	0.084	0.003	0.013
18	230	0.033	0.087	0.003	0.007
20	196	0.022	0.064	0.006	0.015
21	55	0.010	0.029	0.002	0.007
22	358	0.066	0.151	0.020	0.042
23	249	0.026	0.096	0.002	0.008
24	109	0.038	0.100	0.010	0.021
25	981	0.059	0.157	0.014	0.042
26	296	0.124	0.210	0.030	0.053
27	267	0.144	0.267	0.033	0.066
28	780	0.059	0.162	0.018	0.043
29	116	0.017	0.067	0.007	0.017
30	56	0.065	0.101	0.031	0.029
31	431	0.064	0.152	0.008	0.025
32	280	0.109	0.249	0.018	0.035
33	351	0.057	0.152	0.016	0.042
D	47	0.057	0.147	0.021	0.046
E	116	0.002	0.006	0.000	0.003
F	1,220	0.058	0.164	0.013	0.035
G-S	15,287	0.059	0.146	0.009	0.025

Source: Own calculations based on BACI harmonized trade data, Austrian structural business statistics, Extrastat and Intrastat (within AMDC).

There is another crucial difference between the empirical approach in this paper and the existing literature in this field. The possibility to link firms' performance indicators to their export portfolio within AMDC allows me to compute firm-level measures of Chinese competition which, in contrast to the existing literature, vary within industries over time. This allows me to include industry-time fixed effects $\eta_{j,t}$, thereby

substantially reducing the risk that the estimated effects of the expansion of imports from China are confounded by business cycle movements or unobserved industry-level shocks. Hence, once industry-time fixed effects are controlled for, the identifying variation as well as the threat to identification comes exclusively from within industries over time.

3.3.3   Endogeneity concerns

Concerns about the potential endogeneity of measures of Chinese import penetration are pervasive throughout the China shock literature. This is because correlation between measures of Chinese competition with unobserved shocks to, for example, preferences or technology, would render these measures endogenous and the resulting estimates biased. The literature has proposed a number of instrumental variables approaches with the aim of overcoming these concerns. Much of the literature on the early impact of the China shock made use of the trade policy actions that led to the removal of barriers to Chinese imports to instrument for changes in Chinese import penetration. Bloom et al. (2016) among others used China's accession to the WTO and the associated removal of the Multi-Fibre Arrangement (MFA) quotas to construct an instrument. Similarly, Pierce and Schott (2016) considered the U.S. Congress granting China the Permanent Normal Trade Relations (PNTR) status in 2001 as an exogenous shock and used the gap between pre-PNTR tariffs and post-PNTR tariffs as a measure of the intensity of the China shock. While these strategies create convincingly exogenous variation in Chinese import penetration, they cannot be used to assess the impact of Chinese competition after 2013, as I attempt to do in this paper.

Another large part of the literature has relied on shift-share instruments to identify the effect of increased Chinese competition on outcomes in developed economies. In their seminal paper, Autor et al. (2013) measured the change in Chinese market penetration in any commuting zone as the weighted sum of the change in imports to the U.S. in all industries, with the employment share of each industry within each commuting zone as commuting-zone-specific weights of each industry's change in imports. To deal with the potential endogeneity of this measure, Autor et al. (2013) use lagged employment and the change in imports from China in a set of other developed economies to construct an instrument. The use of lagged employment is motivated by the concern that U.S. workers may have anticipated the shock which would then have affected the initial industrial structure and geographical dispersion of production. The use of Chinese imports to other developed economies to instrument for Chinese imports to the U.S. is rooted in the aim to remove demand-side (and thus U.S. specific) drivers of the growth in Chinese imports and solicit the supply shock resulting from China's accession to the WTO. Acemoglu et al. (2016) apply a very similar shift-share strategy to study industry-level outcomes. However, as I have previously noted, I explicitly include measures of Chinese market penetration in Austria's export markets as a separate channel of the China shock in our empirical specification. This obviously prevents us from using the same data to construct an instrument for the level of Chinese competition in the domestic market.

Bloom et al. (2016) proposed another shift-share approach which would theoretically be applicable to our sample. This shift-share approach is based on using initial conditions as instrumental variables. The rationale of this approach is based on the observation that, after its trade liberalization, Chinese exports initially grew the fastest in sectors in which China already had a comparative advantage before. For this

reason, Bloom et al. (2016) used the interaction between ex-ante sectoral Chinese import penetration and aggregate growth of Chinese imports across all sectors as an instrument for the sectoral change in Chinese imports. What this strategy requires, however, is strong correlation between initial conditions and subsequent growth in sectoral imports from China. Given the change in China's industrial structure, it is unsurprising that this correlation is no longer observable for the period studied in this paper. Using product-level indicators (six-digit Harmonized System product lines), the correlation between the product-level indicator of Chinese competition in the Austrian market in 2013 and the subsequent change of this indicator between 2013 and 2022 is -0.19. This renders the initial conditions shift-share instrument of Bloom et al. (2016) unsuitable for the present analysis.

In the absence of a suitable instrument for the present analysis, I do, however, undertake several steps to ensure the robustness of my results. As outlined above, the threat to identification related to potential correlation between unobserved shocks and the growth of Chinese imports in our baseline specification (Formula 3) is already substantially smaller than for studies using industry-level variation to estimate the effect of Chinese competition. For coefficients β_1, β_2 and β_3 estimated using Formula 3 to be biased due to unobserved shocks, the expansion of Chinese imports would have to be correlated with sub-industry or firm-specific shocks.

As a further robustness check, I follow Bloom et al. (2016) in that I estimate models in which I include firm fixed effects in the differenced equation. Hence, these specifications control for both time-invariant firm heterogeneity and firm-specific trends. In these models any effect of changes in Chinese competition is only identified via deviations from the firm-specific trend in the outcome variable in question. In addition, I estimate auxiliary specifications in which measures of non-Chinese import penetration are included as additional explanatory variables. This robustness check intends to ensure that any effects revealed by the baseline specifications are indeed the effects of increased Chinese import competition and not the broader effects of increased import competition irrespective of the country of origin of imports.

3.3.4   Within-firm effects of Chinese competition

Figure 6 depicts the baseline results on the effects of Chinese competition on labor productivity as well as on potentially productivity-enhancing investments of firms in research and development (R&D) and fixed assets. As specified in Formula 3, every specification includes NACE 4-digit-industry-time fixed effects.

Information on working hours is only available for the entire sample of firms after 2021. Until 2020, this information is only recorded for a minor subsample of firms represented in the structural business statistics. Therefore, labor productivity is not computed based on hours worked for the purpose of this analysis. Instead, the number of full-time equivalents (FTE) is used to compute labor productivity of firms. Given that the structural business statistics do not record the extent of employment of self-employed personnel of firms, the number of FTE available in the structural business statistics only reflects the labor input of each firm's employees (excluding the self-employed personnel). For this reason, the effect on labor productivity is assessed both in terms of gross value-added per FTE and in terms of the gross value-added divided by the

headcount of self-employed and non-self-employed personnel.[19]

Figure 6: Baseline within-firm effects of Chinese competition

Effect of an increase in imports from China by 1% of global imports...

- ●— Labor productivity (Value-added/personnel headcount)   ●— R&D share
- ●— Labor productivity (Value-added/full-time equivalents)   ●— Investment/revenue

Source: Own calculations based on structural business statistics, R&D statistics on the business enterprise sector, Intrastat, Extrastat (AMDC) and BACI harmonized trade data.

Notes: The coefficients shown were obtained as the results of pooled OLS specifications with fixed effects for every year-NACE 4-digit industry pair in which either the indicator of Chinese competition in the domestic market or the indicator of Chinese competition in export markets was used as an explanatory variable. The natural logarithm of the measures of labor productivity and the level of the R&D share (R&D spending divided by revenue) and the investment share (investment spending divided by revenue) were used as dependent variables. The 5% confidence intervals shown were computed using robust standard errors.

Labor productivity

In line with the sectoral correlations shown in Figure 5, the baseline results suggest that changes in the intensity of Chinese competition in the domestic market did, on average, not exhibit significant effects on the labor productivity of Austrian firms during the period 2013-2022. This result confirms the findings of Friesenbichler et al. (2024) in that the productivity-enhancing effect of Chinese competition in the domestic market initially reported by Bloom et al. (2016) has disappeared in recent years. Motivated by the eventual reversal of the productivity-enhancing effect documented by Friesenbichler et al. (2024), I assessed whether such a temporal pattern in the effect of Chinese competition on labor productivity of Austrian firms exists. To do so, I interacted the measures of Chinese competition with a Dummy variable indicating whether the base year of any observation (the year in the beginning of the five-year long difference) is after 2015. This allows me to determine whether the effect of Chinese competition may be different in subperiods of the sample.

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[19] Whenever the number of employees (non-self employed personnel) of a firm is 0, the value of full-time equivalents recorded in the structural business statistics is 0. To avoid dropping these firms from the sample in estimations using labor productivity computed by means of full-time equivalents, I follow Weichselbaumer (2024) by imputing the number of full-time equivalents in these cases with 0.5.

In contrast to Friesenbichler et al. (2024) I do, however, not find a significant effect of Chinese competition in either of the subperiods considered.[20]

For Chinese competition in export markets the incentives for productivity upgrading to escape or withstand foreign competition seem to outweigh the discouragement effect of intensified competition (Aghion et al., 2009). An increase in Chinese imports of a firm's products in Austrian export markets by one percent of global imports in a given base year (ΔIC^f = 0.01) is associated with an increase in the firm's labor productivity of approximately 0.05 percent. None of the existing literature has attempted to separately identify the effects of Chinese competition in a firm's domestic market and its export markets. For this reason, it remains unclear whether this effect is specific to the Austrian sample or more generally present.

R&D spending

Figure 6 further reveals a statistically significant negative effect of increased Chinese competition in the domestic market on R&D spending of firms. In particular, a median increase (0.0091) in Chinese competition intensity in the Austrian market is associated with a decrease in the R&D share (R&D expenditure divided by revenue) by approximately 0.08 percent. If the indicator of Chinese competition in the domestic market is not taken into account as an explanatory variable (as in the right panel of Figure 6), increased Chinese competition in export markets is also associated with a reduction in R&D expenditure. However, if both indicators of Chinese competition are simultaneously considered, it becomes apparent that the R&D-reducing effect of Chinese competition is mainly driven by the state of competition in the domestic market (see Table A2 in the Appendix).

Aghion et al. (2009) refer to this R&D-reducing effect as the discouragement effect of increased competition. Cusolito et al. (2023) report a similar pattern among Chilean firms particularly affected by increased Chinese competition. These authors document a significantly negative effect of Chinese competition on innovation spending among the bulk of firms in the Chilean sample, except for the firms belonging to the top decile of the productivity distribution. I assessed whether a similar productivity-gradient exists for our Austrian firm sample. However, I do not find a robust pattern of heterogeneous effects conditional on firm productivity.[21]

The results of Friesenbichler and Reinstaller (2023) may provide some hints regarding the interpretation of the R&D results shown in Figure 6. Based on a sample of large Austrian manufacturing firms, these authors showed that firms subject to larger increases in Chinese competition between 2011 and 2016 were less likely to change their product portfolio or engage in new business fields than less exposed firms. Furthermore, larger increases in Chinese competition were associated with reductions in the development of new competencies within this Austrian firm sample. Taken together, these results indicate that Austrian firms tended to follow a defensive strategy of focusing on core competencies when dealing with increased Chinese competition over the course of the last decade.

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[20] The corresponding regression output is not reported in this paper. However, it can be provided upon request.

