

Competition Law and Supply Chain Resilience – Towards a Research Agenda

Elias Deutscher

Centre for Competition Policy and School of Law,
University of East Anglia

CCP Working Paper 22-06

This version: 13 July 2022

Abstract: Global value chains are currently experiencing a ‘perfect storm’ triggered by the coincidence of various random events, including the Covid-19 pandemic, the temporary blocking of the Suez Canal by the stranded giant container ship ‘Ever Given’, the congestion of major ports, and the outbreak of the war in Ukraine. All these events have laid bare the degree to which our economies rely on integrated and often vulnerable supply chains that form the neural system of our globalised market economies. Empty supermarket shelves, steep increases in energy prices and the bleak prospect of a global food crisis have led to a widespread awareness of the interdependence and fragility of tightly-knit networks of integrated just-in-time value chains. Against this backdrop, there are mounting calls for a general rethinking of how various economic policies and regulations could foster the resilience of integrated supply chains against exogenous shocks. This paper follows this invitation by exploring whether and how competition law – i.e., the prohibition of anti-competitive agreements, the abuse of monopoly power and anticompetitive mergers – could contribute to greater supply chain resilience. It thereby makes three contributions. First, the paper seeks to clarify the notion of value chain resilience and its relationship with competition. It thus addresses the fundamental question of whether competition is conducive or detrimental to supply chain resilience. Second, the paper maps four avenues through which competition policy can promote the shoring up of international supply chains. Third, the paper identifies a number of filters to incorporate concerns about supply chain resilience into competition law analysis. The paper thus lays down the conceptual foundations and pathways for a nascent research agenda on competition (law) and resilience.

Contact Details:
Elias Deutscher

E.Deutscher@uea.ac.uk

Competition Law and Supply Chain Resilience – Towards a Research Agenda

*Elias Deutscher**

Global value chains are currently experiencing a ‘perfect storm’ triggered by the coincidence of various random events, including the Covid-19 pandemic, the temporary blocking of the Suez Canal by the stranded giant container ship ‘Ever Given’, the congestion of major ports, and the outbreak of the war in Ukraine. All these events have laid bare the degree to which our economies rely on integrated and often vulnerable supply chains that form the neural system of our globalised market economies. Empty supermarket shelves, steep increases in energy prices and the bleak prospect of a global food crisis have led to a widespread awareness of the interdependence and fragility of tightly-knit networks of integrated just-in-time value chains. Against this backcloth, there are mounting calls for a general rethinking of how various economic policies and regulations could foster the resilience of integrated supply chains against exogenous shocks. This paper follows this invitation by exploring whether and how competition law – i.e., the prohibition of anti-competitive agreements, the abuse of monopoly power and anticompetitive mergers – could contribute to greater supply chain resilience. It thereby makes three contributions. First, the paper seeks to clarify the notion of value chain resilience and its relationship with competition. It thus addresses the fundamental question of whether competition is conducive or detrimental to supply chain resilience. Second, the paper maps four avenues through which competition policy can promote the shoring up of international supply chains. Third, the paper identifies a number of filters to incorporate concerns about supply chain resilience into competition law analysis. The paper thus lays down the conceptual foundations and pathways for a nascent research agenda on competition (law) and resilience.

1 Introduction

In September 2021, British poultry producers issued a bleak warning: If the supply disruption of carbon dioxide (CO₂), which is used as a critical component to stun poultry for slaughter, was not resolved within days, British households would not find any turkeys on their dinner tables on Christmas Eve. In short, ‘Christmas will be cancelled.’¹ What had happened? In response to a surge in natural gas prices, the fertiliser producer CF Industries had closed two of its plants in the UK to save costs. When taking this decision, it had, however, paid no heed to the fact that both plants also produced about 60% of UK’s CO₂ as a by-product of fertiliser manufacture and, therefore, played a critical role in its food value chain.²

* Lecturer of Competition Law and IP at the University of East Anglia Law School; Research Member of the Centre for Competition Policy (e.deutscher@uea.ac.uk). The author is grateful to Sebastian Peyer and Ben Evans for their insightful comments on previous versions of this working paper. The author welcomes any critical thoughts, suggestions, and feedback.

¹ J. Evans, ‘UK’s biggest chicken producer says industry is at breaking point’ *Financial Times* (19 September 2021) <<https://www.ft.com/content/053f4cc8-8a2e-41bf-92af-980b3a1692d6>> accessed 7 May 2022.

² *ibid*; C. Bushey and others, ‘Fuel, fertiliser and food: How a UK ammonia plant threatened nation with crisis’ *Financial Times* (22 September 2021) <<https://www.ft.com/content/c35e1504-1910-4c20-851f-070fbbd282ef>> accessed 7 May 2022.

This acute disruption of the UK food supply chain due to a sudden shortage in CO₂ was only one episode of an ongoing supply chain crisis that we are witnessing since the outbreak of the Covid-19 pandemic. Global value chains are currently experiencing a ‘perfect storm’ triggered by the coincidence of various random events, including the Covid-19 pandemic and public mitigation mechanisms adopted in response to it, the temporary blocking of the Suez Canal by the stranded giant container ship Ever Given, a steep increase in the demand of consumables and energy, the congestion of major ports, and, on top of that, the outbreak of the war in Ukraine. All these events have laid bare the degree to which our economies rely on integrated and often vulnerable supply chains.³

These multiple convulsions that global trade flows underwent over the last two years have moved the increased interdependence and fragility of tightly-knit networks of integrated value chains centre stage.⁴ Policymakers in Europe and beyond have underscored the need for their economies to become again more self-sufficient and less dependent on imports of strategic goods, such as technological inputs, medical equipment, natural resources, or energy.⁵ Some even advance the view that the Covid-19 crisis demonstrates the need for a partial de-coupling of globalised supply chains to build up ‘strategic autonomy’ by reshoring production in critical sectors.⁶ Brandishing the slogan of ‘building back better’, various international organisations, policymakers and academics see the Covid-19 pandemic as an opportunity to rethink how we organise and design our societies, economies and supply chains in order to make them more stable and resilient against future exogenous shocks.⁷ Against this backdrop, the EU Commission recently carried out a comprehensive review of its existing trade relationships and has singled out 137 critical items – notably raw materials, chemicals, products belonging to the health ecosystems and essential components for digital and green technology – out of more than 5,000 products where the EU is highly dependent on imports.⁸

The growing concern over supply chain resilience also recently gained a foothold in the competition policy debate. The US Federal Trade Commission opened an investigation into the

³ R. Baldwin, ‘Supply chain contagion waves: Thinking ahead on manufacturing ‘contagion and reinfection’ from the COVID concussion’ <<https://voxeu.org/article/covid-concussion-and-supply-chain-contagion-waves>> accessed 18 April 2020; H. Inoue and Y. Todo, ‘Propagation of the economic impact of lockdowns through supply chains’ <<https://voxeu.org/article/propagation-economic-impact-lockdowns-through-supply-chains>> accessed 18 April 2020; M. Elliott, B. Golub and M. V. Leduc, ‘Supply Network Formation and Fragility’ [2022] *American Economic Review*.

⁴ Commission Staff Working Document - Strategic dependencies and capacities. SWD(2021) 352 final; The White House of the United States, ‘Report - Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth: 100-Day Reviews under Executive Order 14017’ (2021).

⁵ See for instance European Commission, ‘Action Plan on Critical Raw Materials’ (2020).

⁶ See for instance the French Minister of Economy and Finance, B. Le Maire, ‘Strengthening the EU’s resilience and strategic autonomy’ *The European Files* (21 October 2020) <<https://www.europeanfiles.eu/industry/strengthening-the-eus-resilience-and-strategic-autonomy>> accessed 7 May 2022. The White House of the United States, ‘Executive Order on Addressing the Threat to the Domestic Supply Chain from Reliance on Critical Minerals from Foreign Adversaries – The White House’ (30 September 2020) <<https://trumpwhitehouse.archives.gov/presidential-actions/executive-order-addressing-threat-domestic-supply-chain-reliance-critical-minerals-foreign-adversaries/>> accessed 7 May 2022; The White House of the United States, ‘Executive Order on America’s Supply Chains’ *The White House* (24 February 2021) <<https://www.whitehouse.gov/briefing-room/presidential-actions/2021/02/24/executive-order-on-americas-supply-chains/>> accessed 7 May 2022. A recent economic study shows that the decoupling and reshoring of global value chains is unlikely to protect against supply chain disruptions and finds that the welfare losses of decoupling exceed by far its benefits P. Eppinger and others, ‘Decoupling Global Value Chains’ (2021). CESifo Working Paper 9079.

⁷ For a discussion see D. Coyle, ‘Building back better requires systemic shifts’ *Financial Times* (30 July 2020) <<https://www.ft.com/content/72b1fbd7-6059-4cb9-835d-c608acc3e603>> accessed 10 October 2020; D. Coyle, ‘Building back better requires systemic shifts’ *Financial Times*.

⁸ Updating the 2020 New Industrial Strategy: Building a strong Single Market for Europe’s recovery. SWD (2021) 351 final 11–12.

causes of supply chain disruption in November 2021.⁹ The EU Commission's updated industrial policy strategy explicitly refers to competition law as one tool amongst others that would enhance the resilience of supply chains in critical industries by addressing 'possible internal dependencies within the Single Market, linked to a concentration of activities at the level of individual firms [...] by ensuring that markets remain open and contestable.'¹⁰ A recent Communication by the Commission laying out plans for a comprehensive overhaul of EU competition policy with a view to making it 'fit for new challenges' also identifies competition law as an important component of a 'resilient Single Market'.¹¹ The terms 'resilience' and 'resilient internal market' are also randomly scattered across the Commission's Draft Revised Horizontal Cooperation Agreement Guidelines.¹² Along similar lines, the Chief Executive of the UK Competition and Markets Authority, Andrea Coscelli, recently issued a joint working paper on 'Competition and Resilience'. The working paper insinuates that industry concentration constitutes an important source of supply chain vulnerability without, however, providing any systematic discussion of the relationship between competitive markets and supply chain resilience.¹³ While the term 'resilience' is poised to become a new catchword in competition policy circles, existing policy documents and publications provide very little detail as to how competition policy is actually supposed to enhance resilience *in concreto*.¹⁴

The rise to prominence of resilience in the current competition policy debate calls for a more systematic analysis of the relationship between competition policy and supply chain resilience. It invites a more fundamental inquiry into the ways in which competition and competition law might affect the systemic stability of our supply chains and economies. This paper seeks to unpack the conceptual and economic relationship between competition and supply chain resilience. It also explores whether and how this relationship between competition and supply chain resilience can and should inform competition law. In short, can competition law contribute to the greater resilience of supply chains against exogenous shocks? And should it do so by promoting more intense competition, or rather by providing for exemptions from competition rules to allow firms to make their business models more stable against unexpected disruptions? Moreover, through which tools can competition law operationalise concerns about value chain resilience?

To address these questions the paper unfolds as follows. First, it seeks to clarify on a conceptual level the notion of supply chain resilience and to map various strategies firms use to manage supply chain risks (Section 2). Second, it investigates more closely the relationship between economic competition and supply chain resilience (Section 3). Third, the paper discusses a number of channels that might allow competition law analysis to incorporate concerns about resilience (Sections 4-7).

⁹ Federal Trade Commission, 'FTC Launches Inquiry into Supply Chain Disruptions' (2021) <<https://www.ftc.gov/news-events/news/press-releases/2021/11/ftc-launches-inquiry-supply-chain-disruptions>> accessed 2 February 2022.

¹⁰ Updating the 2020 New Industrial Strategy: Building a strong Single Market for Europe's recovery (n 9) 12.

¹¹ A competition policy fit for new challenges 18 November 2021. COM (2021) 713 final 16–17.

¹² Draft Communication from the Commission - Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements 2022.

¹³ A. Coscelli and G. Thompson, 'Resilience and Competition Policy: Economics working paper' (2022) 1, 20-22.

¹⁴ *ibid* 20.

2 Concepts: What is Supply Chain Resilience?

The first goal of this paper is to bring some conceptual clarity to the nascent debate on the role of supply chain resilience in competition policy. To this end, this section will start by clarifying what is actually meant by resilience and analysing various strategies employed by firms to foster the resilience of their supply chains.

2.1 Defining (Supply Chain) Resilience

The concept of resilience has its roots in ecological literature and system theory. This literature refers to resilience to describe the ability of ecosystems or social systems to absorb, resist, respond, adapt to and recover from unexpected shocks. Resilience can be defined as the ability of an ecological, societal or economic system or organisation to ‘withstand, adapt and recover from disruptions.’¹⁵ In the economic context, resilience describes the degree of stability of an economy or value chain to endogenous and exogenous disruptions while meeting customer demand and ensuring performance.¹⁶

This definition of resilience invites a number of clarifications. To begin with, the proposed definition of resilience suggests that it is a multi-dimensional concept. Resilience, hence, may relate to different features of a system that contribute in various ways to its stability. A system can, for instance, be described as resilient if it is able to absorb, cushion and thereby resist an external shock (robustness). Resilience thus primarily expresses itself through a low level of vulnerability to shocks.¹⁷ The resilience of a system may, however, also be enhanced by its ability to swiftly respond and adapt to an external shock (responsiveness). Further, a system can also be considered resilient if it is able to recover from an external shock quickly and at minimal costs (recoverability).¹⁸ This multi-dimensionality of resilience can be captured by the ‘3Rs’: robustness, responsiveness, and recoverability.¹⁹

Each of these three elements of resilience has a time dimension. Robustness refers to the *ex-ante* capacity of a system to anticipate, avoid, and withstand unexpected disruptions. It presupposes proactive strategies that enhance the preparedness or readiness of a system to cope with external shocks. Robustness thus depends on the capability of a system to absorb an impact of perturbations and minimise the negative consequences of disruptions.²⁰ Greater robustness may also have an important impact on the recoverability of the system, as it minimises the efforts and costs for the system to recover and return to normal after being impacted by a shock.²¹ Responsiveness, in turn, relates to the adaptive capacity of a system during a perturbation. It comes into play in situations where robustness is not sufficient to eschew or absorb the shock. The responsiveness of a system is contingent on its ability to adapt to and surmount a disruption by implementing ‘non-standard operating practices’, without recourse to recovery activities.²² Lastly, recoverability focuses on the restorative capacity of a system after being impacted by a shock. The fewer and the less costly the recovery efforts necessary to

¹⁵ S. Hosseini, D. Ivanov and A. Dolgui, ‘Review of quantitative methods for supply chain resilience analysis’ (2019) 125 Transportation Research Part E: Logistics and Transportation Review 285–286. For a discussion of various definitions *ibid* 290; P. Régibeau and K. Rockett, ‘Economic analysis of resilience: A framework for local policy response based on new case studies’ (2013) 11(1) Journal of Innovation Economics 107–109.

¹⁶ Hosseini, Ivanov and Dolgui (n 16), 286.

¹⁷ *ibid*.

¹⁸ *ibid*.

¹⁹ The three ‘Rs’ make up what Hosseini et al. call ‘resilience capacity’ *ibid* 286, 291–292.

²⁰ *ibid* 290–291.

²¹ *ibid* 291.

²² *ibid* 291–292; B. Biringer, E. Vugrin and D. Warren, *Critical Infrastructure System Security and Resiliency* (CRC Press 2013).

rebound to the pre-shock performance level, the more resilient the system is.²³ This multi-dimensionality of resilience has major implications for its operationalisation and measurement.²⁴

The notion and operationalisation of resilience also importantly depend on the nature and magnitude of the shock or threat against which a society or system should be resistant. Value chain disruptions may have different causes: either they are natural (e.g., natural disasters, diseases, pests) or they are human (e.g., terrorist attacks, strikes, errors, opportunistic behaviour).²⁵ The sources of shocks and supply chain disruptions can be further categorised as macro-level and micro-level factors. Macro-level factors, such as natural disasters, geopolitical risks, or regulatory environment, affect all supply chains (within a given area) across the board.²⁶ Micro-level factors, in turn, are causes of disruptions that are specific to a given supply chain. These micro-level sources of disruption might either be disruptions to the internal processes within a specific firm ('process risk'; e.g., a mechanical breakdown), or originate from suppliers (supply-side uncertainty/risk) or customers (demand-side uncertainty/risk).²⁷ Supply (chain) uncertainty can take various forms. The most drastic form is disruptions which are random events causing a supplier or another element of the supply chain to stop functioning, either completely or partially, for a specific and typically random amount of time. In the presence of disruption, it is impossible for the supplier to provide goods or services.²⁸ Less drastic supply chain shocks may be caused by yield uncertainty where the quantity delivered by a supplier or produced by a manufacturer is uncertain as it depends on the order quantity.²⁹ Another source of supply uncertainty is capacity uncertainty which materialises if the quantity delivered by a supplier or produced by a manufacturing process is random and does not depend on the order quantity.³⁰ Uncertainty about the order or processing lead time (lead time uncertainty) and procurement prices also constitute important sources of supply chain uncertainty.³¹

Shocks and disruptions do not only differ in terms of their causes or sources but also have divergent disruption profiles. They may vary in the frequency (frequent/infrequent) with which they occur and their duration or scale (short term/long term; high/low impact).³² Some disruptions constitute frequent but short-duration or low-impact events. Others occur very infrequently or rarely but may disturb the functioning of a system for a long period of time or may cause significant damage.³³ Nassim Nicolas Taleb's concept of 'Black Swann events',³⁴ is often used to describe the latter category of high impact events that materialise with a low frequency/probability (high impact/low probability events (HILP)).³⁵ It is, however, also conceivable that two shocks or disruptions have the same probability or frequency but differ in their duration or impact.³⁶

²³ Hosseini, Ivanov and Dolgui (n 16), 292.

²⁴ Régibeau and Rockett (n 16), 114–120.

²⁵ L. V. Snyder and others, 'OR/MS models for supply chain disruptions: A review' (2016) 48(2) IIE Transactions 89–89.

²⁶ A. McKinnon, 'Building Supply Chain Resilience: a Review of Challenges and Strategies' (2014). OECD - International Transport Forum 2014/06 5.

²⁷ Snyder and others (n 26), 91.

²⁸ *ibid* 90.

²⁹ *ibid*.

³⁰ *ibid*.

³¹ *ibid*; McKinnon (n 27) 7.

³² Hosseini, Ivanov and Dolgui (n 16), 285.

³³ Snyder and others (n 26), 91.

³⁴ N. N. Taleb, *The Black Swan: The impact of the highly improbable* (Penguin Books 2010).

³⁵ See for a discussion of low likelihood, but high impact events Hosseini, Ivanov and Dolgui (n 16), 285.

