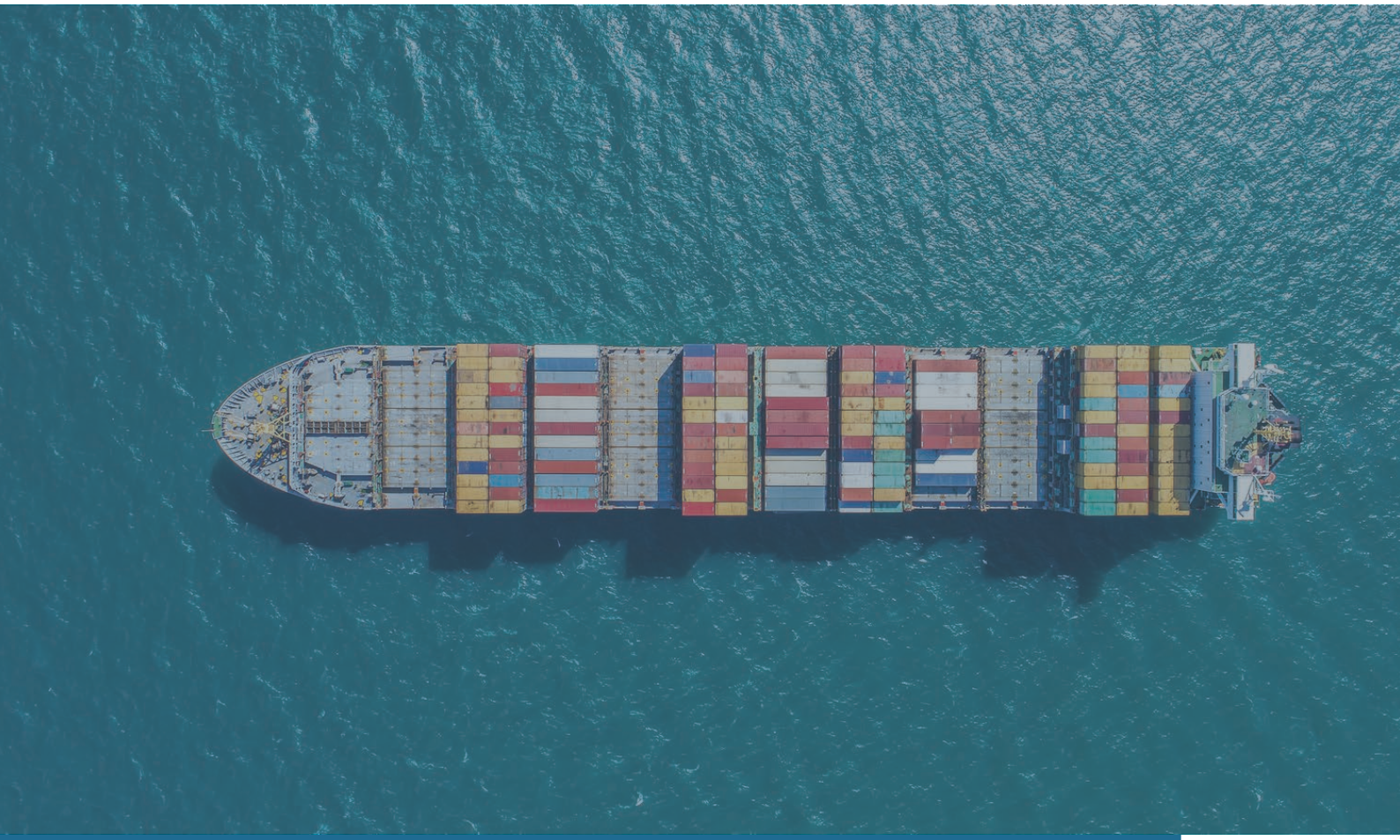
Assessing the impact of potential restrictions on UK recycled metals exports

An evidence-based assessment for the British Metals Recycling Association



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Contents

Glossary of economic terms	**1**
Summary	**3**
1. Introduction	**5**
2. Modelling impacts of export restrictions	**8**
3. Business perceptions	**25**
4. Recommendations	**34**

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Glossary of economic terms

Autoregressive Process (Second Order)	A forecasting method that uses values from the previous two time periods to predict future outcomes. Used here to model how GVA and employment losses continue to evolve over time.
Confidence Interval (CI)	A range within which the true value of an estimate is expected to fall, given a certain probability (e.g. 90% CI). Wider intervals indicate more uncertainty in the projections.
Domestic Substitution	The replacement of lost export demand with increased domestic consumption. In the report, this term highlights attempts to absorb recycled materials in UK markets when exports are restricted.
Econometric Model	A quantitative framework that uses statistical methods to test hypotheses or estimate relationships between economic variables. In this report, econometric models are used to simulate the impact of export restrictions on trade, GVA and employment.
Elasticity	A measure of responsiveness; in this report, it often refers to the percentage change in export value resulting from a 1% change in export volume. Sub-unitary elasticity (<1) indicates less-than-proportional responsiveness.
Employment Multipliers (Type 1)	Measures that quantify the total employment impact (direct and indirect) of a change in sectoral output or value, based on inter-industry relationships. Type 1 multipliers include jobs created in the supply chain but not induced effects from household spending. Under ONS definitions, it is the ratio of total FTE to direct FTE.
Export Shock	A sudden and unexpected disruption in a country's export market, such as the loss of a major trading partner through policy changes, which causes immediate negative impacts on trade volumes and sector revenues.
Fan Charts	Visual representations of forecast scenarios showing a central (median) estimate with uncertainty bands around it, used to convey the potential range of outcomes.
Fixed Effects	Statistical controls in econometric models that account for variables that do not change over time, such as country or sector-specific characteristics, enabling more accurate estimation of the effects of interest.
Grade Heterogeneity	The variation in responsiveness or value generation potential among different types of recycled metal (e.g. cast iron vs stainless steel), reflecting their distinct economic characteristics.
Gross Value Added (GVA)	A measure of economic productivity which reflects the value of goods and services produced in a sector, minus the cost of inputs and raw materials. In this context, it quantifies the economic contribution of the metals recycling sector.

Non-OECD Ban	A hypothetical policy scenario modelled in the report where exports to all non-OECD (Organisation for Economic Co-operation and Development) countries are banned, significantly affecting trade flows and sector performance.
Panel Model	A type of econometric model that uses data across both time and cross-sectional units (e.g. countries, sectors). It allows researchers to control for variables that change over time and those that vary between units but are constant over time, improving accuracy of causal inference.
Persistence (in economic modelling)	The extent to which economic shocks (e.g. a loss in exports) have lingering effects over time due to factors like path dependency, industrial decline and difficulty in market recovery.
Price Feedback Effects	The way changes in trade volume (due to restrictions) can alter prices, which in turn affect production levels and economic value generated.
Quotas (Export Quotas)	Government-imposed limits on the quantity or proportion of a product that can be exported. In this context, quotas restrict the volume of recycled metals allowed for export.
Recovery Profile	A modelled trajectory of how the sector might recover from a trade shock, incorporating both domestic substitution and export rerouting over time.
Rerouting (Exports)	The process of redirecting exports to new international markets when traditional markets become inaccessible due to policy or logistical barriers.
Scale Economies (Economies of Scale)	Cost advantages that arise with increased production or trade volumes, where average costs fall as volume increases. In recycling, larger bulk exports reduce per-tonne handling costs and increase bargaining power, which is indicated by weakening marginal returns to scale.
Scenario Modelling	A technique used to project potential outcomes under different hypothetical policy interventions (e.g. export bans, quotas), allowing evaluation of effects and impacts under various conditions.
Transmission Channels	The mechanisms by which an initial economic shock (e.g. export loss) affects other parts of the economy, such as through supply chains or employment.
Type 1 Effects	Employment and economic impacts that include direct and supply chain (indirect) effects but exclude induced effects like household spending impacts. Where using ONS derived Type 1 effects, it can be defined as how many FTE jobs are supported per 1 million GBP generated through final output.
Value Chain	The full range of activities involved in producing, processing, transporting and selling a product. Exporters typically operate at the end of the metals recycling value chain.

Summary

This report sets out findings from a research assessment conducted by the Centre for Regional Economic and Social Research (CRESR), Sheffield Hallam University for the British Metals Recycling Association (BMRA). It assesses the implications of hypothetical export restrictions on the UK metals recycling sector.

The research was conducted in the context of recent revived interest in the future of the UK steel industry, in particular transformative investments to achieve low carbon steel production, which also likely mean increased demand for recycled steel. This has led to calls for changing rules on exports of recycled metal, which is increasingly seen as a nationally strategic resource.

The research involved two activities: economic modelling of the sector, including implications of different export policy scenarios; and consultation with UK metals recycling businesses. Scenarios were chosen to reflect examples of policies in other countries (further controls on trade to non-OECD countries); modelling an 'export shock' to the UK's largest recycled metals export destination, Türkiye; and different quotas to retain recycled metal for domestic markets.

Key findings from the economic modelling were:

- **Export changes have large, compounding effects on the sector's gross value added (GVA) and employment:** even modest export shocks have substantial and lasting economic consequences. A 1% decline in export value results in a cumulative loss of approximately £121 million GVA over a five-year period. This impact compounds through time as initial disruptions ripple through supply chains and erode industrial productivity. Similarly, a £10 million drop in export value leads to an estimated loss of 114 full-time equivalent (FTE) direct and indirect jobs over five years (the mean estimate is that for every one direct job in the sector, another 0.3 jobs are supported indirectly through supply chains).
- **Significant impacts from destination-specific export bans:**
  - A ban on exports to Türkiye results in a median cumulative GVA loss of 24%, equivalent to approximately £2.16bn, and the loss of around 6,834 FTE jobs over five years.
  - Effects are even more pronounced under a non-OECD export ban, where the sector experiences a median GVA contraction of 54.5%, or approximately £4.9bn, and an estimated 20,317 FTE direct and indirect jobs lost.
- **Quotas produce disproportionate negative employment effects:**
  - Export quotas generate disproportionately large economic impacts as restrictions are increased. A 10% export quota results in a £0.88bn loss in GVA and an estimated 2,835 FTE job losses over five years. However, under a 30% quota these figures increase to a £2.54bn GVA loss, and 8,846 FTE jobs lost. **At the 50% quota level, the model estimates a £4.08bn GVA reduction and approximately 23,206 FTE jobs lost.**
- **Export restrictions undermine the sector's fundamental economics:** limiting export volume disrupts the scale efficiencies that allow exporters to reduce average costs and secure favourable prices in competitive global markets. This is particularly detrimental to high-grade or scale-sensitive scrap segments, where margins depend on volume consolidation and buyer competition.
- **Different grades respond differently to export shocks:** high-elasticity grades (e.g. HS code 720449: Waste and scrap of iron or steel) gain near-proportional revenue with volume and suffer greater losses under restrictions. One-size-fits-all export policies risk disproportionately harming the most value-generating segments.
- **Export rerouting and domestic substitution are important but offer limited relief as it stands:** even under optimistic assumptions, neither domestic trade nor export rerouting can fully offset

losses from export restrictions. For example, rerouting 30-40% of displaced exports still leaves GVA significantly below baseline after five years, indicating that recovery pathways are slow and incomplete.

- **The persistence of a negative policy/shock amplifies economic effects over time:** once export value is lost, it feeds into the next year's baseline, compounding the decline through supply chain contractions, sunk costs and eroded industrial capability. This explains why economic damage continues to grow even when no additional restrictions are imposed after the initial shock.

Consultation with individual businesses reinforced the key messages from the economic modelling. Businesses' main points were:

- **The metals recycling market is complex and in a particularly turbulent and volatile period**, which would likely exacerbate the effects of any new policy changes.
- **Exports are critical to business operations** and internationally, markets are varied: for instance ferrous and non-ferrous markets differ substantially. This means there is no straightforward policy option to support greater domestic retention through export restrictions without risking the functioning of the sector.
- **Domestic demand is currently low but this is not the only barrier to strengthening domestic recycled metals markets.** Fluctuating demand, procurement approaches (e.g. payment terms) and difficulties attaining credit insurance make the domestic market less attractive to many recycling businesses.
- Investments in Electric Arc Furnaces in the UK using recycled metals will create opportunities for metals recyclers, assuming UK steel producers offer competitive prices, but **many will not be able to access these opportunities without technological investment and improved, cost-effective rail freight infrastructure**. Increased processing will also require coordination to ensure capacity to process and/or store increased residual waste.
- **Direct restrictions on metals exports is not a feasible approach to supporting UK steel production** and more stringent restrictions may cause the UK metals recycling sector to fail. Restrictions have knock-on consequences for waste management and blanket restrictions on metals exports aimed at supporting steel production also have unintended consequences for non-ferrous metals recyclers who have no domestic market.
- **There is appetite for an open conversation about quality specifications across the sector.** There is currently a lack of shared understanding about precisely what quality challenges need to be addressed and ways to address them. Any agreed changes will need systematic support across the supply chain, including for SME firms with less access to capital to invest in new technologies and processes.
- **More work is required to support government and key stakeholders to better understand and collaborate with the metals recycling sector.** It is a diverse industry, requiring nuanced understanding of challenges and opportunities. This requires consistent constructive open dialogue between government, steel producers, metals recyclers and other key stakeholders. It also requires the recycling sector to deliver clear, unified messages to help government decision-making.

1. Introduction

This report presents findings from a research exercise commissioned by the British Metals Recycling Association (BMRA) to assess the impacts of potential metals export restrictions for the UK metals recycling industry. It outlines headline quantitative modelling of impacts under a range of different scenarios as well as business perceptions of likely implications of export restrictions.

