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Economic review

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Global supply chain shocks

From just-in-time to just-in-case

In autumn 2021 the UK discovered how fragile 'invisible' supply chains can be. In this article, **Hannah Holmes** traces how a run on petrol stations, empty supermarket shelves and soaring shipping costs revealed the economics of modern logistics, and why many firms now talk less about just-in-time and more about resilience

On a damp Saturday in late September 2021, cars curled around the block outside a suburban petrol station. Drivers traded rumours: a refinery had shut; lorry drivers had vanished; the Government had run out of fuel. None of that was quite true. The fuel existed. What the UK lacked, suddenly and painfully, was the capacity to move it. A shortfall of HGV drivers, exacerbated by pandemic disruption and new frictions at the border after Brexit, meant local deliveries couldn't keep up once people started to panic-buy. The system had little slack, so a small disturbance cascaded into a national story.

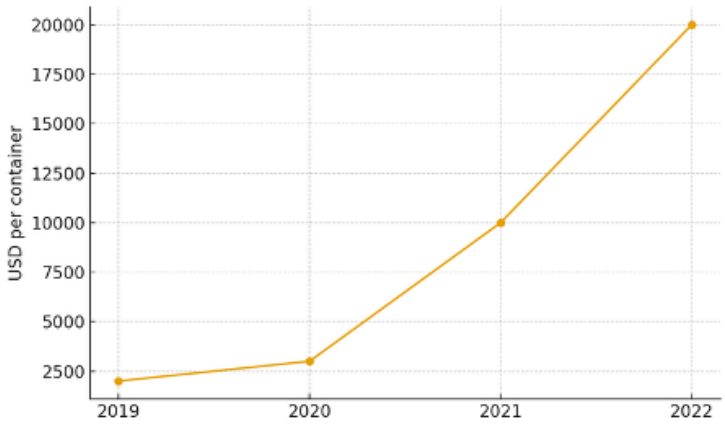
That scene is a perfect entry point to the modern supply chain. For decades businesses have stitched together far-flung networks of suppliers, freighters, ports, warehouses and retailers, coordinated by software and the expectation that everything would arrive 'just in time' (JIT). The result was lower costs and remarkable variety on the shelf. But as the pandemic (and, for the UK, Brexit) made clear, the same leanness that delivers efficiency can also create fragility. When one link weakens, the whole chain jolts.

The efficiency that made us fragile

To understand why things fell apart, it helps to see how well they had been working. From the 1980s to 2019, global supply chains were optimised around JIT: carry minimal inventories; synchronise deliveries to production; treat warehousing as waste. Toyota popularised the method; retailers and electronics firms perfected it. When demand was predictable and transport reliable, JIT was a superpower.

Covid broke those assumptions. Lockdowns shuttered factories in Asia just as European and American households shifted their spending from services to goods, laptops, furniture, weights for home gyms. Ports operated with fewer workers; ships queued outside harbours; containers piled up in the wrong places. Shipping prices spiked several-fold, and on some routes the cost of a 40-foot container briefly topped $20,000. As firms passed on higher freight and input costs, consumers felt the pinch.

Figure 1 shows this shock in a single line: a flat pre-pandemic trend in container freight rates that shoots upward through 2021 before easing as supply gradually adjusted.



Source: UNCTAD; Freightos Baltic Index

Figure 1 Global container freight rates, 2019–2022

The bullwhip in action

Textbook economics helps explain why small problems became big ones. When demand at the retail end becomes volatile, every upstream stage tends to over-correct, a phenomenon called the bullwhip effect. A supermarket that sells out of pasta orders extra 'just in case'; the wholesaler multiplies that order by another safety factor; the manufacturer doubles its inputs. Soon, orders bear little resemblance to true demand. When the surge subsides, the whip cracks the other way: warehouses are bloated, production lurches and prices yo-yo.