³⁶ Snyder and others (n 26), 91.

Identifying the nature or source of a shock or disruption, as well as its frequency and magnitude, is important for three reasons. First, the source of shock and its magnitude may be important to identify the ‘threshold effects’ against which a system should be protected.³⁷ This identification of threshold effects might importantly affect the dimension of resilience that is most relevant for a specific supply chain. A threat or source of shock that gives rise to small, albeit frequent, shocks might require a resilience strategy that promotes the ‘resistance’ or stability of a system. Threats entailing small threshold effects might warrant strategies or policies facilitating the maintenance of or swift return to the original equilibrium. By contrast, a threat or source of shock that provokes large, albeit infrequent, shocks may be best addressed by resilience strategies that enhance the responsiveness and adaptation of the system. Threats or shocks giving rise to high threshold effects may, therefore, necessitate resilience strategies that facilitate the smooth transition towards a new equilibrium.³⁸ In short, different sources of shocks and different threshold effects require different resilience policies or strategies.

Lastly, the identification of the nature of shocks against which resilience is sought is also important to measure the opportunity costs and anticipate the trade-offs between different resiliency strategies with a view to avoiding potential ‘perverse resilience’. Such perverse resilience may arise where a specific set of strategies or policy measures makes society more resilient against one type of threat while increasing at the same time its vulnerability towards others.³⁹ In some instances, the costs of resilience measures simply do not outweigh the discounted benefits of the avoided losses. Enhancing the resilience of supply chains is difficult. General calls for ‘building better backer’ or ‘more resilient supply chains’ are of little help, as long as the specific effects against which protection is sought remain undefined.⁴⁰ The most important challenge is, however, that it is often simply impossible to identify the relevant threats and assign probabilities to them *ex-ante*.

2.2 Supply Chain Resilience Strategies

Having defined the notion of resilience and discussed the importance of identifying the types of shocks or disruptions against which resilience is sought, the next question that immediately arises relates to the strategies that firms can adopt to manage supply chain risks and bolster their resilience.

2.2.1 Supply-chain independent resilience strategies

A first set of strategies that firms can adopt to cope with supply chain risks is unrelated to how they design their supply chains. A recurrent course of action businesses take in light of various supply chain risks actually consists of passive acceptance: that is ‘doing nothing’.⁴¹ Businesses are often reported to be very sluggish in their efforts to carry out supply chain risk assessments and implement contingency plans.⁴² This inertia can be explained by information asymmetries that prevent supply chain members from properly evaluating the risks of various shocks or disruptions. In complex environments, individual firms often simply lack the relevant information to ascertain the risk of supply chain shocks or disruptions. Behavioural optimism

³⁷ Régibeau and Rockett (n 16), 118.

³⁸ *ibid.*

³⁹ *ibid* 121–122, 108.

⁴⁰ *ibid* 143.

⁴¹ Snyder and others (n 26), 91.

⁴² McKinnon (n 27) 10–11.

or *status quo* biases⁴³ may also explain inertia of decision-makers in the light of threats, shocks, and disruptions. Passive acceptance may, however, also constitute a perfectly rational strategy in cases where the opportunity costs of greater supply chain resilience exceed its net present value.⁴⁴

A second widespread supply chain risk mitigation strategy that is not directly related to the design of supply chains is financial mitigation⁴⁵ through insurance or other financial mechanisms.⁴⁶ Historically, the first insurance policies were developed in the maritime sector to allow shippers and carriers to hedge against various risks of disruptions and loss inherent to the transport of goods by sea.⁴⁷ Most businesses nowadays take out insurance coverage against a plethora of threats that may seriously disrupt their operation. Along with insurance, businesses have also increasingly recourse to financial instruments, such as derivatives, to hedge themselves against the risk of or damage caused by different variability shocks, such as price volatility. Financial mitigation strategies are primarily associated with the recoverability of the supply chains as they are geared towards minimising the financial damage of disruptions and restoring the resources of the firms affected.⁴⁸

2.2.2 Supply-chain design and management

A second set of strategies to cope with supply chain risks comprises supply chain management strategies that seek to enhance resilience through specific supply chain design choices. Such supply chain management strategies, on the one hand, consist of drawing up contingency plans that envisage various reactions or responses that firms can revert to in the presence of a shock. These operational contingency strategies⁴⁹ may, for instance, take the form of rerouting, repositioning, or deferred ordering from back-up suppliers.⁵⁰ As these strategies are only triggered if the shock or disruption is imminent or ongoing, they are largely reactive in nature. Operational contingency strategies thus relate to the responsiveness dimension of resilience because they bolster the adaptive capacity of the system during a disruption.⁵¹

By contrast, operational mitigation measures⁵² seek to design supply chains in a way that makes them more resilient against future unexpected shocks and disruptions. Unlike operational contingency strategies, which are largely passive or reactive in nature, operational mitigation strategies are forward-looking and proactive. Businesses can implement operational mitigation measures through the specific design of their supply chains and their day-to-day operation. Operational mitigation measures are a major driver of the robustness dimension of resilience because they reduce the vulnerability of supply chains by enhancing their capacity to anticipate, absorb, and withstand an unexpected perturbation.⁵³

Operational mitigation strategies usually take three forms. Perhaps the most obvious operational mitigation strategy that allows firms to protect themselves against supply-side

⁴³ R. H. Thaler and C. R. Sunstein, *Nudge: improving decisions about health, wealth, and happiness* (Yale University Press 2008) 31–47.

⁴⁴ B. Tomlin, ‘On the Value of Mitigation and Contingency Strategies for Managing Supply Chain Disruption Risks’ (2006) 52(5) *Management Science* 639.

⁴⁵ Snyder and others (n 26), 91.

⁴⁶ McKinnon (n 27) 17.

⁴⁷ J. Kay and M. King, *Radical Uncertainty: Decision-making for an unknowable future* (The Bridge Street Press 2020).

⁴⁸ Hosseini, Ivanov and Dolgui (n 16), 292.

⁴⁹ Snyder and others (n 26), 91.

⁵⁰ Hosseini, Ivanov and Dolgui (n 16), 295–296; V. Babich, ‘Vulnerable options in supply chains: Effects of supplier competition’ (2006) 53(7) *Naval Research Logistics* 656 656–658.

⁵¹ Hosseini, Ivanov and Dolgui (n 16), 291–292.

⁵² Snyder and others (n 26), 91.

⁵³ Hosseini, Ivanov and Dolgui (n 16), 291, 292–293.

uncertainty is to increase their inventory or build extra capacity into the chain.⁵⁴ Increasing inventory levels can be considered as another form of ‘saving’,⁵⁵ as it allows firms to build up reserves and redundancies that cushion and absorb the effects of unexpected supply disruptions.⁵⁶ Firms can implement increases in inventory levels in the short-term, for instance, by increased and/or advanced ordering in situations where the risk of disruption is high. Inventory management is the main channel through which firms can enhance their agility, that is the ability to respond to unexpected changes in demand or supply in a swift, smooth, and cost-effective manner.⁵⁷

Increasing inventory levels as an operational mitigation strategy to boost the resilience of a supply chain importantly departs from the Zero Inventory Ordering (ZIO) paradigm which is the prevailing philosophy underpinning our contemporary ‘just-in-time’ or ‘lean’ supply chains. The ZIO paradigm suggests that the optimal strategy to eliminate slack and enhance the efficiency of supply chains consists of placing an order just before the inventory level reaches zero.⁵⁸ The main objective of the ZIO paradigm of just-in-time value chains is to minimise the storage costs within the supply chain as much as possible. Increasing inventory levels as an operational mitigation strategy, therefore, entails important opportunity costs, as it injects redundancies and slack into the supply chain. Businesses thus face a trade-off between maximising resilience and efficiency. To resolve this trade-off, they must decide from whom to order and how much to reduce the expected costs both of inventory and supply-side disruptions.⁵⁹

Diversification of sourcing constitutes a second category of operational mitigation measures. Firms can reduce both the risk of supply disruptions and their impact by sourcing their requirements from multiple buyers rather than a single buyer. Likewise, suppliers can also mitigate the risks of demand-side uncertainties by relying on more than one buyer to distribute or process their products.⁶⁰ This form of risk diversification also introduces redundancies into supply chains that allow suppliers and buyers to increase their flexibility and decrease their dependence on a single player or a few players. Unlike increased levels of inventory, supply diversification is unlikely to be a short-term strategy. As it requires the negotiation of new supply relationships, its implementation may only be possible in the medium- to long-term.⁶¹

Diversification of sourcing enhances the agility and, at the same time, reduces the likelihood of disruptions in the supply chain. So long as the default risk between upstream (in the case of diversification of sources of supply) or downstream (in the case of diversification of distribution/processing channels) firms is not positively correlated, diversification decreases the probability of simultaneous failures at the up- or downstream level.⁶² Assuming that not all upstream /downstream partners will default simultaneously when a specific shock occurs, the diversification of supply or sales channels creates some form of a portfolio effect that increases the range of options available to supply chain members in the case of the default of an upstream

⁵⁴ Snyder and others (n 26), 92; McKinnon (n 27) 15; Hosseini, Ivanov and Dolgui (n 16), 291.

⁵⁵ Régibeau and Rockett (n 16), 132.

⁵⁶ Snyder and others (n 26), 92–93.

⁵⁷ M. Christopher and H. Lee, ‘Mitigating supply chain risk through improved confidence’ (2004) 34(5) *Int Jnl Phys Dist & Log Manage* 388 395; H. L. a. L. O. J. Töyli, A. Wieland and C. Marcus Wallenburg, ‘The influence of relational competencies on supply chain resilience: A relational view’ (2013) 43(4) *Int Jnl Phys Dist & Log Manage* 300 302. Hosseini, Ivanov and Dolgui (n 16), 292.

⁵⁸ Snyder and others (n 26), 94.

⁵⁹ *ibid* 93; McKinnon (n 27) 15.

⁶⁰ Snyder and others (n 26), 95–97. Hosseini, Ivanov and Dolgui (n 16), 291, 293–295.

⁶¹ *ibid* 92.

⁶² V. Babich, A. N. Burnetas and P. H. Ritchken, ‘Competition and Diversification Effects in Supply Chains with Supplier Default Risk’ (2007) 9(2) *Manufacturing & Service Operations Management* 123 124, 128–129.

or downstream partner.⁶³ The diversification of channels of supply or sales is, however, only an effective strategy to hedge against the risk of supplier or distributor default if the suppliers/distributors do not have the same risk profile and probability to default. This means that the diversification benefits increase with decreasing correlation or co-dependence of the default risk of suppliers/distributors and are greatest if the default risk between upstream or downstream players is perfectly negatively correlated.⁶⁴

Like in the case of the increase in inventory, greater resilience through multi-sourcing comes at a cost.⁶⁵ Multi-sourcing might lead to higher transaction costs than single-sourcing. Multi-sourcing may also require firms to change their production methods to be able to incorporate the inputs of multiple suppliers.⁶⁶ Diversification, therefore, also confronts firms with a trade-off between efficiency of lean supply chain design and greater robustness. So long as the diversification benefits exceed the efficiency losses, firms will opt for diversification of channels of supply or distribution.⁶⁷ The way in which they strike this trade-off depends on the opportunity cost and marginal benefits from greater diversification. Arguably, the marginal resilience gains from multiplying supply sources may decrease with the number of parallel supply or sales channels. This suggests that there might be an optimal degree of diversification (in terms of the number of up-stream/downstream partners) and an optimal resilience/efficiency trade-off that differs across firms or supply chains, depending on the specific features of a given supply chain or industry.

A related third operational mitigation strategy is geographical diversification. This can take the form of the relocation of production or storage facilities and supplier segregation.⁶⁸ While increases in inventory and diversification of supply/distribution channels are capable of addressing in particular intra-supply chain disruptions, the geographical dispersion of suppliers, relocation of facilities or nodes of the supply and distribution network constitute important tools to mitigate macro-level risks associated with certain geographical areas. Firms can mitigate the risk of value chain disruptions by deciding where inventory should be stored, sourced, and distributed from and routed through.⁶⁹ Geographical diversification and supplier segregation allow firms to tackle the problem of the correlation of default risks, which occurs, for instance, if suppliers have common country-specific risks or are exposed to the same disruptive events.⁷⁰

In a similar way to increased inventory or diversification of sourcing, supplier segmentation and relocation of facilities inject some redundancies into the supply chain.⁷¹ As the location of production or storage facilities might involve important strategic and investment decisions, this operational mitigation strategy can only be implemented in the long-term.⁷² Greater geographic decentralisation and diversification might, however, also increase the costs and decrease the efficiencies relative to more centralised infrastructure locations. This might deprive firms of generating economies of scale associated with the use of large production or storage facilities.⁷³

⁶³ *ibid.*

⁶⁴ *ibid* 129.

⁶⁵ *ibid* 128.

⁶⁶ Babich (n 51), 656.

⁶⁷ *ibid.*

⁶⁸ Snyder and others (n 26), 97; Hosseini, Ivanov and Dolgui (n 16), 291, 293-294.

⁶⁹ Snyder and others (n 26), 97.

⁷⁰ Babich, Burnetas and Ritchken (n 63), 143.

⁷¹ Snyder and others (n 26), 97; Hosseini, Ivanov and Dolgui (n 16), 294.

⁷² Snyder and others (n 26), 92, 98.

⁷³ McKinnon (n 27) 10.

2.2.3 Strategic interaction

A third set of strategies to mitigate supply chain risks consists of the interaction with external stakeholders.⁷⁴ Inventory management, diversification of sourcing and geographical diversification are operational mitigation strategies that are undertaken at the firm level. They allow firms to mitigate and reduce risks of supply chain disruptions on an individual basis without requiring a specific strategic response from other players.⁷⁵ Firms, however, can also mitigate risks by cooperating with external stakeholders and partners. Such cooperation can take the form of information sharing, for instance of risk level information and the risk profiles of various supply chain partners.⁷⁶ Firms can also enter contracts with supply chain partners to enhance incentives to disclose relevant information, improve reliability and restore capacity. Coordination and cooperation mechanisms also facilitate collaborative forecasting, resource planning and the pooling of risk and capacity.⁷⁷

3 The Relationship between Supply Chain Resilience and Competition

Having clarified the notion of resilience and canvassed various strategies whereby supply chain resilience can be achieved, we can now turn toward the second question of this paper: What is the conceptual link between competition and resilience? The most straightforward way to answer this question is to interrogate the economic relationship between competition and resilience. This analysis might yield four conceivable outcomes. First, there might be no specific relationship between competition and resilience. In this case, the pursuit of greater resilience does not have any implications whatsoever for competition policy. Second, there is a negative relationship between competition and resilience (sub-section 1). In this case, the objective of ‘building back better’ and creating more robust value chains in a post-Covid 19 world would warrant a more lenient treatment of business conduct that distorts competition but tends to increase economic resilience. Third, competition positively contributes to economic resilience and the robustness of supply chains. This result would counsel a strict enforcement of competition rules or even an express assessment of the impact of distortions of competition on resilience, notably in sectors where value chain resilience is of critical importance or where disruptions are likely to have contagion effects across the economy (sub-section 2). Fourth, the relationship between competition and resilience is ambiguous. A greater role of the goal of resilience in competition policy in the aftermath of the Covid-19 crisis would thus confront competition authorities with a considerable challenge, as they would have to strike a complex balance between promoting competition and preserving resilience. This section will discuss the three latter outcomes in turn.

3.1 *A negative relationship*

The Covid-19 pandemic has laid bare the fragility and the lack of preparedness of numerous supply chains and economic sectors for high-impact/low probability events. Against this backdrop, the view that “excessive” economic competition should take at least part of the blame for the vulnerability of global value chains has gained momentum. Competition, it is

⁷⁴ Snyder and others (n 26), 92.

⁷⁵ These strategies are also often modelled as if they had no impact on other players’ decision-making. The environment is assumed to be ‘given’ *ibid* 92, 101.

⁷⁶ McKinnon (n 27) 14.

⁷⁷ Snyder and others (n 26), 101; Hosseini, Ivanov and Dolgui (n 16), 292- 293, 296; McKinnon (n 27) 14; Töyli, Wieland and Marcus Wallenburg (n 58), 303–307.

argued, pushes businesses to reduce inventory, eliminate redundancies, and cut back on contingency planning in order to reduce their costs and maximise their efficiency. Yet, it is exactly these redundancies, duplication, and slag which supply chains need to withstand sudden changes in the environment. Too much competition, from this perspective, creates an ‘efficiency trap’ that undermines the capacity of firms to build up adequate ‘safety buffers’ and to incur the costs of some of the resilience strategies described in the previous section.⁷⁸

The view that competition and the quest for ever-greater efficiency are a cause of supply chain vulnerability finds, at least in part, support in the literature on supply chain resilience. The intensification of global competition has indeed been a major driving force behind the emergence of just-in-time global value chains, alongside the increasing technical sophistication of products (requiring ever more components), vertical disintegration, advances in communication technology, and the increased capability of emerging markets to carry out outsourced and off-shore tasks.⁷⁹ Exposed to the pressures of ever-fiercer global competition, supply chains had to become more efficient. The primary strategy to generate greater efficiencies was to make inventories leaner. Whilst reduced inventory levels allowed firms to slash their inventory and storage cost to a minimum, it has made supply chains more vulnerable to disruptions.⁸⁰

The view that the move towards just-in-time value chains is a major cause of supply chain vulnerability suggests that supply chain management strategies are often characterised by horizontal and vertical collective action problems. From a horizontal perspective, higher levels of supply chain resilience would be in the interest of all firms active on the same level of an industry or value chain. Yet horizontal competitors often have little incentive to incur the cost of adopting risk-mitigation strategies on their own. This is so because if a firm were to move first and invest in greater resilience, at least some of its competitors would be able to gain market shares and profits by not adopting similar costly supply chain management strategies. By driving up its costs, the adoption of resilience-enhancing measures may put the first mover at a competitive disadvantage compared to its competitors. Moreover, in some situations the first-mover’s supply chain resilience efforts may directly or indirectly strengthen the supply chain stability of all industry members. In this case, competitors would be able to free-ride on the first-mover’s resilience-enhancing efforts. As long as there is no certainty that all firms in the industry implement risk mitigation measures, firms would therefore face a first-mover disadvantage when adopting resilience efforts. Supply chain resilience, from this vantage point, amounts to a market failure or positive externality as firms cannot appropriate all benefits resulting from their resilience efforts by charging higher prices. Horizontal coordination of resilience efforts amongst competitors would, under certain circumstances, allow industry players or members of a supply chain to overcome the first-mover disadvantage.