The aim of the research is to **generate robust evidence on the potential impacts of steel export restrictions for the UK metals recycling industry**. To achieve this aim the research has two objectives:

1. Quantitatively model the economic impacts of different export restriction scenarios for the sector, including GVA and employment.
2. Understand impacts for different businesses through consultation with metals recycling businesses.

The headline findings show that export restrictions based on quotas or restrictions on export to specific countries will likely have a large negative effect on the metals recycling sector gross value added (GVA) and employment. It also finds that systemic change will be required to move towards a greater proportion of recycled metals staying in the UK. Such change will require partnership and collaboration between metals producers, recycling firms, government and other key industry stakeholders. It is also important to note that currently any such changes are more applicable to ferrous metals (iron and steel) because the UK market for many other recycled metals is close to non-existent with few medium-term prospects for this to change.

This report provides a rapid assessment. It follows established research protocols and methodologies, including sign-off from the Sheffield Hallam University research and ethics oversight committees. While its findings provide a headline assessment, further detailed in-depth research and analysis will be required to produce more fine-grained assessment of impacts, especially on different types of businesses, impacts across regions and for exploring potential alternative policy options that focus on supporting greater improvements in material quality and related processes.

1.1. Context

Metals recycling is critical to achieving net zero industry goals, most notably in the steel sector, which is currently responsible for 8% of total global carbon emissions. Already an important input for steelmaking, as steel production moves towards increased use of Electric Arc Furnace (EAF) technologies, scrap steel will account for an increasing proportion of feedstock.

The UK's two final blast furnace production facilities – Tata's Port Talbot facility, which closed in September 2024, and Jingye's Scunthorpe plant – are being replaced by EAFs, which will primarily be fed by scrap steel. By 2050 over 50% of global steel production could be scrap-based, up from 28% in 2023 (OECD, 2024; World Steel, 2024). It is anticipated that in the UK all steel production will be scrap based as soon as 2025 (up from 20% in 2022). The importance of access to recycled steel inputs is therefore seen by some industry stakeholders as a pressing concern for the UK.

In this context, the idea of recycled steel as a nationally strategic material has gained traction and there have been calls for recycled metals export restrictions to ensure security of supply for large steel producers. Different levels of export restrictions operate in some other countries, while the EU is going to impede exports to non-OECD countries from 2027 with calls for further restrictions. The UK currently exports 70-80% of its recycled steel, which means any export restrictions have potentially significant implications for the UK metals recycling industry as a whole, and for individual businesses.

However, economic assessment of these impacts is needed to fully assess the implications. It is important also to understand this potential change alongside other measures potentially undertaken by steel

producers, including increased supply chain integration and more stringent demands on sorting and quality control. Further, while restrictions on scrap export might be designed to target the steel industry, other forms of metal recycling will also be impacted: it is important to understand these potential impacts too.

1.2. Methods

1.1.1. Economic modelling

We adopt a structural, multi-stage econometric modelling framework to assess the potential impact of a range of proposed export restrictions on bilateral recycled metal trade dynamics, gross value added (GVA) and employment outcomes. The approach integrates three main components: a gravity-based trade panel model for UK recycled metal, a model of GVA which allows us to simulate potential industry impacts, and an employment impact simulator based on Office for National Statistics (ONS) defined employment multipliers and realisation effects. These are bespoke models that offer tailoring to the policy context and are in line with established academic approaches to structural economic modelling.

First, a gravity panel model is estimated using bilateral trade data drawn from HM Revenue & Customs, covering the UK's trade across all trading countries and years. This is a type of economic model that helps us understand what drives trade between countries. The specification includes a range of forms to identify key determinants of trade, mass and generated value. These estimates form the empirical basis for calibrating the initial export-value shock, including adjustments for changes in export quantities and composition. These effects we refer to as transmission channels that add complexity that reflect real-world scenarios.

Second, the estimated export shock is passed through an in-house specified dynamic GVA impact model. In this step, we look at how changes in export value (how much value the sector makes from exports) are connected to losses in production or output. To do this, we use results from a group of statistical models (called log-log panel estimators) that measure relationships between variables. These models take into account things that don't change over time (called fixed effects) for each year, type of metal and industry sector. In addition to the direct trade-output elasticity, we incorporate a price feedback term that reflects the effect of trade-driven terms-of-trade changes on real output. These GVA parameters are either estimated in-house or drawn from established empirical studies, ensuring alignment with the wider literature. Next, we project future losses in GVA (gross value added) using a method that looks at how changes today can carry over into the future. This method is called a second-order autoregressive process, which means it uses information from the last two time periods (like the past two years) to predict what happens next. It helps us capture short-term effects that don't disappear right away, as well as delayed responses in the economy.

We then extend with recovery profiles that account for both domestic substitution and the rerouting of exports to alternative markets. These recovery dynamics are modelled through retention and switching parameters: the domestic retention rate captures the share of displaced export value that is absorbed by local demand after a lag, while the export rerouting rate captures reallocation to new international buyers. Both parts of the industry we're looking at – how industries adjust at home and how they find new export markets – don't happen instantly. There are delays and slowdowns, because in the real world, it takes time to move resources, retrain workers, or find new buyers. Some of this lost production may never fully recover. These effects help us reflect how, in practice, domestic recovery and switching exports to new markets often happens slowly and only partially, as shown in real-world studies. To explore different future outcomes, we run simulations by changing the key assumptions (like how fast industries adapt or how much they recover domestically) within reasonable, evidence-based limits. The results are shown using fan charts, which display the most likely outcome (the median) and a range of possibilities over time, from best-case to worst-case scenarios.

Third, employment effects are derived by applying 'Type I' employment multipliers and effects to the estimated value of the initial trade shock. These multipliers, sourced from the ONS Input-Output Supply and Use Tables (Blue Book), capture the direct and indirect full-time equivalent (FTE) jobs associated

with external economic change.[1] The employment shock is then simulated over time using a parallel autoregressive structure, combined with recovery profiles that account for both domestic substitution and the rerouting of exports to alternative markets. Recovery dynamics are modelled with delay lags and diminishing adjustment rates, reflecting the likely pace and frictions of reallocation and business adjustment to policy events.

Parameter values across all stages are generated internally from available data and validated against published empirical benchmarks, where available. Where we feel it is more suitable, we adopt parameter estimates from existing empirical literature. Together, the framework provides a consistent, evidence-based simulation of how export restrictions translate into GVA and employment losses over time.

Findings from the economic modelling are outlined in Section 2.

1.1.2. Business consultation

While economic modelling provides important analysis to understand the sector-level impacts of changes to export levels, it does not provide contextual detail on how different businesses might be affected by changes, specific ways that businesses might be affected or seek to mitigate changes, nor on exploring different potential policy approaches. To meet this need we conducted a consultation exercise with businesses, through two methods: an online survey and interviews with businesses.

The online survey was designed to capture information from as many businesses as possible about their export activities and potential impacts of changes to export rules. The intention of the survey was to produce quantitative data allowing us to investigate in more detail how different size businesses and businesses processing different types of metals would likely be affected by changes as well as more granular understanding of business activities to further enhance our economic modelling. Response rates allowed for some indicative analysis but not deeper statistical analysis. This information was combined with qualitative data where appropriate to add weight to our findings (see Section 3).

Qualitative interviews were used to provide more in-depth understanding of how recycled metals markets operate, the current business landscape, export activities, what currently limits domestic markets, and discussion of different policy scenarios or alternative proposals. These yielded valuable insights for supporting future policy development and ways of working for government, steel producers, the recycling sector and other stakeholders.

The findings from the business consultation are outlined in Section 3.

1 While direct employment multipliers (FTEs per £1 millions of output) offer a straightforward, direct measure of labour intensity within a sector, they understate the full economic footprint of that sector within the broader economy. By contrast, **'Type I' employment effects** incorporate both direct and indirect employment, capturing not only the jobs within the sector itself but also those supported across domestic supply chains (e.g. transport, energy and manufacturing inputs). This broader scope is critical for a sector like metals recycling, which is deeply interconnected with industrial, logistics and materials processing networks. Using Type I effects better reflects the **true systemic importance** of the sector, ensuring that policy decisions (e.g. around export restrictions) account for the **knock-on effects on upstream and downstream employment**. It also aligns more closely with the lived economic reality in regional economies, where job losses often occur beyond the immediate boundaries of the focal sector. Furthermore, in the context of this study, the aim is to understand the **macroeconomic and labour market consequences** of export bans, not just firm-level impacts. Type I multipliers thus offer a more **policy-relevant and realistic estimate** of employment exposure, supporting more informed, system-level decision-making. From a **modelling standpoint**, using only direct FTEs produced **larger uncertainty bounds** in simulation outputs. This reflects greater sensitivity and instability in the ONS estimates, likely because direct-only multipliers are more volatile across regions and firm structures. In contrast, **Type I multipliers yield tighter, more stable estimates** of job impacts, improving the **precision and reliability** of simulation outcomes. **The mean estimate is that for every direct FTE job in the metals recycling sector, another 0.3 FTE jobs are supported indirectly through supply chains.**

2. Modelling impacts of export restrictions

This section presents the results of the economic modelling and is structured in two parts. First, we provide an evidence-based view of the current structure and dynamics of the UK recycled metals export market. Second, we assess the projected impacts of a range of potential export control scenarios on sectoral gross value added (GVA) and employment outcomes. The scenarios are as follows:

- 1% reduction in exports. This scenario shows the impact of fluctuations in exports on the sector to show its sensitivity to change.
- Loss of Türkiye as an export market. This scenario shows the impact of an export 'shock' resulting in the loss of the UK's major ferrous recycling export market. It is not proposed as a likely policy scenario but to understand the dependence of the sector on this market and its ability to adjust to different markets.
- Non-OECD export ban. This reflects the direction of travel towards trading with countries with comparable environmental policy records (as also being pursued in the EU), and shows the impacts of such a change without other mitigating measures or exemptions.
- Quotas set on current exports. This scenario shows the impact retainment of different proportions of recycled metal for the domestic market.

These different scenarios are hypothetical and designed to show how different changes to recycled metals exports would impact on the sector and its contribution to the UK economy. They highlight the sensitivity of the market to export reductions and the likely significant impact of any major changes to export rules.

2.1. Export market dynamics: Setting the policy context

This section presents economic insights from our initial export model simulations, setting the foundation for understanding how UK recycled metal exports function and how they respond to disruption. These results offer a structured, evidence-based view of the export market's pricing dynamics, scale dependencies, product sensitivities and geographic exposures. Taken together, they highlight why the UK scrap export sector cannot be treated as a uniform market – value creation depends heavily on scale, grade, timing and destination. This has important policy implications: broad restrictions risk undermining the economic foundations that support jobs, value added, and competitiveness.

2.1.1. Volume and scalable effects

Value generated through exporting is not perfectly proportional to volume exported, but this is the main determinant of value. The value generated from recycled metal exports does not rise or fall in perfect proportion to the quantity of mass shipped. Instead, our simulations suggest export value depends heavily on **scale economies**: large, consistent volumes/bulk unlock better pricing and stronger buyer interest. Smaller or disrupted flows tend to fetch disproportionately lower value.

The estimated elasticity[2] of export value with respect to mass is approximately 0.613 [CI: 0.5919, 0.6338[3]] from the baseline coefficient. This elasticity is significantly below one, where constant, a 1% increase in exported tonnage yields a median 0.613% increase in export revenue, rather than a full 1% gain. Economically, that shortfall of, at the median, 0.387% (= 1-0.613) represents the efficiency benefits

[2] Economic elasticity measures the responsiveness of one economic variable to changes in another variable. It quantifies how much one variable changes (in percentage terms) when another variable changes by a given percentage. These are sometimes referred to as parameters.
[3] Confidence intervals (95% level) of 0.591 at the lower bound and 0.633 at the upper bound.

captured when shipment volumes grow: as exporters move larger, consistent quantities, they spread fixed collection and handling costs over more tonnes and negotiate better prices on global markets. Conversely, without that increased scale, average cost per tonne remains higher and sellers must offer steeper discounts on smaller shipments. Hence, the model quantifies exactly how much value increases per percentage point of volume expansion, reflecting the industry's scale economy effects – driven cost advantages and stronger pricing power as export volumes rise. This is a fundamental characteristic of how the sector generated value for itself and its GVA-employment footprint.

Where export volume declines, those forgone tonnes cannot always be absorbed by domestic recyclers or manufacturers at the same value. In practice, our simulations suggest that a 10% reduction in exported mass can lead to a circa 6% reduction/shortfall in total export value (depending on the exact recycled metal grade, for example), rather than a simple 10% shortfall. Taken against the broader context of our simulations, this has broad indicative implications: *it signals that UK recycled metal exporters rely on the deep, competitive, global marketplace to secure the best prices, and they lose more than just the tonnage margin if those flows cease.*

Policy Message

Cost advantages that sustain value are significantly realised through scale economies offered by export markets and free trade.

In policy terms, it means that any assumption that domestic recyclers or manufacturers can fully compensate for forgone export volumes will likely overestimate the industry's ability to recover lost revenue.

Policy Message

If policymakers consider export bans, controls and/or quotas, it is essential to recognise that restricting exports does more than cut tonnage, it erodes the fundamental economics that sustain the sector in a globally competitive environment.

2.1.2. Grade heterogeneity

Model estimates reveal significant grade heterogeneity, in that not every recycled metal grade/category responds in the same way within the trade market. Although the median relationship – approximately 0.613 – implies that a 1% increase in total exported tonnage yields about a 0.613% rise in export revenue, individual product groupings deviate above or below that baseline.