[21] I also investigated the effect of Chinese competition on firms' employment of researchers and technicians as another indicator of the intensity of R&D activity. In addition, I estimated whether firms subject to larger increases in Chinese competition potentially received more R&D subsidies by using the R&D expenditure funded by public subsidies as a dependent variable. None of these models revealed significant effects of Chinese competition. The results are reported in Table A6 in the Appendix.

Figure 6 uses the share of firm revenue spent on research and development activities as the dependent variable for gauging the effect of Chinese competition on this type of potentially productivity-enhancing investment. This choice of dependent variable is based on the observation that a large number of firm-year observations show R&D spending of zero. Hence, taking logs would reduce the sample size substantially.[22] Using the R&D share and estimating the model in levels circumvents this issue.[23] A disadvantage of using the revenue share of R&D is, however, that movements in this share can be driven by either changes in expenditure or changes in revenue which potentially impairs the interpretability of the results. For this reason, Table 2 assesses the robustness of the baseline findings with respect to R&D expenditure by means of alternative specifications.

Column 1 of Table 2 (panels I and IV) reiterates the coefficients of the baseline specification shown in Figure 6. Column 2 uses the natural logarithm of R&D expenditure as the dependent variable. Column 3 addresses another particularity of data on R&D expenditure which is that its distribution has a light tail with a very small number of firms accounting for a large share of total R&D expenditure in the business enterprise sector. These outliers threaten to have a large effect on OLS estimates. Column 3 therefore drops observations within the top percentile of the distribution of R&D expenditure to rule out that the effects in column 1 are exclusively driven by firms conducting the largest amount of R&D. Column 4 contain the estimates of level-level specifications that use the absolute change in expenditure as the dependent variable. This ensures that the qualitative results remain unchanged if the observations dropped in the log-level specifications are included in the estimation.

Table 2 further contains several robustness checks with respect to the choice of indicators of Chinese competition. Panels I and IV correspond to the baseline specifications using exclusively the indicators of either Chinese competition in the domestic market or export markets (Formulas 1 and 2). Panels II and V augment these specifications by additionally taking into account indicators of non-Chinese import competition. In doing so, these specifications ensure that the effects documented in the baseline specifications are indeed China-specific and not more broadly driven by changes in foreign competition overall. Finally, panels III and VI use measures of Chinese import competition that divide Chinese imports in year t by total imports in year t instead of total imports in a base year t_0 as in Formulas 1 and 2.[24]

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[22] Observations with no recorded R&D expenditure at the beginning or the end of the five-year interval are dropped when logs are taken. Therefore the estimation samples of log-level specifications only contain observations with non-zero R&D expenditure in both the year at the beginning and the end of the five-year interval. This reduces the available sample size from 10,307 to 6,812 observations (see Table 2).

[23] Another possibility to address this problem would have been to apply the inverse hyperbolic sine transformation to R&D expenditure which approximates the natural logarithm of that variable and allows retaining zero-valued observations (Bellemare and Wichman, 2019).

[24] In these specifications, the change in non-Chinese import competition could not be taken into account as an additional explanatory variable. This is because the share of Chinese imports in global imports and the share of non-Chinese imports in global imports in the same year necessarily sum to 1, thereby creating a collinearity issue.

Table 2: Effects of Chinese competition on R&D spending

Explanatory Variables	Dependent Variable			
	Δ R&D / Revenue	Δ log R&D	Δ log R&D w/o outliers[1]	Δ R&D (in thous. EUR)
	(I) Chinese competition in domestic market			
ΔIC_d^{CHN}	-0.091***	-0.184*	-0.180*	-1330.057**
	(0.016)	(0.11)	(0.11)	(647.022)
	(II) Chinese & non-Chinese competition in domestic market[2]			
ΔIC_d^{CHN}	-0.091***	-0.204*	-0.193*	-1374.909**
	(0.016)	(0.113)	(0.113)	(612.76)
	(III) Chinese competition in domestic market (IC_{dr})			
ΔIC_{dr}^{CHN}	-0.180***	-0.324	-0.276	-4704.781***
	(0.044)	(0.335)	(0.341)	(1822.739)
	(IV) Chinese competition in export markets			
ΔIC_f^{CHN}	-0.040***	-0.036	-0.035	-87.353
	(0.012)	(0.092)	(0.093)	(515.288)
	(V) Chinese & non-Chinese competition in export markets[2]			
ΔIC_f^{CHN}	-0.039***	-0.043	-0.042	-79.835
	(0.013)	(0.094)	(0.095)	(477.37)
	(VI) Chinese competition in export markets (IC_{fr})			
ΔIC_{fr}^{CHN}	-0.146***	0.733*	0.686	-314.282
	(0.056)	(0.431)	(0.439)	(2301.835)
Observations	10,307	6,812	6,668	10,307
Firms	2,852	1,970	1,925	2,852

Source: Own calculations based on BACI harmonized trade data, Austrian structural business statistics, R&D statistics of the business enterprise sector, Extrastat and Intrastat.

Notes: [1]The top percentile of the distribution of R&D expenditure was removed. [2]The coefficients of non-Chinese competition intensity are not shown here. These are insignificantly different from 0 throughout. The coefficients shown were obtained as the results of pooled OLS specifications with fixed effects for every year-NACE 4-digit industry pair. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. IC_{dr}^{CHN} and IC_{fr}^{CHN} divide Chinese imports in year t by total imports in year t instead of a base year t_0 as in Formulas 1 and 2.

The effect of Chinese competition in the domestic market on firms' R&D expenditure is remarkably robust. It is significantly negative irrespective of whether the R&D share, R&D expenditure in logs (with and without outliers) or the level of R&D expenditure is used as the dependent variable. The level of significance is, however, lower in the log-level specifications (columns 2 and 3). One way to interpret this finding may be that switching into and out of conducting R&D is an important channel through which Chinese competition affects firm behavior. Some firms may, for example, abandon R&D activities due to intensified Chinese competition. These firms would not be reflected in the estimation sample of the log-level specifications due to their end-of-sample R&D spending being zero.

The estimates also remain virtually unchanged if a measure of non-Chinese import penetration (panel II) is included as a control.[25] This finding indicates that Chinese competition is indeed different from competition from other origin countries (Mion and Zhu, 2013). Finally, the results also remain qualitatively unchanged if the measures of Chinese competition are computed as the ratio between Chinese imports and total imports in year t instead of the ratio between Chinese imports in t and total imports in base year t_0. In these specifications, the effects of Chinese competition in the Austrian market turn insignificant in the log-level specifications, however. The results with respect to the effect of Chinese competition in export markets are substantially less robust. This is, however, in line with the finding that the R&D-reducing effect of Chinese competition is primarily driven by the competition intensity in the domestic market (see Table A2).

Investment spending

I further assessed whether intensified competition from China caused changes in investment spending among Austrian firms between 2013 and 2022. Given that data on investment spending shares many of the traits of data on R&D expenditure (frequent observations with zero expenditure, few observations accounting for a large share of overall expenditure), Table 3 contains the same specifications as Table 2 to assess the robustness of the findings on the relationship between Chinese competition and firms' investment in fixed assets.[26] As visible in Table 3, the evidence with respect to investment spending is less conclusive than the results with respect to R&D spending. While the first column of Table 3 suggests that Chinese competition in export markets incentivizes investment, this effect is no longer significant if Chinese competition in the domestic market and in export markets is simultaneously considered in the same specification (see Table A2). If the natural logarithm of investment spending is used as the dependent variable, the investment-inducing effect of Chinese competition in foreign markets is significant, both in specifications including only IC_f^{CHN} or both IC_d^{CHN} and IC_f^{CHN}. This positive effect vanishes, however, if the level of investment expenditure is used as the dependent variable. This again indicates that switching into or out of investing are important drivers of the empirical results. Summing up, this evidence hints at a potential investment-inducing effect of Chinese competition abroad. This evidence is, however, far from conclusive.

Nevertheless, these findings represent a clear departure from the evidence for U.S. firms prior to the global financial crisis, who tended to reduce investment if faced with strong increases in Chinese competition (Pierce and Schott, 2018).

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[25] The coefficient estimates with respect to non-Chinese import competition are not shown in Table 2. These are insignificantly different from zero throughout.

[26] I conducted similar robustness checks for labor productivity as well. The corresponding tables can be provided upon request.

Table 3: Effects of Chinese competition on investment spending

Explanatory Variables	Dependent Variable			
	Δ Investment/ Revenue	Δ log Investment	Δ log Investment w/o outliers[1]	Δ Investment (in thous. EUR)
	(I) Chinese competition in domestic market			
ΔIC_d^{CHN}	0.001	0.052	0.045	9.75
	(0.001)	(0.041)	(0.04)	(21.723)
	(II) Chinese & non-Chinese competition in domestic market[2]			
ΔIC_d^{CHN}	0.001	0.017	0.018	-7.582
	(0.001)	(0.042)	(0.042)	(21.798)
	(III) Chinese competition in domestic market (IC_{dr})			
ΔIC_{dr}^{CHN}	0.006	0.293*	0.269*	107.608
	(0.004)	(0.156)	(0.155)	(81.115)
	(IV) Chinese competition in export markets			
ΔIC_f^{CHN}	0.002**	0.134***	0.128***	12.093
	(0.001)	(0.039)	(0.038)	(18.633)
	(V) Chinese & non-Chinese competition in export markets[2]			
ΔIC_f^{CHN}	0.002**	0.138***	0.133***	13.835
	(0.001)	(0.039)	(0.038)	(18.237)
	(VI) Chinese competition in export markets (IC_{fr})			
ΔIC_{fr}^{CHN}	0.01**	0.623***	0.614***	23.882
	(0.005)	(0.176)	(0.175)	(92.37)
Observations	69,274	58,866	57,484	69,286
Firms	22,507	20,076	19,944	22,562

Source: Own calculations based on BACI harmonized trade data, Austrian structural business statistics, R&D statistics of the business enterprise sector, Extrastat and Intrastat.

Notes: [1] The top percentile of the distribution of investment expenditure was removed. [2] The coefficients of non-Chinese competition intensity are not shown here. These are insignificantly different from 0 throughout. The coefficients shown were obtained as the results of pooled OLS specifications with fixed effects for every year-NACE 4-digit industry pair. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. IC_{dr}^{CHN} and IC_{fr}^{CHN} divide Chinese imports in year t by total imports in year t instead of a base year t_0 as in Formulas 1 and 2.

The findings of Pierce and Schott (2018) further point to a performance-gradient of the effect of Chinese competition on firms' investment. They show that intensified competition from China led to declines in investment in the U.S. which were concentrated among establishments with low initial levels of labor productivity. Similarly, Gutierrez and Philippon (2017) show that increased competition from China, on average, exhibited significantly negative effects on firms' capital stocks of both tangible and intangible capital. Yet, these authors document that this effect is insignificantly different from zero or even slightly positive for so-called "leaders", defined as firms with a high market to book value. In contrast to these two studies, I do not find evidence of such a productivity-gradient with respect to the effect of Chinese competition on investment.

3.3.5   Effects of Chinese competition on measures of structural change within and between firms

Structural change within firms

Recent studies by Bernard et al. (2017) and Ding et al. (2022) have revealed that a significant share of the relative employment decline in manufacturing vis-à-vis services in Denmark and the United States respectively can be attributed to sector switching. This sector switching may occur via continuing establishments (or entire firms) switching their specialization and as a result their sectoral classification. Such sector switches lead to a reduction in employment classified as manufacturing employment accompanied by a simultaneous expansion in non-manufacturing employment. Alternatively, this within-firm type of structural change may take the shape of firms closing manufacturing establishments while simultaneously opening non-manufacturing establishments.