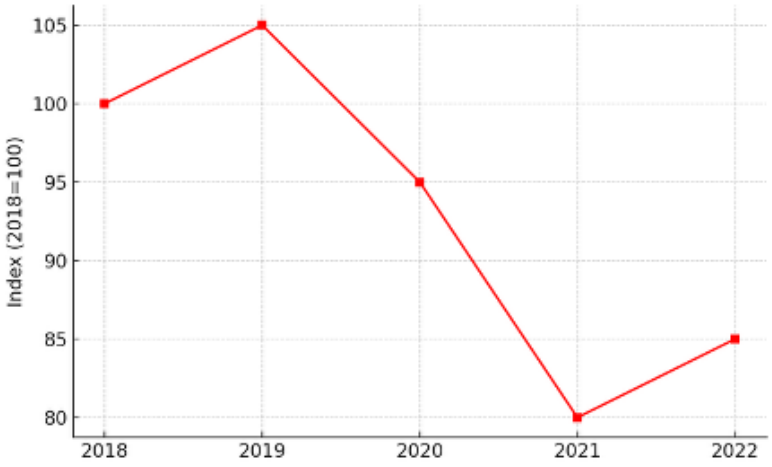
JIT systems are particularly vulnerable to bullwhips because they carry so little buffer stock. In normal times that's a feature, in a crisis, it becomes a bug.

The UK's specific twists

The UK's difficulties weren't only global. New customs checks and paperwork at the EU border added friction to once-frictionless trade. That meant more delays precisely when the system could least absorb them. Meanwhile, the pandemic slowed HGV driver training and testing, while some EU nationals left the UK haulage workforce. The result was a thinner labour market in logistics. If a supermarket depot was short of even a handful of drivers on a weekend when demand spiked, local shelves went empty.

Trade data underline the timing. As Figure 2 indicates, UK–EU goods trade dipped sharply around the end of the transition period and recovered unevenly amid the pandemic. For firms that had planned production on the assumption of near-instant cross-Channel flows, even

modest delays were disruptive: a component missing for two days can shut a line that costs thousands of pounds an hour to keep idle.



Source: ONS

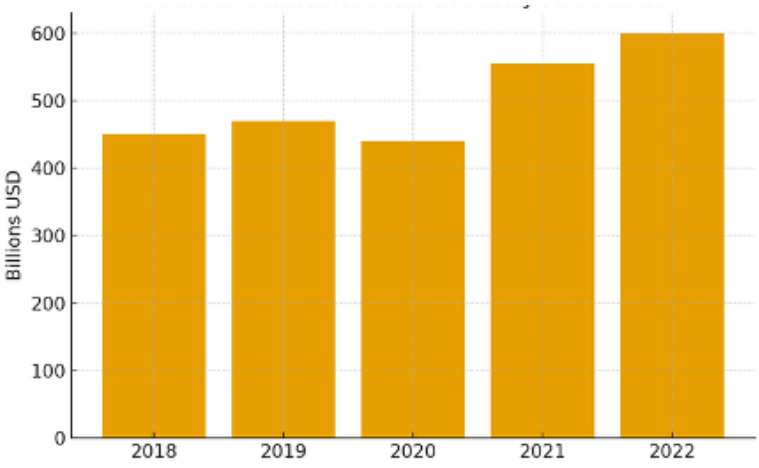
Figure 2 UK goods trade with the EU, 2018–2022

Microchips: the shortage inside the shortage

If you could point to a single component that defined the supply chain crisis, it would be the semiconductor. Cars, phones, consoles, microwaves, modern products are computers in disguise. During lockdowns, households upgraded devices while carmakers, anticipating a slump, cancelled chip orders. Foundries pivoted to phones and laptops. When car demand roared back, the industry discovered that chip capacity can't be conjured in a fortnight. New fabrication plants take years and billions to build; lead times for advanced chips stretched from weeks to many months.