Policy Message

Not all recycled metal export grades are equal. Some grades thrive with *scale* and need open markets to realise their value, *while others* do not benefit as much. If policymakers apply broad quality restrictions to all exports, they risk hurting the most productive, high-value parts of the industry. This has important implications for considerations of export quality controls, as broad restrictions may disproportionately affect higher-value or scale-sensitive segments.

Table 2.1 shows that export-value elasticities for UK recycled metal categories span a wide range around the 0.613 average, revealing meaningful differences in how volume changes translate into value shifts. In those categories with elasticities above 0.613 (the high elasticity group in Table 2.1), increased tonnage delivers nearly proportional revenue gains, reflecting strong **scale economies**: larger shipments lower unit costs and command better global prices. Conversely, when volumes in those same categories fall, revenues drop by more than the percentage decline in mass, since these segments rely heavily on scale to maintain per unit margins.

As each recycled metal grouping's elasticity differs, any export restriction will have uneven impacts across the sector. High-elasticity segments endure the steepest percentage-revenue declines per percentage point of lost volume, mid-elasticity segments see relative weaker losses, and low-elasticity segments incur the smallest proportional shocks (as shown in Table 2.1).

Table 2.1: Grade sensitivities to volume changes

HS6 code	Recycled metal type	Elasticity
720410	Cast iron	0.613
720421	Stainless steel	0.666
720429	Alloy steel	0.635
720430	Tinned iron/steel	0.670
720441	Turnings and filings	0.689
720449	Unsorted iron/steel	0.704
720450	Remelting ingots	0.373

2.1.3. Temporal vulnerabilities

We obtain a dynamic view of *volume-to-value* elasticities that evolve with global market conditions, policy cycles and commodity booms. The persistently sub-unitary elasticities confirm enduring scale economies, but their magnitudes vary considerably across years – shaped by shifts in global demand and supply.

Two key trends emerge from the simulations, pointing to a growing vulnerability in the UK recycled metal sector. First, underlying global demand for UK recycled metal has trended upward, particularly during commodity cycle peaks (e.g. 2007-2008, 2011 and 2021). This rise cannot be fully explained by traditional factors such as the number of market entrants, country-specific fixed effects or exchange rate movements. After controlling for mass and inflation, a tonne of recycled metal exported in recent years is worth significantly more in real terms than the same tonne exported in 2000. *Simulations suggest a combination of stronger global demand, more conducive supply conditions and increased productivity within the UK recycled metal sector.*

Second, the sensitivity of export value to mass, i.e. the elasticity, has also increased during these high-demand years. For instance, elasticities climbed to around 0.70 in 2008 and 2021, indicating that marginal changes in export volume translated into disproportionately large changes in revenue. By contrast, in periods of oversupply or muted demand (e.g. 2000-2001, 2012-2013 and 2016), elasticities were lower – typically below 0.58 – reflecting more modest scale effects.

The combination of these two forces – higher baseline value per tonne and greater volume sensitivity – points to a thinner market at the margin. In short, as global demand rises, the economic consequences of losing even a small share of export volume become more severe. The logic is twofold: (1) a smaller quantity loss reduces a larger absolute pool of value, and (2) with higher elasticity, each percentage point of volume loss results in a larger percentage loss in revenue.

Model simulations thus reveal a time-based variation in *vulnerability*: the sector is more exposed during certain time periods than others. In stronger years marked by high demand and elevated elasticity, export disruptions cause disproportionately larger economic shocks. Although the sector enjoys the benefits of

stronger demand during such periods, it is also more exposed to downside risks from trade frictions or policy interventions.

These dynamics did not hold in earlier periods of lower demand and weaker elasticities, underscoring how the sector's risk profile has shifted over time.

Policy Message

At the time of writing, simulations suggest the export market is situated within an especially high-risk window – where elevated global demand and high-value sensitivity combine to create new exposure.

2.1.4. Geographic and spatial effects

The destination-specific results from simulations carry implications for any policy that would restrict recycled metal shipments based on geography and/or market blocs. When we examine non-OECD destinations, we find that those buyers pay relatively high margins only when tonnage is large. In practice, a 10% cut in non-OECD shipments, whether imposed by a ban, quota or sudden logistical disruption, produces a disproportionately large fall in revenue because non-OECD buyers require scale to promote value. Where exporters lose access to a non-OECD market, they cannot make up the shortfall by reallocating the same volume to OECD markets without sacrificing significant margin.

By contrast, OECD destinations generate far higher baseline prices per tonne and are relatively less sensitive to volume swings. A 10% cut in OECD bound tonnage would still drive a drop in value, but each tonne previously sent to OECD partners would command more than triple the price of a non-OECD shipment. Thus, the absolute revenue loss from an OECD ban is larger, despite the somewhat lower percentage sensitivity. If a policy were to restrict OECD exports, it would remove the highest-value sales channel.

For EU versus non-EU distinctions, the simulations shows that shipments into EU markets earn about 26% less per tonne than non-EU, non-OECD routes, and EU sales are also highly volume-sensitive (with elasticity close to non-OECD levels). As a result, cutting EU exports creates a double jeopardy: first, those routes already pay a lower baseline price; and second, any reduction in EU tonnage causes a larger percentage decline in revenue for those shipments. Where restrictions target non-EU destinations (the highest-value markets outside the OECD), exporters face a significant economic shock, non-EU buyers historically pay the premium for quality or processed recycled metal. Where no other bloc pays as richly per tonne, diverted tonnage cannot easily recoup lost income by moving to alternative destinations.

Policy Message

Restricting recycled metal exports is never a one-size-fits-all proposition. Non-OECD bans drive large percentage losses because of high-scale economies; OECD bans cause the largest pound value losses because of high per unit prices; EU bans saddle exporters with both low baseline prices and high sensitivity; and non-EU bans eliminate the highest value outlets entirely. Any policy aiming to limit volume to a particular bloc, for example, would have to be designed with those destination-specific effects front of mind.

2.2 Scenario impacts on GVA and employment

2.2.1 'Headline' model simulation illustrations for context

GVA illustration

Contribution is modelled to operate around a central baseline of £9bn (with a plausible band of £7bn-£11bn) over the next five years, under the neutral assumption that policy, demand and price trends remain within confidence bounds. Translating a hypothetical scenario of a 1% export-value shock through a full transmission model gives the following indicative losses in Table 2.2 and Table 2.3. Put simply, every 1% fall in export value reduces GVA by between £94-£148 million over the subsequent five-year period. This infers a plausible range of around a mid-median loss of £121 million. The exact impact tightens or widens according to how fast displaced tonnage is (i) absorbed by domestic processors and (ii) rerouted to alternative export markets, while (iii) slower adjustment lets (iv) time persistence and industrial productivity losses compound it.

Employment illustration

All else being equal, a £10 million drop in export value would lead to a total loss of around 114 full-time equivalent (FTE) jobs over the subsequent five years. These estimates are shown in Table 2.3. In the year the shock happens (Year 0), employment falls by about 0.24%, which means a loss of roughly 62 jobs. One year later, the cumulative job loss grows to about 0.51%, or 99 jobs. By Year 2, losses reach 0.72%, or around 113 jobs. By Year 4, employment is down 0.86%, and by Year 5, it remains nearly 0.95% below baseline – both equating to about 114 jobs lost across five years. The range of uncertainty around these numbers is also included and reflects natural variation in how different parts of the sector might respond. Put differently, each £10 million of value raised through exports supports between 87 and 150 full-time equivalent jobs in the direct sector and its indirect supply chains, such as transport services, equipment suppliers and business services that depend on export-related demand.

Table 2.2: 1% export-value shock: Compounded GVA losses

Year	Median compounded, cumulative % GVA loss [90% confidence intervals]	Median approx. £ loss
Year 1	0.73% [-0.64% to -0.82%]	£65 million
Year 2	1.10% [-0.85% to -1.3%]	£99 million
Year 3	1.24% [-0.82% to -1.6%]	£112 million
Year 4	1.30% [-0.73% to -1.9%]	£117 million
Year 5	1.35% [-0.7% to -2.0%]	£121 million

Note: The 1% fall in export receipts is applied in Year 0; the table reports the compounded cumulative effect on sector GVA at the end of each subsequent calendar year. Median losses assume benchmark model parameter values and mid-range domestic-uptake/rerouting lags.

Table 2.3: £10 million export-value drop: Cumulative job losses

Year	Median cumulative % employment loss [90% CI]	Median cumulative FTE lost [90% CI]
Year 1	0.24% [0.146% to 0.361%]	62 [47 to 82]
Year 2	0.51% [0.32% to 0.78%]	99 [75 to 130]
Year 3	0.72% [0.45% to 1.11%]	
	113 [86 to 148]	
Year 4	0.86% [0.54% to 1.32%]	114 [87 to 150]
Year 5	0.95% [0.59% to 1.46%]	114 [87 to 150]

Note: The 10 million GBP is applied in Year 0; the table reports the compounded cumulative Type 1 employment effect at the end of each subsequent calendar year. Median losses assume benchmark model parameter values.

2.2.2. Scenario A: Ban on exports to Türkiye

2.2.2.1. GVA impacts

For a complete ban on the ability to export all recycled metal types to Türkiye, the projected median GVA impacts are presented in Table 2.4 and visualised by Figure 2.1. Model non-technical interpretations can be found at footnote.[4] Simulations show that under this scenario, **the median impact on GVA is a compounded loss of -24%, with an implied monetary loss of -£2.16bn, over a five-year period.**

The contraction begins sharply in Year 1 with an estimated loss of £1.51bn and deepens in subsequent years as the shock persists through trade path-dependencies and limited recovery via domestic absorption or export rerouting.

The model incorporates dynamic adjustments in price, value-added and supply chain constraints, capturing both immediate and longer-term path-dependent effects. Crucially, the confidence intervals widen over time, reflecting increasing uncertainty in sectoral responses. By 2028, the range of outcomes spans from a more moderate contraction of -15.7% (approx. £1.41bn) to a severe -39.5% decline (approx. £3.50bn), all within reasonable parameter bounds.

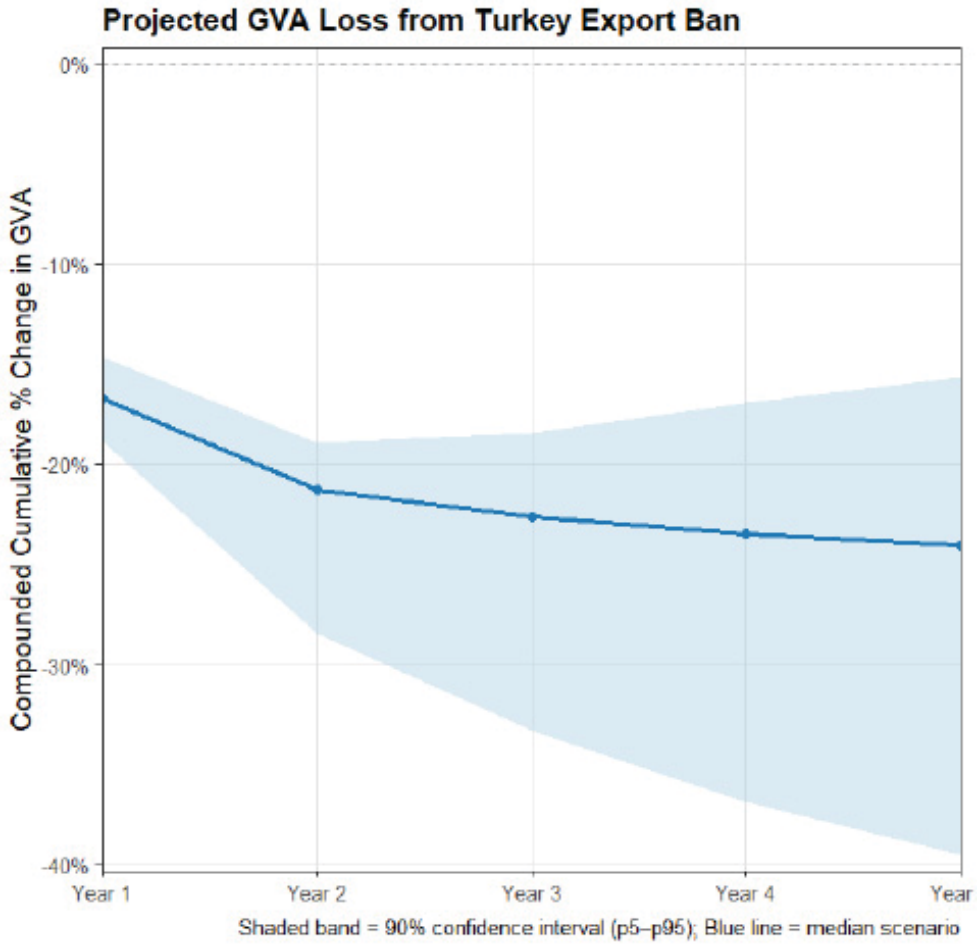
[4] **Non-technical interpretation:** Models begin by imposing the policy event (i.e. a ban on exports to Türkiye) in Year 0 from a simulation of the shock within the export gravity model. In each subsequent year, the remaining loss carries forward, a portion of last year's decline continues to depress exports because firms do not instantly recover lost ground. At the same time, two recovery channels gently offset that decline: first, some of the lost exports may find new buyers in other countries (export rerouting), and second, some of the output that would have been exported may instead be sold at home (domestic substitution). Each year after Year 0, the model simulates how much of the previous export shortfall still lingers, adds back whatever volume is rerouted and whatever volume is sold domestically, and then converts that adjusted export level into a corresponding change in gross value added (GVA). That conversion uses two forces: an 'elasticity' that measures how a given change in exports affects GVA directly, and a 'price feedback' term capturing how lower export volumes might influence domestic prices and, in turn, GVA. Whenever part of the lost exports is rerouted or absorbed domestically, it does not reappear at full strength in later years – each recovery channel is designed to fade over time – which is in line with tapering of allocation, reduced productivity of the sector, which is tied to GVA, and lost activity. By repeating this process over five years and allowing the strength of persistence, elasticity, price feedback, domestic recovery speed and rerouting speed to vary across plausible values, the model produces a wide range of possible GVA outcomes. The middle path represents the most likely scenario when every parameter is set to its median value, and the shaded envelope shows how far above or below that path GVA might be if those key assumptions turn out to be stronger or weaker than expected. The shaded ribbon in each panel reflects uncertainty arising from variation in several key economic transmission effects. First, elasticity (β) captures how responsive output or employment is to changes in export value, higher elasticities imply larger impacts from a given shock. Persistence (φ) reflects how long the effects of the shock endure over time, with more persistent effects indicating slower recovery. Price-feedback effects (α and θ) represent how changes in exports influence domestic prices and, through these, further affect output – this channel captures potential amplifications or dampening of the original shock. Finally, domestic reallocation speed (δ) and associated lags (lag_dom) describe how quickly domestic markets adjust, either by absorbing displaced workers or redirecting surplus materials, which affects the pace at which the economy stabilises after the shock. Together, these parameters govern the speed, depth and duration of the overall impact.