Bloom et al. (2024) have further investigated the importance of this phenomenon in light of the well-documented China shock-induced employment losses in the United States. They find that about 40 percent of the employment decline in manufacturing in the U.S. due to the increase in Chinese competition can be attributed to sector switching. In light of this finding, I examine whether Chinese competition has induced this type of within-firm structural change in Austria in recent years. For this purpose, I regress a Dummy variable indicating whether a firm changes its NACE classification from a manufacturing sector to a service sector over the course of a five-year interval on the changes of our measures of Chinese competition in the domestic market and export markets over the same five-year interval. In addition, I attempt to assess whether Chinese competition has induced changes in specialization of Austrian firms on a more granular level. This is implemented by using a Dummy variable indicating whether the company in question has changed its NACE 4-digit sectoral classification over a five-year time period.[27] The results of these linear probability models are shown in Figure 7. The estimated parameters are to be interpreted as the change in the probability of the outcome in question resulting from an increase in the indicators of Chinese competition by 1.[28]

As visible in Figure 7, increasing Chinese competition is associated with an increased probability of sector switches towards services, irrespective of whether all switches to market and non-market services, only switches to market services or only permanent switches to market services are considered as the depen-

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[27] The resulting empirical specifications have the following form:
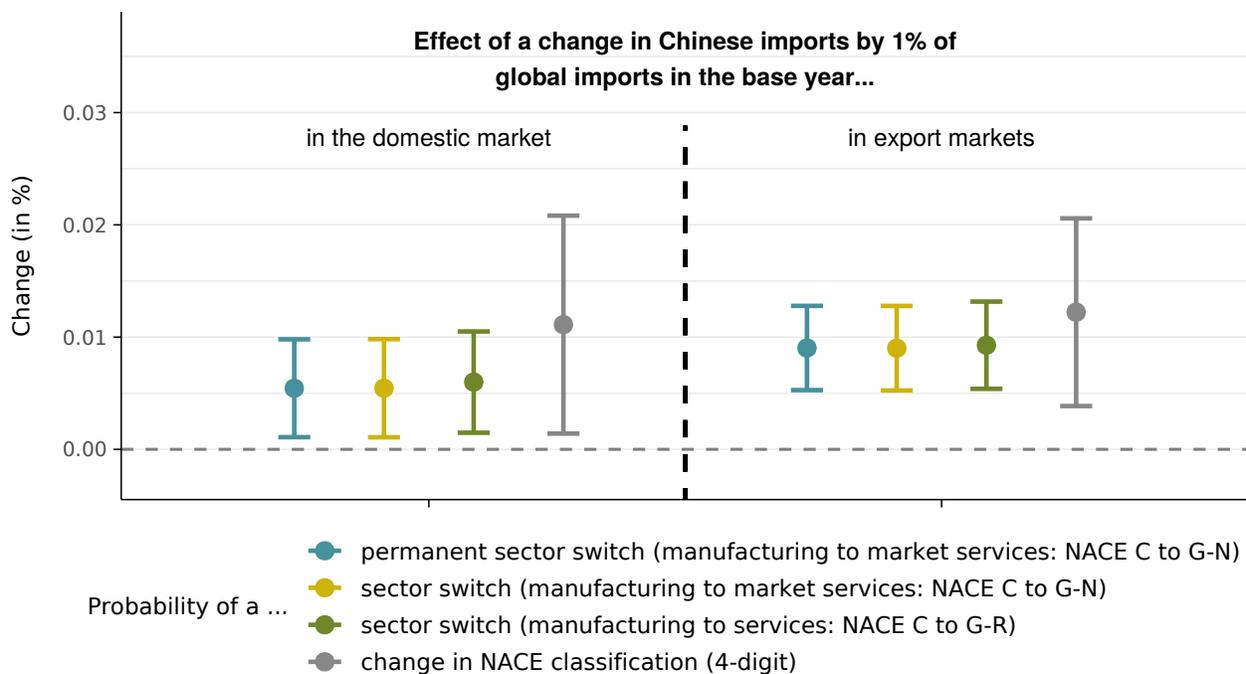
$$\Delta I_{i,j}(Classification_t = Classification_{t_0}) = \beta_1 \Delta IC_{i,j,t}^d + \beta_2 \Delta IC_{i,j,t}^f + \beta_3 \Delta IC_{i,j,t}^d \cdot IC_{i,j,t}^f + \eta_{j,t} + \Delta \varepsilon_{i,j,t}$$

[28] Such an indicator change of 1 corresponds to an increase in imports from China equaling total imports in the base year.

dent variable. Figure 7 further indicates that both Chinese competition in the domestic market and in export markets induces structural change within firms. This finding remains unchanged if Chinese competition in both types of markets are considered in the same specification. The interaction term between IC_d^{CHN} and IC_f^{CHN} is significantly negative in these specifications, however. This indicates that the individual structural change-inducing effects of increasing Chinese competition in both markets are lower if the intensity of competition increases simultaneously in Austria and Austrian export markets (see Table A3).

The effects reported in Figure 7 are small, however. The estimates suggest that a firm, whose export portfolio experiences an increase of Chinese imports over a five-year period equal to 1 percent of the value of total imports in the base year is between 0.011-0.012 percent more likely to experience a switch in NACE 4-digit classification. The effects on the probability of switches from manufacturing to services are even smaller, ranging from 0.005 to 0.009. Hence, these results suggest that the China-induced structural change within continuing firms documented for the U.S. by Bloom et al. (2024) is also observable in Austria, albeit to a much smaller extent (this type of industry switch occurs for only approximately 1.3 percent of all observations in the sample).

Figure 7: Effects of Chinese competition on measures of structural change within firms

Source: Own calculations based on structural business statistics, R&D statistics on the business enterprise sector, Intrastat, Extrastat (AMDC) and BACI harmonized trade data.

Notes: The coefficients shown were obtained as the results of pooled OLS specifications (linear probability models) with fixed effects for every year-NACE 4-digit industry pair in which either the indicator of Chinese competition in the domestic market or the indicator of Chinese competition in export markets was used as an explanatory variable. The dependent variables used are Dummy variables indicating whether the firm's NACE classification has, either temporarily or permanently, changed from manufacturing (NACE C) to market services (NACE G-N) or services more generally (NACE G-R) or at all (change in 4-digit NACE code) over the five-year interval considered for each observation. The 5% confidence intervals shown were computed using robust standard errors.

Structural change across firms

Structural change across firms can take multiple shapes. It can occur via movements of workers away from continuing establishments as well as via the exit of establishments. Table 4 examines the effect of Chinese competition on both types of structural change. To avoid dropping the most extreme cases of employment decline — the firms ceasing all operations — I follow Bloom et al. (2016) by creating pseudo-observations on employment for exiting firms after they closed all their establishments. The results in Table 4 are based on employment data including these pseudo-observations. The results with unaltered employment data are qualitatively identical, however.[29] Table 4 contains the results of three empirical specifications for each of the two dependent variables. For each dependent variable, the left column only uses the change in the intensity of Chinese competition in the domestic market as an explanatory variable (column I and IV respectively). The middle column does the same but for the indicator of Chinese competition in export markets. The right column instead controls for changes in competition intensity in both markets as well as an interaction term of the two.

Table 4: Effects of Chinese competition on measures of structural change between firms

Explanatory Variables	Dependent Variable					
	log (Employment)			I (Firm survival)		
	I	II	III	IV	V	VI
ΔIC_d^{CHN}	0.015		0.036	-0.001		0.001
	(0.016)		(0.028)	(0.001)		(0.002)
ΔIC_f^{CHN}		-0.005	-0.021		-0.001	-0.002
		(0.013)	(0.018)		(0.001)	(0.001)
$\Delta IC_d^{CHN} \times \Delta IC_f^{CHN}$			-0.003			0
			(0.01)			(0.001)
Observations	69,851	69,851	69,851	70,887	70,887	70,887
Firms	22,444	22,444	22,444	22,777	22,777	22,777

Source: Own calculations based on BACI harmonized trade data, Austrian structural business statistics, Extrastat and Intrastat.

Notes: The coefficients shown were obtained as the results of pooled OLS specifications with fixed effects for every year-NACE 4-digit industry pair. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
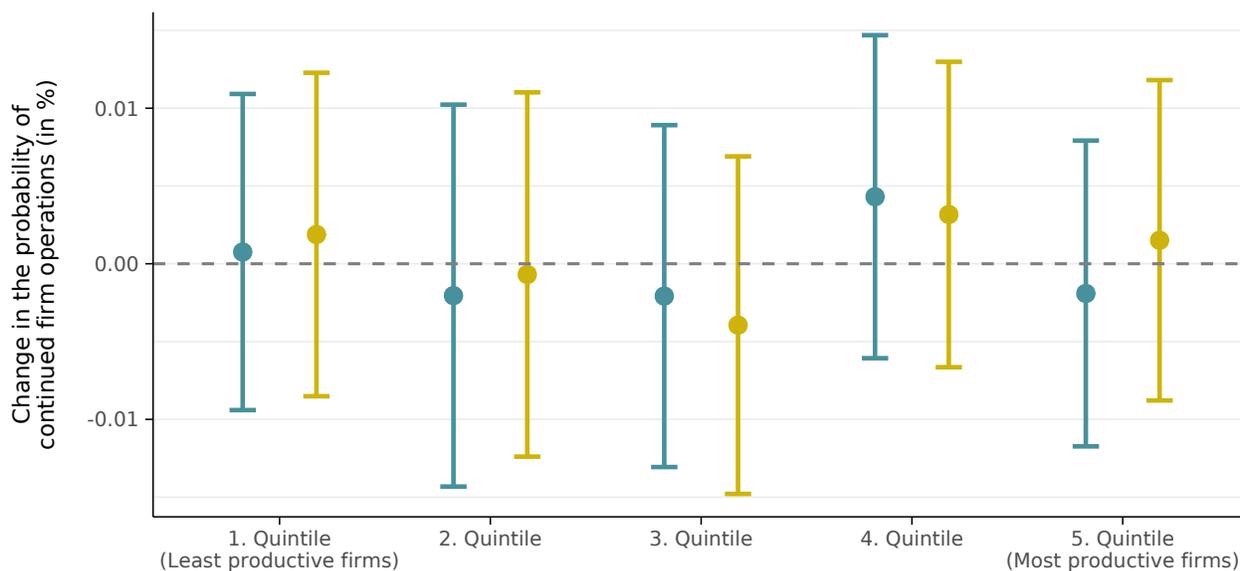
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[29] Furthermore, the effects on employment were also assessed in terms of the number of full-time equivalents of employees. The results are qualitatively identical to the results based on the personnel headcount reported in Table 4.