For the UK, this translated into intermittent shutdowns at car plants that couldn't complete vehicles for want of a handful of chips worth a few pounds each. Globally, production

schedules were rewritten, model launches delayed, and product features trimmed. As Figure 3 illustrates, industry revenues rebounded strongly after an initial dip, evidence of surging demand, but that didn't mean chips were where they needed to be, when they were needed.



Source: Semiconductor Industry Association

Figure 3 Global semiconductor sales, 2018–2022

From ports to pallets: why bottlenecks multiply

A striking feature of the crisis was the way local bottlenecks created global consequences. A Covid-19 outbreak idled workers at a major Chinese port; suddenly ships diverted to other terminals, creating queues there. A shortage of warehouse staff in Britain slowed unloading; containers sat on chassis in port car parks, meaning hauliers had fewer trailers to turn. When the Suez Canal was blocked in early 2021, schedules slipped by days; the resulting wave of late arrivals swamped European ports already operating at the edge.

Economically, this is a network problem. Each node, a port, depot, truck fleet, or customs office, has a capacity constraint. If one node saturates, the queue spills upstream and downstream. Because firms had minimised spare capacity to cut costs, the network had little resilience. Think of it as running a city with just enough buses for an ordinary day, and then a concert finishes, and everyone tries to go home at once.

When supply shocks become inflation

Students typically meet inflation first as a demand-pull story: too much money chasing too few goods. The supply chain crisis was the other kind: cost-push inflation. With shipping, energy and inputs more expensive, the short-run aggregate supply (SRAS) curve shifted left. Output fell and prices rose. The result was uncomfortable: a squeeze on living standards at the same time as growth slowed.

This created policy dilemmas. Central banks raise interest rates to tame inflation, but tighter policy also cools demand, which can deepen a slowdown caused by a supply shock. Governments could lower some costs, for example, by temporarily cutting duties or smoothing border processes, but they couldn't magic chips or containers into existence. In the UK, the debate turned on how much of the inflation surge was temporary and how much might persist through second-round effects, such as workers bargaining for higher wages and firms raising prices to protect margins.

From just-in-time to just-in-case

By 2022 boardrooms had absorbed the lesson: resilience is not optional. Many firms began to diversify suppliers('China-plus-one'), hold more inventory of critical inputs, and near-

shore some production. What once looked like waste, a warehouse full of components, now looked like insurance. In industries where a single missing part can halt a whole factory, the premium is worth paying.

Policy followed. The EU advanced plans to expand chip manufacturing. The UK reviewed critical supply chains for medicines and medical devices and discussed stockpiles in strategic areas. Globally, logistics operators invested in digital tracking, data-sharing, and smarter scheduling to reduce the odds that the next shock becomes a pile-up.

Figure 4 captures firms lived experience: through 2021, a large share of UK manufacturers reported materials shortages and transport delays in official business surveys. The share has fallen since the peak but remains a warning that the system, while healing, is not invulnerable.

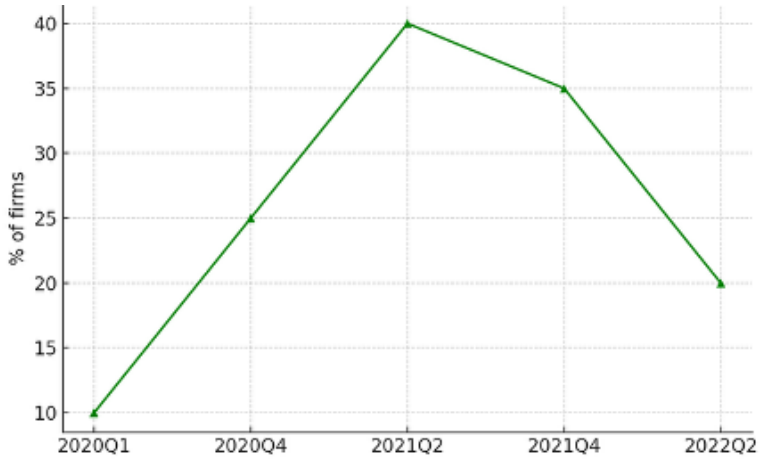


Figure 4 UK manufacturing firms reporting supply disruptions, 2020–2022

The economics beneath the headlines

Beyond the headlines, the crisis is a rich case study in core economic ideas:

- Opportunity cost and trade-offs: JIT minimised the cost of capital tied up in stocks; JIC spends more upfront to reduce the expected cost of disruption. The 'right' choice depends on the probability and size of shocks.