Simulations show these outcomes *persist* chiefly because the initial export restriction carries forward into subsequent years and given rerouting and domestic reabsorption cannot fully offset the lost output. A large portion of that reduction lingers into Year 1, even if 30-40% of lost volume is recaptured through other routes. Where domestic demand cannot absorb all previously exported goods, and new export agreements require time to establish (modelled as year lags), substitution or rerouting benefits decline rapidly after the first year.

Table 2.4: GVA losses from an export ban on trade with Türkiye

Year	Median compounded, cumulative % drop in GVA [confidence intervals]	Implied median £ loss [confidence intervals]
Year 1	-16.7% [-14.7% to -18.9%]	-£1.51bn [-1.33bn to -£1.7bn]
Year 2	-21.3% [-19% to -28.5%]	-£1.92bn [-1.71bn to -£2.6bn]
Year 3	-22.6% [-18.4% to -33.3%]	-£2.03bn [-1.66bn to -£3bn]
Year 4	-23.5% [-16.9% to -36.9%]	-£2.11bn [-1.52bn to -£3.32bn]
Year 5	-24.0% [-15.7% to -39.5%]	-£2.16bn [-1.41bn to -£3.5bn]

Figure 2.1: Projected GVA loss: Export ban on Türkiye



Additionally, each 1% gain in rerouted exports translates into less than 1% of GVA recovery, meaning full offset is unattainable, significantly due to subsequent industrial decay, associated frictions and persistence (sometimes referred to as long-term memory). As a result, by Year 5, GVA remains significantly smaller than it would have been in the absence of an export ban. The wide 'fan' of simulated outcomes reflects empirical bounds in two especially influential factors: how strongly a drop in exports translates into lower GVA, and how long the initial downturn continues to weigh on the economy (persistence). Small differences

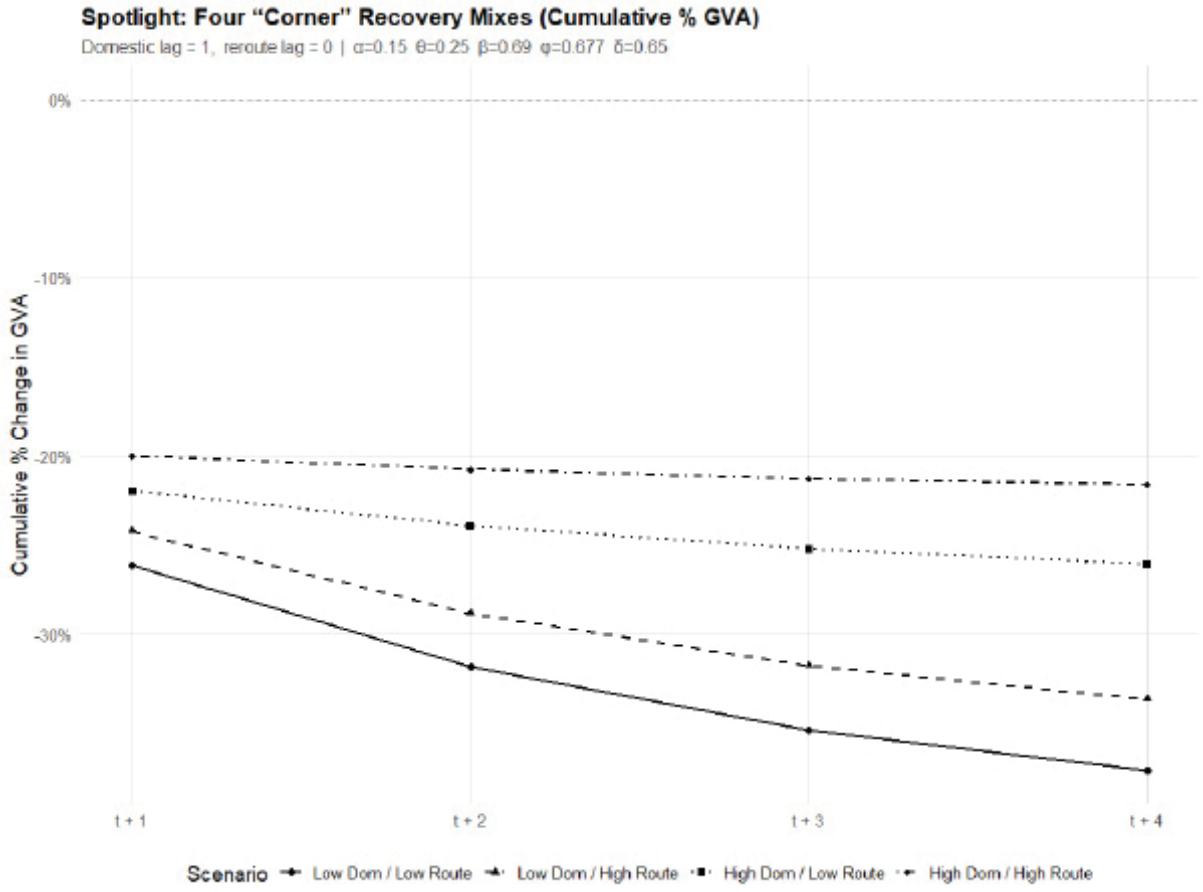
in these two transmission effects become magnified over five years. Meanwhile, other factors – such as the effect of falling export prices on domestic competitiveness, the rate of rerouting and the precise timing of when domestic or alternative markets pick up slack – play a significant role.

Viewed from a policy perspective, these results underline that an export ban of this magnitude cannot simply be *made up* by shifting production elsewhere or by redirecting sales domestically. Even under the most aggressive assumptions, where one third of lost exports immediately sells into local markets and nearly half finds new foreign buyers, the industry GVA remains noticeably smaller five years out.

We extend to spotlighting varied patterns of domestic demand recovery and export-rerouting. Figure 2.2 compares four extreme *(corner)* combinations of domestic recovery and export rerouting to illustrate how GVA evolves over five years after the export restriction. All four lines assume a median one-year lag before any recovery begins domestically or abroad. All other model parameters are held at their median.

The simulations make it clear that no combination of domestic absorption and export rerouting can fully offset the restriction shock. In the most optimistic scenario, where 30% of the lost exports are reabsorbed at home and 40% are rerouted abroad, GVA remains roughly 22% below its baseline four years after the shock. Both domestic and export substitution matter: the line representing high domestic recovery paired with high export rerouting consistently stays above all others, illustrating that only by combining both strategies does the economy cushion itself most effectively. By contrast, the line for low domestic recovery and low export rerouting falls most steeply, showing that without any reallocation of lost output at home or abroad, the economy is left entirely exposed to the initial shock. However, even when substitution or rerouting occurs, industrial decay erodes the early gains. Persistence remains a dominant factor: all four scenarios continue trending downward, at different rates, because last year's export shortfall carries forward into the next year. In model simulations, neither domestic substitution nor rerouting can fully neutralise the medium-term drag of the original export loss, and GVA therefore remains below zero throughout the entire five-year period.

Figure 2.2: Spotlighting recovery routes



2.2.2.2. Employment impacts

Table 2.5 and Figure 2.3 present the projected cumulative percentage and absolute FTE employment losses over five years under a complete ban on exporting to Türkiye. All figures reflect Type I effects,[5] capturing both direct and indirect job impacts without any assumption of activity retention.

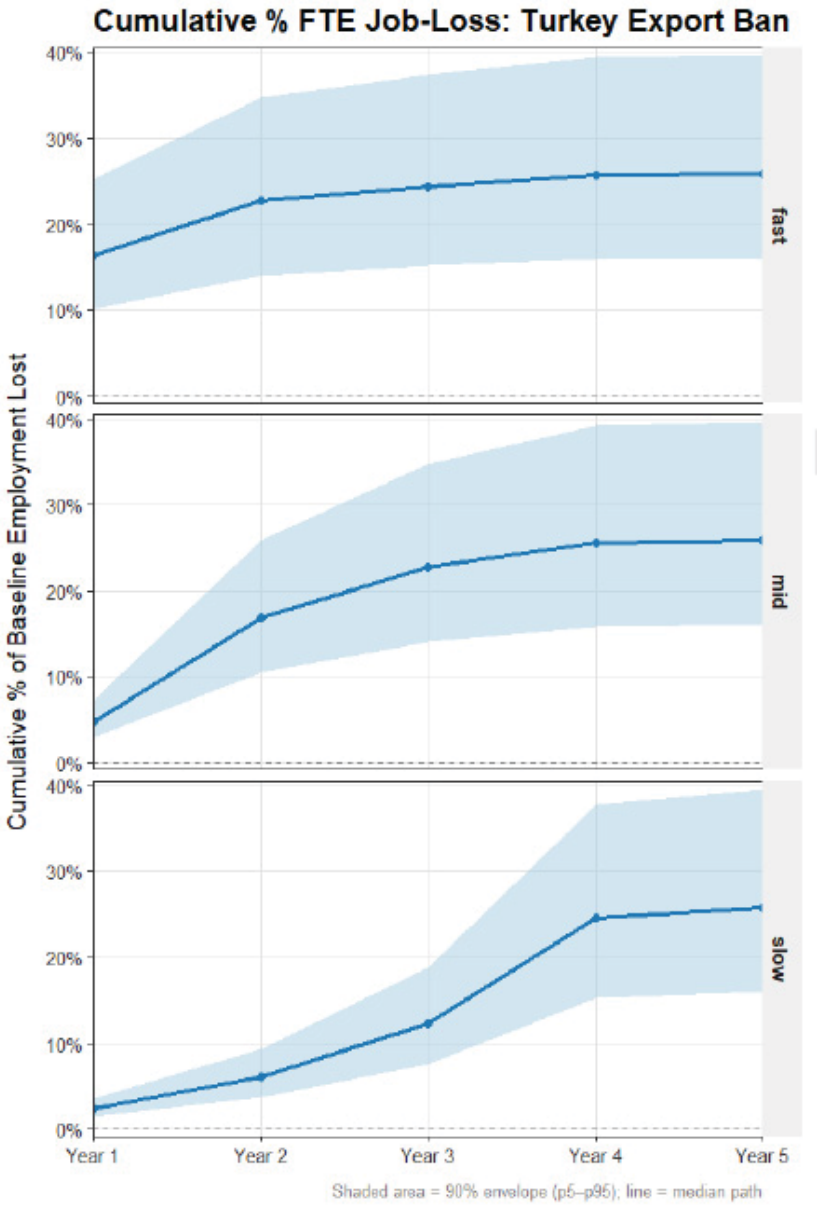
As shown in Table 2.5, the median cumulative employment loss, under a middling realisation rate, reaches 6,934 FTE (25.9% loss) in a five-year period following the policy change. The widening confidence intervals (CI) reflect uncertainty in the Type I multipliers and the level of persistence, but even the most optimistic scenario indicates substantial job losses by Year 5.

Table 2.5: Median employment effects: Türkiye bans

Year	Median cumulative % lost [CI]	Median cumulative FTE count lost [CI]
Year 1	4.7% [2.9% to 7.2%]	1,241 [944 to 1,628]
Year 2	16.9% [10.5% to 25.9%]	4,458 [3,392 to 5,850]
Year 3	22.7% [14.1% to 34.8%]	5,998 [4,564 to 7,872]
Year 4	25.6% [15.9% to 39.3%]	6,762 [5,146 to 8,874]
Year 5	25.9% [16.1% to 39.7%]	6,834 [5,200 to 8,968]

[5] Type I effects refer to the direct and indirect employment impacts resulting from a change in final demand (e.g. for exports, public investment, consumer demand) in a particular industry or sector. Type I effects do not include induced effects, that is, the additional economic activity generated by the re-spending of wages by employees. The mean estimate is that for every direct FTE job in the metals recycling sector, another 0.3 FTE jobs are supported indirectly through supply chains.

Figure 2.3: Employment profiles: Türkiye ban



Three distinct *realisation* profiles,[6] fast, mid and slow, capture alternative assumptions about how quickly the initial employment shock materialises across all affected sectors. These profiles account for sectoral variation in exposure, adjustment speed and supply chain dependencies, recognising that some sectors experience immediate disruption while others adjust more gradually over time.

