BEWARE DIWORSIFICATION: A FIRM- AND SUPPLY-CHAIN APPROACH TO TRADE RESILIENCE

THIERRY WARIN, PHD

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Thierry Warin, PhD[†]

Abstract/Résumé

This paper examines the often-invoked principle that diversifying international trade partners reduces economic risk, and argues that an uncritical application of this concept at the country level can be misleading. Using historical context and a simple theoretical model, we show that while spreading trade across many countries – akin to portfolio diversification – can mitigate idiosyncratic shocks, it provides little protection against systemic shocks and can mask dangerous concentrations at the firm and supply chain levels. Key insights include: (1) Countries do not trade; firms do – and export flows are often dominated by a small number of firms or commodities, so national diversification statistics may conceal micro-level vulnerabilities. (2) Simply increasing the number of trade partners yields diminishing returns in risk reduction, especially when partners' economies are correlated; more partners do not automatically mean less exposure. (3) A diversified macro-level trade profile does not ensure that individual firms or industries are diversified or resilient. We formalize these ideas in a mean–variance portfolio framework and illustrate how true risk reduction depends on having independent streams of trade (not merely multiple streams). Policymakers are cautioned to look beyond aggregate metrics: without examining who trades what with whom, efforts to diversify trade can create a false sense of security – a phenomenon akin to "diworsification" in finance. The paper concludes by suggesting a multi-level approach to trade diversification that emphasizes firm-level and supply-chain considerations for genuine economic resilience.

Cet article examine le principe souvent invoqué selon lequel la diversification des partenaires commerciaux internationaux réduit le risque économique, et soutient qu'une application non critique de ce concept à l'échelle nationale peut être trompeuse. En utilisant le contexte historique et un modèle théorique simple, nous montrons que si la répartition des échanges commerciaux entre de nombreux pays – comparable à la diversification de portefeuille – peut atténuer les chocs idiosyncratiques, elle offre peu de protection contre les chocs systémiques et peut masquer des concentrations dangereuses au niveau des entreprises et de la chaîne d'approvisionnement. Les principaux enseignements sont les suivants : (1) Les pays ne commercent pas ; ce sont les entreprises qui le font ; et les flux d'exportation sont souvent dominés par un petit nombre d'entreprises ou de matières premières, de sorte que les statistiques nationales de diversification peuvent masquer des vulnérabilités au niveau microéconomique. (2) La simple augmentation du nombre de partenaires commerciaux produit des rendements décroissants en termes de réduction du risque, en particulier lorsque les économies des partenaires sont corrélées ; un plus grand nombre de partenaires ne signifie pas

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automatiquement une exposition moindre. (3) Un profil commercial diversifié au niveau macroéconomique ne garantit pas la diversification ou la résilience des entreprises ou des secteurs individuels. Nous formalisons ces idées dans un cadre de portefeuille moyenne-variance et illustrons comment une véritable réduction du risque dépend de l'existence de flux commerciaux indépendants (et non pas simplement de flux multiples). Les décideurs politiques sont invités à regarder au-delà des indicateurs agrégés : sans examiner qui échange quoi avec qui, les efforts de diversification des échanges peuvent créer un faux sentiment de sécurité – un phénomène comparable à la « diworsification » en finance. L'article conclut en suggérant une approche multi-niveaux de la diversification des échanges, qui met l'accent sur les considérations au niveau de l'entreprise et de la chaîne d'approvisionnement pour une véritable résilience économique.

1 Introduction

By the turn of the twentieth century, globalization was gathering momentum. Innovations in transportation (like steamships and railways) and communications (the telegraph) had significantly reduced the barriers of distance. Capital and goods flowed across borders at levels never seen before: by 1913, merchandise exports approached 10% of global output (nearly double the share of a half-century earlier), a record high for the era. Many observers took this increasing interdependence as a sign that the world had become too economically intertwined to fall into large-scale conflict. International trade was supposed to bind nations together and make war prohibitively costly—a notion encapsulated in the era's conventional wisdom that commerce and peace went hand in hand. On the eve of World War I, global commerce had reached unprecedented levels for its time, tying the major powers of Europe together in a dense web of mutual dependence. British author Norman Angell famously argued in The Great Illusion (1909) that the economic interdependence between industrialized nations had made war not only unthinkable but fundamentally futile (Angell, 1909). In his view, no country could rationally expect to gain by starting a war in an era when conquest would destroy the very prosperity that trade had built. This optimistic belief – that extensive trade ties would insulate nations from the risks of conflict and upheaval – was widely shared in the years leading up to 1914.