Collective action problems undermining value chain resilience can also be vertical in nature. In a recent paper, Elliott et al. emphasise the importance of relationship-specific investments that strengthen the relationship between the members located at different levels of a just-in-time value chain. Relationship strength, that is the probability that a supply relationship

⁷⁸ ‘Covid-19 crisis has laid bare weaknesses in supply chains’ *Financial Times* (12 May 2020) <<https://www.ft.com/content/9bb6939d-6a31-4a33-bb62-ecbf74da8491>> accessed 10 October 2020; ‘Will coronavirus pandemic finally kill off global supply chains?’ *Financial Times* (28 May 2020) <<https://www.ft.com/content/4ee0817a-809f-11ea-b0fb-13524ae1056b>> accessed 10 October 2020; Coyle (n 8); ‘Covid forces rewrite of academic textbooks on supply chains and logistics’ *Financial Times* (8 October 2020) <<https://www.ft.com/content/d78ae36f-be2f-4560-ab0f-21b22c702e21>> accessed 10 October 2020; H. Lee, ‘The Triple-A Supply Chain’ [2004] *Harvard Business Review* 2, 3.

⁷⁹ McKinnon (n 27) 8; Lee (n 79), 3.

⁸⁰ Lee (n 79), 3–4. Babich, Burnetas and Ritchken (n 63), 142. Snyder and others (n 26), 89.

is operational,⁸¹ plays a crucial role for the resilience of supply chains, as (symmetric) exogenous shocks put the relationships of members of the chains under strain.⁸² Supply chain relationship strength importantly depends – amongst other things⁸³ – on the relationship-specific investments that enhance the reliability of supply-relationships between the various parties of a supply chain.⁸⁴ Elliott et al. show that excessive entry and competition decreases profits and, hence, the incentives of the individual players of a supply chain to invest in the relationship with other suppliers and buyers.⁸⁵ Competition may thus lead to under-investment in relationship strength because new entrants will free-ride on the investments of other parties in the robustness of the supply chain. The free-riding and under-investment effect results from the fact that the investments into relationship strength amount to a positive externality as the members of the supply chain face difficulties to appropriate them.⁸⁶ This under-investment may tip the supply chains into a critical equilibrium where even small shocks to the relationship strengths may lead to the collapse of the entire supply chain.⁸⁷ In this situation, (even small) aggregate shocks – such as a pandemic – hitting all levels of the supply chain at once may lead to cascading failures propagating and amplifying across various nodes and echelons of the supply chain.⁸⁸

The positive externality of resilience-enhancing efforts is only one of the multiple horizontal and vertical collective action problems that prevent firms from adopting supply chain risk mitigation strategies. Greater resilience may also require horizontal or vertical communication and exchange of information. Defining common standards for and exchanging risk information may be crucial to reduce information asymmetries and anticipate shocks or engage in risk sharing. In the transport sector, communication between competitors and coordination may also be necessary to avoid congestion or maintain a regular freight service. Shoring up the resilience of value chains may, however, require more integrated forms of cooperation that go beyond mere exchanges of information or definition of standards. Cross-supply commitments in times of supply chain disruption may form an important part of risk mitigation strategies. Members of the same supply chain or industry may also have to jointly expand common port capacities and storage facilities to reduce bottlenecks and build up greater inventory buffers. Such joint resiliency measures may not only require large amounts of investments that a single firm could barely shoulder, but they might also be ineffective without a critical mass of industry members being involved. A recent example of such a joint resilience initiative is the joint supply chain risk monitoring initiative Catena-X which involves all major players of the supply chain in the German automotive industry. The main objective of Catena-X is to establish a network of standardised, continuous, and secure exchange of supply chain data for all contributors in the European automotive value chain to monitor and anticipate risks across various levels of the supply chain.⁸⁹

⁸¹ Elliott, Golub and Leduc (n 4), 13.

⁸² *ibid* 8–12.

⁸³ *ibid* 2,16–17.

⁸⁴ *ibid* 18–20.

⁸⁵ *ibid* 20–21, 24,26–27.

⁸⁶ *ibid* 33.

⁸⁷ *ibid* 33–34.

⁸⁸ *ibid* 33, 40.

⁸⁹ B. Masters and A. Edgecliffe-johnson, ‘Supply chains: Companies shift from ‘just in time’ to ‘just in case’
Financial Times (20 December 2021) <<https://www.ft.com/content/8a7cdc0d-99aa-4ef6-ba9a-fd1a1180dc82>>
 accessed 8 May 2022; Catena X <<https://catena-x.net/en/>> accessed 8 May 2022. This cooperation has also been
 recently found to be compliant with competition law by the German Federal Cartel Office Bundeskartellamt, ‘First
 component for Gaia-X: Bundeskartellamt gives green light for establishing data network for automotive industry
 (Catena-X)’ (24 May 2022)
 <https://www.bundeskartellamt.de/SharedDocs/Meldung/EN/Pressemitteilungen/2022/24_05_2022_Catena.html?nn=3591286> accessed 7 July 2022.

Competition and resilience hence seem to pull at times in different directions. If correct, the characterisation of resilience as horizontal and vertical collective action problems or market failures would support the view that competition is not always conducive to greater resilience and stability. Under certain circumstances, centralisation of decision-making and restrictions upon the free contracting of the members of the supply chain appear to be effective tools to overcome horizontal and vertical collective action problems and mitigate exogenous risks resulting in particular from aggregate shocks hitting all members of an industry or of a supply chain equally.⁹⁰ From the social planner's perspective, a restriction of competition and hence a reduction in decentralised decision-making to the benefit of more centralisation constitutes an optimal solution to reduce the fragility and volatility of supply chains. A social planner will therefore be willing to sacrifice some surplus generated by competition to boost resilience and stability and avoid the greater costs of the widespread collapse of supply chains.⁹¹ There is hence an economic argument to be made for competition law to tolerate, at least in some circumstances, horizontal or vertical restraints of competition and concomitant higher prices, as long as their positive impact on stability outweighs their adverse costs in terms of loss of consumer welfare. A more prominent role of supply chain resilience in competition law might thus require competition policy to reconsider its approach towards certain forms of horizontal and vertical coordination between firms.

3.2 A positive relationship

Although it is conceivable that competition is not always conducive to greater resilience – notably due to vertical or horizontal collective action problems – it cannot be argued that competition always tends to undermine resilience. On the contrary, there are important theoretical considerations that would suggest a positive relationship between competition and resilience.

Theories of polycentricity⁹² coined by Michael Polanyi and Nobel Prize laureate Eleanor Ostrom suggest that polycentric systems composed of many players engaging in decentralised and autonomous decision-making processes⁹³ are often more resilient to shocks than centralised systems. This greater level of resilience results from at least three effects. First, systems with many independent, competing players might be less prone to system wide failure.⁹⁴ The reason for the lower propensity of polycentric systems to simultaneous systemic failure derives from the fact that there are parallel, redundant players who strive to find the best solution to a certain problem. In promoting diverse and independent decision-making paths, polycentricity mitigates

⁹⁰ Régibeau and Rockett (n 16), 123–124.

⁹¹ Elliott, Golub and Leduc (n 4), 34.

⁹² M. Polanyi, *The Logic of Liberty* (Routledge 1951) 170–180. V. Ostrom, C. M. Tiebout and R. Warren, 'The Organization of Government in Metropolitan Areas: A Theoretical Inquiry' (1961) 55(4) *American Political Science Review* 831–831; V. Ostrom, 'Polycentricity: The Structural Basis of Self-Governing Systems' in F. Sabetti and P. Dragos Aligica (eds), *Choice, Rules and Collective Action: The Ostroms on the Study of Institutions and Governance* (ECPR Press 2014) 45.

⁹³ Polycentric systems are shaped by '(1) many autonomous units formally independent of one another, (2) choosing to act in ways that take account of others, (3) through processes of cooperation, competition, conflict and conflict resolution. Ostrom (n 93) 46. K. Carlisle and R. L. Gruby, 'Polycentric Systems of Governance: A Theoretical Model for the Commons' (2017) 47(4) *Policy Stud J* 927–935.

⁹⁴ E. Ostrom, 'Why Do We Need to Protect Institutional Diversity?' (2012) 11(1) *Eur Polit Sci* 128–129; Carlisle and Gruby (n 94), 944–947; R. R. Nelson, 'Uncertainty, Learning, and the Economics of Parallel Research and Development Efforts' (1961) 43(4) *The Review of Economics and Statistics* 351; W. J. Abernathy and R. S. Rosenbloom, 'Parallel Strategies in Development Projects' (1969) 15(10) *Management Science* B-486–B-505; F. M. Scherer and W. S. Comanor, 'Mergers and innovation in the pharmaceutical industry' (2013) 32(1) *Journal of Health Economics* 106.

the risk of errors through decentralisation and redundancy.⁹⁵ The theories of polycentricity thus describe the same risk diversification and pool effect that informs the multi-sourcing supply chain design strategy discussed in the previous section. Competition, understood in structural terms as a multitude of firms active on a market, should bolster the robustness of supply chains by reducing their vulnerability to the simultaneous failure of their members.

A second reason why polycentric competitive systems are considered to be more resilient than centralised systems relates to their greater adaptability to environmental changes and exogenous shocks. Parallel experimentation by multiple players is capable of producing swifter solutions to existing problems and responds more flexibly to external environmental changes than sequential trial-and-error under the direction of a single centralised authority.⁹⁶ Theories of polycentricity thus support the theoretical argument that competition in the structural sense, understood as a multitude of parallel-experimenting players, will also enhance the resilience of a system to external shocks by increasing its adaptability and problem-solving capacity.

A third, related, way in which polycentric competition may increase resilience is by inducing a greater diversification of the risk profiles of individual players. This might be the case if competition compels firms to differentiate their business models. This diversification of business models may diminish the positive correlation between their individual risk profiles, thereby reducing the vulnerability of a specific industry or value chain to exogenous shocks relative to a sector characterised by only one predominant business model.⁹⁷ Theories of polycentricity thus provide us with a number of macro-arguments as to why competition may foster the robustness adaptability of specific industries or value chains against simultaneous failures and exogenous shocks.

This diversification effect may, however, come at the expense of competition in the behavioural sense understood as fierce rivalry and lead to higher prices. As firms become aware of the value – in terms of greater reliability of supply – they derive from sourcing their requirements from two or more suppliers instead of a single supplier, the products offered by their suppliers, even if identical, are no longer perfect substitutes. Reliability becomes an additional product feature or quality attribute. Due to this differentiation of otherwise identical products in terms of reliability, price competition between the suppliers will be less intense relative to a situation where their default risks are perfectly positively correlated and the diversification benefits are equal to 0 (because any exogenous shock affects the reliability or even completely knocks out both producers). In the extreme situation where there are only two suppliers and their risk of default is perfectly negatively correlated, either of them could charge monopoly prices because they would not coexist in the same probabilistic state of affairs and, therefore, would not need to compete to sell their products.⁹⁸ A party in a supply chain confronted with only two suppliers thus faces an important trade-off between price competition and diversification effects. Both effects depend on the correlation of supplier-default risks. The stronger the diversification effect, the less intensive will become the competition between the two suppliers.⁹⁹ As the price competition effect is likely to trump the diversification effect, a purchaser will prefer a riskier organisation of its supply chain with a high degree of default correlation between the suppliers to the more resilient ones. On a standalone basis, this outcome would again suggest that greater competition will lead to less rather than more resilience.

⁹⁵ Ostrom (n 95), 129.

⁹⁶ W. Kerber, 'Competition, Innovation and Maintaining Diversity Through Competition Law' (2009) 3, 9.

⁹⁷ K. S. McCann, 'The diversity-stability debate' (2000) 405(6783) *Nature* 228.

⁹⁸ Babich, Burnetas and Ritchken (n 63), 124–125, 129–130.

⁹⁹ *ibid* 124–125.

Babich et al., however, also show that this trade-off will be reduced as the number of suppliers increases. As soon as there are three suppliers, the purchaser may be able to enjoy both price competition and diversification benefits. Assume that there are three suppliers, two of which have positively and one negatively correlated default risks. A purchaser who decides to multi-source from all three suppliers can at the same time benefit from the price competition effect owing to the intensive competition between the two players whose default risk is positively correlated, while also obtaining the diversification effect by purchasing from the third player whose default risk is negatively correlated to the other two.¹⁰⁰ In the presence of four or more players, a purchaser could only benefit from an increase in the number of players. It will be facing various groups of suppliers composed by members with perfectly positively correlated default risks. The default risks between the groups will be, however, negatively correlated. As the number of players in each group increases, the purchaser will gain due to greater price competition between the members of each of these groups, while simultaneously being able to mitigate suppliers' default risk by multi-sourcing from different groups with different risk profiles.¹⁰¹ The relationship between competition and resilience, the paper by Babich et al. suggests, is not inevitably agonistic. On the contrary, price competition and diversification benefits and, hence, greater supply chain resilience may be complementary and pull in the same direction. Effective supplier competition may even reinforce resilience by making diversification less expensive.

The macro- and micro-level arguments supporting a positive relationship between competition and resilience suggest that value chain resilience can be bolstered through robust competition law enforcement. For instance, by being tough on in-put/supplier cartels and, thereby, maintaining supplier competition, competition policy may create incentives for retailers to multi-source in the first place, since it makes diversification less costly than if suppliers collusively set prices. Competition policy could also facilitate risk mitigation strategies by reducing switching barriers that prevent retailers from multi-sourcing. Likewise, resilience considerations might raise concerns about mergers that are likely to diminish the ability of buyers to multi-source and hence diversify their sources of supply.

3.3 *An ambiguous relationship*

The above discussion shows that the relationship between competition and resilience is anything but straightforward. In some instances, competition seems to lead to underinvestment in resilience and hence greater fragility or vulnerability. Centralised rather than decentralised decision-making might, in these cases, be the most effective pathway towards greater supply chain stability and resilience. Other considerations, however, indicate that competition may, in some situations, support resilience. Here, polycentric and decentralised solutions allowing for risk diversification and risk pooling effects may be the driver of greater supply chain resilience.

Instead of being either clearly negatively or positively correlated, the relationship between competition and resilience appears to be often ambiguous. This ambiguity results, on the one hand, from the difficulty of appropriating resilience gains. On the other, it also stems from the complex relationship between competition understood in the structural sense as a polycentric market structure and in the behavioural sense as fierce rivalry. In concrete cases, this ambiguity can play out in different ways. It can, for instance, result in sectoral differences. In some markets, competition may lead to greater instability and fragility, while in others it bolsters stability and resilience. It is also conceivable that the relationship between competition and resilience is ambiguous within sectors. That might be the case if supply chain resilience

¹⁰⁰ *ibid* 125, 131-132.

¹⁰¹ *ibid* 133-142-143.

first increases with the number of firms up to a maximum threshold beyond which the industry or supply chain tips towards an unstable equilibrium. In this second situation, the relationship between competition and resilience may take the form of an inverted u-shaped curve, akin to that between competition and innovation.¹⁰²

The exact nature of the ambiguous relationship between competition and resilience may have important implications for competition policy. If sectoral differences cause this ambiguity, competition authorities could address it simply by enforcing competition rules more leniently in sectors where competition undermines resilience. Simultaneously, competition rules should be strictly enforced in sectors where greater competition enhances resilience. Intra-sectoral ambiguity, by contrast, arguably poses greater difficulties for competition authorities. Instead of being able to operationalise concerns about resilience through a sectoral approach, the conflicting or complementary relationship between competition and resilience would have to be ascertained and – in the case of tensions – also balanced on a case-by-case basis.

The foregoing discussion of the ambiguous relationship between competition and resilience raises the question of how concerns about supply chain resilience can be factored into concrete competition policy and play out in concrete policies and cases. Competition authorities have remained so far largely silent on how they envisage using competition law as an instrument to enhance value chain resilience. The following sections seek to address this gap by mapping four avenues that would enable competition law enforcers to account for resilience considerations.

4 Avenue 1 – An Ad-hoc approach

A first way in which competition authorities can accommodate the objective of supply chain resilience consists of adopting an ad-hoc approach, whereby competition law is applied or disappplied to address specific instances of supply chain disruptions. Rather than seeking to anticipate and mitigate the risk of value chain disruptions more systematically, the ad-hoc approach seeks to enhance the responsiveness of value chains to a concrete external shock that has already materialised.

4.1 The ad-hoc approach during and in the aftermath of the Covid-19 pandemic

This ad-hoc approach has largely characterised the responses of competition policy to supply chain disruptions during and in the aftermath of the Covid-19 pandemic. In response to the supply chain meltdown triggered by the Covid-19 pandemic, several competition authorities in Europe decided to relax the enforcement of competition law in specific instances. The European Commission,¹⁰³ the Competition and Markets Authority¹⁰⁴ and the Secretary of State

¹⁰² P. Aghion and others, 'Competition and Innovation: An Inverted-U Relationship' (2005) 120(2) *The Quarterly Journal of Economics* 701; C. Shapiro, 'Competition and Innovation: Did Arrow Hit the Bull's Eye?' in J. Lerner and S. Stern (eds), *The Rate and Direction of Inventive Activity Revisited* (University of Chicago Press 2012).

¹⁰³ Temporary Framework for assessing antitrust issues related to business cooperation in response to situations of urgency stemming from the current COVID-19 outbreak. C(2020) 3200 final; European Competition Network, 'Antitrust: Joint statement by the European Competition Network (ECN) on application of competition law during the Corona crisis' (17 October 2020) <https://ec.europa.eu/competition/ecn/202003_joint-statement_ecn_corona-crisis.pdf>; European Commission, 'Comfort letter: coordination in the pharmaceutical industry to increase production and to improve supply of urgently needed critical hospital medicines to treat COVID-19 patients' (8 April 2020); Comfort letter: cooperation at a Matchmaking Event – Towards COVID-19 vaccines upscale production 25 March 2021. COMP/E-1/GV/BV/nb (2021/034137).

¹⁰⁴ Guidance CMA approach to business cooperation in response to coronavirus (COVID-19) 2020.

in the UK,¹⁰⁵ as well as the German Bundeskartellamt,¹⁰⁶ temporarily softened the application of competition rules to enable firms to join forces with a view to overcoming shortages of essential products and develop coordinated responses to mitigate supply chain disruptions.