In contrast to most existing studies on the employment effects of Chinese competition in European economies, I find no indication of significantly negative employment effects (see columns I to III of Table 4). Columns IV to VI further report the results of linear probability models that use a Dummy variable indicating whether or not a firm is still active at the end of a five-year time interval as the dependent variable. There is a vast number of studies documenting that Chinese competition induced firm exit in particularly exposed industries (see e. g. Bloom et al., 2024 for results on the U.S. and Bloom et al., 2016 for Europe). The results of Bloom et al. (2016) for the period between 1995 and 2007, for example, suggest that the average effect of Chinese competition on the probability of firm exit across twelve European economies was significantly positive. The results in Table 4, on the other hand, indicate a more muted effect of Chinese competition on firm exit. Columns V and VI give some indication that increased Chinese competition in export destinations of Austrian firms negatively affects the probability of firm survival. These effects are not significant in the full sample of firms, however (p-value of around 0.2).
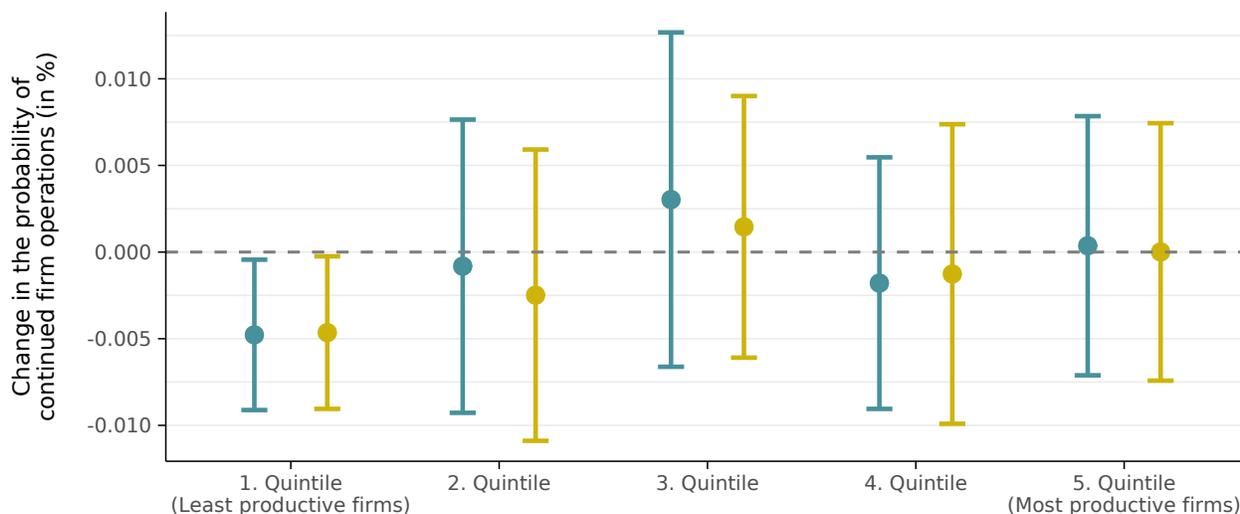
I investigate this effect more thoroughly by splitting the sample in two subperiods (see Table A4 in the Appendix). This analysis reveals that the average effect of Chinese competition on the probability of firm exit is marginally significant, but only for a subperiod of our sample (2013-2019), with no indication of such effects after 2020. In terms of magnitude, the estimates in Table A4 suggest that an increase of Chinese imports in Austrian export markets equal to 10 percent of the amount of total imports in the base year increases the probability of firm exit by about 0.03 percent during the period 2013-2019. Hence, even during the period in which the estimates reveal a significantly negative effect on firm survival, the effects are quantitatively small.

Figure 8 further assesses the heterogeneity of the effects on firm survival conditional on the ex-ante labor productivity of firms. For this purpose, the sample of firms is assigned to productivity quintiles based on their average labor productivity between 2011 and 2013. This is done both based on the productivity distribution of the full sample as well as the productivity distribution within each NACE 2-digit industry. The latter approach is considered to assess whether it is primarily the productivity distribution within industries or across industries that matters in this context. More specifically, differential effects depending on the position of firms in the overall productivity distribution may be driven by less and more productive firms within each industry being affected heterogeneously or technologically lagging and technologically advanced industries being impacted differently irrespective of the within-sector productivity distribution (Friesenbichler et al., 2025). Figure 8 reveals very similar patterns for both approaches of assigning firms to productivity baskets. Intensifying Chinese competition in export markets is associated with an increased probability of market exit but only for firms within the bottom quintile of the productivity distribution, both across the full sample and within each NACE 2-digit industry. The similarity of the findings based on the distinct approaches of assigning firms to productivity baskets indicates that the documented effects are driven primarily by firms far from the technological frontier within sectors. Overall, Chinese competition seems to have improved allocative efficiency between 2013 and 2022 by causing unproductive firms to be pushed out of the market. This finding is again in line with the results of Bloom et al. (2016) who find that the negative effect of Chinese competition on the survival probability of firms is significantly larger for less productive firms.

Figure 8: Effect of Chinese competition on firm exit by productivity quintiles

a) Effect of an increase in Chinese imports in the domestic market
by 1% of global imports in the base year

b) Effect of an increase in Chinese imports in export markets
by 1% of global imports in the base year

Firms categorized according to labor productivity
● in full sample
● within NACE 2-digit industry

Source: Own calculations based on structural business statistics, Intrastat, Extrastat (AMDC) and BACI harmonized trade data.
Notes: The coefficients shown were obtained as the results of pooled OLS specifications (linear probability models) with fixed effects for every year-NACE 2-digit industry pair in which the indicator of Chinese competition in the domestic market, the indicator of Chinese competition in export markets as well as their interaction were used as explanatory variables. The quintile-specific effects were computed by interacting the measures of Chinese competition with the quintile with respect to average labor productivity between 2011-2013 that the firm in question belongs to. Firms were assigned to quintiles either based on the productivity distribution in the entire sample or the labor productivity distribution within each NACE 2-digit industry. The dependent variable used is a Dummy variable indicating whether the firm is still in operation at the end of the five-year interval considered for each observation. The 5% confidence intervals shown were computed using robust standard errors.

3.3.6 Effects of Chinese competition on firms' exports and activities abroad

The existing literature emphasizes that sales market diversification serves as a strategy for dealing with intensified foreign competition. Firms subject to larger increases in Chinese competition have been shown to have a higher probability of becoming exporters (Caselli and Schiavo, 2020) and broadening their set of export destinations (Friesenbichler and Reinstaller, 2023). Furthermore, firms subject to larger hikes in the intensity of foreign competition have been documented to have a larger tendency to diversify their export portfolio (Friesenbichler and Reinstaller, 2023). As reported in Table 5, I find some evidence of increasing Chinese competition in the domestic market fostering export market diversification.

Table 5: Effects of Chinese competition on export market and export portfolio diversification

| | Dependent Variable | | | | | |
| | Δ Number of export destinations | | | Δ Number of distinct products exported | | |
Explanatory Variables	I	II	III	IV	V	VI
ΔIC_d^{CHN}	0.158		0.44*	0.391		-0.065
	(0.133)		(0.242)	(0.823)		(1.498)
ΔIC_f^{CHN}		0.154	0.194		0.548	0.554
		(0.114)	(0.153)		(0.708)	(0.948)
$\Delta IC_d^{CHN} \times \Delta IC_f^{CHN}$			-0.186**			0.019
			(0.086)			(0.532)
Observations			71,637			
Firms			22,963			

Source: Own calculations based on BACI harmonized trade data, Austrian structural business statistics, Extrastat and Intrastat.

*Notes: The coefficients shown were obtained as the results of pooled OLS specifications with fixed effects for every year-NACE 4-digit industry pair. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.*

Column III in Table 5, which simultaneously accounts for the change in Chinese competition intensity in the domestic market and in export markets, suggests that firms that experience an increase in Chinese imports of their export portfolio into the Austrian market by 10 percent of total Austrian beginning-of-period imports of these products increase their number of export destinations by approximately 0.04, whereby this effect is mitigated if Chinese competition in export markets increases as well. This effect is not significantly

different from zero in the baseline specification which only considers the change in competition intensity in the domestic market (column I). It is significant, however, if less disaggregated sector-time fixed effects (e.g. NACE 2-digit time fixed effects) are considered. These findings are qualitatively identical if the natural logarithm of the number of foreign affiliates is treated as the dependent variable. In sum, these results provide somewhat inconclusive evidence corroborating the findings of Friesenbichler and Reinstaller (2023) with respect to competition-led market diversification. I do not find any evidence of firms exposed to larger increases in competition intensity showing a differential propensity of diversifying their export portfolio though (see Columns IV to VI of Table 5). Furthermore, I also find no systematic effects on aggregate export values and export quantities of firms (not reported here).

In addition, I also investigated a channel through which Chinese competition may influence firm activity first highlighted by Gu et al. (2021). These authors show that larger increases in Chinese competition before the global financial crisis were associated with an increased tendency among Danish firms to offshore production tasks abroad. The outward foreign affiliate statistics available within AMDC allow me to track the development of foreign affiliates under the control of Austrian firms as an indicator of offshoring tendencies. This data obviously only covers a particular type of offshoring activities, as offshoring to third parties, for example, is not reflected in measures of economic activity of foreign affiliates. The corresponding results, in which I assess the effect of changes in Chinese competition on the number and the employment of foreign affiliates of Austrian firms, are reported in Table A5 in the Appendix. The results do not reveal any significant connection between Chinese competition and the propensity of Austrian firms to establish or expand the activity of foreign affiliates.

3.3.7   Robustness checks

As previously mentioned, I assess the robustness of the baseline results on within-firm outcomes (Figure 6, Tables 2, 3 & 4) by estimating models that adjust for firm-specific trends using firm fixed effects in the differenced equations. This approach addresses the concern that the evolution of Chinese competition intensity in our sample period may be correlated with sub-industry specific pre-trends (Bloom et al., 2016).[30] The results of this test confirm the findings of the pooled OLS specifications with disaggregated industry-time fixed effects. The signs of the estimated effects (see Table A7 in the Appendix) are entirely consistent with the pooled model specifications. With the exception of the reported within-firm effect of changes in Chinese competition intensity in export markets on the investment share of firms, the estimated coefficients are insignificantly different from zero though. This reduction in precision is not surprising, given that adding firm-specific trends in addition to NACE 2-digit-industry-time fixed effects acts to reduce the identifying variation substantially. This issue is particularly relevant for the R&D specifications, for which the available sample from the R&D statistics of the business enterprise sector were substantially smaller than for the dependent variables taken from the structural business statistics to begin with.

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[30] The same was not done for the linear probability models used to estimate the effect of Chinese competition on the probability of occurrence of rare events (firm exit, sector switching). This is because, in these cases, adding firm fixed effects in the differenced equation is likely to remove most of the remaining variation after previously controlling for sector-time fixed effects.

3.4   Discussion

Overall, the micro-empirical evidence presented in subchapter 3.3 indicates that the effects of increasing Chinese competition on Austrian firms in recent years was substantially more muted than the literature on the early effects of the China shock in the EU and the U.S. suggests. It remains unclear, however, whether this is due to a change in the effects of Chinese competition over time or whether the effects on Austrian firms had already been different to the effects on other European countries for the early China shock. While some studies on the impact of the early China shock considered Austrian firms in their sample (Bloom et al., 2016; Friesenbichler et al., 2024), no studies that focus exclusively on the impact of the early China shock on Austrian firms exist.

Notwithstanding, the findings of this study may be interpreted as a sign of robustness and competitiveness of the Austrian manufacturing sector thus far[31]. Yet, the results suggest that Chinese competition accelerates the process of structural change by contributing to the market exit of the least productive firms and by inducing changes in the specialization of firms. Given the increase in allocative efficiency possibly associated with this structural change, this observation does not necessarily entail the need for policy intervention. Turning our attention to the evidence on the effect of Chinese competition on productivity-enhancing investments, the results in Table 2 show that larger increases in Chinese competition are associated with relative declines in firms' R&D expenditure, with no observable heterogeneity across the productivity distribution. This indicates that, on average, the so-called discouragement effect of increasing competition (Aghion et al., 2009) seems to dominate for Austrian firms. Given that investments in R&D are typically associated with product-upgrading and other activities meant to differentiate a firm's output from the competition, stagnating levels or even reductions in such investments may reduce the ability of Austrian firms to withstand foreign competition in the future. This observation is particularly problematic if the pattern of specialization across firms remains stagnant and structural change within firms as a means to escape competition is seldom (as documented by Weichselbaumer, 2025).