- Externalities and public goods: A firm that invests in resilient port access or better customs data helps not just itself but everyone using that infrastructure. That's why governments have a role in resilience, some benefits are non-excludable.

- Market structure: Highly concentrated sectors (like container shipping or advanced chips) can amplify shocks. When a few firms face outages, there's little spare capacity elsewhere.

- Expectations and coordination: If every retailer fears a shortage and orders extra 'just in case', the shortage can become self-fulfilling. Managing expectations, through credible information about stocks and deliveries, is part of policy.

- Global versus local risk: Diversifying suppliers across regions can be smart, but global shocks (a pandemic) hit all regions together. True resilience mixes geographic spread with local buffers.

What changed, and what didn't

Did the crisis kill JIT? Not quite. Where demand is predictable and transport reliable, lean systems still save money and keep prices down. The change is subtler: managers have learned to map critical nodes and add selective slack. A pharmaceutical firm might hold months of inventory for a handful of active ingredients and stay lean on everything else. A supermarket

chain may dual-source staples and sign capacity commitments with logistics partners that guarantee trucks when the next crunch arrives.

Consumers, too, have adapted. During the worst of the disruption, people switched brands, tried local substitutes, or accepted longer waits for big-ticket items. That flexibility, the ability to substitute, helped limit the economic damage. But it also exposed uneven impacts: low-income households, who spend a larger share of their budgets on food and energy, felt the squeeze most.

The UK's next test

For the UK, the long-run challenge is to combine open trade with robust logistics. That means investing in ports, roads and rail that move goods efficiently; streamlining border processes with trusted-trader schemes and digital customs; and building a skills pipeline for drivers and warehouse technicians. It also means embracing data: real-time visibility across supply chains helps firms anticipate trouble before queues form at the pump.

There is a geopolitical dimension, too. Energy security, food security and technology sovereignty have returned to the top of policy agendas worldwide. The UK will need to decide where to place strategic bets: in which sectors to encourage domestic capacity, and where to rely on resilient global partners.

Bringing it back to the forecourt

Return to that petrol queue. The lesson is not that people panicked or that one policy caused the crunch. It is that modern prosperity rests on systems we don't see, ships scheduled to the hour, containers lifted by the thousand, invoices that clear borders because a data field

is correct. Those systems delivered abundance so reliably that we stopped noticing them. In 2021–22 we noticed.

For students of economics, the episode brings diagrams to life. A negative supply shock shifting SRAS; a bullwhip effect magnifying small changes; a policy trade-off between fighting inflation and supporting growth; a recalculation of the efficient level of inventory when the probability distribution of shocks shifts. The story is not only about queues and empty shelves. It is about how choices under uncertainty, by firms and governments, shape living standards.

The post-pandemic world will still depend on global connections. But the balance has tilted. We have learned that efficiency without resilience is brittle, and that a little slack, wisely placed, is part of prosperity.

Hannah Holmes is Dean of the Business School at Manchester Metropolitan University and a member of the Economic Review Editorial Board.

Key points

- Just-in-time supply chains kept costs low but proved fragile in crises.
- The UK's supply chain crisis was worsened by Brexit frictions and labour shortages.
- Global shocks such as the pandemic and semiconductor shortages disrupted production worldwide.
- Supply shocks fuelled inflation through higher costs and restricted output.
- Businesses and governments are shifting from just-in-time to just-in-case models.

Specification links

global context; aggregate demand and supply; inflation