More recently, the ad-hoc approach also found application in cases where the supply-chain convulsions were not the immediate result of the Covid-19 pandemic and public health measures. In autumn 2021, the UK government, for instance, temporarily suspended the application of competition law to the fuel industry to ease supply chain issues and shortages.¹⁰⁷ The same solution was also adopted a month later to address our initial example of supply chain disruptions as a consequence of the CO₂ shortages in the food sector. To make sure that the food industry and Christmas – unlike poultry – would survive the disruption of CO₂ supply, the UK government granted a temporary exemption from competition law to parts of the CO₂ industry to allow industry members – including CF Industries – to share information and optimise supply.¹⁰⁸

4.2 The shortcomings of an ad-hoc approach

During and in the aftermath of the Covid-19 crisis, the ad-hoc approach had the merit of enabling timely and swift responses to acute supply chain shortages or disruptions. This greater flexibility and speed come, however, at a cost. First, the ad-hoc approach is fraught with a number of procedural shortcomings. All recent ad-hoc measures were enacted and communicated through so-called ‘comfort letters’ (in the case of the Commission), press releases, and statutory instruments. The ad-hoc approach hence relies on rather informal mechanisms and processes. The way in which these ad-hoc measures were adopted often lacked transparency. Third parties, e.g., customers and final consumers, were not involved in the decision-making.

Second, the ad-hoc approach during and in the aftermath of the pandemic is also characterised by the absence of a thorough substantive analysis of the restrictions of competition adopted to overcome supply disruptions. Very little, if any, reasoning was provided to set out why an exception from competition law was deemed necessary to overcome supply shortages or value chain disruptions. Most decisions gave, for instance, little consideration to the nature or type of supply chain disruption or risk the suspension of competition law was supposed to enable firms to address. Nor did they consider the type of collective action problem at stake and explain why cooperation between firms was necessary to overcome it. The extent to which the restriction of competition was indispensable and did not go beyond what is necessary to resolve or alleviate supply chain disruptions was considered only to a limited

¹⁰⁵ The Competition Act 1998 (Groceries) (Coronavirus) (Public Policy Exclusion) Order 2020. UK Statutory Instruments 2020 No. 369; The Competition Act 1998 (Health Services for Patients in England) (Coronavirus) (Public Policy Exclusion) Order 2020. UK Statutory Instruments 2020 No. 368; The Competition Act 1998 (Solent Maritime Crossings) (Coronavirus) (Public Policy Exclusion) Order 2020. UK Statutory Instruments 2020 No. 370; The Competition Act 1998 (Dairy Produce) (Coronavirus) (Public Policy Exclusion) Order 2020 (revoked) UK Statutory Instruments 2020 No. 481.

¹⁰⁶ Bundeskartellamt, ‘Crisis management measures in the automotive industry - Bundeskartellamt supports the German Association of the Automotive Industry (VDA) in developing framework conditions under competition law aspects’ <https://www.bundeskartellamt.de/SharedDocs/Meldung/EN/Pressemitteilungen/2020/09_06_2020_VDA.html> accessed 19 September 2020.

¹⁰⁷ Department for Business, Energy & Industrial Strategy and Business Secretary, *Statement following meeting between the Business Secretary and fuel industry* (2021).

¹⁰⁸ Department for Business, Energy & Industrial Strategy, *Press release - Further support to ensure supplies of carbon dioxide (CO₂): The Business Secretary Kwasi Kwarteng has temporarily exempted parts of the CO₂ industry from competition law to help provide further security of CO₂ supplies.* (2021).

extent.¹⁰⁹ The criteria against which a certain sector or product was declared essential also remained opaque. While the qualification of some sectors or products, such as grocery stores¹¹⁰ and the supply of critical medicines and vaccines for the treatment of Covid-19¹¹¹ appears justified, it remains more debatable for others, such as the dairy industry.¹¹²

A third important limitation of the ad-hoc approach is its lack of any economic evaluation of the benefits and costs of the temporary suspension of competition law in critical sectors. The publicly available ad-hoc measures adopted during and after the pandemic contain little economic analysis of the effects of the exempted restrictions on competition and resilience. Competition authorities and governments also failed to carry out a thorough ex-post analysis to consistently evaluate whether the ad-hoc measures were effective in enhancing resilience by alleviating or avoiding supply chain disruptions.

The ad-hoc approach thus fails to ensure legal certainty and transparency, notably for affected third-parties. Owing to its informal and opaque *modus operandi* the ad-hoc approach is also more prone to interest capture and lobbying. The most important shortcoming of the ad-hoc approach is, however, that it does not operate on or produce a consistent set of principles that will allow competition policy makers to develop systematic responses to mitigate the impact of future exogenous shocks on supply chains. Without any ex-post assessment of the lessons learned during and in the aftermath of the Covid-19 crisis, the ad-hoc approach is unlikely to provide a clear blueprint setting out how competition law should be redesigned to avoid or respond more effectively to future supply chain disruptions. The ad-hoc approach on its own is unlikely to bolster the preparedness of competition law for future supply chain crises.

5 Avenue 2 – A Sectoral Approach

Adopting a sectoral approach constitutes a second strategy that might allow competition policy to account for supply chain resilience. Such a sectoral approach may be particularly warranted if (i) the relationship between competition and supply chain resilience depends on sector-specific features and/or (ii) the supply chain resilience of a specific sector is of systemic importance to the stability of the economy or international value chains at large. In this case, it might be warranted to apply a different set of competition rules than in other sectors where the relationship between competition and resilience is more ambiguous, or value chain stability is of no systemic importance.

5.1 *The liner shipping industry*

The most prominent example of such a sectoral approach is the specific competition law regime for the liner shipping industry. Liner shipping companies, so-called ‘carriers’, provide maritime transport services of containerized freight to multiple business customers, so-called ‘shippers’, on the basis of regularly scheduled arrivals and departure from advertised ports.¹¹³ The liner shipping sector transports about 60% of the value of international trade

¹⁰⁹ Comfort letter: cooperation at a Matchmaking Event – Towards COVID-19 vaccines upscale production (n 104) 3; Bundeskartellamt, ‘Crisis management measures in the automotive industry - Bundeskartellamt supports the German Association of the Automotive Industry (VDA) in developing framework conditions under competition law aspects’ (n 107).

¹¹⁰ Guidance CMA approach to business cooperation in response to coronavirus (COVID-19) (n 105).

¹¹¹ European Commission (n 104).

¹¹² The Competition Act 1998 (Dairy Produce) (Coronavirus) (Public Policy Exclusion) Order 2020 (revoked) (n 106).

¹¹³ OECD, ‘Competition Policy in Liner Shipping: Final Report’ (Directorate for Science, Technology and Industry - Division of Transport, 2002) 10, 14.

(approximately 4 trillion USD).¹¹⁴ It therefore constitutes a central ‘backbone’ of international trade.¹¹⁵ Given that it accounts for more than half of the value of international trade, the systemic importance of the liner shipping industry on the stability of global value remains unmatched by any other sector. The capacity of liner shipping to ensure a reliable, punctual and regular freight schedule is a crucial precondition for the seamless functioning of our just-in-time supply chains.¹¹⁶ The disruptions caused by the grounding of the giant container ship *Ever Given* in the Suez Canal in spring 2021, as well as recent congestion of major Chinese and US ports, are just the latest reminder that disturbances in the freight schedule, serious delays, or insufficient service reliability of cargo liners may have a dramatic impact on the stability of and send shockwaves across international value chains. Volatility in freight rates (prices), too, may compromise supply chain stability and have major macro-economic ramifications on consumer prices and inflation.¹¹⁷

The crucial role of steady and stable liner shipping services for the integrity of international supply chains may explain why the liner shipping industry remained for most of the last one and a half centuries largely sheltered from the application of competition law. Until recently, competition authorities and policymakers across the globe, for the most part, tolerated collusion and coordination between carriers which characterised the industry since its incipency. In 1875, container shippers established the first liner conference which practically operated as a cartel amongst carriers to fix prices (freight rates and prices of ancillary services)¹¹⁸ and capacity.¹¹⁹ Unlike ordinary cartels in other sectors, liner shipping conferences operated for most of their history openly under the blessing of competition law and even institutionalised to different degrees their coordination, for instance, by creating specific governance and enforcement structures.

The exemption of the liner shipping industry from competition rules is a posterchild example of a sectoral competition policy approach geared towards enhancing supply chain resilience. It is cognisant of the fact that the liner shipping industry plays a systemic role in securing the stability of international trade flows and value chains. At the same time, it also accounts for the specific economic features of the capital-intensive liner shipping industry. While the provision of liner shipping services involves important sunk costs – in terms of investment in container ships (capital costs) and discontinuous avoidable voyage costs (e.g., fuel, wages and subsistence for the crew, insurance, etc.) – the marginal costs of transporting an additional container are nominal.¹²⁰ As they are expected to provide a regular service, carriers must ensure that their ships operate maritime routes and call at ports on a frequent basis and at the set times irrespective of the amount of cargo they carry.¹²¹ The demand of shippers,

¹¹⁴ World Shipping Council, ‘About the industry’ (15 October 2020) <<https://www.worldshipping.org/about-the-industry/global-trade>>.

¹¹⁵ UNCTAD, ‘Review of Maritime Transport 2019’ 9 <https://unctad.org/system/files/official-document/rmt2019_en.pdf> accessed 15 October 2020. See also M. Fugazza and J. Hoffmann, ‘Liner shipping connectivity as determinant of trade’ (2017) 2(1) *Journal of Shipping and Trade* 1. C.-L. Liu and others, ‘Supply chain resilience, firm performance, and management policies in the liner shipping industry’ (2018) 110 *Transportation Research Part A: Policy and Practice* 202–202.

¹¹⁶ A. Harrison and J. Fichtinger, ‘Managing variability in ocean shipping’ (2013) 24(1) *Int Jnl Logistics Management* 7.

¹¹⁷ Y. Carrière-Swallow, P. Deb and D. Furceri, ‘Shipping Costs and Inflation’ . IMF Working Papers WP/22/61.

¹¹⁸ OECD (n 114) 43.

¹¹⁹ *ibid* 6.

¹²⁰ S. C. Pirrong, ‘An Application of Core Theory to the Analysis of Ocean Shipping Markets’ (1992) 35(1) *The Journal of Law and Economics* 89–108–109.

¹²¹ OECD (n 114) 18. OECD, *International Transport Forum - The Impact of Alliances in Container Shipping* (OECD 2018) 12; Commission Staff Working Document - Evaluation of the Commission Regulation (EC) No 906/2009 of 28 September 2009 on the application of Article 81 (3) of the Treaty to certain categories of

is, however, often volatile and there are important directional imbalances of trade-flows between different legs (e.g., Asia – North America).¹²² As a result, on certain legs or during certain periods, carriers will have to operate their ships below capacity.

Proponents of the exemption of the liner shipping industry from competition law affirm that in this environment, characterised by high sunk costs, demand volatility and over-capacity, competition driving down prices to marginal costs will prevent carriers from covering their fixed and avoidable costs. In the medium-to-long term, carriers will no longer be able to break even and go bankrupt.¹²³ Competition, by pushing carriers into bankruptcy, will thus lead to disruptions in the coverage and continuity of services.¹²⁴ This ‘cutthroat competition’¹²⁵ argument finds further support in ‘empty core’ theorems of cooperative game theory,¹²⁶ which indicate that competition in the liner shipping industry will not generate a stable equilibrium.¹²⁷ Several studies, therefore, suggest that in markets like the shipping industry which are characterised by an empty core, agreements between horizontal competitors to restrict competition and cooperate constitute efficient forms of coordination that ‘could impose an equilibrium’ in an otherwise unstable market.¹²⁸ For these reasons, competition has been traditionally considered to be a source of instability in the liner shipping industry that would disrupt trade flows with disastrous externalities for the stability of global supply chains. Cooperation between carriers was therefore widely viewed as the only way to ensure the deployment of sufficient capacity necessary to guarantee regular and predictable services and secure the stability of global trade flows.¹²⁹

The tolerant stance of competition policy towards collusion and coordination in the liner shipping industry only started to erode with the adoption of the United States Ocean Shipping and Reform Act (OSRA) in 1998. This legislation ensured that shippers and carriers in the US trades could enter into confidential agreements, thereby undermining the strong rate discipline and stability of the liner conferences.¹³⁰ In Europe, it was not before 2008 that the European Commission repealed the Block Exemption Regulation (‘BER’) that exempted liner shipping conferences from the prohibition of anticompetitive agreements under Art. 101 TFEU.¹³¹ Though this phasing out of a complete antitrust immunity for liner conference limited the ability of carriers to fix prices and output, it did not put an end to cooperation and coordination between carriers.¹³² Instead, the Block Exemption Regulation for liner conferences was replaced with a Block Exemption Regulation that allowed carriers to enter various so-called strategic ‘consortia’ and ‘strategic alliances’ (‘Consortia BER’).¹³³ While consortia are cooperative arrangements between carriers on a single route or maritime service,¹³⁴ strategic alliances are

agreements, decisions and concerted practices between liner shipping companies (consortia). SWD (2019) 412final, 6.

¹²² OECD (n 114) 15–16.

¹²³ *ibid* 52, 54–56, 61. For a critical discussion *ibid* 57–59, 64–69.

¹²⁴ *ibid* 52, 57. For this view see also H. E. Haralambides and others, ‘The “Erasmus Report”: Global Logistics and the Future of Liner Shipping Conferences’ (European Commission 2003).

¹²⁵ OECD (n 114) 18, for a critical discussion 52–69.

¹²⁶ W. Sjostrom, ‘Collusion in Ocean Shipping: A Test of Monopoly and Empty Core Models’ (1989) 97(5) *Journal of Political Economy* 1160. Pirrong (n 121), 90–93; OECD (n 114) 61–63.

¹²⁷ *ibid* 1161–1162, 1164.

¹²⁸ *ibid* 1164.

¹²⁹ OECD (n 114) 6, 18, 19.

¹³⁰ *ibid* 22.

¹³¹ OECD (n 122) 72–78.

¹³² Note also that in many jurisdiction, in particular in South-East Asia and Japan which is the most important hub/region for containerised maritime transport, liner shipping conferences continue to benefit from competition law immunities. *ibid* 72–73.

¹³³ OECD (n 114) 24–27.

¹³⁴ OECD (n 122) 10–11.

combinations of various carriers to cooperate on the vessel deployment on and utilisation of particular routes, sailing schedules, itineraries and the use of joint terminals and containers on a global scale.¹³⁵ Strategic alliances and consortia differ from liner conferences in so far as their members no longer enter price- or capacity-fixing agreements. Alliance and consortia members also continue to provide their cargo shipping services under their own brand and on their own behalf. Nonetheless, consortia and strategic alliances often involve the full integration of specific service capabilities and close cooperation between consortia/alliance members. Alliance members, for instance, use slot allocation agreements whereby cargo carriers agree to reserve and exchange a fixed percentage of vessel capacity on their respective container ships. This allows carriers active on the same routes to increase their service frequency and, at the same time, optimise their vessel capacity with different departure time schedules.¹³⁶ Alliance members often also cooperate to jointly meet the demand on a specific route by entering vessel sharing agreements that facilitate the optimisation of departure schedules and shipping-order assignment and involve the sharing of operating and demand information.¹³⁷

With the rise of consortia and alliances and after several merger waves over the last two decades,¹³⁸ the liner shipping industry has experienced steep increase in industry concentration that has already been driven by liner conferences.¹³⁹ Today, the seven largest carriers control about 75% of all container ship capacity, relative to about 55% in 2016.¹⁴⁰ Since 2017, the industry has been dominated by three global alliances 2M, Ocean Alliance and The Alliance, bringing together the largest eight container shipping operators. The three alliances hold together about 80% of the global ship capacity and in some trade lanes even market shares of around 95%.¹⁴¹ The combined industry-wide market share of the top four carriers has increased from less than 20% in 1998 to almost 60% in 2019. Over the same time, their combined industry-wide Herfindahl-Hirschman Index (HHI) has increased from 300 to almost 1400.¹⁴² The market shares and concentration ratios are even higher on individual trade lanes.¹⁴³

¹³⁵ P. M. Panayides and R. Wiedmer, 'Strategic alliances in container liner shipping' (2011) 32(1) *Research in Transportation Economics* 25–26; OECD (n 122) 10–12.

¹³⁶ Panayides and Wiedmer (n 136), 26. OECD (n 122) 10, 16–18.

¹³⁷ OECD (n 122) 10.

¹³⁸ *ibid* 16.

¹³⁹ OECD (n 114) 28; OECD (n 122) 16.

¹⁴⁰ The Economist, 'Not so choppy - How Covid-19 put wind in shipping companies' sails: Despite a slowdown in global trade, the maritime industry is having a banner year' <<https://www.economist.com/business/2020/10/10/how-covid-19-put-wind-in-shipping-companies-sails>> accessed 15 October 2020.

¹⁴¹ *ibid*; OECD (n 122) 13.

¹⁴² OECD (n 122) 37; Commission Staff Working Document - Evaluation of the Commission Regulation (EC) No 906/2009 of 28 September 2009 on the application of Article 81 (3) of the Treaty to certain categories of agreements, decisions and concerted practices between liner shipping companies (consortia) (n 122) 21–24.

¹⁴³ OECD (n 122) 38–39; Commission Staff Working Document - Evaluation of the Commission Regulation (EC) No 906/2009 of 28 September 2009 on the application of Article 81 (3) of the Treaty to certain categories of agreements, decisions and concerted practices between liner shipping companies (consortia) (n 122) 22–24. Some authors highlight that traditional concentration (HHI and CR4) measures tend to underestimate the market power of alliances and therefore propose alternative concentration metrics. O. Merk and A. Teodoro, 'Alternative approaches to measuring concentration in liner shipping' [2022] *Marit Econ Logist* 1.

Table 1-Overview of the three global alliances in container shipping – Data 2021¹⁴⁴

Alliance	Global Market share (%)	Carriers	Global carrier rank
2 M	29	Maersk	1
		MSC	2
Ocean Alliance	29	Cosco-OOCL	3
		CMA CGM	4
		Evergreen	7
The Alliance	17	Hapag-Lloyd	5
		One	6
		Yang Ming	8
Independents	20		

5.2 Cooperation as a driver of resilience in the liner shipping industry

This rise of strategic alliances has been for a long time widely perceived as a source of stability and efficiencies in the liner shipping industry. Strategic alliances, in a similar way to liner conferences, allow carriers to cope with the challenges of fixed cost recovery¹⁴⁵ and enable them to achieve economies of scale and scope.¹⁴⁶ By facilitating coordinated planning and deployment of vessels on a global scale, strategic alliances also allow carriers to align their responses to fluctuations in demand and ensure an optimal vessel deployment, for instance by laying idle or relocating capacity in response to excess capacity.¹⁴⁷ Strategic alliances enable carriers to pool, diversify and mitigate financial risks relating to the investment in new ships¹⁴⁸ and routes.¹⁴⁹ By allowing carriers to expand and optimise both their capacity and geographical scope, strategic alliances also enhance the flexibility of carriers to react to changes and thereby diversify and mitigate operational risks.¹⁵⁰ Alliances also contributed to the stability of freight rates which reduced in the last two decades before the Covid-19 pandemic by 50%¹⁵¹ and enabled the industry to weather the sudden drop in global trade during the pandemic rather

¹⁴⁴ OECD (n 122) 2018. statista.com, ‘Market share of the leading container shipping alliances from 2012 to 2021’ (2022) <<https://www.statista.com/statistics/1249648/leading-container-ship-alliances-market-share/>>.