Finally, it is noteworthy that the documented firm-level effects are not consistently driven by either Chinese competition in the domestic market or Chinese competition in export markets. Instead, the effects on potentially productivity-enhancing expenditure within firms seems to be driven primarily by the evolution of Chinese competition in the domestic market while structural change within firms (changes in specialization) and between firms (firm survival) seems to be induced primarily by the increase of Chinese competition abroad. As previously mentioned, this study is the first to simultaneously assess the effect of changes in Chinese competition intensity in the domestic market and export markets. Therefore this paper is also the first to uncover that the market in which competition intensifies matters in terms of the type of adjustment of firm behavior it entails. This novel finding certainly warrants further research.

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[31] Recent survey evidence suggests, however, that the Austrian manufacturing sector is now under increased pressure from Chinese competition. This is highlighted by the significantly positive correlation of measures of Chinese competition intensity and both intentions to reduce staff levels and offshore firm functions abroad over the period 2025-2030 (Gruber-Német et al., 2025).

4   The firm-level impact of the Trump-I tariffs

4.1   Data and descriptive evidence

In terms of firm-level information, this analysis was again conducted by means of the Austrian Micro Data Center (Fuchs et al., 2023). As in Chapter 3, I draw data from the structural business statistics, Intrastat and Extrastat (Figure 6).

Table 6: Firm sample for the analysis of the effects of the Trump-I tariffs

NACE activity	Number of Firms	Share of pre-tariff export portfolio targeted	
		Mean	Median
B	70	0.002	0.000
10	471	0.000	0.000
11	142	0.000	0.000
13	259	0.004	0.000
14	105	0.000	0.000
15	62	0.000	0.000
16	521	0.006	0.000
17	105	0.000	0.000
18	280	0.012	0.000
20	229	0.001	0.000
21	63	0.016	0.000
22	401	0.011	0.000
23	282	0.001	0.000
24	117	0.389	0.029
25	1,104	0.061	0.000
26	330	0.002	0.000
27	296	0.006	0.000
28	867	0.014	0.000
29	129	0.030	0.000
30	59	0.000	0.000
31	492	0.001	0.000
32	335	0.010	0.000
33	394	0.019	0.000
D	55	0.018	0.000
E	127	0.001	0.000
F	1,412	0.027	0.000
G-S	22,559	0.014	0.000

Source: Own calculations based on USITC Harmonized tariff schedules, Austrian structural business statistics, Extrastat and Intrastat.

To conduct an analysis on the impact of the recent protectionist measures implemented by the U.S. administration, a product-level database on bilateral tariff rates is required. Fajgelbaum et al. (2020) provide a comprehensive database of U.S. import duties that captures all U.S. tariff reforms between 2013 and mid-2019. I extended this database by compiling the information contained in all Harmonized Tariff Schedules published by the United States International Trade Commission until the end of 2022.[32] To match the information on U.S. import tariffs from the USITC to firms' exports recorded in AMDC, the tariff data available for Harmonized System 10-digit product codes was aggregated to the level of Harmonized System 6-digit product lines. This aggregation necessarily requires a weighting of Harmonized System (HS) 10-digit codes within HS 6-digit product lines. For this purpose, the value share of each HS 10-digit product code in the total value of Austrian exports of the corresponding HS 6-digit product line to the U.S. in 2017 was used. The weighted tariff measures at the level of 6-digit Harmonized System product lines were then matched to the product-level trade data in AMDC. As previously mentioned, the trade data in AMDC uses the Combined Nomenclature (CN) product classification, requiring the use of concordance tables between CN product codes and HS codes based on the classification database of Statistics Austria.

Figure 9 uses this tariff database to compare the aggregate evolution of Austrian export values and quantities to the U.S. of products targeted and non-targeted by the tariffs introduced during U.S. President Trump's first term.

Figure 9: Exports to the U.S. by targeted status

Source: Own representation based on BACI trade data, Harmonized Tariff Schedules by USITC as well as Fajgelbaum et al. (2020).

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[32] The database was not extended further due to the information in Intrastat and Extrastat only being available until 2022.

Several interesting patterns emerge from this representation. While the trade values and quantities of treated varieties declined substantially in 2019 and 2020, they saw visibly larger increases in both export values and quantities than non-targeted varieties in 2018 and 2021, even though the majority of tariffs on steel and aluminum were already in effect for most of 2018 (starting on June 1) and were still in effect for all of 2021. Secondly, the total value of shipments of non-targeted varieties also decreased in 2019 and 2020 while quantities increased. In sum, this descriptive evidence suggests that the impact of tariffs on Austrian exporters may not be as straightforward as much of the literature suggests.

4.2   Firm-level evidence

In order to assess the impact of the U.S. import tariffs introduced in 2018, I first examine their impact on the product-level exports of Austrian firms by means of empirical specifications of the following form (Formula 4):

$$X_{p,i,t} = \beta Tariffs_{p,t}^{US} + \eta_{i,t} + \gamma_p + \varepsilon_{p,i,t} \tag{4}$$

Where $X_{p,i,t}$ are the exports of product p by firm i in year t. Such estimations at the product level within firms allow me to include product fixed effects (γ_p) as well as firm-time fixed effects ($\eta_{i,t}$) that purge the effects from any firm-specific shocks that may otherwise confound the results. Hence, these estimates should provide the cleanest possible identification of the effect (β) of the U.S. tariffs on exports of targeted varieties. As is common in analyses of bilateral trade flows, Formula 4 is estimated by means of Poisson Pseudo Maximum Likelihood (Gourieroux et al., 1984; Santos Silva and Tenreyro, 2006). The corresponding results are shown in Figure 10. To produce the estimates presented in Figure 10 I use two different measures of tariffs ($Tariffs_{p,t}^{US}$). The left panel follows the event-study design of Fajgelbaum et al. (2020) in that I use a Dummy variable for targeted varieties to gauge the effect of the Trump tariffs on product-level exports. The right panel of both subfigures instead uses the weighted HS6-product-level statutory tariff rate levied on Austrian exports to the U.S. as the explanatory variable.

Existing estimates on the elasticity of export quantities to the U.S. with respect to the import tariffs introduced during U.S. President Trumps first term range between 1.3 (Amiti et al., 2019) and 1.5 (Fajgelbaum et al., 2020) across all affected exporters. Hence, a 1 percent increase in the effective tariff rate was associated with a 1.3-1.5 percent decline in export quantities of treated varieties. For the tariffs on aluminum (10%) and iron/steel (25%) this would translate to declines in export quantities by 13-15 percent and 33-38 percent respectively. The effect on Austrian exporters (Figure 10) was vastly different than this average effect across all exporters. In particular, export quantities of treated varieties to the U.S. did not decline significantly. Interestingly, however, export quantities of treated varieties to other EU countries significantly declined by approximately 10 percent. One potential interpretation of this finding is that the U.S. tariffs may have reduced exports of other EU countries that used targeted Austrian products as inputs in production. I further find a marginally significant positive effect of U.S. tariffs on exports to destinations outside of the U.S. and the EU, if the product-specific weighted U.S. import tariff rate is used as the explanatory variable (right panel of Figure 10). This increase may be interpreted in different ways. It may be driven by trade
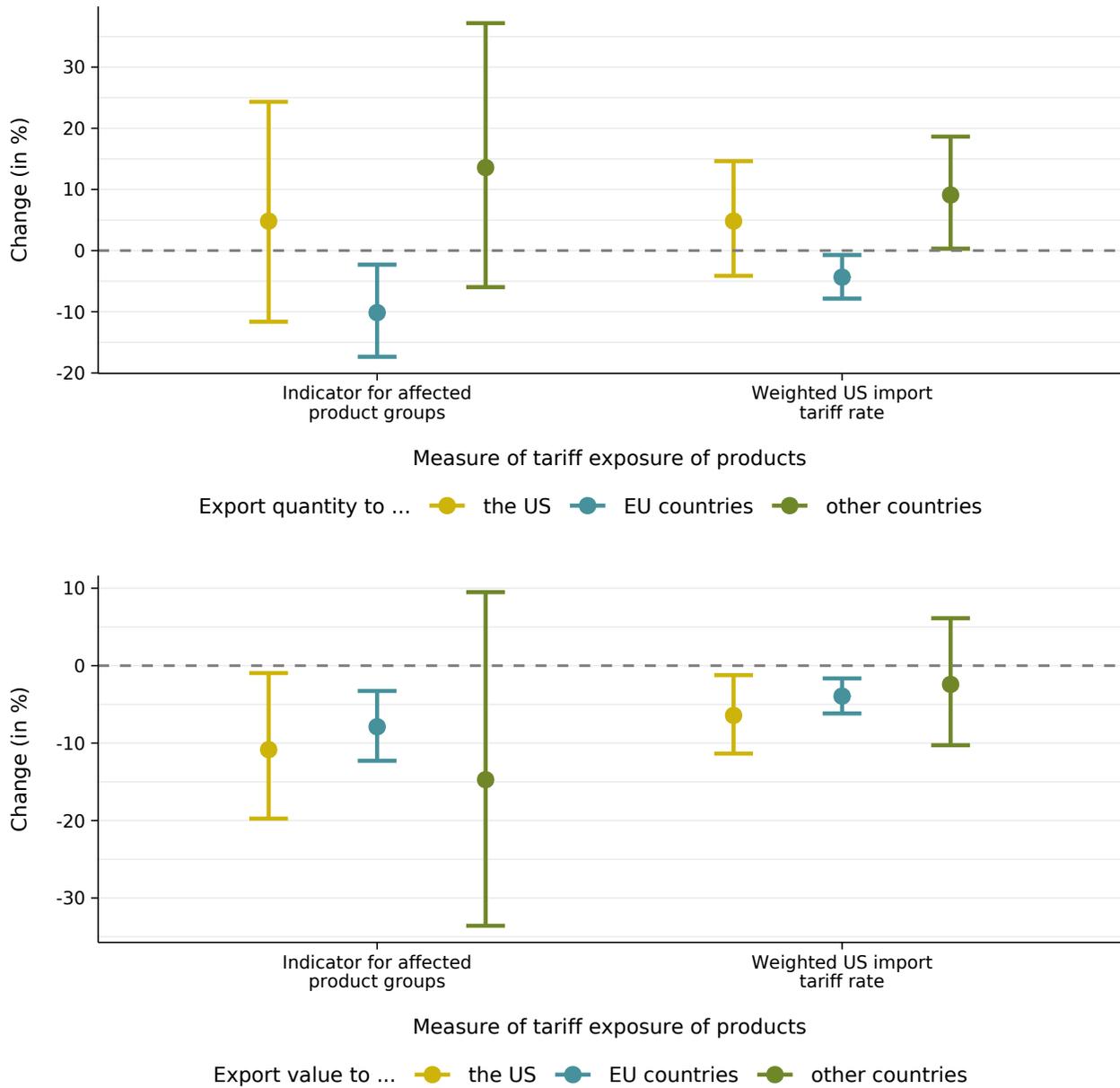
redirection of Austrian exports. Instead, it may be the result of Austrian firms diversifying their portfolio of export destinations in light of the protectionist measures implemented by the U.S. administration. Either way, the evidence on the existence of this increase to non-EU-or-US destinations is not conclusive, as it is not significant in the event study specification (left panel of Figure 10).