Yet history delivered a harsh corrective. Despite the tight interlocking of their economies, the great powers plunged into a catastrophic war in 1914. By 1915, the press noted with dismay that "ten nations, more or less closely bound a short time ago by economic ties, are now involved in war". The collapse of peace in such an interconnected world revealed that trade interdependence alone had failed to prevent a systemic crisis. The very era held up as proof that commerce guaranteed stability had instead demonstrated how a global shock – in this case, a general war – could overwhelm economic bonds. In retrospect, the confident pre-war assumptions about risk insulation through trade were shown to be dangerously simplistic. International trade had indeed grown, but so too had the scale of risks that transcended individual bilateral ties. In the chaos of 1914–1918, global trade networks disintegrated as nations prioritized strategic imperatives over commerce, shattering the illusion that economic ties by themselves would avert disaster.

This historical episode provides a cautionary framing for modern discussions about trade diversification and risk. The early 1900s experience illustrates that even extensive diversification between countries does not automatically confer immunity to systemic disruptions. Today, policymakers often promote trade diversification – especially geographic diversification of trading partners – as a strategy for enhancing economic resilience. The logic appears straightforward: if a country trades with a wider array of partners, it should be less exposed to a shock originating in any single one of them. At a glance, this principle echoes the age-old wisdom of "not putting all eggs in one basket." Consequently, many national trade strategies set explicit goals to broaden export markets or import sources, assuming that more partners equate to greater security against volatility. This debate is more than academic: the supply and demand shocks experienced during the COVID-19 pandemic, as well as recent geopolitical tensions and trade disputes, have underscored the fragility

of tightly concentrated trade links. Trade wars – such as escalating tariffs between the US and China since 2018 – and geopolitical conflicts – like Russia's invasion of Ukraine in 2022 disrupting energy and grain supplies – have prompted calls for countries to "re-shore," "friend-shore," or otherwise rethink and diversify their trade relationships for security (U.S. International Trade Commission, 2020; Yellen, 2022). Policymakers across the world are striving to reduce dependence on single foreign suppliers and broaden export destinations. Yet without a clear understanding of what true diversification entails, these well-intentioned efforts risk giving a false sense of security. The portfolio diversification principle from finance might be invoked here—indeed, the idea of spreading investments to reduce risk is sound in theory (Markowitz, 1952)—but applying it simplistically at the country level in trade can embed implicit assumptions that lead to misguided policies. We must ask: under what conditions does broader trade connectivity actually yield greater safety, and when might it fail?

However, this paper argues that the common assumption that more partner countries equal less risk, when applied uncritically at the country level, can be misleading and may even engender false confidence. The analogy with the pre-WWI illusion is deliberate: just as early 20th-century leaders conflated extensive interdependence with assured stability, contemporary policymakers may conflate country-level diversification with genuine risk reduction. In reality, the relationship between diversification and risk is more nuanced. The efficacy of diversification depends crucially on how it is measured and at what level of economic activity. What looks like diversification at the national level may conceal dangerous concentrations and correlations beneath the surface. Without reframing diversification through a meso- or micro-level lens – that is, examining the composition of trade at the industry, supply chain, or firm level – policies based solely on macro-level indicators can misfire.

The central research question motivating this analysis is how trade diversification can be conceptualized and measured in a way that genuinely reduces risk. In particular, we investigate whether country-level diversification metrics accurately capture economic resilience, or whether a finer focus on firms and supply chains is necessary to identify where true vulnerabilities lie. By exploring this question, we aim to clarify the gap between the classic diversification logic and the real-world complexity of global trade.

This paper is structured as a critical examination of the implicit assumptions that often underlie the use of country-level trade diversification in policy discourse. In particular, we scrutinize three key assumptions that require careful rethinking:

- **Assumption 1: Countries are the primary units of trade.** Many discussions implicitly treat the nation-state as the basic unit in trade analysis, as if countries themselves trade with one another as monolithic entities. We examine why this assumption can be problematic, given that trade flows are in fact the aggregate outcome of myriad firm-level and sector-level transactions.
- **Assumption 2: More trading partners always equal less risk.** It is often assumed that increasing the number of bilateral trade partners will linearly reduce a country's exposure

to shocks. We challenge this notion by considering the nature of shocks (idiosyncratic vs. systemic) and the non-linearities and hidden correlations that can undermine the supposed benefits of having many partners.

- **Assumption 3: Macroeconomic diversification maps cleanly onto micro-level firm behavior.** Policymakers frequently act as though a diversified export/import profile at the national level implies that individual firms and industries are similarly diversified. We question this correspondence and explore how micro-level concentration and network structures can diverge significantly from macro averages.