¹⁴⁵ OECD (n 122) 12.

¹⁴⁶ *ibid* 12–13. D.-W. Song and P. M. Panayides, ‘A conceptual application of cooperative game theory to liner shipping strategic alliances’ (2002) 29(3) *Maritime Policy & Management* 285. D. Yang, M. Liu and X. Shi, ‘Verifying liner Shipping Alliance’s stability by applying core theory’ (2011) 32(1) *Research in Transportation Economics* 15; Z. Wang and others, ‘Profit Sharing and the Stability of Shipping Alliances Based on Game Theory’ (3) 50(2016) *Journal of Transport Economics and Policy*, 245; Panayides and Wiedmer (n 136), 26.

¹⁴⁷ Commission Staff Working Document - Evaluation of the Commission Regulation (EC) No 906/2009 of 28 September 2009 on the application of Article 81 (3) of the Treaty to certain categories of agreements, decisions and concerted practices between liner shipping companies (consortia) (n 122) 20. Song and Panayides (n 147), 292–297; R. Midoro and A. Pitto, ‘A critical evaluation of strategic alliances in liner shipping’ (2000) 27(1) *Maritime Policy & Management* 31–33.

¹⁴⁸ Song and Panayides (n 147), 288. D. K. Ryoo and H. A. Thanopoulou, ‘Liner alliances in the globalization era: A strategic tool for Asian container carriers’ (1999) 26(4) *Maritime Policy & Management* 349–351, 353. For a general study of alliances as risk-sharing vehicle see D. T. Robinson, ‘Strategic Alliances and the Boundaries of the Firm’ (2008) 21(2) *Review of Financial Studies* 649. Robinson shows that alliance intensity across industries is positively correlated with their respective risk intensities *ibid* 652, 662, 679; Midoro and Pitto (n 148), 33; OECD (n 122) 20.

¹⁴⁹ W. Sjostrom, ‘Competition and cooperation in liner shipping’ (2009). University College Cork - Centre for Policy Studies Working Papers 12–2.

¹⁵⁰ Panayides and Wiedmer (n 136), 36.

¹⁵¹ OECD (n 122) 31–32. These positive price effects are however counterbalanced by increases in more opaque service surcharges *ibid*; Commission Staff Working Document - Evaluation of the Commission Regulation (EC) No 906/2009 of 28 September 2009 on the application of Article 81 (3) of the Treaty to certain categories of agreements, decisions and concerted practices between liner shipping companies (consortia) (n 122) 28–29.

unscathed.¹⁵² Considerations about the positive impact of industry consolidation and coordination in the liner shipping sector on the stability of global supply chains may also explain why the European Commission decided amid the Covid-19 crisis to extend the Block Exemption Regulation for Shipping Consortia by four years until 2024.¹⁵³ The Commission thereby turned a deaf ear to mounting calls from shippers, ports, and international experts¹⁵⁴ to remove competition law immunity for shipping alliances after a one-year extension.¹⁵⁵

5.3 The shortcomings of the sectoral approach in the liner shipping industry

Since the European Commission's hasty extension of the Consortia Block Exemption Regulation in spring 2020, the role of cooperation among consortia and shipping alliances in ensuring the stability of global supply chains has increasingly been called into doubt. Instead, high levels of industry concentration in the container shipping industry are suddenly perceived to be part of the problem and a destabilising factor for global value chains.¹⁵⁶ Since March 2020, container freight rates have surged exponentially. In March 2022, the global freight rate index for a 40-inch container was almost six times higher (8, 752 USD) relative to the same month in 2020 (1, 525 USD).¹⁵⁷ This increase in freight rates is in part caused by rising costs and supply bottlenecks triggered by Covid-19 containment measures. It is also driven by a rapid rebound in manufacturing, an important demand shock owing to Covid-19 related government stimulus packages and a shift in demand patterns towards more bulky consumables during the Covid-19 pandemic.¹⁵⁸ Supply-side factors, such as the increased level of concentration and market power of large alliances and carriers are, however, also increasingly seen to be an important factor explaining the surge in freight rates.¹⁵⁹ The impact of rising levels of shipping freight rates on

¹⁵² The Economist (n 141).

¹⁵³ Commission Regulation (EU) 2020/436 of 24 March 2020 amending Regulation (EC) No 906/2009 as regards its period of application. OJ [2020] L 90/1; European Commission, 'Antitrust: Commission prolongs the validity of block exemption for liner shipping consortia' <https://ec.europa.eu/commission/presscorner/detail/en/ip_20_518> accessed 17 October 2020.

¹⁵⁴ OECD (n 122) 8.

¹⁵⁵ CLECAT, ETA, ESC, ETF and FEPORT, 'Joint Submission in response to the consultation by DG Competition of 20 November 2019 on its proposed prolongation of the Consortia Block Exemption Regulation (CBER) based on its findings in the Evaluation of the CBER presented in the Staff Working Document by CLECAT, FEPORT, ESC and ETA' (2019) <https://www.clecat.org/media/CBER%20joint%20submission_1.pdf> accessed 17 October 2020. CLECAT, ETA, ESC, ETF and FEPORT, 'Supply Chain Stakeholders Alert President von der Leyen about their disapproval of the Consortia BER Exemption' <<https://www.clecat.org/media/Joint%20CLECAT-ESC-ETA-ETF-FEPORT%20Press%20Release%20Consortia%20BER%20Decision%20-%202026%20March%202020.pdf>> accessed 17 October 2020; CLECAT, ETA, EBU, ESC, FEPORT, GSF, GSA and UIRR, 'Stakeholders in the Maritime Logistics Supply Chain urge the Commission to reconsider its decision and to proceed to a proper objective evaluation of the Consortia BER' <<https://europeanshippers.eu/download/joint-press-release-2020-01-stakeholders-in-the-maritime-logistic-supply-urge-the-commission-to-proceed-to-a-proper-objective-evaluation-of-the-consortia-ber/>> accessed 17 October 2020.

¹⁵⁶ Coscelli and Thompson (n 14) 14–16.

¹⁵⁷ statista.com, 'Global container freight rate index from January 2019 to May 2022' <<https://www.statista.com/statistics/1250636/global-container-freight-index/>> accessed 5 July 2022.

¹⁵⁸ M. G. Attinasi, A. Bobasu and R. Gerinovic, 'What is driving the recent surge in shipping costs?' [2021] <https://www.ecb.europa.eu/pub/economic-bulletin/focus/2021/html/ecb.ebbox202103_01~8ecbf2b17c.en.html>.

¹⁵⁹ The White House of the United States, 'Fact Sheet: Lowering Prices and Leveling the Playing Field in Ocean Shipping' (2022); Merk and Teodoro (n 144), 2–3.

consumer prices and inflation has prompted competition policymakers to take a closer look at the state of competition in the liner shipping industry.¹⁶⁰

Freight rate volatility is, however, only one channel through which the trend towards greater consolidation in the shipping industry may give rise to supply chain risks. Growing levels of industry concentration and consolidation are increasingly viewed by shippers, supply chain stakeholders, and experts as a source of disruption and instability in global value chains. Recent reports suggest that the rise of strategic alliances led to a decrease in service quality, in terms of frequencies, number of direct port-to-port connections, reliability, and punctuality.¹⁶¹ Investments in ultra-large container ships (of 20,000 TEUs¹⁶² or more) boosted by the rise of alliances appear to have exacerbated rather than reduced the problem of excess capacity.¹⁶³ The alliance-driven increase in ship size and reduction of service frequencies and port-to-port connections is a growing source of delays and disruptions.¹⁶⁴ The risk and frequency of port and route congestion have multiplied, as freight flows are increasingly concentrated in a limited number of nodes and narrow corridors¹⁶⁵ and port infrastructures are often not sufficiently prepared to accommodate the ultra-large container ships.¹⁶⁶ Alliance-driven concentration of trade flows is, hence, an important source of bottlenecks that increases the vulnerability of maritime transport and supply chains to unexpected disruptions. While the extension of service coverage has brought about greater opportunities to geographically diversify risk, it also has rendered operations more complicated and fragile¹⁶⁷ and exposed them to a greater range of diverse risks.¹⁶⁸ At the same time, the shipping industry is also characterised by vertical integration into various layers of the maritime transport supply chain, with large carriers also controlling terminal handling, port logistics, as well as the hinterland transport of containers from and to ports.¹⁶⁹

¹⁶⁰ Memorandum of Understanding Between the Federal Maritime Commission and the Antitrust Division, Department of Justice Relative to Cooperation with respect to Promoting Competitive Conditions in the U.S.-International Ocean Liner Shipping Industry 12 July 2021; Executive Order on Promoting Competition in the American Economy 9 July 2021; A Bill to amend title 46, United States Code, to repeal certain antitrust exemptions for ocean common carriers. HR117th Congress, 2nd session. L. Clarence-smith, 'Competition and Markets Authority is urged to look into shipping container costs' *The Times* (10 August 2021) <<https://www.thetimes.co.uk/article/competition-and-markets-authority-is-urged-to-look-into-shipping-container-costs-hvklxrmw9>> accessed 7 May 2022; Coscelli and Thompson (n 14) 14–16.

¹⁶¹ The reliability score of alliance members in 2018 lay between 71-81%, which is considerably lower than in the previous year (82% -85%). Vessel delay have increased after the creation of new alliances in 2017. In the second half of 2017, it reached 1.02 days, as compared to 0.6 in the second semester of 2016. OECD (n 122) 24–26, 27, 34. See for the opposite view Commission Staff Working Document - Evaluation of the Commission Regulation (EC) No 906/2009 of 28 September 2009 on the application of Article 81 (3) of the Treaty to certain categories of agreements, decisions and concerted practices between liner shipping companies (consortia) (n 122) 30–31.

¹⁶² A TEU or Twenty-foot Equivalent Unit is an exact unit of measurement used to determine cargo capacity for container ships and terminals

¹⁶³ OECD (n 122) 20–23, 32. This has already been the case for liner conferences OECD (n 114) 47–50.

¹⁶⁴ OECD (n 122) 27–30.

¹⁶⁵ McKinnon (n 27) 9–10.

¹⁶⁶ OECD (n 122) 55. Within the framework of the most recent review of the Consortia BER the Commission acknowledged that some parties had raised concerns about congestions caused by mega ships, but observed that no evidence has been provided and that the stakeholders had failed to show the causality between the prevalence of consortia and over-investment in new ultra-large container ships. Commission Staff Working Document - Evaluation of the Commission Regulation (EC) No 906/2009 of 28 September 2009 on the application of Article 81 (3) of the Treaty to certain categories of agreements, decisions and concerted practices between liner shipping companies (consortia) (n 122) 26–27.

¹⁶⁷ Liu and others (n 116), 203.

¹⁶⁸ *ibid.*

¹⁶⁹ OECD (n 122) 34, 45-48; Commission Staff Working Document - Evaluation of the Commission Regulation (EC) No 906/2009 of 28 September 2009 on the application of Article 81 (3) of the Treaty to certain categories of agreements, decisions and concerted practices between liner shipping companies (consortia) (n 122) 24–25.

Against this backdrop, experts warn that rising levels of horizontal concentration and vertical integration in the liner shipping industry may become an important driver of the vulnerability of global supply chains to idiosyncratic shocks and reduce system resilience.¹⁷⁰ Owing to greater horizontal and vertical concentration and the increased weight of individual carriers in the supply chains, the operational disruption of a single carrier may cause damage of a considerable order of magnitude. When, for instance, the Korean carrier Hanjin Shipping went bankrupt in 2016, the ripple effects were felt across the entire industry and global supply chains. The default of Hanjin meant that shippers had to wait for their cargo for months because more than 80 Hanjin vessels loaded with 520,000 containers filled with about 14 bn USD worth of merchandise remained stranded at sea.¹⁷¹ As Hanjin formed part of the shipping alliance ‘The Alliance’, its default affected not only its own customers but also other alliance members that had loaded some of their cargo on Hanjin ships. The Hanjin collapse shows how greater cooperation and hence greater interdependence and interconnectedness between carriers might act as amplifiers of contagion effects that spread disruptions across supply chains.¹⁷² Similar systemic disruptions struck the industry in 2017 when the leading container carrier, Maersk, became the victim of a cyber-attack. The attack paralysed Maersk’s entire IT and logistic system and disrupted not only its liner shipping but also its ancillary logistic and port activities.¹⁷³ Owing to the high interconnectedness of industry members through slot chartering and vessel sharing agreements, the disruptions also hit other cargo carriers.¹⁷⁴ Industry concentration and vertical integration in the shipping industry may thus amplify the impact of the disruption of one carrier – due to cyberattacks, financial risks, or other exogenous shocks – by propagating ripple effects across the entire industry.¹⁷⁵

Along with creating new sources of instability (diminishing reliability) and amplifying the magnitude of potential disruption effects, the increase in industry concentration and interconnectedness resulting from the trend towards shipping alliances also reduced the ability of shippers to mitigate the risks of disruptions. The rise of alliances reduced differentiation between and the choice amongst carriers.¹⁷⁶ Moreover, as shipping alliance members increasingly use slot charter agreements and vessel sharing agreements, shippers find it increasingly difficult to monitor and diversify their supply chains.¹⁷⁷ Shippers, hence, have fewer possibilities to spread risks by multi-sourcing carrier services.¹⁷⁸ As a consequence, shippers struggle to mitigate the risk of supply chain disruptions by transporting their cargos through different carriers and routes. Against this backdrop, the OECD warned already back in 2018 that ‘global alliances pose risks for system resilience’.¹⁷⁹

¹⁷⁰ OECD (n 122) 34. Integration may however also have a positive impact on risk management and the stability of operations, as it increases the flexibility of the carrier and facilitates the exchange of risk information Liu and others (n 116), 207, 214.

¹⁷¹ OECD (n 122) 70–71. C. Paris and E. E. Phillips, ‘Hanjin Shipping’s Troubles Leave \$14 Billion in Cargo Stranded at Sea Owners strive to recover their goods and get them to customers in wake of Hanjin Shipping bankruptcy filings’ *The Wall Street Journal* (7 September 2016) <<https://www.wsj.com/articles/billions-in-cargo-remains-stranded-at-sea-1473285117>> accessed 17 October 2020; Liu and others (n 116), 208.

¹⁷² On the relationship between inter-connectivity and systemic vulnerability I. Linkov, B. D. Trump and W. Hynes, ‘Resilience-based Strategies and Policies to Address Systemic Risks’ (2019) SG/NAEC(2019)5 5.

¹⁷³ OECD (n 122) 34–35. A. Greenberg, ‘The Untold Story of NotPetya, the Most Devastating Cyberattack in History: Crippled ports. Paralyzed corporations. Frozen government agencies. How a single piece of code crashed the world.’ *Wired* (22 August 2018) <<https://www.wired.com/story/notpetya-cyberattack-ukraine-russia-code-crashed-the-world/>> accessed 17 October 2020.

¹⁷⁴ OECD (n 122) 35.

¹⁷⁵ *ibid* 35, 76.

¹⁷⁶ *ibid* 23–27, 70–71.

¹⁷⁷ *ibid* 34.

¹⁷⁸ *ibid*.

¹⁷⁹ *ibid*.

Competition policy in the liner shipping industry illustrates the challenges and shortcomings of a sectoral competition policy approach that seeks to enhance supply chain resilience by providing a partial or total antitrust immunity for specific industries. Far from constituting a posterchild case where cooperation and industry concentration always promote supply chain stability, the liner shipping industry reveals the complex relationship between competition, cooperation, and resilience. Both cooperation and competition appear, in different ways, to contribute to and undermine the stability of the liner shipping industry and the global supply chains that depend on it. The performance of the liner shipping sector over the last decade also suggests that the relationship between competition or cooperation and supply chain resilience may depend on the type of shock. It appears that greater concentration and cooperation have allowed the industry to withstand and flexibly react to Covid-19 as a large-scale macro-shock hitting all parts of the industry equally and thereby exposing all industry members to a highly correlated default risk. Yet, at the same time, the increase in industry concentration has heightened the vulnerability of the industry to and the magnitude of harm caused by more localised, idiosyncratic shocks whose risks are not positively correlated across all industry members, by reducing the stakeholder's possibilities to multi-source and facilitating the propagation of contagion effects.¹⁸⁰ The shipping industry, therefore, also exemplifies the phenomenon of 'perverse resilience'¹⁸¹ where greater stability towards one potential threat of disruption makes the industry more vulnerable towards other risks. A sectoral approach that insulates an entire industry from competition law may often prove too unwieldy an instrument to disentangle the complex trade-offs between different types of risks.

These growing concerns over lower levels of resilience and service quality reported by supply chain stakeholders and various experts have been largely brushed aside as unfounded by the European Commission when it extended the Consortia BER by another four years in spring 2020. Relying mostly on data submitted by the World Shipping Council, the largest trade association representing the liner shipping industry, the Commission concluded that there was little evidence in support of mounting complaints about decreasing service quality, frequency, reliability, and greater disruptions due to congestions.¹⁸² Instead, the Commission's evaluation of the previous BER found that alliances have generated important efficiencies – in terms of economies of scale and the rationalisation of the use of resources – which have benefited shippers in the form of considerably reduced freight rates.¹⁸³ Yet, no economic ex-post analysis of the previous Consortia BER had been commissioned to test or support these findings. The prolongation of the Consortia BER thus also highlights yet another risk of a sectoral competition policy approach towards supply chain resilience. As the gains for incumbents from a partial or total sectoral antitrust exemption are even higher than those accruing from ad-hoc exemptions, competition authorities will be exposed to much greater and more coordinated lobbying efforts from industry members. The sectoral approach of competition policy to enhance supply chain resilience is hence also vulnerable to interest capture and rent seeking.

¹⁸⁰ For a taxonomy of these perturbation risks see P. E. Achurra-Gonzalez and others, 'Modelling the impact of liner shipping network perturbations on container cargo routing: Southeast Asia to Europe application' (2019) 123 *Accident Analysis & Prevention* 399 400–402. Liu and others (n 116), 203, 214–215.

¹⁸¹ Régibeau and Rockett (n 16), 108.