The lower panel of Figure 10 instead looks at the effect of the U.S. import duties on export values (quantity × price) of Austrian firms. In contrast to the findings regarding export quantities, the U.S. tariffs significantly reduced the value of exports of targeted varieties to the United States. Remarkably, the magnitude of this decline is even larger than for exports to EU countries, for which I find a significant decline in export quantities. A comparison of these findings with the findings on export quantities suggests that Austrian exporters seem to have reacted to the U.S. tariffs by lowering the price of targeted products to reduce the tariff-induced increase in tariff-inclusive consumer prices in the U.S., thereby attempting to prevent significant declines in U.S. demand. The upper panel of Figure 10 indicates that Austrian firms were largely successful in doing so.

These findings represent a remarkable departure from the existing evidence across all countries subject to the tariffs introduced during U.S. President Trump's first term. Amiti et al. (2019); Fajgelbaum et al. (2020) and Cavallo et al. (2021) show that the tariff-inclusive consumer prices per unit of targeted imports in the U.S. approximately increased by the magnitude of the tariffs, meaning a virtually complete tariff pass-through. Hence, on average across all exporters, export values and export quantities declined to a similar extent. A comparison with my findings points to Austrian firms having followed a strategy to deal with the U.S. tariffs that differed substantially from the reaction of exporters from other economies. It remains unclear, however, whether exporters from other countries chose not to decrease prices or were unable to do so due to, for example, a lack of profit margins. Austrian exporters may have had sufficiently large margins to reduce prices without incurring per-unit losses. Instead, it is also possible that Austrian exporters reduced prices in spite of resulting per-unit losses to prevent permanent losses of market share in the U.S. market, which is very important for several Austrian manufacturing sectors (see Figure 11).

Even though the results presented in Figure 10 suggest that the tariff effects on exports of targeted varieties were, on average, not overwhelmingly large, the tariffs may still have affected firm-level outcomes. They may have, for example, reduced profit margins or export growth expectations of firms. While we do not have a way to assess to which extent the tariffs impacted firms' expectations, we can assess whether the tariffs affected firm-level outcomes. For this purpose, I compute firm-specific measures of exposure to these tariffs. To do so, I use the most recent export information from Intrastat and Extrastat available for each firm prior to the implementation of the U.S. tariffs in 2018. Based on this information, I compute the average rate of U.S. tariffs for each firm's ex-ante export basket for each year in the sample. I fix the export basket before the implementation of the tariffs as changes in firms' export baskets may constitute responses to the tariffs and would therefore create an endogeneity problem. As an additional measure of firm-level exposure to the U.S. tariffs, I compute, for each firm-year cell, the share of the firm's ex-ante export basket that is subject to the Trump tariffs in the year in question.

Figure 10: Product-level impact of Trump-I tariffs

Source: Own calculations based on structural business statistics, Intrastat, Extrastat (AMDC) and data on U.S. import duties from USITC.

Notes: The coefficients shown are derived from Poisson Pseudo Maximum Likelihood estimations (Gourieroux et al., 1984; Santos Silva and Tenreyro, 2006) with fixed effects for each firm–year combination as well as for each product. The left panel corresponds to an event-study specification and uses a dummy variable (=1 if the product was subject to Trump tariffs in the respective year) as the explanatory variable. The right panel uses the applicable U.S. import tariff rate for the respective product and year as the explanatory variable. The effects shown in the right panel correspond to the impact of a 10 percent increase in the tariff rate. The 5% confidence intervals shown were computed using clustered standard errors (at the firm-year level).

As in Chapter 3, I assess the impact of the U.S. tariffs introduced in 2018 on a variety of firm-level outcomes including employment, labor productivity, the probability of firm survival, investment, R&D expenditure, export values and quantities, the number of export destinations and the size of the export portfolio. In contrast to Formula 4 used to estimate the results in Figure 10, I can, however, no longer include firm-time fixed effects in these specifications as the explanatory variables in the firm-level specifications no longer vary within but only across firms. Instead, I include firm fixed effects as well as NACE industry-time fixed effects. Tables 7 and 8 report the firm-level outcomes for which the estimations reveal significant effects.

Table 7: Effects of U.S. tariffs on firms' investment spending

	Dependent variable		
Explanatory variable	Investment full sample	Investment winsorized	Investment trimmed
Avg. U.S. tariff on firm's ex-ante exports at t			
Coefficient estimate	-3.193*	-0.236	-0.047
	(1.797)	(0.302)	(0.363)
Estimated elasticity	-27.333*	-2.331	-0.471
Share of ex-ante export portfolio s.t. U.S. tariff at t			
Coefficient estimate	-0.708**	-0.023	0.007
	(0.327)	(0.062)	(0.073)
Estimated elasticity	-50.734**	-2.288	0.706
Observations	236,857	236,857	231,065
Firms	26,921	26,921	26,322

Source: Own calculations based on Austrian structural business statistics, Extrastat, Intrastat and USITC Harmonized Tariff Schedules.

Notes: The coefficients shown were obtained as the results of Poisson Pseudo Maximum Likehood estimations with fixed effects for each firm as well as each year-NACE 2-digit industry pair. The dependent variables used are the raw data on investment spending (first column), winsorized data on investment spending (data above the 99th percentile replaced by the value of the 99th percentile, second column) and trimmed data on investment spending (data above the 99th percentile removed, third column). The estimated elasticities represent the percentage point change in investment spending associated with an increase in the targeted share of the ex-ante export portfolio of 1 (100%) and an increase in the average U.S. tariff rate on a firm's export portfolio of 10% respectively. Clustered standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

I do not find any significant effects on employment, labor productivity, the probability of firm survival, R&D expenditure, export values, export quantities and the number of distinct products exported as a measure of export portfolio diversification.[33] I do, however, find significant effects on firms' investments as well as on the number of destination countries that affected firms export to. In particular, I find some evidence (see the left column in Table 7) that firms with a larger share of targeted varieties in their ex-ante export portfolio tended to invest less during the spell of increased tariffs from 2018-2021 than firms less exposed to these tariffs. This result holds irrespective of whether we use the share of each firm's export basket targeted at any point in time or the export-basket-weighted average U.S. tariff that a firm is subject to as the firm-specific explanatory variable. In terms of magnitudes, these results suggest that a firm, whose entire ex-ante export portfolio was targeted by the U.S. tariffs of 2018, reduced its level of investment spending by 50 percent during the effective period of the tariffs.

However, this finding is almost entirely driven by a reduction in large investments. This conjecture is based on the observation that the significantly negative effect of tariffs on investment becomes negligible in size and insignificant if winsorized or trimmed data on investment spending is used as in the middle and right column of Table 7 respectively. In these specifications, data on investment spending above the 99th percentile was either set to the value of the 99th percentile (winsorized) or dropped from the sampe (trimmed).

This observation remains largely unchanged if we restrict the sample to firms in the NACE 2-digit industries with the largest exposure to the Trump I tariffs. These industries were selected as those NACE 2-digit industries for which at least 25 percent of firms in the sample exported at least one targeted product before 2018 and where therefore directly affected by the Trump I tariffs.[34] In this restricted sample, the effect on investment spending also remains significant if winsorized investment data is used as the dependent variable, however (see Table A8).

In Table 8, I assess whether the firm-level measures of exposure to the Trump tariffs are related to changes in the number of export destinations of firms. Using the share of each firm's ex-ante export basket subject to the tariffs as the explanatory variable, I find evidence that points to exposed firms diversifying their set of export destinations in response to the tariffs introduced by the U.S. administration. While the direction of the effect is the same if we use the firm-specific tariff rate as the explanatory variable, the effect for the full sample of firms reported in the left column of the upper panel of Table 8 is insignificantly different from zero. This apparent link between tariff exposure and export market diversification is much more pronounced (and significant) within the restricted sample of the most exposed industries. In particular – within these industries –, the estimate in the lower panel of Table 8 suggests that a firm, whose entire export portfolio is subject to the tariffs, increased its number of export destinations by approximately 9% due to the tariffs.

To the best of my knowledge, none of the existing papers on the U.S.-China trade war have investigated diversification of export destinations specifically. Nevertheless, the finding that firms more affected by the U.S. tariffs tended to expand their set of export destinations fits well with the finding of reallocations of trade

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[33] The corresponding results are not reported in the paper. However, they can be provided upon request.

[34] The industries selected based on this criterion are NACE C24 (manufacturing of basic metals), NACE C25 (fabricated metal products), NACE C27 (electrical equipment), NACE C28 (machinery and equipment n.e.c.), NACE C29 (motor vehicles, (semi-)trailers) and NACE C30 (other transport equipment).

flows in response to the trade war (e.g. Fajgelbaum et al., 2024; Yang et al., 2024). This response may be viewed as an adjustment of firms to reduce the impact of bilateral tariffs and reduce the reliance on individual markets.

Table 8: Effects of U.S. tariffs on the number of firms' export destinations

Explanatory variable	Number of export destinations	
	Full sample	Restricted sample: Exposed sectors
Avg. U.S. tariff on firm's ex-ante exports at t		
Coefficient estimate	0.08	0.224**
	(0.091)	(0.114)
Estimated elasticity	0.801	2.269**
Share of ex-ante export portfolio s.t. U.S. tariff at t		
Coefficient estimate	0.037*	0.085***
	(0.02)	(0.028)
Estimated elasticity	3.722*	8.82***
Observations	238,803	22,536
Firms	27,570	2,686

Source: Own calculations based on Austrian structural business statistics, Extrastat, Intrastat and USITC Harmonized Tariff Schedules.

*Notes: The coefficients shown were obtained as the results of Poisson Pseudo Maximum Likelihood estimations with fixed effects for each firm as well as each year-NACE 2-digit industry pair. The estimated elasticities represent the percentage point change in the number of export destinations associated with an increase in the targeted share of the ex-ante export portfolio of 1 (100%) and an increase in the average U.S. tariff rate on a firm's export portfolio of 10% respectively. Clustered standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.*

4.3 Discussion

In light of the large magnitude of the negative effects of the trade war on U.S. imports reported in the existing literature — Fajgelbaum et al. (2020), for example, report a decline of import values and quantities by approximately 20 percent for targeted varieties —, the evidence presented in this paper for Austrian firms is striking. Austrian firms seem to have been either in the unique position to reduce prices or exporters from other countries actively decided against doing so. Regardless, Austrian firms seem to have managed

to prevent significant declines in U.S. demand for targeted varieties by reducing prices. While these findings are certainly informative in the wake of the 2025-wave of trade policy measures, there are several crucial differences between the two tariff waves that need to be kept in mind when attempting to draw conclusions.

Firstly, while the Trump-I tariffs applied to only about 5 percent of Austrian exports to the United States, the 15 percent tariffs pursuant the framework agreement of July 27, 2025 apply to almost all EU exports to the United States. Hence, it is not clear whether Austrian exporters not targeted by the 2018-wave but by the near-universal tariffs of 2025 will choose to follow a similar strategy as the exporters of aluminum, iron and steel did during Trump's first term. There are a number of potential reasons why reactions of firms only affected in 2025 may differ. They may, for example, not be in the position to lower prices due to a lack of profit margins. Another reason for potentially diverging reactions may be different incentives due to varying degrees of reliance on U.S. demand. In particular, for several Austrian industries, the share of their value-added reliant on the U.S. market is substantially higher than for the industries primarily targeted by the 2018-tariffs (e.g. NACE C24, C25).