2.2.3. Scenario B: Non-OECD export ban

2.2.3.1. GVA impacts

For a complete ban on the ability to export all recycled metal types to non-OECD countries, simulations of the projected median (and confidence ranges) GVA impact are presented in Table 2.6 and visualised by Figure 2.4. Simulations show that under this scenario, the median impact on GVA is a **compounded loss of -54.5%**, with an implied monetary loss of -£ 4.9 bn, over a five-year period after the policy change.

[6] Fast profiles assume firms cut jobs immediately when exports collapse, reflecting minimal buffers and flexible labour markets. Mid profiles delay most layoffs into Year 2, as firms draw down inventories or pivot to alternative channels before reducing labour. Slow profiles spread job losses over several years, reflecting high adjustment costs or contractual rigidity that delay workforce reductions despite declining revenues.

Eliminating non-OECD trade removes a substantial portion of the sector's export base, leaving limited room for typical adjustment mechanisms. Whereas domestic demand will not absorb the full displaced output, and establishing new export relationships, particularly in restricted markets, takes time, often exceeding a year. This renders persistent effects. Moreover, any gains from rerouting or substitution tend to diminish quickly. As a result, GVA remains persistently depressed, falling to approximately 30% below baseline in Year 1 and approaching a 60% shortfall by Year 4. This trajectory underscores the scale of vulnerability: without access to non-OECD markets, the sector endures a prolonged collapse in value added, with stabilisation remaining slow and partial even under favourable model assumptions.

Figure 2.5 illustrates how the shock propagates through the sector when non-OECD markets are closed, highlighting the transmission channels of export losses into GVA and the necessary scale of domestic reallocation[7] and rerouting to offset those losses. Under median assumptions the initial drop in output feeds forward via persistence, so that each subsequent year's export shortfall compounds on the last. Price feedback provides only a modest cushion given even a small fall in domestic prices cannot fully counteract the loss in export volume. At the same time, any attempt to recapture lost export value at home must overcome industrial productivity decay, which causes each year's reallocated volume to shrink once recovery begins.

Across all three facets, a low 10% reallocation is effectively inconsequential: GVA remains down around 40% or worse in every year because it cannot offset either the initial shock or its persistence. At 50%, reallocation mitigates some of the decline but never pushes GVA above 20% unless rerouting is already very high. Only a near total reallocation of roughly 90% meaningfully counters the compounded exporter shortfall, and even that extreme scenario fails to close the gap entirely within three years. In short, once non-OECD markets are closed and persistence carries forward the initial loss, only an almost complete reallocation of lost exports back into the domestic sector, combined with substantial rerouting abroad, comes close to neutralising the shock. Any realistic domestic recovery rate well below 90% leaves GVA significantly under baseline.

Table 2.6: GVA losses from a non-OECD ban

Year	Median compounded, cumulative % drop in GVA [CI]	Implied median £ loss [CI]
Year 1	-31.4% [-30.2% to -32.8%]	-£2.83bn [-£2.72bn to -£2.96bn]
Year 2	-45.0% [-40.9% to -47.2%]	-£4.05bn [-£3.69bn to -£4.25bn]
Year 3	-50.9% [-45.2% to -54.5%]	-£4.58bn [-£4.07bn to -£4.91bn]
Year 4	-53.2% [-47.0% to -57.7%]	-£4.79bn [-£4.23bn to -£5.19bn]
Year 5	-54.5% [-47.8% to -60.0%]	-£4.90bn [-£4.30bn to -£5.40bn]

[7] Note: In this model, '90% domestic recovery' refers to reallocating 90% of the original export-value shortfall into domestic markets in the first year after the specified lag. Thereafter, the recoverable amount decays each year by the factor δ. For example, where δ = 0.85 and the original shock is –1 (100% drop), then in the first eligible year firms recapture 0.90 × |–1| = 0.90 of the shock; in the following year they recapture 0.90 × max(0, 1 – 0.85 × 1) = 0.90 × 0.15 ≈ 0.135; and by the third year the pool has decayed to zero (since δ × 2 ≥ 1), so no further reallocation is possible.

Figure 2.4: Project GVA loss: Non-OECD ban

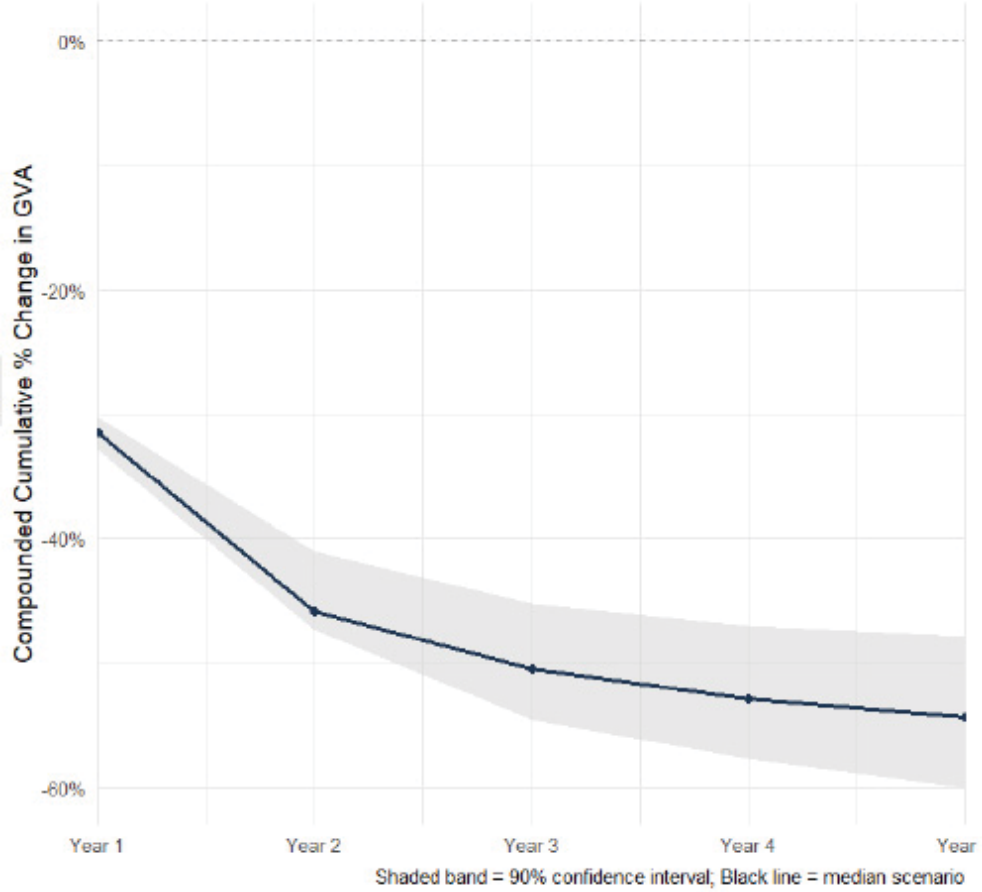
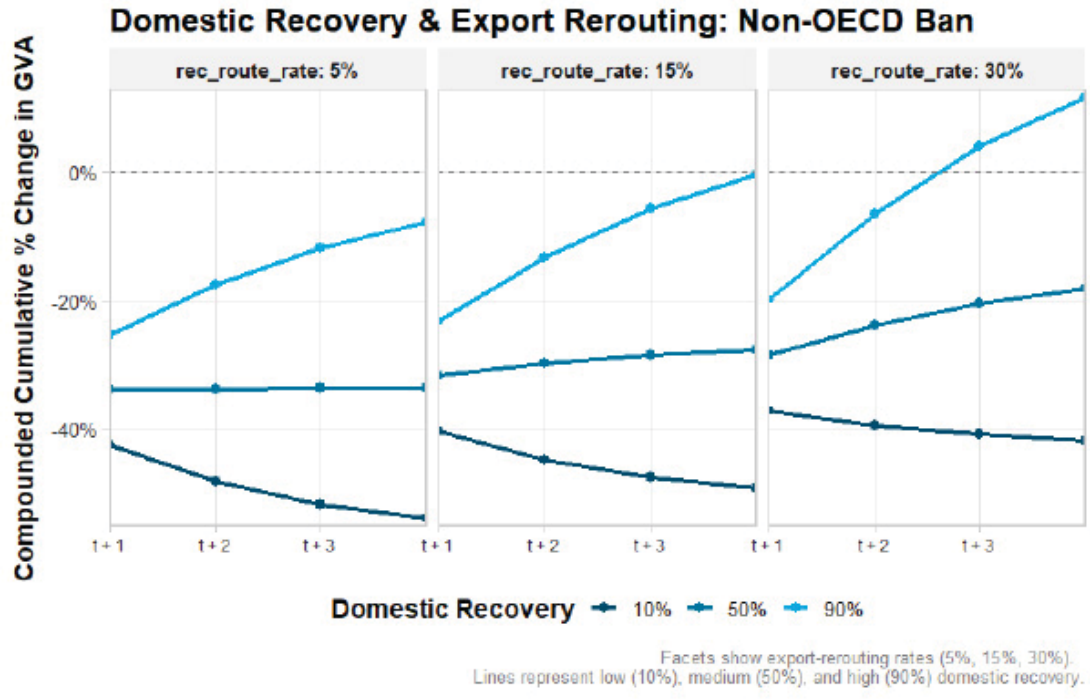


Figure 2.5: Recovery routes: Non-OECD ban



2.2.3.2. Employment impacts

Table 2.7 and Figure 2.6 present the projected cumulative percentage and absolute (FTE) employment losses over five years under a complete non-OECD export ban. All figures reflect Type I employment effects, capturing both direct and indirect job impacts without any assumption of activity retention. Where

non-OECD markets are entirely closed, no significant export rerouting is possible; all employment impacts follow directly from the initial output shock and its propagation through domestic linkages. A non-OECD ban drives cumulative job losses to 53.3% (≈20 317 FTE) by Year 5, with 44.8% (≈17 098 FTE) lost by Year 2.

By Year 5, cumulative employment falls by a median of 53.3% or 20,317 FTE.

Across these five years, most of the job reductions occur by Year 2, with only modest additional losses thereafter. The confidence intervals widen over time, reflecting growing uncertainty in how persistence and adjustment processes play out beyond the initial two-year horizon.

Table 2.7: Median employment effects: Non-OECD ban

Year	Median cumulative % lost [CI]	Median cumulative FTE count lost [CI]
Year 1	14.5% [11.1% to 19.0%]	5,527 [4,229 to 7,242]
Year 2	44.8% [34.3% to 58.8%]	17,098 [13,083 to 22,402]
Year 3	52.5% [40.2% to 68.8%]	20,019 [15,319 to 26,230]
Year 4	53.2% [40.7% to 69.7%]	20,292 [15,527 to 26,588]
Year 5	53.3% [40.8% to 69.8%]	20,317 [15,547 to 26,621]

Figure 2.6: Employment impacts of non-OECD export ban

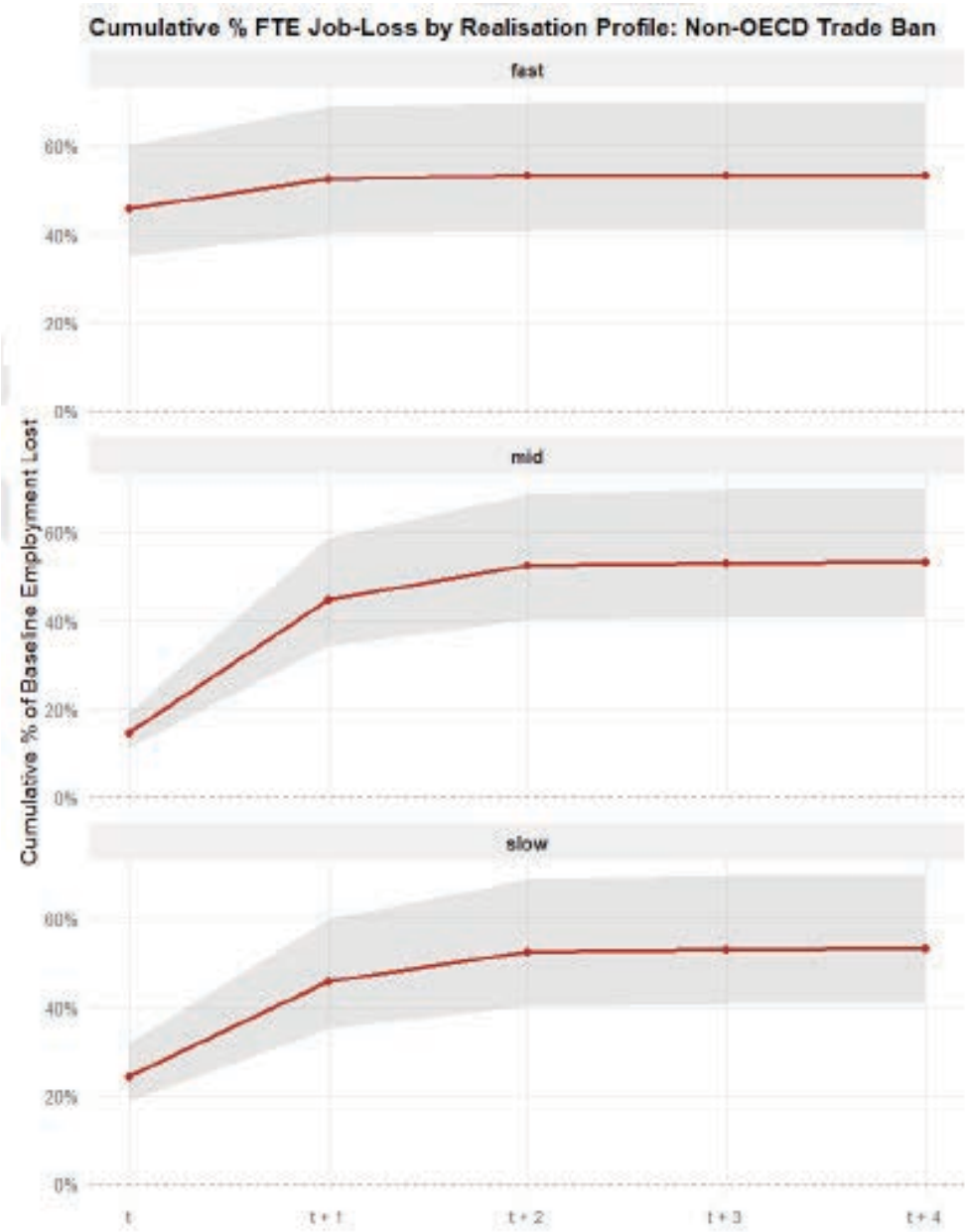


Figure 2.6 offers simulations where the realisation rate, that is, the speed at which job losses unfold, is varied across three profiles: **fast, mid** and **slow**. These terms provide a simple yet intuitive way to characterise how *quickly* the economic shock affects employment over time.