¹⁸² Commission Staff Working Document - Evaluation of the Commission Regulation (EC) No 906/2009 of 28 September 2009 on the application of Article 81 (3) of the Treaty to certain categories of agreements, decisions and concerted practices between liner shipping companies (consortia) (n 122) 26, 30–33. 35.

¹⁸³ *ibid* 20, 28–29.

6 Avenue 3 – A Systematic Incorporation of Supply Chain Resilience Considerations in the analysis of Horizontal Cooperation and Vertical Restraints

As a third approach, located half-way on the continuum between the two extremes of an ad-hoc and a sectoral approach, competition authorities could incorporate resilience considerations more systematically into their case-specific competition analysis of coordinated and unilateral conduct. The most effective way to ensure this more systematic approach towards resilience would consist of accounting for supply chain resilience as part of the revision of existing competition law guidelines, such as the Guidelines on Horizontal Cooperation Agreements¹⁸⁴ or the Guidelines on Vertical Restraints.¹⁸⁵ Factoring resilience into existing competition law guidelines would ensure greater consistency across various cases and sectors and ensure more legal certainty than an ad-hoc approach. Improved consistency across sectors and cases would arguably increase the preparedness of competition law and supply chain members and enable them to react to value chain disruptions more holistically and effectively than an ad-hoc approach. At the same time, it would allow for a more clinical, case-specific, and bespoke approach towards supply chain resilience than a sector-wide competition law exemption. A systematic inclusion of resilience considerations into existing guidelines would thus secure the incentives of industry members to invest in resilience-enhancing strategies, while minimising the welfare trade-off and costs of greater supply chain resilience.

6.1 *Assessment of horizontal cooperation*

In their current state, however, existing European Commission Guidelines give little thought to supply chain resilience. The issue of value chain resilience finds, for instance, no mention in the existing European Commission's Guidelines on Horizontal Cooperation Agreements which regulate various types of agreements and cooperation between firms active on the same level of a supply chain. It is only with respect to information exchange that resilience is considered in passing. The Guidelines recognise that the exchange of information may enable firms to reallocate resources more efficiently to respond to demand fluctuations, reduce inventories, or reduce the time of delivery of perishable products.¹⁸⁶ The Guidelines further acknowledge that information exchange may also help firms overcome information asymmetries and reduce risks (notably of credit default).¹⁸⁷ Aside from information exchange, considerations about supply chain disruptions, play, however, only a minor role in the Horizontal Cooperation Agreements currently in force.

This is set to change radically with the draft revised Horizontal Cooperation Agreements Guidelines. The Draft Guidelines recognise, somewhat precipitously, in sweeping terms that virtually all types of horizontal cooperation between competitors – ranging from joint R&D¹⁸⁸,

¹⁸⁴ Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements. OJ [2011] C 11/01.

¹⁸⁵ Guidelines on Vertical Restraints, Guidelines on Vertical Restraints. OJ [2010] C 130/01. These Guidelines have been recently replaced by Annex to the Communication from the Commission - Approval of the content of a draft for a Communication from the Commission -Guidelines on vertical restraints. C(2022) 3006 final.

¹⁸⁶ Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (n 185) paras. 57, 95-96.

¹⁸⁷ *ibid* para. 97.

¹⁸⁸ Draft Communication from the Commission - Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (n 13) para. 188.

over production and specialisation,¹⁸⁹ joint purchasing,¹⁹⁰ commercialisation,¹⁹¹ standardisation¹⁹² and sustainability agreements,¹⁹³ to information exchange¹⁹⁴ – are capable of strengthening value chain resilience by reducing dependencies and mitigating supply shortages and disruptions. The Guidelines also maintain in broad terms that increased resilience constitutes a qualitative efficiency that benefits consumers.¹⁹⁵ Apart from these general statements, little to no explanation is provided as to how these various forms of horizontal cooperation between competitors might strengthen supply chain resilience. This is a major omission. If the concept of a ‘resilient internal market’¹⁹⁶ is to be more than a slogan, the Guidelines need to lay down a more specific analytical framework to determine when horizontal cooperation between competitors is able and necessary to decrease dependencies or mitigate risks of supply shortages or disruptions.

The focus of such an analytical framework should lie on the specific market failure that various forms of horizontal cooperation are supposed to internalise with a view to enhancing supply chain resilience. Only if these market failures would otherwise prevent firms from adopting independent or less restrictive strategies to increase the stability of their supply chains, can cooperation between competitors rather than competition be plausibly considered the right instrument to bolster resilience. Amongst various factors, this analysis should centre on the (i) specific risk that firms seek to mitigate, (ii) the type of resilience-enhancing strategy they intend to adapt to this end, and (iii) the specific mechanics through which competition creates a collective action problem that can only be surmounted through cooperation. Such collective action problems may stem from a variety of sources, such as the necessity to buy or sell a sufficient volume to achieve economies of scale,¹⁹⁷ information asymmetries,¹⁹⁸ free-riding and first-mover disadvantages,¹⁹⁹ as well as the need for fixed cost recovery.²⁰⁰

In detailing under which circumstances horizontal cooperation is necessary and effective to enhance supply chain resilience, the Guidelines could provide clearer guidance on the forms of coordination that firms may legitimately have recourse to with a view to mitigating the risk of or respond to supply chain disruptions without violating competition law. Businesses need to know which type of information they can share to monitor and mitigate supply chain risks.²⁰¹ Setting up a common risk monitoring system within a given sector also requires the industry-wide standardisation of common risk information and metrics. This standard-setting process needs to comply with competition rules.²⁰² Likewise, clearer guidance on when joint purchasing, joint production, or joint ventures – such as for instance investment in joint storage

¹⁸⁹ *ibid* para. 288 (f).

¹⁹⁰ *ibid* paras. 313, 344.

¹⁹¹ *ibid* para. 380.

¹⁹² *ibid* para. 501.

¹⁹³ *ibid* para. 578.

¹⁹⁴ *ibid* para. 457.

¹⁹⁵ *ibid* para. 344.

¹⁹⁶ *ibid* para. 1. The term ‘resilient internal market’ appears in total seven times in the draft Guidelines.

¹⁹⁷ *ibid* paras. 345, 380, 585.

¹⁹⁸ *ibid* para. 458.

¹⁹⁹ *ibid* para. 584.

²⁰⁰ *ibid* para. 585.

²⁰¹ This becomes, for instance, apparent from the joint Catena-X resilience-initiative in the German automotive supply chain Catena X, ‘Leitlinien Kartellrecht des Vereins Catena-X Automotive Network e.V.: [Competition Law Guidelines of the Association Catena-X Automotive Network e.V.]’ (7 May 2021) paras. 2.2 (a) and (b).

²⁰² Draft Communication from the Commission - Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (n 13) para. 453, 457. This is also highlighted by the joint Catena-X resilience-initiative in the German automotive supply chain, Catena X, ‘Leitlinien Kartellrecht des Vereins Catena-X Automotive Network e.V.: [Competition Law Guidelines of the Association Catena-X Automotive Network e.V.]’ (n 202) paras. 2.2 (c) and 3 (c).

facilities – are compliant with competition law would provide firms with greater legal certainty and increase their incentive to invest in joint resilience-enhancing measures.

Alongside providing more guidance on the forms of joint resilience initiatives that are consistent with competition law, the revised Guidelines should also set out in greater detail how the indispensability of such coordination is to be assessed and compared against less restrictive measures.²⁰³ The indispensability of an agreement to strengthen supply chain resilience importantly depends on the market failure or collective action problem it seeks to address. This is why it is important to identify the market failure or collective action problem in the first place.²⁰⁴ The assessment of the indispensability of collective resilience initiatives also raises the question of the requisite standard to which firms must demonstrate that the alleged resilience gains could not reasonably be achieved on a standalone basis or through less restrictive joint initiatives. A central issue in this regard is the counterfactual against which the parties will need to show indispensability. Will the firms need to provide evidence that they cannot mitigate the identified risk(s) by adopting individual resilience-enhancing measures (e.g., multi-sourcing, inventory buffers); or is it sufficient that there is no less restrictive collective measure that would allow firms to jointly bolster the resilience of their supply chains? A second related question pertains to the exact threshold against which indispensability is then measured. Will it be sufficient for firms to show that individual/less restrictive collective measures would be more costly or would yield less resilient outcomes? Or will parties need to make the case that individual or less restrictive collective measures are unrealistic, unattainable, or significantly less efficient alternatives?²⁰⁵ The assessment of the indispensability of joint resilience initiatives, hence, requires at least some agreement on common metrics to measure the effectiveness of various resilience strategies.²⁰⁶

While the Draft Guidelines recognise greater value chain resilience as a source of qualitative efficiencies that benefit consumers,²⁰⁷ it also remains unclear the extent to which these benefits must be quantified or can be otherwise substantiated.²⁰⁸ Quantifying the benefits accruing from increased supply chain resilience can be challenging because they are difficult to isolate and cannot be easily translated into cost reductions. Measuring resilience benefits by estimating the net present value of the mitigated risk or harm resulting from greater supply chain disruption is also fraught with difficulties. Such an estimation would necessarily rely on a variety of strong assumptions about the trajectory of the performance of the supply chain, the nature, strength and duration of the shock, the realistic recovery level, and the right discount rate.²⁰⁹

²⁰³ Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (n 185) paras. 101-102. To qualify for an individual exception under Art. 101 (3) any horizontal cooperation agreement would need to comply with the indispensability criterion Draft Communication from the Commission - Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (n 13) paras. 189, 290, 345, 383, 549, 505-510, 580-587.

²⁰⁴ See with respect to sustainability agreements *ibid* para. 584.

²⁰⁵ Communication from the Commission - Guidelines on the application of Article 81(3) of the Treaty 2004, Commission Guidelines on the Application of Article 81(3) of the Treaty. O.J. C 101/97 paras. 73, 75-76.

²⁰⁶ Hosseini, Ivanov and Dolgui (n 16).

²⁰⁷ Draft Communication from the Commission - Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (n 13) para. 344.

²⁰⁸ The draft Guidelines give recognition to quality efficiencies and seem to be less stringent with respect to quantification than previous Guidelines *ibid* paras. 190, 291, 345, 384, 450, 577-578. If resilience is achieved through standardisation agreements consumer benefits may even be presumed. *ibid* para. 511.

²⁰⁹ Régibeau and Rockett (n 16), 119-121; UK Government, 'Measuring Resilience' <https://assets.publishing.service.gov.uk/media/57a08956e5274a27b200002f/EoD_Topic_Guide_Measuring_Resilience_May_2016.pdf> accessed 27 May 2022.

Resilience gains also may not immediately accrue to consumers in the market where firms cooperate, but often strengthen resilience across different levels of the supply chain and hence different markets. This raises questions as to whether these collective benefits and out-of-market efficiencies resulting from joint resilience initiatives are cognisable as consumer benefits. Although the European Commission still adheres to the orthodoxy that gains from cooperation must normally be passed-on to consumers and materialise in the market to which the agreement relates,²¹⁰ there are at least some limited instances in which it accounted for out-of-market efficiencies.²¹¹ With respect to the newly crafted category of ‘sustainability agreements’, the draft Guidelines display even greater latitude towards collective benefits²¹² and out-of-market efficiencies.²¹³ While resilience gains and reduced value chain disruptions are explicitly recognised as a potential source of sustainability in the Guidelines,²¹⁴ it remains, however, unclear whether the category of sustainability agreements will encompass all or only a subset of collective resilience initiatives that also have a beneficial effect on other sustainability objectives.²¹⁵ As a consequence, the question about the appropriate treatment of out-of-market benefits of joint resilient initiatives remains unsettled.

6.2 Assessment of vertical restraints

Alongside the competition law analysis of horizontal cooperation, supply chain resilience considerations may also be relevant for the assessment of vertical restraints. Yet, the Commission’s Vertical Guidelines²¹⁶ and the relevant provisions in the Commission’s Guidance Paper on Art. 102 TFEU (ex-Art. 82 EC)²¹⁷ give even less consideration to value chain resilience than their horizontal counterpart. Although the revised Vertical Guidelines refer to resilience and resilience benefits as factors to be accounted for in the assessment of vertical restraints, they provide no explanation of how vertical restraints may affect supply chain resilience.²¹⁸ This is a major omission because vertical restraints may have important implications for supply chain resilience.

Vertical contracting plays a central role in strengthening value chain resilience by increasing the level of relationship-specific investments.²¹⁹ Such investments in relationship strength are crucial for the emergence and stability of value chains. Without any commitment

²¹⁰ Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (n 185) 103.

²¹¹ CASE COMP/AT.39595 Continental/United/Lufthansa/Air Canada (‘Star Alliance’). C(2013) 2836 final paras. 57 ff. A broad consideration of out-of-market benefits also finds some, albeit conditional, support in the case law of the Court of Justice *Case C-382/12 P MasterCard and Others v Commission* ECLI:EU:C:2014:2201 paras- 237, 240-243; G. Monti and J. Mulder, ‘Escaping the Clutches of EU Competition Law: Pathways to Assess Private Sustainability Initiatives’ (2017) 42(5) European Law Review 635 649–650.

²¹² Draft Communication from the Commission - Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (n 13) para. 601.

²¹³ *ibid* paras. 602-603.

²¹⁴ *ibid* paras. 578.

²¹⁵ *ibid* para. 543, 547.

²¹⁶ Guidelines on Vertical Restraints, Guidelines on Vertical Restraints. OJ [2010] C 130/01; Annex to the Communication from the Commission - Approval of the content of a draft for a Communication from the Commission -Guidelines on vertical restraints (n 186).

²¹⁷ Guidance on the Commission’s enforcement priorities in applying Article 82 of the EC Treaty to abusive exclusionary conduct by dominant undertakings, Guidance Paper. OJ [2009] C 45/7 para. 32-46.

²¹⁸ Annex to the Communication from the Commission - Approval of the content of a draft for a Communication from the Commission -Guidelines on vertical restraints (n 186) paras. 8 and 9.

²¹⁹ See previous discussion of Elliott, Golub and Leduc (n 4); B. Maheshwari, V. Kumar and U. Kumar, ‘Optimizing success in supply chain partnerships’ (2006) 19(3) Journal of Enterprise Information Management 277 279, 285-286; M. Jennejohn, ‘The Transactional Dynamics of Market Fragility’ 85(2022) Law and Contemporary Problems 101- 103, 104, 116.

on the part of the prospective supply chain partners to guarantee a minimum amount of supply or demand, they would have little incentive to incur the costs of the relationship-specific investment in the first place. Vertical supplier and buyer commitments are hence a crucial precondition for the emergence of value chains and an essential ingredient for their stability and resilience. Conversely, excessive competition on various levels of the supply chain may undermine firms' incentive to make these relationship-specific investments.²²⁰ In their current state, the Vertical Guidelines and the Guidance Paper recognise the importance of vertical restraints in internalising 'free-rider'²²¹ and hold-up problems related to relationship-specific investments.²²² Yet, they do not account for the pivotal role these relationship-specific investments play in bolstering the stability of supply chains.

Greater focus on supply chain stability and resilience could add a novel dimension to the competition law assessment of vertical restraints. From a resilience perspective, restrictions of competition on one level of the supply chain ought to be tolerated so long as they facilitate the emergence and strengthen the stability of the supply chain. This is notably the case if vertical restraints enable firms to appropriate the positive externalities of relationship-specific investments and supply chain stability. Ensuing reductions in *intra*-supply chain competition can be considered the 'price' for greater supply chain stability. In shoring up value chain resilience, these restraints are also likely to boost *inter*-supply chain competition in the long run, which in turn is likely to partially offset any adverse welfare effects resulting from reductions in *intra*-supply chain competition. The role of vertical guidelines in securing supplier/buyer commitments and incentivising relationship-specific investments could, for instance, provide valid explanations for quantity-forcing (i.e., minimum quantity purchasing agreements) or non-compete clauses (i.e., commitments by a purchaser to obtain 80% or more of its requirements from a seller) in single branding agreements²²³ or exclusive distribution agreements.²²⁴

Resilience considerations may also constitute an additional factor to be accounted for in the assessment of the potential anti-competitive effects of vertical restraints. While vertical restraints tend to enhance value chain stability by guaranteeing the appropriability of relationship-specific investments, they might also undermine resilience by increasing the costs of multi-sourcing or by preventing multi-sourcing and the diversification of supply or sales channels altogether. The exact impact of vertical restraints on multi-sourcing arguably depends on their specific contractual design. The duration of the exclusivity agreements is a design factor that may importantly affect multi-sourcing: the longer the term of vertical exclusivity, the greater the obstacles for value chain partners to multi-source.²²⁵ The existence and importance of any penalty imposed on the purchaser in the event of non-compliance with exclusivity criteria are also likely to affect the costs of multi-sourcing and thereby impact value chain resilience. The exact exclusivity threshold – e.g., a requirement of purchasing 80%, 90% or all requirements from a single supplier – is another design parameter that determines the ability of parties to multi-source. The smaller the residual demand of purchasers that is not

²²⁰ Elliott, Golub and Leduc (n 4).

²²¹ Annex to the Communication from the Commission - Approval of the content of a draft for a Communication from the Commission -Guidelines on vertical restraints (n 186) para.16 (b).

²²² *ibid* para. 16 (e); Guidance on the Commission's enforcement priorities in applying Article 82 of the EC Treaty to abusive exclusionary conduct by dominant undertakings (n 218) para. 46.

²²³ Annex to the Communication from the Commission - Approval of the content of a draft for a Communication from the Commission -Guidelines on vertical restraints (n 186) paras. 298-320.

²²⁴ *ibid* paras. 321-331.

²²⁵ Competition law analysis of single-branding agreements entered for more than 1 and less than 5 years normally involves a balancing of pro- and anti-competitive effects. Similar considerations apply to exclusive supply agreements *ibid* paras. 324, 247-248, 300, 315.

bound by exclusivity clauses, the more likely the agreement is to undermine multi-sourcing and, in consequence, supply chain resilience.

The effect of vertical restraints on competitors at various levels of the supply chain and hence the number of existing alternative supply or distribution channels is arguably the most important factor determining their impact on supply chain resilience. If the number of alternative suppliers or sales channels is already limited and vertical restraints prevent the entry of alternative sources/channels or lead to their further reduction, the ability of firms to multi-source and diversify their channels of supply or sales will suffer. The market share of the parties to the agreements and the cumulative effect of a network of similar vertical restraints in the market are important benchmarks used by the conventional analysis that might also be helpful to determine the impact of vertical restraints on resilience. As long as an agreement or the cumulative effect of a thicket of similar agreements does not foreclose too substantial a share of the relevant market,²²⁶ it can be assumed that alternative suppliers/distributors may be able to serve a large enough customer base to offer a stable alternative source of supply.