Figure 11 reports this share of Austrian value-added exposed to U.S. demand by NACE division/section. This share of U.S. exposed value-added was calculated using the OECD Inter-Country Input-Output Tables for 2019[35] as the sum of the Austrian industry value added in U.S. final demand and the Austrian industry value added in U.S. gross exports that are not eventually consumed by U.S. consumers. The Austrian industry value added in U.S. final demand and U.S. gross exports was computed according to Guilhoto et al. (2022). This data is also available from the OECD TiVA database. However, gross exports also include exports by the U.S. that are eventually re-imported and consumed in the United States. This fraction of re-imported exports is already contained in U.S. final demand, which means that it needs to be subtracted from gross exports to avoid double-counting. This correction was done by computing the Austrian industry value-added in the input of U.S. industries in the U.S. final demand of non-U.S. output.

As visible in Figure 11, most of the NACE industries strongly reliant on U.S. import demand unsurprisingly belong to the manufacturing sector. Among these particularly exposed manufacturing sectors are producers of motor vehicles (C29), producers of machinery (C28) and producers of pharmaceuticals (C21). In 2019, between 8 and 16 percent of total value added of these industries was directly reliant on U.S. demand. Some service industries, such as air transport, are also highly exposed to U.S. demand. However, these industries primarily export services which are not subject to tariffs. Hence, it is to be expected that the manufacturing sectors producing cars and car parts as well as machinery and pharmaceuticals have the largest incentive to prevent declines in U.S. demand in light of the tariffs introduced in 2025.

While it is therefore difficult to draw conclusions for other industries, the results reported in this paper should at least speak to the expected effect on exporters of aluminum and steel products. The product-level estimates suggest that Austrian exporters of aluminum and steel would be fairly resilient in light of the import duties reintroduced in 2025 if the tariffs had similar magnitude. However, the import duties levied on these

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[35]At the time of writing this report, the OECD ICIO tables were only available until 2020. 2019 was chosen to avoid that Covid-induced changes in trade flows affect the results.

products in 2025 are (at the time of writing this report) significantly higher than the tariffs introduced in 2018 (50 percent instead of 25 percent for steel and 10 percent for aluminum respectively). This entails that the effects on Austrian exporters of these products are likely to be larger in 2025 than the effects reported in this study, particularly because it is very unlikely that Austrian firms will be able to prevent substantial increases in U.S. consumer prices by lowering prices in light of 50 percent tariffs.

Figure 11: Exposure to U.S. demand by Austrian industry, 2019

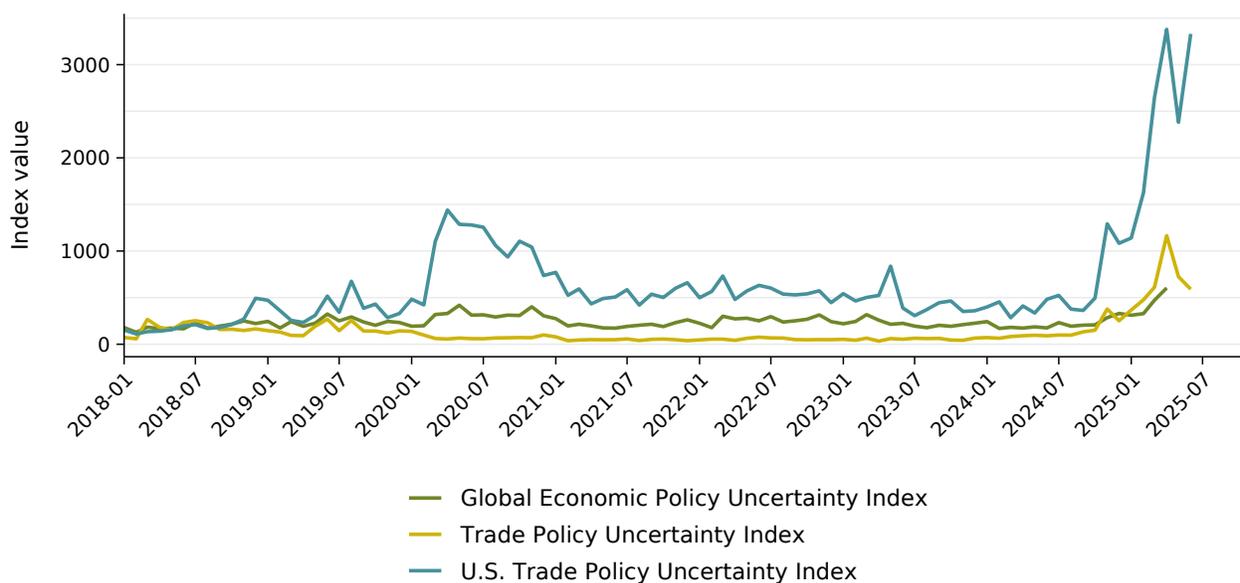Source: Own calculations based on OECD inter-country input-output tables (2019) as well as Guilhoto et al. (2022).

Moving on to the firm-level effects, the results in Table 7 reveal an impact dimension of the 2018-tariffs that may undermine the future competitiveness of affected Austrian firms by causing them to cancel or postpone large investments. One might again argue that the discouraging effect of the U.S. import duties on

corporate investment of Austrian firms documented in Table 7 constitutes a lower bound for the expected effect of the 2025-wave of U.S. tariffs. This is because the degree of policy uncertainty surrounding U.S. trade policy during the first two quarters of the second Trump administration has been substantially more pronounced than during the first wave of protectionist measures in 2018. In 2018, once the trade policy measures had been implemented, they mostly remained in place for several years with only minor adjustments. The first two quarters of 2025, on the other hand, were characterized by very frequent announcements and threats of additional measures that were often followed by deferrals or adaptations as well as court rulings challenging their legality. This uncertainty is clearly reflected in Figure 12 which shows the recent evolution of selected indicators of economic policy uncertainty. The U.S. Trade Policy Uncertainty Index by Baker et al. (2016) shows some spikes during President Trump's first term as well, however, the increase in recent months has been substantially larger. This is also reflected in the global trade policy uncertainty index by Caldara et al. (2019) as well as the Global Economic Policy Uncertainty Index by Davis (2016).[36] Given the negative relationship between uncertainty and corporate investment documented by numerous studies (e.g. Bloom et al., 2007; Kumar et al., 2023), this substantially larger degree of policy uncertainty in 2025 is likely to induce larger declines in corporate investment than those reported in Table 7.

Figure 12: Economic policy uncertainty

Source: The global economic policy uncertainty index is taken from Davis (2016), the U.S. trade policy uncertainty index from Baker et al. (2016) and the trade policy uncertainty index from Caldara et al. (2019).

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[36] The absence of a standstill clause in the framework agreement between the US and the EU reached in July 2025 allows both parties to unilaterally deviate from the agreement. The U.S. has made use of this by imposing tariffs on a range of products partially fabricated from steel and aluminium which is at odds with the terms of the framework agreement (Kawlath, 2025). Hence, the uncertainty for EU exporters remains high even after the framework agreement was reached.

5   Conclusion

This paper assesses the impact of two distinct but interrelated challenges for Austrian firms resulting from Austria's integration in global trade. In particular, I provide evidence on the extent to which Austrian firms were affected by the increase in Chinese competition over the last decade and by the U.S. trade policy actions during U.S. President Trump's first term. Overall, the results indicate that Austrian firms were fairly robust with respect to these challenges, as neither of the two challenges entailed significantly negative effects on employment or labor productivity of firms. Nevertheless, the study reveals firm-level adjustments to these challenges. In particular, I find that Chinese competition contributed to some structural change by inducing changes in specialization within firms and by exhibiting a small, but significantly positive effect on the probability of firm exit among the least productive firms. Within firms, Chinese competition decreased R&D expenditure of firms and the U.S. tariffs introduced in 2018 reduced large investments, even though Austrian firms managed to prevent significant declines in sales quantities to the U.S. market. Finally, the results of this study indicate that the diversification of markets serves as a strategy among Austrian firms to deal with both increased competition and protectionist measures.

The policy implications of these findings are not straightforward. One potentially fruitful policy direction would be measures that support firms in their individual adjustment to challenges resulting from trade linkages. In particular, measures that reduce barriers to trade could help firms enter and develop new sales markets to reduce the reliance on individual destinations and establish new market niches in light of increased competitive pressures. For this reason, the EU single market strategy and the harmonization and simplification of rules it aims to achieve is of particular importance. This is because, as Fontagné and Yotov (2024) point out, even a moderate strengthening of the integration of the European single market may be able to compensate for the economic costs resulting from the currently observable decoupling of geopolitically distant blocs. Beyond the EU market, international trade agreements create opportunities for EU exporters to enter new markets by reducing trade barriers and providing increased legal certainty in trade relationships as evidenced by the various ex-post evaluations conducted by the European Commission (see, for example, European Commission, 2025).

6   Declarations

This research project was conducted with data from the Austrian Micro Data Center (AMDC). The AMDC is a research data infrastructure facility of Statistics Austria that enables research on micro data processed in compliance with data protection regulations (Fuchs et al., 2023).

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Appendix

Table A1: Sectoral evolution of measures of Chinese competition

NACE activity (2-digit)	Competition in domestic market				Competition in export markets			
	IC_d^{2023}		$\Delta IC_d^{2008-2023}$		ΔIC_f^{2023}		$\Delta IC_f^{2008-2023}$	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank
01: Crop and animal production, hunting	0.007	25	-0.005	37	0.014	27	0.001	27
02: Forestry and logging	0.002	29	0	33	0.006	34	-0.001	32
03: Fishing and aquaculture	0.038	14	0.03	12	0.014	26	0.002	23
05: Mining of coal and lignite	0	35	0	32	0.01	29	0.007	19
06: Extraction of crude petroleum & natural gas	0	35	0	28	0	39	0	31
07: Mining of metal ores	0.002	30	0	27	0.004	36	-0.001	33
08: Other mining and quarrying	0.113	7	0.001	25	0.067	18	-0.028	37
10: Manuf. of food products	0.014	22	0.003	21	0.035	21	0.01	17
11: Manuf. of beverages	0.003	26	0.001	24	0.008	30	0.004	22
12: Manuf. of tobacco products	0	35	-0.004	36	0.008	32	0.001	25
13: Manuf. of textiles	0.104	8	0.049	7	0.32	5	0.166	5
14: Manuf. of wearing apparel	0.204	4	0.025	14	0.292	6	0.038	15
15: Manuf. of leather and related products	0.329	1	0.147	3	0.419	1	0.167	4
16: Manuf. of wood & products thereof	0.038	15	0.022	15	0.075	16	0.005	20
17: Manuf. of paper (products)	0.01	24	0.006	20	0.069	17	0.046	14
18: Printing & reproduction of recorded media	0.001	31	-0.001	34	0.024	23	0.008	18
19: Manuf. of coke & refined petroleum pr.	0.035	17	0.034	11	0.023	24	-0.016	36
20: Manuf. of chemicals and chemical pr.	0.066	13	0.053	6	0.143	12	0.107	7
21: Manuf. of pharmaceutical products	0.024	19	0.007	19	0.089	14	0.067	11
22: Manuf. of rubber and plastic products	0.073	10	0.048	8	0.171	10	0.099	9
23: Manuf. of non-metallic mineral pr.	0.067	12	0.02	16	0.269	7	0.112	6
24: Manuf. of basic metals	0.015	21	-0.001	35	0.048	19	0.004	21
25: Manuf. of fabricated metal products	0.083	9	0.043	10	0.222	8	0.097	10
26: Manuf. of computer, electr. & optical pr.	0.311	2	0.18	1	0.406	2	0.21	2
27: Manuf. of electrical equipment	0.237	3	0.177	2	0.374	4	0.236	1
28: Manuf. of machinery & equipment n.e.c.	0.069	11	0.043	9	0.179	9	0.107	8
29: Manuf. of motor vehicles, trailers	0.032	18	0.029	13	0.08	15	0.067	12
30: Manuf. of other transport equipment	0.121	6	0.094	4	0.09	13	0.019	16
31: Manuf. of furniture	0.038	16	0.008	18	0.165	11	0.05	13
32: Other manufacturing	0.202	5	0.088	5	0.387	3	0.17	3
35: Electricity, gas steam and air conditioning	0	35	0	28	0	38	0	30
38: Waste collection, treatment & disposal	0	35	0	28	0.001	37	0.001	24
58: Publishing activities	0.001	33	0	31	0.008	31	0	29
59: Video, TV, music prod. & publishing	0.012	23	0.002	23	0.048	20	0.001	26
71: Architectural & engineering & techn. act.	0.002	28	-0.011	39	0.01	28	-0.012	34
74: Other profess., scient. & techn. activ.	0.001	32	0	26	0.006	35	-0.014	35
90: Creative, arts & entertainment	0.003	27	0.002	22	0.006	33	-0.039	38
91: Libraries, museums & cultural activ.	0.023	20	0.014	17	0.021	25	0	28
96: Other personal services	0	34	-0.006	38	0.025	22	-0.06	39

Source: Own calculations based on BACI harmonized trade data.