In the *fast* profile, 70% of the one-off shock materialises in Year 0. Median cumulative job losses reach approximately 50% of baseline employment by Year 1, rise marginally to about 52% by Year 2, and then stabilise near 53% through Year 4. This pattern reflects a strong immediate transmission: a large fraction of the shock is absorbed in the first year, after which persistence in the process generates only modest additional losses.

The *mid* profile allocates 20% of the shock in Year 1 and 50% in Year 2. Median losses are circa 15% at Year 1, increasing to approximately 45% at Year 2, then reach about 50% by Year 4 before settling near 52% thereafter. Here the transmission is more gradual: indirect effects and persistence drive continued erosion into the second year, but the absence of rerouting precludes any recovery.

Under the *slow* profile, 10% in Year 1, smaller amounts in Years 2-3, and 50% in Year 4, median job losses begin near 25% at t, climb to roughly 45% at t + 1, and reach a median 52% by t + 2, ultimately plateauing around 53% by t + 4. Even though realisation is backloaded, the persistence ensures that losses accumulate steadily, and without export substitution the peak impact converges to a similar level as the faster profiles.

In all scenarios, cumulative losses exceed 50% of baseline FTE employment within two to three years. The Type I employment effects amplify the initial export value shock through direct and indirect channels, while the persistence transmission maintains those losses over time. With no significant option for rerouting to alternative markets, the ban's full effect is transmitted through domestic supply chains, leaving employment roughly half below its baseline level by Year 2 and remaining at that subdued level through Year 4.

2.2.4. Scenario C: Quotas

2.2.4.1. GVA impacts

Table 2.8, Table 2.9, Table 2.10 and Figure 2.7 present three quota scenarios, 10% volume blocked from exporting, 30% blocked, and 50% blocked, showing how UK recycled metal export quotas feed through to cumulative changes in GVA over a five-year horizon. These quota scenarios intend to replicate a policy in which government restricts a certain quality of recycled 'scrap' steel (and therefore volume) from being exported. This is a volume ban irrespective of grade and exporting location. In each panel, the solid line is the median projection, and the shaded ribbon spans the 5th-95th percentile range, capturing variation in key transmission channel assumptions. The headline findings are as follows:

- 10% quota scenario: £0.8bn (9.8%) cumulative loss by Year 5. The narrow confidence bands indicate that, across all parameter combinations, outcomes remain closely clustered around this path.
- 30% quota scenario: £2.54bn (28.2%) cumulative loss by Year 5.
- 50% quota scenario: £4.1bn (45.3%) cumulative loss by Year 5. The confidence intervals remain narrow at each point (e.g. Year 1 ranges only from 22.5% to 24.0%), indicating that, across all plausible parameter combinations, outcomes consistently exhibit severe, compounding output losses when half of exports are blocked.

Modest quotas (10%) create limited, non-compounding losses because price adjustments alone can absorb most of the 10% volume shock and domestic demand can absorb the small remainder, keeping GVA close to baseline. At 30%, price feedback and domestic reuse only partially mitigate an initial circa 13% drop, prices cannot fall much further and domestic markets have finite capacity, so the unabsorbed gap persists and compounds to a ~28% shortfall by Year 5. Under a 50% quota, price relief reaches its limit, and domestic recycling is fully tapped, leaving a large residual loss that persistence amplifies from ~23% in Year 1 to over 45% by Year 5.

Table 2.8: 10% quota restriction

Year	Median compounded, cumulative % drop in GVA [CI]	Implied median £ loss [CI]
1	-4.3% [-4.1% to -4.4%]	-£0.38bn [-£0.37bn to -£0.40bn]
2	-6.9% [-6.2% to -7.2%]	-£0.62bn [-£0.56bn to -£0.65bn]
3	-8.5% [-7.4% to -9.0%]	-£0.76bn [-£0.66bn to -£0.81bn]
4	-9.3% [-8.1% to -10.1%]	-£0.83bn [-£0.73bn to -£0.91bn]
5	-9.8% [-8.5% to -10.9%]	-£0.88bn [-£0.77bn to -£0.98bn]

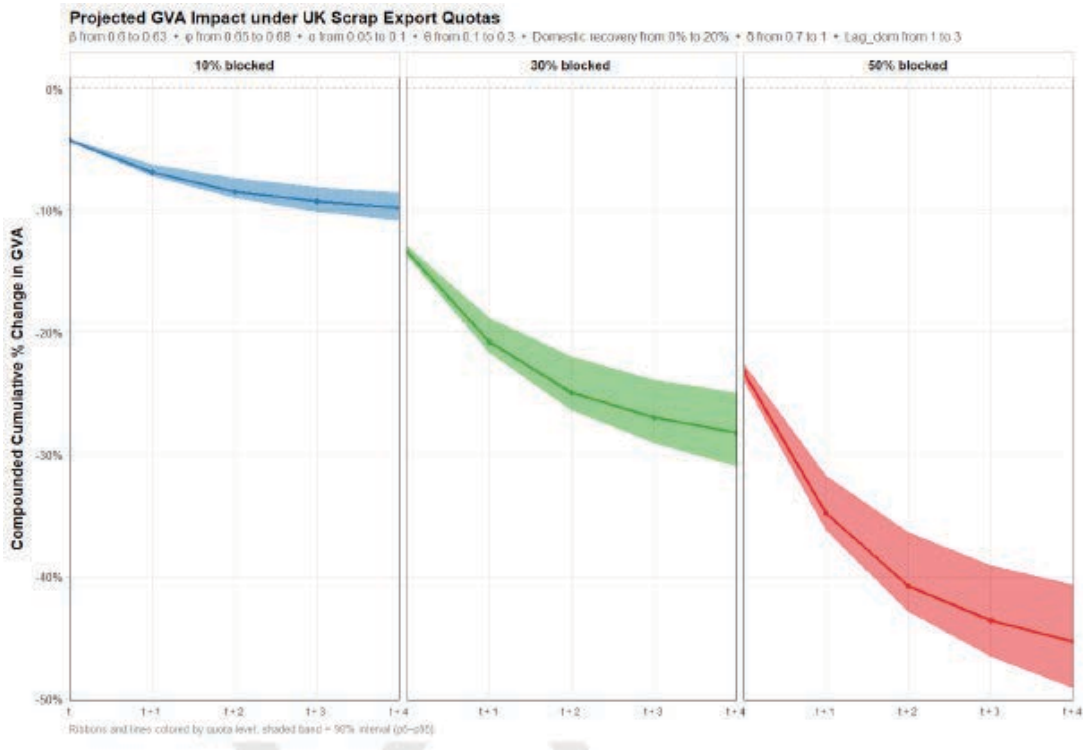
Table 2.9: 30% quota restriction

Year	Median compounded, cumulative % drop in GVA [CI]	Implied median £ loss [CI]
1	-13.3% [-12.9% to -13.7%]	-£1.20bn [-£1.16bn to -£1.23bn]
2	-20.8% [-18.8% to -21.7%]	-£1.87bn [-£1.69bn to -£1.95bn]
3	-24.9% [-21.9% to -26.4%]	-£2.24bn [-£1.97bn to -£2.38bn]
4	-27.0% [-23.8% to -29.1%]	-£2.43bn [-£2.14bn to -£2.62bn]
5	-28.2% [-24.9% to -31.0%]	-£2.54bn [-£2.24bn to -£2.79bn]

Table 2.10: 50% quota restriction

Year	Median compounded, cumulative % drop in GVA [confidence interval]	Implied median £ loss [confidence interval]
1	-23.3% [-22.5% to -24.0%]	-£2.10bn [-£2.03bn to -£2.16bn]
2	-34.8% [-31.7% to -36.2%]	-£3.13bn [-£2.85bn to -£3.26bn]
3	-40.8% [-36.4% to -42.9%]	-£3.67bn [-£3.28bn to -£3.89bn]
4	-43.6% [-39.1% to -46.6%]	-£3.92bn [-£3.52bn to -£3.99bn]
5	-45.3% [-40.7% to -49.1%]	-£4.08bn [-£3.66bn to -£4.42bn]

Figure 2.7: Projected GVA – Quota ranges



2.2.4.2 Employment effects

Table 2.11 and Figure 2.8 present the projected cumulative percentage and absolute (FTE) employment losses over five years under a range of quota profiles. All figures reflect Type I employment effects, capturing both direct and indirect job impacts without any assumption of activity retention.

The key headline findings are as follows:

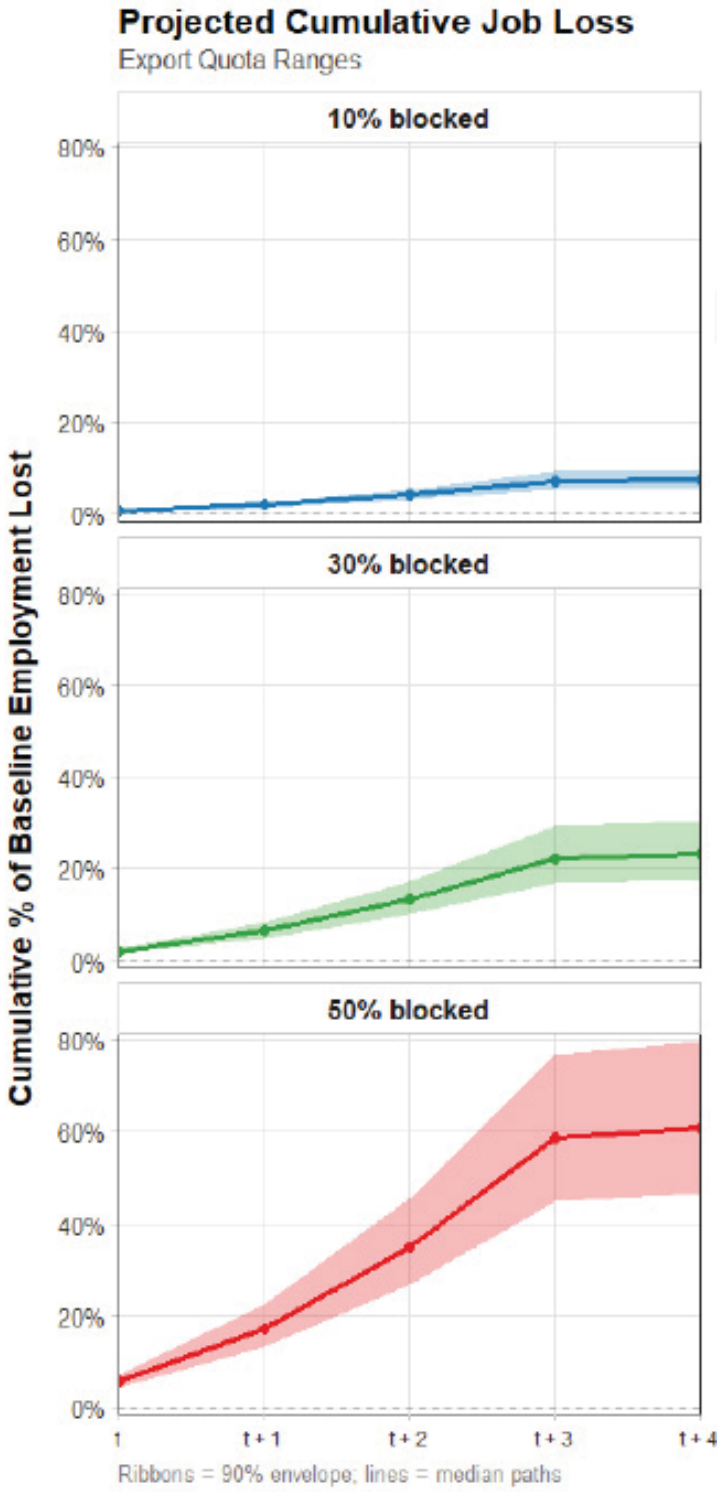
- Quota reducing exports by 10%: 2,731 (9.7%) cumulative jobs lost by Year 5.
- Quota reducing exports by 30%: 8,846 (23%) cumulative jobs lost by Year 5.
- Quota reducing exports by 50%: 23,206 (60.9%) cumulative jobs lost by Year 5.

These results are not proportional, doubling a 30% quota does not simply double employment loss, but rather pushes firms into a situation where they lack sufficient alternative buyers, so they cut capacity and jobs far more sharply. Beyond the immediate effects of quotas, other indirect effects magnify this nonlinearity. In short, small quotas allow gradual adjustment, whereas larger quotas trigger price collapses and cascading closures throughout the network of firms, producing disproportionately large and uncertain employment losses.