The exact threshold of the critical foreclosure rate may depend on industry-specific factors that determine the minimum efficient scale firms have to reach to be able to operate on a lasting basis on the market. Existing market share thresholds in the Vertical Block Exemption Regulation may, nonetheless, constitute a helpful proxy for the impact of vertical restraints on multi-sourcing and diversification of sources of supply/sales channels. If the market share of the parties on each level of the supply chain does not exceed 30%,²²⁷ it can be assumed that the non-foreclosed market share can accommodate at least two alternative sources of supply/sales channels of similar size. Accordingly, vertical restraints by firms with substantial market power and shares between 30 – 40% should undergo closer scrutiny as they may also raise resilience concerns depending on various circumstances (such as the cumulative effect of a network of similar agreements concluded by competing firms).

Exclusivity-enhancing conduct by dominant firms – such as exclusivity rebates or exclusive dealing agreements – that cover a substantial number of purchasers/suppliers may have a substantial adverse effect on supply chain resilience if they result in the concentration of sources of supply or sales channels within one and the same dominant firm and eliminate meaningful options for multi-sourcing. Competition policy should therefore be alert to situations where dominant firm conduct may entail the creation of supply or distribution bottlenecks that make supply chains more vulnerable to exogenous shocks by preventing multi-sourcing. Supply bottlenecks may also operate as a multiplier of exogenous shocks that may propagate across the supply chain and undermine systemic resilience. Cases such as *Gazprom* and *Qualcomm*, however, suggest that the impact of exclusivity agreements by dominant firms on multi-sourcing and supply chain resilience has been largely ignored by the Commission. At least in sectors that are of particular strategic importance, such as energy and semi-conductors, the assessment of exclusive dealing agreements and similar exclusivity-enhancing conduct by dominant companies should give greater weight to their impact on supply chain resilience.

Competition policy should hence display greater awareness of the ambiguous impact that vertical restraints may have on supply chain resilience. While vertical restraints enhance relationship-specific investments that contribute to the general stability of supply chains and allow firms to internalise externalities resulting from resilience strategies, their resilience-enhancing impact may reach a tipping point where their adverse effect on multi-sourcing offsets their positive impact on value chain stability. This is the case when vertical agreements fundamentally restrict suppliers' or distributors' ability to multi-source or cement bottlenecks,

²²⁶ E.g. 50% *ibid* paras. 304, 307, 310.

²²⁷ Commission Regulation (EU) 2022/720 on the application of Article 101(3) of the Treaty on the Functioning of the European Union to categories of vertical agreements and concerted practices. OJ [2022] L 134/4, Art. 3.

for instance, by foreclosing any alternative source of supply or sales channel. If vertical agreements lead to foreclosure effects that reduce the ability of supply chain members to multi-source below a critical level where it becomes impossible for them to diversify their supply risks, any potential efficiency and resilience gains brought about by the internalisation of relationship-specific investments may be outweighed by the losses in competition and diversification benefits that are also crucial elements of supply chain resilience. The exact location of this breaking point is, ultimately, an empirical question. Existing market share thresholds may, however, provide an important starting point to determine which of the two effects dominates. The more market shares of the parties exceed the critical threshold in the Vertical Block Exemption Regulation²²⁸ of 30% or approximate that of dominance, the likelier it is that the downside impact of vertical restraints on multi-sourcing outweighs their positive effect on relationship-specific investments.²²⁹ This might suggest that resilience considerations can, at least in part, be incorporated through the use (and if need be recalibration) of existing filters that inform the assessment of vertical restraints by non-dominant and dominant firms.

7 Avenue 4 – Merger control

One competition policy instrument that may play a central role in enhancing supply chain resilience is merger control. Unlike the regulation of coordinated and unilateral conduct, merger policy is capable of actively shaping market structures by regulating when changes in the ownership of firms should be allowed or prohibited. Its structural and forward-looking nature suggests that merger control has a greater capacity than competition rules on horizontal and vertical agreements to pro-actively fashion the structure and design of value chains. By preventing lasting changes in the market structure that would lead to excessive concentration, merger control can play an important role in averting the emergence of bottlenecks and preserving sufficient opportunities for multi-sourcing.

7.1 *The decisional practice of competition authorities*

Merger control until recently, however, attributed very little weight to supply chain resilience. This becomes apparent, for instance, in our initial example of CF Industries which, by suspending its production of CO₂, inadvertently brought to a halt the entire UK food supply chain. CF Industries' critical role as CO₂ supplier is the ultimate outcome of a merger between the two chemical firms Terra and Kemira in 2007. This transaction reduced the number of UK based CO₂ producers from 4 to 3, led to a substantial increase in concentration and created a merged entity with a market share of about 60%.²³⁰ Terra was, in turn, acquired by CF Industries in 2010. Back in 2007, the UK Competition Commission had identified concerns about the merger's effects on price and, notably, security of supply²³¹ on various markets, including the market for carbon dioxide.²³² Yet, the Terra/Kemira merger was eventually cleared, subject to remedies.²³³ While the remedies package involved structural remedies for some of the affected

²²⁸ *ibid.*

²²⁹ From a theoretical point of view, the critical level may lay at around 30% which is equivalent to the presence of three equally-sized upstream / downstream players, as from this level onwards competition and diversification benefits pull into the same direction. Babich, Burnetas and Ritchken (n 63).

²³⁰ Kemira Growhow Oyj and Terra Industries Inc merger inquiry 2007, A report on the anticipated joint venture between Kemira GrowHow Oyj and Terra Industries Inc paras. 10.3, 10.44-10.46.

²³¹ *ibid* paras. 9.34, 9.43, 10.45 and 10.64.

²³² *ibid* para. 10.74.

²³³ *ibid* paras. 9.34, 9.43, 10.45 and 10.64.

markets, divestiture was considered to be disproportionate in relation to the anticompetitive effects in the CO₂ market.²³⁴

Against the backdrop of the supply chain disruptions caused by the Covid-19 pandemic and Russia's military build-up on the Russian-Ukrainian border, value chain resilience has gained a more prominent role in recent merger proceedings. Growing concerns over supply chain resilience had, for instance, an important bearing on the European Commission's decision to prohibit the merger between the two Korean shipbuilders Hyundai and Daewoo in January 2022.²³⁵ The Commission found that the merger would have led to a reduction in the number of competitors from 3 to 2 and would have created a dominant position in the construction of ships specialised in the transport of liquified natural gas (LNG), so-called large liquified natural gas carriers (LLNGCs). Alongside adverse price effects and reduced choice, Commissioner Vestager also highlighted that LLNGCs are an essential element in the LNG supply chain which importantly 'contributes to the diversification of Europe's source of energy and therefore improves energy security.'²³⁶ This statement suggests that under the prospect of a mounting energy crisis, which since then has been further exacerbated by the war in Ukraine, concerns about supply chain resilience and security of energy supplies were an important factor in the Commission's review of the Hyundai/Daewoo merger. The systemic importance of LLNGCs in securing the stability of the LNG value chain and thereby reducing Europe's dependence on Russian gas imports appears to have been a central consideration in the Commission's decision to prohibit the proposed merger.

Similar concerns over merger-driven industry concentration in a sector that plays a pivotal role in the resilience of global value chains were at full display in the Cargotec/Konecranes merger. This merger would have combined the leading manufacturers of container and cargo handling equipment used in port infrastructures, logistics companies, and various other industries. While the European Commission conditionally cleared the merger subject to remedies, the deal was eventually derailed by the UK Competition and Markets Authority (CMA) which decided to block the merger in spring 2022. Not only is Cargotec/Konecranes the first merger after Brexit where the European Commission and the CMA diverged in their substantive assessment, but it also highlights the growing importance of supply chain resilience in merger analysis. While the CMA's decision itself remained silent on the merger's impact on supply chain resilience,²³⁷ the press releases issued by the CMA and the US Department of Justice maintained that the merger would have led to price increases and a reduction in the number of alternative providers in the container and cargo handling equipment markets, which are of systemic importance for the stability of global supply chains.²³⁸

7.2 The transmission belt between mergers and supply chain disruptions

While concerns over supply chain resilience appear to hold growing sway over merger assessment, competition authorities have done very little to flesh out how exactly mergers may affect supply chain stability and how these effects can be incorporated more explicitly and

²³⁴ *ibid* paras. 15.81-15.92; 15.108–15.112.

²³⁵ Case M.9343 Hyundai Heavy Industries Holdings/Daewoo Shipbuilding & Marine Engineering.

²³⁶ European Commission, *IP/22/343 Mergers: Commission prohibits proposed acquisition of Daewoo Shipbuilding & Marine Engineering by Hyundai Heavy Industries Holdings* (2022).

²³⁷ Anticipated merger between Cargotec Corporation and Konecranes Plc - Final Report 31 March 2022.

²³⁸ Competition and Markets Authority, *CMA blocks planned Cargotec/ Konecranes merger* ; Antitrust Division of the US Department of Justice, *Shipping Equipment Giants Cargotec and Konecranes Abandon Merger After Justice Department Threatens to Sue: Press release number 22-296* ; Australian Competition & Consumer Commission, *Cargotec and Konecranes merger cancelled* .

systematically into merger analysis. The first step towards a greater role of value chain resilience in merger control thus consists of explicating the transmission belt between mergers and reduced supply chain resilience.

Concerns about the impact of mergers on value chain resilience may arise both in horizontal and vertical mergers. The adverse impact of horizontal mergers on supply chain resilience may operate through two separate, albeit often complementary, channels. The first of the two channels is structural in nature. A horizontal merger may increase the risk of value chain disruptions by concentrating sources of supply within a few firms or even a single firm. This structural effect may increase the vulnerability of supply chains to exogenous shocks that lead to firm-level and, to a lesser extent, plant-level disruptions. One example of such firm-level default risks are IT accidents or hacker attacks that may disrupt the entire merged entity. Greater firm-level risk may also arise if the merging parties seek to reduce duplication and redundancies of their production facilities or distribution networks to cut costs after the merger.²³⁹ The closing down of one of the two merging parties' overlapping production or distribution networks may increase the geographic concentration of production facilities or supply channels. Such an increase in geographic concentration, in turn, may entail a greater positive correlation of (geographic) default risks of the merging parties and heighten the vulnerability of value chains to local or regional exogenous shocks, for instance, extreme weather events. The example of CF Industries shows that the risk and impact of disruptions are particularly high when a horizontal merger results in the creation of a supply or distribution bottleneck. The structural effect of horizontal mergers not only increases the risk value of chain disruptions by making the merged entity more vulnerable to firm-and plant-level risks of disruption, but it also reduces the number of independent and alternative sources of supply from which customers can source their requirements. Horizontal mergers thus undermine the ability of value chain partners to mitigate disruption risks by multi-sourcing. The combined effect of the reduction and concentration of alternative sources of supply in a few or a single firm may increase not only the likelihood but also the scale of supply chain disruptions.

A second channel through which horizontal mergers may reduce supply chain resilience is behavioural in nature. The reduction of market-wide rivalry and competitive pressure resulting from a horizontal merger may dampen the incentives of the merged entity and non-merging parties to compete on prices, improve the quality and reliability of their products or services or invest in measures that secure supply security.²⁴⁰ The price effects of the merger will make multi-sourcing more expensive and increase purchasers' switching costs. The non-price effects of the merger may substantially decrease the pre-merger level of supply reliability and security.

Similar structural and behavioural effects are also, albeit to a lesser extent, at play in vertical mergers, notably if they result in the foreclosure of the provider of an essential input²⁴¹ or sales channel.²⁴² Such foreclosure effects, on the one hand, may result in the creation of supply or distribution bottlenecks and reduce the ability of customers to multi-source. On the other hand, the decrease in overall competitive pressure resulting from input and customer foreclosure may also dampen the incentives of the merged entity and non-merging up- or downstream competitors to engage in resilience enhancing efforts.²⁴³

²³⁹ Scherer and Comanor (n 95).

²⁴⁰ Commission Guidelines on the assessment of horizontal mergers 2004. O.J [2004] C 31/5 paras. 24-38.

²⁴¹ Commission Guidelines on the assessment of non-horizontal mergers under the Council Regulation on the control of concentrations between undertakings 2008, Commission Guidelines on the assessment of non-horizontal mergers. O.J. C 265/6 paras. 33-57.

²⁴² *ibid* para. 60-76.

²⁴³ *ibid* paras 47-50, 58-75.

7.3 Filters for a resilience-sensitive merger analysis

The assessment of various channels through which horizontal and non-horizontal mergers can lead to the consolidation of market structures that undermine value chain stability may transform merger control into an effective policy tool that could substantially contribute to the strengthening of supply chain resilience.

A greater role of resilience considerations would not necessarily require a complete overhaul of the existing analytical toolbox of merger policy. On the contrary, HHI ratios which are usually used to measure the impact of mergers on market concentration may, for instance, serve as a useful filter to account for the structural impact of merger-driven market consolidation on supply chain resilience. As they constitute useful metrics for concentration and diversity of supply²⁴⁴ within an industry, value chain resilience literature and reports rely on (country- or firm-level) HHI ratios as a central variable for the measurement of supply risks.²⁴⁵ The existing market share and HHI filters may thus also serve as a first indication of how horizontal²⁴⁶ or vertical²⁴⁷ mergers are likely to affect the ability of customers to multi-source by reducing the number of suppliers through integration (horizontal) or potential foreclosure (horizontal and non-horizontal mergers). Existing market share and HHI thresholds suggest that horizontal and non-horizontal mergers come only under closer scrutiny if they reduce the number of roughly equally sized firms below five.²⁴⁸ One limitation of the use of HHI ratios as proxies for supply chain risks is that the correlation between the concentration of supply and disruption risks may depend on various factors, such as the specific type of risks, geographical regions, and the industry at hand. Merger policy could draw on insights from the critical supply chain literature to construct risk-weighted or -adjusted HHI measures for various types of suppliers or sectors (e.g., at SIC/NACE code level).²⁴⁹

The assessment of HHI ratios as a first proxy for the potential impact of mergers on supply chain resilience could be complemented by a more case-specific analysis that is grounded in existing theories of harm. In horizontal mergers, competition authorities could assess the extent to which a merger – in addition to reducing the number of players and hence the ability of customers to diversify supply – is also likely to make multi-sourcing more costly. This would notably be the case if the merger combines two closely competing competitors.²⁵⁰ Horizontal mergers may, however, also have an adverse effect on resilience if they reduce the incentive of the merging parties and/or their non-merging rivals to compete on non-price factors that enhance supply chain resilience and security of supply. In the recent Tata

²⁴⁴ B. Sprecher and others, ‘Novel Indicators for the Quantification of Resilience in Critical Material Supply Chains, with a 2010 Rare Earth Crisis Case Study’ (2017) 51(7) *Environ. Sci. Technol.* 3860 3864; E. H. Simpson, ‘Measurement of Diversity’ (1949) 163(4148) *Nature* 688; P. Adajar, E. Berndt and R. Conti, *The Surprising Hybrid Pedigree of Measures of Diversity and Economic Concentration* (National Bureau of Economic Research 2019).

²⁴⁵ G. A. Blengini and others, ‘EU methodology for critical raw materials assessment: Policy needs and proposed solutions for incremental improvements’ (2017) 53 *Resources Policy* 12; G. A. Blengini and others, ‘Methodology for establishing the EU list of critical raw materials : guidelines, Publications’ (2017); Sprecher and others (n 245); S. Althaf and C. W. Babbitt, ‘Disruption risks to material supply chains in the electronics sector’ (2021) 167 *Resources, Conservation and Recycling* 105247.

²⁴⁶ Commission Guidelines on the assessment of horizontal mergers (n 241) paras. 17-21.

²⁴⁷ Commission Guidelines on the assessment of non-horizontal mergers under the Council Regulation on the control of concentrations between undertakings (n 242) paras. 23-25.

²⁴⁸ Commission Guidelines on the assessment of horizontal mergers (n 241) para. 20; Commission Guidelines on the assessment of non-horizontal mergers under the Council Regulation on the control of concentrations between undertakings (n 242) para. 25.

²⁴⁹ B. Achzet and C. Helbig, ‘How to evaluate raw material supply risks—an overview’ (2013) 38(4) *Resources Policy* 435 436–444.

²⁵⁰ Commission Guidelines on the assessment of horizontal mergers (n 241) para. 28.

Steel/Thyssenkrupp merger, the Commission, for instance, found that the merging parties were competing closely on lead times in the delivery of steel products. After the merger, the merged entity would have had an incentive to compete less fiercely on lead times, which is of crucial importance for the functioning of just-in-time delivery and value chains in the automotive and packaging industry.²⁵¹ In this case, the merger will not only increase the costs, reduce the quality or variety of sources that enable multi-sourcing but the alignment of default risks will also reduce the effectiveness of multi-sourcing as risk diversification or mitigation strategy.

Evidence that a substantial number of customers were multi-sourcing from the merging parties as first- and second-choice would provide additional evidence that the price and non-price effects resulting from the combination of two closely competing competitors will have a substantial effect on supply chain resilience by affecting not only potential but actual multi-sourcing. Assessing the risk profile of the merging parties and how it is affected by the merger might be an additional filter to determine whether the merger reduces the diversification benefits of multi-sourcing. Indeed, the adverse effect of a horizontal merger on resilience is more significant if the default risk of the merging parties has been negatively correlated prior to the merger and their risk profile becomes more aligned after the merger – for instance, because they close or re-centralise some production sites or IT infrastructure.

Similarly, in non-horizontal mergers, competition authorities could assess whether the merger leads to the foreclosure of an alternative source of supply/sales channel by assessing the ability and incentives of the merged entity to engage in input, customer or other types of foreclosure. The adverse effect of the merger on value chain resilience is particularly high if it forecloses an important alternative source of supply or sales channel.²⁵² Evidence that customers purchased from the foreclosed rival to multi-source might further corroborate the finding that the vertical merger has a detrimental effect on value chain resilience. If the default risk of the foreclosed rival is negatively correlated to that of the merged entity or remaining competitors in the market, the merger will have an even greater adverse effect on resilience. In this case, the merger will not only lead to higher prices and reduced possibility for customers to multi-source, but the resilience-enhancing benefits of multi-sourcing might be reduced by a greater order of magnitude than if the merged entity and the foreclose competitors had the same risk profile.