Notes: The indicator of Chinese competition intensity in the domestic market corresponds to the quotient of the value of Austrian imports from China in 2023 and the value of total Austrian imports in 2008 associated with the corresponding NACE 2-digit industry. The indicator related to Austrian export markets weighs the country-specific indicators by means of product-specific Austrian export weights.

Table A2: Effects of Chinese competition in the domestic market and export markets on firms' activity indicators

Explanatory Variables	Dependent Variable			
	Δ log Value-Added / Headcount	Δ log Value-Added / FTE	Δ R&D / Revenue	Δ Investment / Revenue
ΔIC_d^{CHN}	0.018	-0.001	-0.069***	0
	(0.04)	(0.04)	(0.025)	(0.002)
ΔIC_f^{CHN}	0.084***	0.086***	0.004	0.002
	(0.028)	(0.028)	(0.015)	(0.001)
$\Delta IC_d^{CHN} \cdot \Delta IC_f^{CHN}$	-0.028**	-0.019	-0.015	0
	(0.014)	(0.014)	(0.011)	(0.001)
Observations	66,248	66,248	10,307	69,274
Firms	21,835	21,835	2,852	22,507

Source: Own calculations based on BACI harmonized trade data, Austrian structural business statistics, R&D statistics of the business enterprise sector, Extrastat and Intrastat.

Notes: The coefficients shown were obtained as the results of pooled OLS specifications with fixed effects for every year-NACE 4-digit industry pair. The dependent variables used are the change in the natural logarithm of labor productivity computed as the ratio between value-added and the personnel headcount and the ratio between value-added and the number of full-time equivalents in columns I and II respectively, in the ratio of R&D spending over revenue (column III) and in the ratio of investment in fixed assets over revenue (column IV). Robust standard errors in parentheses. $***\ p < 0.01$, $** \ p < 0.05$, $*\ p < 0.1$.

Table A3: Effects of Chinese competition in the domestic market and export markets on structural change within firms

Explanatory Variables	Dependent Variable			
	NACE C → G-N (permanent)	NACE C → G-N (all)	NACE C → G-R (all)	Δ NACE 4-digit (all)
ΔIC_d^{CHN}	0.009*	0.009*	0.010**	0.039***
	(0.005)	(0.005)	(0.005)	(0.011)
ΔIC_f^{CHN}	0.013***	0.013***	0.013***	0.018***
	(0.003)	(0.003)	(0.003)	(0.007)
$\Delta IC_d^{CHN} \cdot \Delta IC_f^{CHN}$	-0.005***	-0.005***	-0.006***	-0.018***
	(0.002)	(0.002)	(0.002)	(0.004)
Observations	71,219	71,219	71,219	71,219
Firms	22,964	22,964	22,964	22,964

Source: Own calculations based on BACI harmonized trade data, Austrian structural business statistics, R&D statistics of the business enterprise sector, Extrastat and Intrastat.

Notes: The coefficients shown were obtained as the results of pooled OLS specifications (linear probability models) with fixed effects for every year-NACE 4-digit industry pair. The dependent variables used are Dummy variables indicating whether the firm's NACE classification has, either temporarily or permanently, changed from manufacturing (NACE C) to market services (NACE G-N) or services more generally (NACE G-R) or at all (change in 4-digit NACE code) over the five-year interval considered for each observation. Robust standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A4: Evolution of the effects of Chinese competition on firm survival

Explanatory Variables	$\Delta_{2013-18,\ 2014-19}$			$\Delta_{2015-20,\ 2016-2021,\ 2017-22}$		
	I	II	III	IV	V	VI
ΔIC_d^{CHN}	-0.004*		-0.004	0.001		0.002
	(0.002)		(0.004)	(0.002)		(0.003)
ΔIC_f^{CHN}		-0.003**	-0.003*		0.001	0.001
		(0.001)	(0.002)		(0.002)	(0.003)
$\Delta IC_d^{CHN} \times \Delta IC_f^{CHN}$			0.001			-0.001
			(0.001)			(0.001)
Observations			71,219			
Firms			22,802			

Source: Own calculations based on BACI harmonized trade data, Austrian structural business statistics, Extrastat and Intrastat.

Notes: The coefficients shown were obtained as the results of pooled OLS specifications with fixed effects for every year-NACE 4-digit industry pair. The dependent variable used is a Dummy variable indicating whether or not a firm is still active at the end of the 5-year period under consideration. The coefficient estimates for the two subperiods were obtained by interacting the measures of changes in Chinese competition intensity with an indicator capturing whether the observation (five-year long difference) started before or after 2015. For each time period, the left column only uses the change in the intensity of Chinese competition in the domestic market as an explanatory variable (column I and IV respectively). The middle column does the same but for the indicator of Chinese competition in export markets. The right column instead controls for changes in competition intensity in both markets as well as an interaction term of the two. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A5: Effects of Chinese competition on the number and employment of foreign affiliates

Explanatory Variables	Δ Number of foreign affiliates			Δ Number of employees of foreign affiliates		
	I	II	III	IV	V	VI
ΔIC_d^{CHN}	0.003 (0.027)		-0.004 (0.051)	-1.288 (13.681)		-1.578 (26.25)
ΔIC_f^{CHN}		-0.004 (0.017)	-0.012 (0.023)		-3.508 (8.775)	-5.803 (11.744)
$\Delta IC_d^{CHN} \times \Delta IC_f^{CHN}$			0.007 (0.015)			2.085 (7.59)
Observations			42,885			
Firms			19,314			

Source: Own calculations based on BACI harmonized trade data, Austrian structural business statistics, foreign-controlled enterprises statistics (outward FATS), Extrastat and Intrastat.

Notes: The coefficients shown were obtained as the results of pooled OLS specifications with fixed effects for every year-NACE 4-digit industry pair. For each dependent variable, the left column only uses the change in the intensity of Chinese competition in the domestic market as an explanatory variable (column I and IV respectively). The middle column does the same but for the indicator of Chinese competition in export markets. The right column instead controls for changes in competition intensity in both markets as well as an interaction term of the two. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A6: Effects of Chinese competition on R&D personnel and R&D subsidies received

Explanatory variables	Dependent variables		
	Δ R&D subsidies received (thous. EUR)	Δ Number of technicians employed	Δ Number of researchers employed
	I) Chinese competition in the domestic market		
ΔIC_d^{CHN}	-17.897	0.389	0.696
	(35.407)	(2.076)	(2.386)
	II) Chinese competition in export markets		
ΔIC_f^{CHN}	-5.22	1.989	-0.219
	(26.586)	(1.559)	(1.792)
Observations	10,307	10,307	10,307
Firms	2,852	2,852	2,852

Source: Own calculations based on BACI harmonized trade data, Austrian structural business statistics, R&D statistics on the business enterprise sector, Extrastat and Intrastat.

*Notes: The coefficients shown were obtained as the results of pooled OLS specifications with fixed effects for every year-NACE 4-digit industry pair. Robust standard errors in parentheses. Panel I) reports the coefficient estimates of models that exclusively control for the change in competition intensity in the domestic market. Panel II) instead reports the estimates of specifications including only the change in the intensity of Chinese competition in export markets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.*

Table A7: Baseline effects of Chinese competition conditional on firm-specific trends

Explanatory Variables	Δ log(LP$_{\#Emp.}$)	Δ log(LP$_{\#FTE}$)	Δ R&D / Revenue	Δ Investment / Revenue	Δ log(Employm.)
		Dependent variables			
	I) Chinese competition in the domestic market				
ΔIC_d^{CHN}	0.026	0.034	-0.034	0.001	0.003
	(0.024)	(0.024)	(0.035)	(0.001)	(0.015)
	II) Chinese competition in export markets				
ΔIC_f^{CHN}	0.028	0.038	-0.007	0.001*	0.005
	(0.026)	(0.026)	(0.02)	(0.001)	(0.01)
Observations	70,702	70,702	10,307	69,274	69,851
Firms	22,694	22,694	2,852	22,507	22,444

Source: Own calculations based on BACI harmonized trade data, Austrian structural business statistics, R&D statistics on the business enterprise sector, Extrastat and Intrastat.

Notes: The coefficients shown were obtained as the results of fixed effects models that include firm fixed effects in the differenced equations. These specifications also include fixed effects for every year-NACE 2-digit industry pair. The dependent variables used are the changes in the natural logarithm of labor productivity computed as the ratio between value-added and the personnel headcount and the ratio between value-added and the number of full-time equivalents in columns I and II respectively, in the ratio of R&D spending over revenue (column III), in the ratio of investment in fixed assets over revenue (column IV) and in the natural logarithm of the personnel headcount (column V). Panel I) reports the coefficient estimates of models that exclusively control for the change in competition intensity in the domestic market. Panel II) instead reports the estimates of specifications including only the change in the intensity of Chinese competition in export markets. Clustered standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A8: Effects of U.S. tariffs on firms' investment in particularly exposed sectors

Explanatory variable	Dependent variable		
	Investment full sample	Investment winsorized	Investment trimmed
Share of ex-ante export portfolio s.t. U.S. tariff at t			
Coefficient estimate	-0.435***	-0.122*	-0.06
	(0.103)	(0.066)	(0.101)
Estimated elasticity	-35.249***	-11.47*	-5.822
Avg. U.S. tariff on firm's ex-ante exports at t			
Coefficient estimate	-1.476***	-0.79***	-0.524
	(0.522)	(0.302)	(0.485)
Estimated elasticity	-13.721***	-7.595***	-5.104
Observations	22,988	22,988	21,852
Firms	2,699	2,699	2,578

Notes: The coefficients shown were obtained as the results of Poisson Pseudo Maximum Likehood estimations with fixed effects for each firm as well as each year-NACE 2-digit industry pair. The estimation was conducted on a restricted sample of NACE 2-digit industries most exposed to the Trump tariffs. In particular, all NACE 2-digit industries were selected in which at least 25 percent of firms exported targeted varieties in 2017: NACE C24, C25, C27, C28, C29, C30. The dependent variables used are the raw data on investment spending (first column), winsorized data on investment spending (data above the 99th percentile winsorized, second column) and trimmed data on investment spending (data above the 99th percentile removed, third column). The estimated elasticities represent the percentage point change in investment spending associated with an increase in the targeted share of the ex-ante export portfolio of 1 (100%) and an increase in the average U.S. tariff rate on a firm's export portfolio of 10% respectively. Clustered standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.