Table 2.4: Employed effects: Quota ranges

Quota	Year	Median cumulative % lost [confidence interval in brackets)	Median cumulative FTE count lost [confidence interval in brackets]
50% blocked	Year 1	5.539% [4.239% to 7.258%]	2,112 [1,616 to 2,767]
50% blocked	Year 2	17.134% [13.111% to 22.450%]	6,533 [4,999 to 8,560]
50% blocked	Year 3	34.833% [26.654% to 45.640%]	13,282 [10,163 to 17,402]
50% blocked	Year 4	58.641% [44.872% to 76.834%]	22,359 [17,109 to 29,296]
50% blocked	Year 5	60.862% [46.571% to 79.744%]	23,206 [17,757 to 30,406]
30% blocked	Year 1	2.111% [1.616% to 2.767%]	805 [616 to 1,055]
30% blocked	Year 2	6.531% [4.998% to 8.558%]	2,490 [1,906 to 3,263]
30% blocked	Year 3	13.278% [10.160% to 17.398%]	5,063 [3,874 to 6,634]
30% blocked	Year 4	22.353% [17.105% to 29.289%]	8,523 [6,522 to 11,168]
30% blocked	Year 5	23.200% [17.753% to 30.398%]	8,846 [6,769 to 11,591]
10% blocked	Year 1	0.677% [0.518% to 0.887%]	258 [197 to 338]
10% blocked	Year 2	2.093% [1.602% to 2.743%]	798 [611 to 1,046]
10% blocked	Year 3	4.255% [3.256% to 5.575%]	1,623 [1,242 to 2,126]
10% blocked	Year 4	7.164% [5.482% to 9.386%]	2,731 [2,090 to 3,579]
10% blocked	Year 5	7.435% (CI: 5.689%-9.742%)	2,835 FTE (2,169-3,714)

Figure 2.8: Projected employment paths



3. Business perceptions

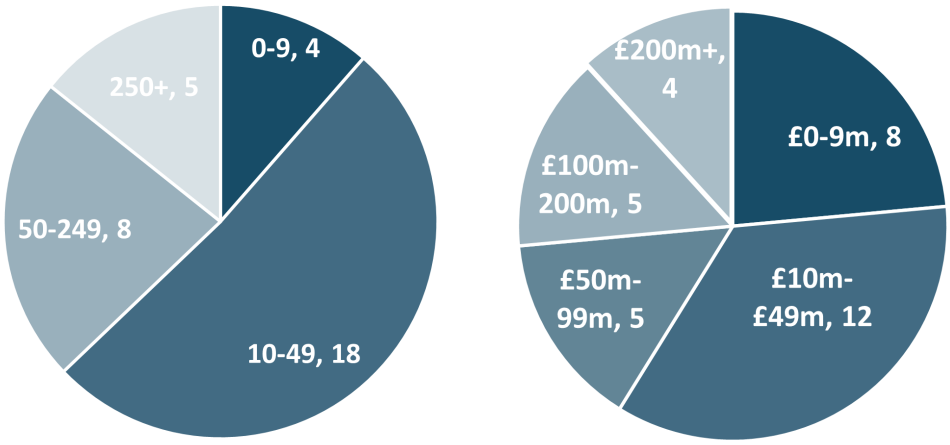
3.1. Introduction

In this section we outline findings from consultation with metals recycling businesses through a short survey and in-depth qualitative interviews (see methods in Section 1). The analysis in this section is organised around the following key messages:

- A challenging market for metals recycling.
- Exports are critical to business operations.
- Domestic markets are limited and uncertain.
- Decarbonising metals production creates potential opportunities but only with systemic changes and investment.
- Quotas or bans on metals exports are not seen to be a feasible policy option.
- There is need for an open conversation on quality specification or controls within the recycling sector.
- More work is required to support government and key stakeholders to better understand and collaborate with the metals recycling industry.

Between the survey and interviews we received responses from 34 businesses ranging across micro (0-9 employees), small (10-49 employees), medium (50-249 employees) and large (250+ employees) enterprises.[8] Collectively they account for a significant proportion of the UK recycling sector by turnover and mass processed, and cover a range of business sizes to provide understanding of different businesses' perceptions.

Figure 3.1: Business respondents by employment (left) and turnover (right)



Survey respondents were asked questions about which metals they process or trade, the size and nature of their export operations, and the likely implications of four different scenarios for export restrictions as outlined in Section 2.

Qualitative interviews covered similar topics as well as more detailed discussion about the existing business landscape, current and future market opportunities, and their views on opportunities and challenges for increasing domestic supply of recycled metals.

[8] We received 18 survey responses and conducted 14 interviews; two businesses responded to the survey as well as taking part in an interview.

Due to the relatively small number of survey responses we have not provided statistical analysis of these; rather we have used these responses indicatively and in combination with the qualitative interviews to provide a more rounded picture.

3.2. A challenging market

The metals recycling industry operates within complex and volatile markets. This is not widely understood outside the sector and this lack of appreciation is one source of frustration for recycling businesses.

Summary of recent challenges

Depressed demand for metals globally feeding into lower demand for recycled metals.

Metal price volatility owing to a range of factors including the recent round of tariff and trade negotiations prompted by US protectionist measures.

Military disputes and wars affecting access to markets, including recent tensions between India and Pakistan, both important markets for a number of research participants.

Rising shipping costs, partly because of challenges navigating shipping lanes in the Red Sea subject to Houthi attacks.

High UK energy costs, exacerbated by the energy price shock of 2022 following the Russian invasion of Ukraine. Metals recyclers have not benefitted from access to energy subsidies allocated to energy intensive users like steel producers.

Some businesses mentioned challenges navigating changing regulatory requirements, including those for exports.

Some businesses also mentioned that feedstock was becoming more complex (for instance, automotives), requiring increased processing and more advanced processing methods.

As a result many businesses reported that current market conditions were extremely challenging: 'I think it's survival of the fittest at the minute in the metal industry. It's very, very difficult. The markets are difficult, the margins are very tight, if not non-existent… it's a complex and volatile market' (BM13, mixed metals, 450 employees).

Policy Message

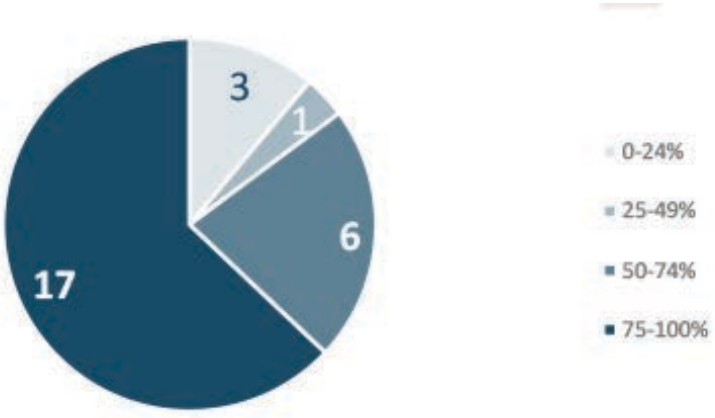
Any changes to export controls or wider policy come at a time of turmoil and challenge for the industry. Any changes must be sensitive to this context.

3.3. Exports: critical to business operations

Businesses that participated in the research mostly operated at the end of the UK value chain. That is, they exported directly to international markets and/or sold to UK metals producers (for information on domestic markets see Section 3.4 on page 28).

Exports were critical to the current business model of almost all firms consulted. The median export percentage (as a proportion of turnover) was 85% (27 respondents). A more detailed breakdown is shown in Figure 3.2, which shows that only four businesses had exports below 50%, whereas for 17 (60%), exports accounted for more than 75% of turnover.

Figure 3.2: Exports as percentage of turnover (survey and interview participants)



Because most metals are exported from the UK, these businesses are essential to the functioning of the metals supply chain, including for businesses that do not currently export but which instead sell material to export businesses.

Even some of the material that is not directly exported is often sold to other recycling firms who then export the material. Only one of the businesses that participated in the research relied on a domestic producer market and did not export, nor was actively seeking to export in future.

Key markets for non-ferrous metals varied partly depending on the grade and quality of material businesses were trading – for instance there is a good market for higher-quality copper in Europe – but most businesses reported that their largest non-ferrous markets were in South, South East and East Asia.

Following the overall pattern of exports, ferrous metals were exported in bulk to Türkiye, as well as a growing market in Egypt. India and Pakistan were also important destinations. EU countries, particularly Spain, also remained sources of custom.

Imports were not a significant source of material for most businesses. Less than half of firms imported any material and those that did mostly reported small proportions from nearby markets (e.g. Ireland and Belgium). In most cases imports were for specialist or 'niche' grades.

Policy Message

The metals recycling sector is oriented towards exports which means any significant changes to export regulations impact the whole sector. Shifting supply to domestic markets is not straightforward.

3.4. Limited and uncertain domestic markets

Almost all businesses interviewed said that they would prefer to supply a domestic metals market if there was reliable demand and the price was competitive with export markets. However, current domestic market opportunities are limited and often risky compared to export opportunities.

There is an extremely limited market for non-ferrous metals, with only one remaining aluminium smelter (in Lochaber, Scotland), and no major copper or brass producers. The UK market for ferrous material, already low, has reduced further recently due to closure of the Tata steelworks at Port Talbot for redevelopment, intermittent and low demand from Liberty Steel's production site in South Yorkshire and lower demand from British Steel in Scunthorpe. The number of smaller foundries has also reduced over time. Fluctuations in demand were considered a systemic challenge for serving the domestic producer market, especially in comparison to a wider market base internationally that smoothed out any fluctuations with individual businesses or countries.

> *'It would cripple me not being paid for 90 days'* (BM06, mixed metals, 13 employees)

Businesses also reported that payment terms from producers were often a sticking point, with lengthy payment times of up to 90 days, compared to much shorter payment times for export markets (via Letter of Credit agreements[9]). This is especially challenging for smaller businesses. Further, recycling businesses faced additional challenges selling to UK-based producers because UK steel production was seen as a risky industry by insurers. This made it hard for recyclers to get credit insurance on sales to producers, especially smaller foundries.

Policy Message

Low levels of demand is a central limiting factor on domestic supply. However, fluctuating demand, procurement approaches and difficulties attaining credit insurance make the domestic market less attractive to many recycling businesses. Any growth in demand would need to be accompanied by improvements in these other areas to rebalance recycled metal flows towards domestic consumption.

[9] See here for further information on Letters of Credit: https://www.trade.gov/letter-credit

3.5. Opportunities from decarbonising metals production

Interview participants were asked about the implications of decarbonising metals production, particularly in the steel industry. Businesses see opportunities in increased demand for recycled metal, especially as feedstock for Electric Arc Furnaces (EAFs). Some participants say that they have been involved in conversations about new EAFs in countries they currently export to, although none are aware of new EAFs coming online as yet. There were potentially some opportunities for increased non-ferrous demand, especially aluminium, through increased recycled content in production as well as increasing demand for lighter metals for vehicle manufacturing linked to the shift to electric vehicles.

Businesses were also asked more specifically about potential implications of investments in new EAFs to replace blast furnaces in Port Talbot (Tata) and potentially Scunthorpe (British Steel). Almost all participants from businesses that process ferrous metals see growing domestic demand as positive for the industry, and most can see potential benefits for their business through increased demand.

Businesses expect new EAFs in the UK to have different requirements on quality, grade and form of metal inputs compared to most existing customers. For instance, greater demand for low residual product, including potential requirements for only shredded feedstock. Some larger recyclers had experience of working with steel producers with similar requirements in – for example – the USA, but many businesses would need to invest in new processes or technology in order to take up opportunities. However, most businesses also said they would welcome more clarity on what specific metal grades would be required by new EAFs to aid planning and investment to meet requirements.

Greater processing of metals through, for instance, more shredded material also increases the amount of waste produced. One concern for some recyclers was the lack of capacity for the UK to process or store the additional waste created.

It was also agreed that while the UK has a large surplus of recycled steel in relation to domestic demand, steel producers would likely still look to import material to ensure supply of specific grades required. Further, some businesses experience logistical challenges to supplying the UK-based production sites. Rail connections to Port Talbot, for instance, are variable and road transport creates environmental challenges alongside transport costs.

Some of the businesses we spoke to feel that they will not be able to supply new EAFs at a competitive price as it would be more cost effective to ship goods overseas than to transport over land to Port Talbot or – potentially – Scunthorpe. In some cases this is because business models focus on locating operations at port facilities, but others also feel there would likely be a regional catchment area for competitive supply of domestic recycled metals to new EAFs.

Policy Message

New domestic demand for recycled ferrous materials will create opportunities for metals recyclers, assuming UK steel producers offer competitive prices, but many will not be able to access these opportunities without technological investment and improved, cost-effective rail freight infrastructure. Increased processing will also require coordination to ensure capacity to process and/or store increased residual waste.

3.6. Export bans are an existential threat for many businesses

In addition to the economic modelling in Section 2, we also asked individual businesses to reflect on the likely impacts of different forms of export controls. Businesses were asked to consider different scenarios for restricting exports to specific countries, or a complete export ban. A complete export ban would be devastating for all businesses we consulted, and many believed that the UK metals recycling sector would cease to function. An inability to export would not only impact on those at the end of the value chain who export metals, but also all businesses that collect, process and supply metals to exporting businesses, and significantly alter market dynamics for the very small number of firms that currently only supply directly to domestic producers.