This analysis of the structural and behavioural effects of horizontal and non-horizontal mergers on resilience could be further refined by incorporating insights from network theory, which is increasingly used to analyse supply chains as ‘complex adaptive systems’.²⁵³ Greater recourse to network analysis would allow competition authorities to gain a better understanding of the connectivity patterns and the role of the merging parties or potentially foreclosed competitors within often complex, multi-layered supply chains. Network theory has developed various metrics that measure the importance of certain agents – modelled as so-called ‘nodes’ – within a complex network.²⁵⁴ Network metrics measuring the extent to which a supply chain is organised around specific nodes focus, for instance, on the betweenness centrality (i.e. how

²⁵¹ Case M.8713 Tata Steel/Thyssenkrupp/JV. C(2019) 4228 final paras. 812, 1389-1399. This decision was upheld on appeal by the EU General Court *Case T-584/19 thyssenkrupp v Commission* see notably, paras. 526, 742, 744.

²⁵² Commission Guidelines on the assessment of non-horizontal mergers under the Council Regulation on the control of concentrations between undertakings (n 242) para. 48.

²⁵³ C. R. Carter, D. S. Rogers and T. Y. Choi, ‘Toward the Theory of the Supply Chain’ (2015) 51(2) J Supply Chain Manag 89 90; N. Choudhary and others, ‘Assessing Supply Chain Resilience During the Pandemic Using Network Analysis’ [2021] IEEE Trans. Eng. Manage. 1.

²⁵⁴ E. M. Airolidi, X. Bai and K. M. Carley, ‘Network Sampling and Classification: An Investigation of Network Model Representations’ (2011) 51(3) Decision support systems 506 506–508; Y. Li and others, ‘Network characteristics and supply chain resilience under conditions of risk propagation’ (2020) 223(107529) International Journal of Production Economics 1 6.

often nodes in a network lie on the shortest path between all combinations of network node pairs) or degree centrality (i.e. the number of incoming and outgoing connections (edges) of a node with other nodes) of specific agents.²⁵⁵ By determining the betweenness centrality and degree centrality, competition authorities will be able to evaluate the systemic role and centrality of the merging parties and/or foreclosed competitors in a given supply chain.

The determination of various network characteristics – such as the degree and betweenness centrality – would yield several additional insights for merger analysis. First, network analysis would enable competition authorities to look beyond narrowly defined antitrust markets and to account for cross-market connections with a view to understanding the broader impact of mergers within their complex value chain environments.²⁵⁶ The assessment of degree and betweenness centrality would provide an indication of how merger-induced price, non-price, or foreclosure effects are likely to affect other players in the supply chain that are situated outside the relevant product or geographic market. Second, the analysis of degree and betweenness centrality would enable competition authorities to estimate the magnitude of potential anti-competitive effects within a complex value chain network. Measuring the degree centrality, would generate insights on how likely foreclosure effects and the ensuing reduction of possibilities to multi-source will affect various players within the value chain or within interconnected²⁵⁷ value chains (e.g., if the player is a critical player within more than one value chain). Third, network analysis will also enable competition authorities to appreciate the extent to which a merger increases the criticality of certain players within a supply chain and might thus operate as an amplifier of potential ripple effects of supply chain disruptions. When a merger combines firms that are two highly connected nodes within a given value chain or interconnected value chains, the transaction is likely to heighten the potential impact of supply chain disruptions as ripple effects may propagate more easily and widely. Network analysis would thus enable merger analysis to appraise the extent to which a merger has the potential to increase the vulnerability of a supply chain to future disruptions by creating bottlenecks and reinforcing the criticality of nodes.

While mergers may have an adverse effect on supply chain resilience, for instance by reducing the availability of alternative sources of supply and distribution channels, making multi-sourcing more expensive or deteriorating lead times, it is conceivable that mergers also lead to greater supply chain resilience. The structural and behavioural effects of mergers by no means always undermine value chain resilience. A horizontal merger may, for instance, enhance value chain resilience if the merging parties reposition themselves in such a way that the negative correlation of their default risk increases. This would be the case if the two merging parties were to decide to reposition themselves geographically in order to avoid profit cannibalisation resulting from competitive overlaps between each other or competing non-merging firms. As a consequence of the merger, customers will benefit from greater geographical diversification of sources of supply.²⁵⁸ Such a diversification effect is not always the most likely outcome of mergers, as repositioning is a costly and risky strategy.²⁵⁹ This increased diversification benefit may, moreover, be counteracted by higher prices that the

²⁵⁵ L. C. Freeman, 'Centrality in social networks conceptual clarification' (1978) 1(3) *Social Networks* 215; Choudhary and others (n 254), 4; Li and others (n 255), 6.

²⁵⁶ M. Elliott and A. Galeotti, 'The role of networks in antitrust investigations' (2019) 35(4) *Oxford Review of Economic Policy* 614 615-617, 621-629.

²⁵⁷ Linkov, Trump and Hynes (n 173) 27.

²⁵⁸ S. T. Berry and J. Waldfogel, 'Do Mergers Increase Product Variety?: Evidence from Radio Broadcasting' (2001) 116(3) *Q J Econ* 1009; A. Gandhi and others, 'Post-Merger Product Repositioning' (2008) 56(1) *The Journal of Industrial Economics* 49; E. Argentesi and others, 'The effect of mergers on variety in grocery retailing' (2021) 79 *International Journal of Industrial Organization* 1.

²⁵⁹ Department of Justice/Federal Trade Commission - Commentary on the Horizontal Merger Guidelines 2006 31.

merging parties can charge because of their greater geographical differentiation which allows them to escape price competition.²⁶⁰

Merger-specific efficiencies are a second channel through which mergers may enhance resilience. A horizontal merger may, for instance, strengthen value chain resilience if it enables the merged entity to increase its investments into resilience-enhancing strategies or infrastructure. Supply chain resilience would also be fostered if a merger enhances the appropriability of resilience-enhancing investments or enables the merged entity to diversify its risks. Vertical mergers, too, may bolster value chain resilience by internalising principal-agent problems or externalities, or by making supply chains simply more efficient, thereby reducing lead times, and increasing supply security.²⁶¹ Vertical mergers themselves may, indeed, constitute an attempt to overcome supply chain resilience problems.

The ambiguous impact of horizontal and vertical mergers on supply chain resilience thus confronts competition authorities with the challenging task of isolating the adverse and positive effects of mergers on resilience and netting them off. Such balancing may, however, be less complex than it appears at first glance. A majority of vertical mergers may, for instance, have a significant positive effect on supply chain resilience, while their foreclosure effect and ensuing adverse impact on multi-sourcing is nominal. Conversely, if a horizontal or vertical merger has substantial adverse effects on customers' ability to multisource, their adverse impact on value chain resilience is likely to outweigh resilience-enhancing efficiencies by far.

8 Conclusion

Against the backdrop of the ongoing supply chain convulsions triggered by Covid-19 and further exacerbated by the war in Ukraine, this paper asks whether competition policy may constitute an appropriate tool to reinforce the resilience of global supply chains. It thereby responds to mounting calls that competition policy should play a greater role in strengthening the stability of supply chains in order to 'build back better' our economy and enhance its preparedness for future shocks. Drawing on economic and supply chain management literature to define the notion of resilience and identify various strategies firms use to bolster the resilience of their supply chains, the paper makes three major contributions.

First, it shows that the relationship between competition and supply chain resilience is more complex than recent statements by competition policymakers seem to suggest. Competition, on the one hand, has the potential to undermine supply chain resilience if it creates collective action problems, information asymmetries, or externalities that prevent firms from adopting supply chain management strategies or appropriate relationship-specific investments that increase relationship strength between supply chain partners. In some instances, supply chain resilience could, therefore, be enhanced by relaxing competition rules with a view to allowing firms to enter horizontal or vertical agreements that internalise these collective action problems or externalities. On the other hand, competition may also foster supply chain resilience by securing the ability of firms to multi-source and thereby mitigate the risk of supply chain disruptions. This insight counsels strict competition law enforcement in cases where contractual arrangements, unilateral conduct or mergers reduce supply chain members' ability to multi-source and/or create bottlenecks that increase the risk and scale of supply chain disruptions and ensuing ripple effects. In short, the relationship between competition and supply

²⁶⁰ Gandhi and others (n 259).

²⁶¹ *ibid* para. 587.

chain resilience is a complex one. In some instances, greater supply chain resilience necessitates the relaxation of competition rules. In others, it is best achieved through tough enforcement.

Second, the paper identifies four avenues through which competition policy could contribute to greater supply chain resilience. Competition policy can account for supply chain resilience by relying on a (i) ad-hoc approach, (ii) sectoral approach, (iii) systematic inclusion of resilience into the assessment of horizontal and vertical restraints, and/or (iv) resilience-sensitive merger assessment. Not each of these approaches is however equally suitable for promoting supply chain resilience. The paper shows that the ad-hoc approach of temporarily suspending the application of competition law, which has mainly been used during and in the aftermath of the Covid-19 pandemic to react to supply chain disruptions, is fraught with difficulties. While having the merits of enabling a timely response by industry members to acute supply chain disruptions, the exclusive reliance on an ad-hoc approach is unlikely to effectively and systematically strengthen the preparedness of competition policy for future supply chain disruptions. Similarly, the example of the liner shipping sector suggests that a sectoral approach that (partially) exempts an entire industry from competition law with a view to securing supply chain resilience has important shortcomings. Under certain circumstances, it might even end up undermining resilience by facilitating industry concentration and the emergence of bottlenecks. Instead of merely relying on an ad-hoc or sectoral approach, competition policy would be better advised to account in a more systematic manner for supply-chain resilience in its case-by-case assessment of horizontal and vertical contracting (third avenue) and a more resilience-sensitive merger policy (fourth avenue). An update of existing EU Guidelines on Horizontal Cooperation Agreements and Vertical Restraints, as well as a fine-tuning of existing analytical tools in merger control would constitute a promising starting point to incorporate supply-chain resilience considerations into competition policy.

Third, the paper also identifies various filters that competition authorities could use to update their analytical toolkits with a view to accounting for supply chain resilience. To build supply chain resilience considerations into their analysis, competition authorities would need, in a first step, to identify the specific type of disruption or default risk(s) against which resilience is sought. In a second step, the type of resilience-enhancing strategy that firms could or intend to adopt to mitigate the identified disruption risks would need to be assessed. It would then be necessary, in a third step, to pin down the market failure that prevents firms from adopting a suitable resilience-enhancing strategy. Depending on the market failure identified, the competition authorities would then be in the position to determine whether agreements, unilateral conduct, or mergers are appropriate and necessary for firms to implement these resilience-enhancing strategies, for instance, by overcoming collective action problems, information asymmetries, externalities, facilitating greater diversification or effectuating a more efficient design or organisation of supply chains. It is, however, also conceivable that the business conduct under investigation itself is the source of a market failure that undermines supply chain resilience, for example, by reducing the possibilities to multi-source or creating a bottleneck.

Existing market share and concentration thresholds established by the case law,²⁶² the horizontal,²⁶³ vertical,²⁶⁴ and various sectoral²⁶⁵ Block Exemption Regulations, as well as

²⁶² *Case C-62/86 AKZO v Commission* ECLI:EU:C:1991:286 para. 60.

²⁶³ Commission Regulation (EU) No 1218/2010 on the application of Article 101(3) of the Treaty on the Functioning of the European Union to certain categories of specialisation agreements. OJ [2010] L 335/43 Art. 20.

²⁶⁴ Commission Regulation (EU) 2022/720 on the application of Article 101(3) of the Treaty on the Functioning of the European Union to categories of vertical agreements and concerted practices (n 228) Art. 3.

²⁶⁵ Commission Regulation (EC) No 906/2009 on the application of Article 81(3) of the Treaty to certain categories of agreements, decisions and concerted practices between liner shipping companies (consortia). OJ [2009] L 256/31, Art. 5.

existing merger guidelines,²⁶⁶ constitute a suitable filter to identify when firm conduct is likely to undermine supply chain resilience by reducing the availability of multi-sourcing or creating bottlenecks. These structural filters also provide a first indication of when the potentially resilience-enhancing effects of horizontal cooperation, vertical contracts, or mergers are likely to be outweighed by their adverse effect on multi-sourcing. This structural analysis can be further complemented by the analysis of behavioural effects of contractual arrangements or mergers that indicates whether they are likely to make multi-sourcing more expensive, undermine its quality or make it more difficult by foreclosing important sources of supply/sales channels.

An analysis of the positive or negative correlation of default risks between the contractual or merging parties and/or potentially foreclosed competitors may provide a further indication as to how contractual arrangements or mergers reduce the benefits of multi-sourcing as a risk-diversification strategy by increasing the positive correlation of these default risks between the parties or foreclosing a supplier whose default risks was negatively correlated with that of remaining competitors. The use of betweenness and degree centrality metrics developed by network analysis would allow competition authorities to gain a better understanding of whether an agreement, unilateral conduct, or merger increases the criticality of specific supply chain agents and therefore amplifies the potential scale of harm of supply chain disruptions by facilitating cascading ripple and propagation effects.

These filters, summarised in Table 2, are particularly suitable for the case-by-case analysis of horizontal and vertical agreements (avenue three) and a more resilience-sensitive merger policy (avenue four). At the same time, they can also inform and improve ad-hoc and sectoral approaches used by competition policy to enhance supply chain resilience.

²⁶⁶ Commission Guidelines on the assessment of horizontal mergers (n 241) para. 20; Commission Guidelines on the assessment of non-horizontal mergers under the Council Regulation on the control of concentrations between undertakings (n 242) para. 25.

Filter	Description
Identification of the type of default risk	Macro-level or micro-level risk
Identification of the type of resilience-enhancing strategies	Operational contingency strategies Operational mitigation strategies (e.g., inventory management, multi-sourcing, geographic diversification and supplier segmentation) Strategic interaction (e.g., information exchange)
Identification of the type of market failure preventing the adoption of resilience-enhancing strategies	Collective action problems (e.g., first-mover disadvantage) Appropriability of relationship-specific investments and free-riding The limited ability of multi-sourcing (e.g., lock-in effects and switching costs, bottlenecks)
Assessment of Market shares thresholds	Horizontal agreements: Market share of each of the parties < 20%: at least three equally sized alternative sources of supply/sales channels available Horizontal agreements: Market share of each of the parties > 20%: limited possibilities of multi-sourcing and risk of bottlenecks Vertical agreements: Market share of each of the parties (on various levels of supply chain) < 30%: at least two similarly sized alternative sources of supply/sales channels available Vertical agreements: Market share of each of the parties > 30%: limited possibilities of multi-sourcing and risk of bottlenecks HHI < 2000 HHI: at least 5 similarly sized sources of supply/sales channels available post-merger HHI > 2000 HHI: sources of supply/sales channels likely to be concentrated within 4 or less players
Assessment of the behavioural effects of the agreement/unilateral conduct or merger on the price, quality and availability of multi-sourcing	Price increases make multi-sourcing more difficult Reduction in service quality reduces reliability or timeliness of alternative sources of supply Concentration or foreclosure effects create bottlenecks and reduce availability of multi-sourcing
Default-risk correlation between the contractual/merging parties and/or the foreclosed competitor and the other industry members	Contractual arrangement or merger increases the positive default-risk correlation between the parties or industry members (e.g. by foreclosing a source of supply whose default-risk was negatively correlated to the other industry players) and, thereby, reduces the risk-diversification benefits of multi-sourcing
Assessment of the degree and betweenness centrality of the contractual / merging parties and/or the foreclosed competitor	Contractual arrangement or merger increases the criticality of specific supply chain agent and thereby creates bottlenecks and thereby increases the impact of disruptions and their ripple effects

Table 2 - Potential filter for the incorporation of supply chain resilience into competition policy analysis

Although this paper shows that competition policy may have a role to play in enhancing supply chain stability, this does not mean that competition policy is the silver bullet to solve all current supply chain woes. Competition policy is neither the only nor the most effective tool to shore up the resilience of global value chains. On the contrary, there are a number of other policy tools currently on the table to address supply chain vulnerabilities. Subsidization in critical sectors may secure the incentive of firms to invest in building up inventory buffers that would cushion future supply chain disruptions. Industrial policy initiatives and state support may also enable the ramping up of more localised supply chains with a view to reducing the dependence of a domestic economy on foreign imports of critical inputs or raw materials. The EU is currently pursuing this industrial policy route by clearing and handing out massive subsidy packages for so-called ‘Important Projects of Common European Interest’ that seek to promote cross-Member State industrial alliances in critical sectors, such as the battery,²⁶⁸ microelectronics,²⁶⁹ and semi-conductor²⁷⁰ value chains. The Commission has also launched other industrial policy initiatives to facilitate industrial alliances in critical sectors, such as critical raw materials.²⁷¹ Various recent trade policy initiatives, such as the introduction of foreign direct investment screening tools²⁷² and the proposed EU anti-coercion instrument²⁷³, may also constitute suitable tools to fence off the weaponization of critical supply chains by third countries.

Competition policy thus can only act in concert with other, arguably often better targeted, tools to bolster supply chain resilience. At the same time, competition policy and, notably, competition advocacy also have an important role to play in ensuring that various industrial policy initiatives to enhance value chain resilience are designed in a way that does not result in excessive distortions of competition. In this regard, competition policy can operate as an emergency brake which guarantees that the current wave of supply chain resilience initiatives does not overshoot the mark. Competition officials should issue a note of caution whenever the quest for greater strategic autonomy risks generating ‘perverse resilience’ effects by creating new bottlenecks and exposing supply chains to new types of vulnerabilities, for instance, through the reshoring of international value chains.

²⁶⁸ European Commission, *Press release IP/21/226 - State aid: Commission approves €2.9 billion public support by twelve Member States for a second pan-European research and innovation project along the entire battery value chain*.

²⁶⁹ European Commission, *Press Release - IP/18/6862 - State aid: Commission approves plan by France, Germany, Italy and the UK to give €1.75 billion public support to joint research and innovation project in microelectronics*.

²⁷⁰ European Commission, ‘Alliance on Processors and Semiconductor technologies’ <<https://digital-strategy.ec.europa.eu/en/policies/alliance-processors-and-semiconductor-technologies>> accessed 10 May 2022; Proposal for a Regulation establishing a framework of measures for strengthening Europe's semiconductor ecosystem (Chips Act). COM(2022) 46 final; Commission Recommendation on a common Union toolbox to address semiconductor shortages and an EU mechanism for monitoring the semiconductor ecosystem. C(2022) 782 final.

²⁷¹ Communication from the Commission on Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability. COM(2020) 474 final; European Commission (n 6); European Raw Materials Alliance (ERMA), ‘European Raw Materials Alliance (ERMA)’ <<https://erma.eu/about-us/>> accessed 20 May 2022.

²⁷² Regulation (EU) 2019/452 establishing a framework for the screening of foreign direct investments into the Union. OJ [2019] L 79/1; UK National Security and Investment Act 2021. 2021 c. 25.

²⁷³ Proposal of a Regulation on the protection of the Union and its Member States from economic coercion by third countries. COM(2021) 775 final.