All businesses agree that any blocks on exports are negative and distort the market. Individual businesses vary in terms of how different scenarios might impact their business. A ban on exports to Türkiye is seen as potentially difficult, for instance 54% of survey respondents report that a ban on exports to Türkiye would either put the future of the business at risk or have a significant impact on the business. Interview participants for businesses that export bulk shipments to Türkiye also see such a ban as challenging.

A second scenario put forward was a ban on exports to non-OECD countries. 83% (10 out of 12) of survey respondents say this would either put the future of the business at risk or have a significant negative impact. Interview respondents varied, but those with more focus on non-ferrous metals see this as especially problematic, as for many firms China, South East Asia and South Asia were key export markets. The European market was limited to ‘cleaner’ higher grades of non-ferrous material.

Ferrous recyclers with interests in India, Pakistan and a growing market in Egypt also saw this as problematic for their businesses. It would not simply be a case of moving to different markets as demand between countries could be quite different. For instance one firm we spoke to sends bulk ferrous shipments to nearer markets like Türkiye, Egypt and some EU countries, while shipments to India and Pakistan were smaller, focused on heavier or niche grades. These markets are therefore not readily substitutable.

Given that current and forecast demand in the UK is significantly lower than supply, and virtually non-existent for non-ferrous materials, businesses feel that reductions in exports would also lead to challenges storing or disposing of the surplus of material in the UK, putting further strain on waste management capacity. Firms say that they support the principle of retaining more recycled material within the UK and a small number of businesses say that export quotas matching levels of UK demand might be feasible, however most businesses see this as a means of suppressing prices for UK producers.

Policy Message

Direct restrictions on exports of metals is not a feasible approach to supporting UK steel production and more stringent restrictions may cause the UK metals recycling sector to no longer function. Restrictions have knock-on consequences for waste management and blanket restrictions on metals exports aimed at supporting steel production also have unintended consequences for non-ferrous metals recyclers who have no domestic market.

3.7. Time for an open conversation on quality controls

Opposition to direct restrictions on the amount of metal being exported is broadly shared across all businesses. However, there are different views about the potential value of other forms of export controls, focused on quality of exported material and related processes. Around half of the interview participants we spoke to broadly support changes to quality controls on exports or more broadly across the industry. These

participants included larger firms and those specialising in ferrous material, with smaller and non-ferrous firms more critical of any suggestion that greater controls would be beneficial.

Use of existing End of Waste accreditation as a pre-requisite for export of some materials was one suggested approach by larger firms. Others suggested further regulation to ensure broader and deeper changes to recycling processes.

Medium-sized businesses are also concerned with what they see as an uneven playing field relating to existing regulation. They feel that barriers to entry in the market can be too low for start-up firms who do not need the same levels of permits and accreditation that more established firms do.

'I think it'd be important to say, you know, banning exports would be bad, but if you want to bring in, shall we say, sensible restrictions to get rid of, I don't use the word Cowboys, but fly by night operations who aren't doing things in the right way and acting in the best interests of the country and their customer just trying to make a quick buck.'
(BM09, ferrous, 15 employees)

These businesses worry that there is a hollowing-out of the middle tier of recycling firms, who face a squeeze from smaller businesses that have fewer regulatory costs and larger businesses who can more easily invest in technology and processes to take advantage of regulatory change.

Related to the issue of uneven regulatory oversight, for some businesses opposition to further controls is partly tied to concern that significant leakage would occur. They feel that not only are there uneven requirements on businesses, lack of organisational capacity in organisations like the Environment Agency means that some businesses are able to export materials which already have restrictions.

In outlining concerns about regulatory change on exports, businesses referred to recent introduction of new controls on the export of motors and cables as part of Waste Electronic and Electronic Equipment (WEEE) legislation.[10] Some larger firms have been able to turn this change into an opportunity by investing in new equipment to process motors and cables to meet new specifications. Others talked about the significant challenges the new legislation created for their own operations, who lacked the resources to respond quickly to change. The view from businesses is that these controls have also introduced significant grey areas as well as a sizeable amount of non-compliant material continuing to be shipped via smaller firms who face less regulatory oversight. Some businesses also say they have experienced significant delays receiving permits like Transfrontier Shipment of Waste certification – one of the methods used to legally export restricted materials – which creates concerns about organisational capacity to process other new requirements for accreditation to ship material.

'It's very easy for you to go and rent a unit, get an exemption, put it in a container, buy a cheap container loader and get the price that I'm getting. And we have huge overheads in terms of environmental teams, health and safety, teams, logistics, all of that that you would expect. But it's so very simple for anybody to set themselves up and get cracking with it.'
(BM11, mixed grades, 75 employees)

Greater controls also increase costs, in particular through increased processing which leads to greater electricity and waste disposal costs. Some businesses say that this is simply doing responsible recycling

[10] https://www.gov.uk/guidance/importing-and-exporting-waste-electrical-and-electronic-equipment-weee

and all businesses should commit to that. However, increasing quality control also creates additional pressures on waste disposal and storage facilities. Most businesses that took part in interviews say that there is already a capacity problem for disposing and storing residual materials, which would be exacerbated by further quality controls. This is not necessarily an argument that quality controls are a bad idea in principle, but that any changes require systemic interventions rather than introduction of controls on one part of the metals supply chain.

The question of quality controls is a complex issue requiring further research and consultation. It brings together questions about business practices within UK markets, demand for different grades of metals, as well as what a 'responsible' export approach looks like, which also must be viewed within the context of maintaining a competitive industry in a global market, therefore also requiring on-going work to support alignment with key trading partners, including beyond the OECD (e.g. India, China and Egypt).

Policy Message

There is appetite for an open conversation about quality specifications across the sector. There is currently a lack of shared understanding about precisely what quality challenges need to be addressed and what the most appropriate ways to address them would be. Any agreed challenges need to be addressed systemically and will require investment across the supply chain and support for SME firms with less access to capital to invest in new technologies and processes.

3.8. Helping government better understand the metals recycling industry

Businesses shared a view that there is a need to support better understanding of the metals recycling industry in government and other key stakeholders as well as in the wider public.

UK government has recently become more engaged with the steel industry than previous administrations and has produced a consultation document on a steel strategy for the UK. This can provide opportunities for the metals recycling industry to engage with government to develop a constructive approach to supporting the sector to meet productivity and sustainability goals, and for open dialogue around new domestic market opportunities.

> *'I don't think metals recycling is seen as important enough … it really needs a lot of focus from government.'* (BM13, mixed metals, 450 employees)

It is important in this context that the sector develops a shared vision and clear policy proposals that chime with the needs of the sector while speaking to government priorities on growth and net zero. The sector should be well placed to do so, and BMRA already has a position on the UK Steel Council to connect the sector to strategic thinking. However, there remains a need for further work to clarify specific policy asks and messages. Our research surfaced a range of different views from businesses on export regulation and wider debates on quality assurance, highlighting the need for further conversation to discuss viewpoints and work collectively towards shared proposals.

Businesses stress the importance of government consultation and dialogue involving a range of different types of metals recycling businesses, in particular to elevate the voices of SME recycling firms alongside larger firms. This is important for understanding the different needs, challenges and opportunities across the recycling supply chain.

'Everything's been about steel. How do we save the steelworks, put money into the steelworks, legislation for the steelworks and I really believe because in the media it's always been the poor relation … there's a massive difference between steel and non-ferrous.'
(BM01, non-ferrous, 24 employees)

In the context of renewed focus on domestic steel production and implications for metals recycling, firms specialising in non-ferrous materials also emphasise the importance of considering implications for policy designed to support the steel industry on other metals recycling activities.

Businesses also note the need for a more constructive relationship between steel producers and metals recyclers. Some businesses have good relationships with individual producers, but there is a lack of trust between the two sectors which prevents both sectors working more collaboratively. In recognition of this, the UK government's Department for Business and Trade supports a scrap-steel working group.

Policy Message

The metals recycling sector is a diverse industry and requires nuanced understanding of operations, challenges and opportunities. This requires consistent, constructive, open dialogue between government, steel producers, metals recyclers and other key stakeholders. It also requires the recycling sector to deliver clear, unified messages to help government decision-making.

4. Recommendations

Drawing from our findings, we make the following recommendations for BMRA, recycling businesses, government, government agencies, steel producers and other stakeholders.

4.1. Recommendations for policy

1. Provide clear and consistent messages

These insights can support policy development briefing for government, making clear that proposed export restrictions carry disproportionate economic costs relative to the perceived short-term gains in material availability. The market is at a particularly vulnerable point because of price volatility and uncertainty combined with the reliance on high volume throughput.

As such, direct restrictions on exports of metals are not a feasible approach to supporting UK steel production and more stringent restrictions may cause the UK metals recycling sector to break down.

Aside from low demand, a range of other systemic challenges act as barriers to a stronger domestic metals recycling market. Systemic changes are needed to improve domestic scrap retention, focusing on supportive action across supply chains.

- **Action:** The recycling sector to work together with BMRA to develop a clear and consistent message to government, steel producers and the wider public. It is critical that messaging reflects the breadth of the sector, including smaller businesses.
- **Who:** BMRA, metals recycling businesses.

2. Work to build more constructive collaborative relations between metals recycling, steel producers and government

There is currently a lack of consistent engagement between key stakeholders to support a strong recycling sector that also meets the needs of the steel producers and government goals for growth and net zero. Our research supports the continued need for a joint working group of UK recyclers and steelmakers, also including key government representatives. It is important that such a group includes a range of voices from the metals recycling industry.

- **Action:** Continue to work through cross-sector working group to support further and deeper collaboration on domestic supply and demand for recycled metals.
- **Who:** BMRA, steel producers, UK government.

3. Support systemic change to ensure increases in domestic demand lead to greater opportunities for UK recycling businesses

New domestic demand for recycled ferrous materials will create opportunities for metals recyclers, assuming UK steel producers offer competitive prices, but many will not be able to access these opportunities without technological investment and improved, cost-effective rail freight infrastructure. This is backed up by economic modelling that shows that stronger domestic markets can soften the impact of export market disruptions (whether caused by UK policy or external events), but the findings show that such recovery is typically delayed and subject to significant decay over time. Increased processing of materials to meet domestic demand will also require coordination to ensure capacity to process and/or store increased residual waste.

- **Action:** Adopt policy approach focusing on systemic support and incentives for domestic retention of recycled metals.
- **Who:** UK government, government agencies, steel producers.

4. Support market diversification

The modelling demonstrates that the ability to reroute exports to alternative international markets significantly reduces the negative economic impacts of trade disruptions. When access to one export destination is restricted – whether through policy, market failure or geopolitical shock – firms that can rapidly pivot to other high-value markets are far more resilient in terms of revenue and employment preservation.

This underscores the strategic importance of market diversification. Industry stakeholders should therefore support efforts to expand access to a wider range of international buyers, particularly in high-value and scale-sensitive markets. This includes promoting policies that reduce trade barriers, streamline customs procedures and harmonise quality standards – measures that help minimise frictions and enable faster, more effective redirection of exports when disruptions occur.

Diversification is not just about spreading risk – it enhances bargaining power, pricing stability and long-term investment incentives. In a vulnerable global trade environment, enabling UK exporters to operate across multiple regions protects the sector's GVA and employment footprint and strengthens its global competitiveness.

- **Action:** Industry and government should work together to strengthen the sector's ability to absorb trade shocks by improving access to alternative export markets through, for example, targeted trade agreements and reduced logistical barriers.
- **Who:** BMRA with partners and Department for Business and Trade.

4.2. Recommendations to further enhance knowledge, communication and insight

5. Develop risk-based trade impact tools

The sector is particularly vulnerable to logistical, policy or geopolitical disruptions that undermine the economics of the sector's value generation. BMRA should collaborate with partners to develop early-warning tools or scenario planning frameworks to anticipate and respond to these risks.

- **Action:** Develop early-warning tools and scenario planning.
- **Who:** BMRA with partners (e.g. research, government stakeholders).

6. Build on current modelling strengths to deepen foresight and advocacy

The modelling framework presented in this report provides a robust and policy-relevant foundation, demonstrating how export restrictions generate disproportionate economic losses due to market-scale effects, limited domestic absorption and terms-of-trade impacts. To further strengthen this platform, BMRA could invest in expanding the model's granularity and scenario depth, such as incorporating commodity-specific dynamics, firm-level behavioural assumptions and regional supply chain constraints. Enhancing the calibration of rerouting pathways and international price feedback mechanisms will improve realism and forward-looking value. Crucially, involving BMRA members in refining these assumptions can enhance accuracy, legitimacy and policy impact without undermining the integrity of the current analytical approach.

- **Action:** Expand and refine the current modelling framework to improve foresight, deepen scenario realism and strengthen the evidence base for future policy engagement.
- **Who:** BMRA with partners (e.g. research, government stakeholders), research organisations, government agencies.

7. Further research and engagement on specific proposals for quality specifications

The research surfaced a range of views on further enhancement of quality specifications for the industry, including to meet future needs for lower residual recycled material and address long-term challenges of contamination, which will be important if metals production is to achieve decarbonisation goals through greater reliance on recycled metals. While some suggestions focused on using export controls to support changes in quality, a more open assessment of potential policy mechanisms, support and incentives to achieve change is needed.

More specifically, there is a need for an open conversation and further research to understand (a) exactly what different stakeholders consider to be the 'quality challenge' and how it can be addressed; and (b) develop specific policy proposals to meet these challenges.

- **Action:** Further industry engagement and research (e.g. roundtable workshops) to produce policy proposals for further enhancing quality of materials and processes to meet future metal producer needs across the sector.
- **Who:** BMRA, research organisations.