In the following sections, each of these assumptions is analyzed in turn. We draw on theoretical insights and empirical evidence to illustrate how relying on these assumptions in isolation can lead to flawed policy prescriptions. Throughout, we emphasize that a re-expression of diversification metrics at the meso (industry or supply-chain) and micro (firm) levels is essential for capturing true economic resilience. After dissecting the assumptions and their implications, the discussion section returns to the historical example of pre-WWI trade interdependence. By revisiting that scenario with the benefit of our modern critique, we underscore the enduring lesson that broad connections at the country level can mask fragilities—specifically, the conflation of systemic and idiosyncratic risk exposures and the overestimation of risk resilience gained by simply expanding the count of trade partners. The paper concludes by summarizing the insights for contemporary trade policy and calling for more nuanced, multi-level approaches to understanding and managing trade-related risks.

2   Countries as the Primary Units of Trade: Reality or Artefact?

A fundamental assumption in much trade policy discourse is that countries themselves are the natural units of trade – in other words, that "Country A trades with Country B." In everyday shorthand and in many datasets, this is indeed how trade is recorded: exports and imports are tallied between nations. Policymakers often speak of diversifying trade by "finding new country partners" or "reducing dependence on Country X," implicitly treating nations as if they were unitary actors directly exchanging goods and services. However, this simplification, while convenient for macro-level analysis, can be misleading. Countries do not trade per se; firms and individuals do. What we label as trade between Country A and Country B is in fact the sum of countless transactions by private enterprises (and sometimes state-owned firms) operating within (or across) those two jurisdictions. Therefore, using countries as the primary units of analysis glosses over the rich microeconomic structure that underpins trade flows (Bernard, Jensen, Redding, & Schott, 2007; Eaton, Kortum, & Kramarz, 2011).

One immediate problem with the country-as-unit assumption is that it conceals who within the country is actually engaged in trade. A nation's exports might be generated by a broad base of companies and sectors – or they might be dominated by a handful of firms, or even a single industry concentrated in one region. Two countries could have identical export diversification

indexes at the national level, yet one might consist of many small exporters each sending goods to a variety of markets, while the other's exports come mostly from one large multinational. From a risk perspective, these scenarios are not equivalent at all. The latter country, despite an ostensibly diversified national export profile, is highly vulnerable to any shock affecting that dominant exporter or its sector. Country-level statistics would fail to register this vulnerability because they treat the nation as a homogeneous unit.

Empirical evidence underscores how stark the difference between macro and micro trade structures can be. In many economies, export activity is heavily concentrated in a relatively small number of firms. For example, in the United States, one study found that the top 1% of exporting firms account for more than 80% of U.S. export value, and the top 10% of exporters account for over 95% of exports (Bernard et al., 2007). Likewise, across a sample of dozens of countries (both advanced and developing), the top five firms often comprise roughly one-third of total exports on average (Freund & Pierola, 2015). Such concentration means that when we say "the country is diversified across 50 trading partners," it may really be the case that a few giant firms – perhaps each with operations or sales spanning many countries – are driving that diversification, while the vast majority of smaller firms are active in only one or two markets. Aggregating to the country level creates a statistical illusion of diversification that may not hold at the level where decisions are made and risks are actually borne. In extreme cases, a single company or commodity can dominate a nation's trade. For example, in some resource-dependent economies, one mineral or oil export (often controlled by one enterprise) might constitute the bulk of export earnings; the country's exports may nominally go to dozens of trading partners, but if all are buying the same commodity, the economy's fortunes hinge on that one market and product.

Another aspect obscured by treating countries as the primary units is the role of multinational enterprises and global value chains. Modern trade often involves complex supply networks that do not align neatly with national borders. A single multinational firm might produce intermediate components in Country A, assemble them in Country B, and distribute the final product from Country C to multiple markets. In trade data, this might appear as a web of bilateral flows between countries, but the underlying reality is that an internal supply chain of one firm (or a tightly coordinated network of firms) spans those borders. A significant share of global trade—by some estimates, one-third or more—occurs as intra-firm transactions within multinational corporations (OECD, 2011; WTO, 1996). Such flows are recorded as trade between countries in official statistics, yet they actually take place within the boundaries of a single company operating across borders. In these cases, the apparent diversification of trading partners in the data may not reflect truly independent counterparties, but rather the logistical network of a single firm. A corporate decision or disruption can thus simultaneously affect trade with multiple countries at once, a risk factor masked by country-level reporting. If policymakers view each bilateral flow in isolation – "we import X from Country B and Country C" – they might overlook that both sources ultimately trace back to a single corporate supply chain or to a single originating country for key inputs. In effect, country-level diversification can be more apparent than real when the same multinational entities or narrow supplier bases are behind the trade flows. Indeed, studies of trade in value-added

frequently reveal that supply chains are more concentrated than gross trade figures imply, as multiple countries' exports may rely on inputs from the same single source (Johnson & Noguera, 2012; OECD, 2021; UNCTAD, 2013).

The nation-as-unit assumption also tends to presume that countries act as unified rational agents in trade, adjusting exports or imports in response to policy as a whole. But in practice, trade policy incentives affect different firms in heterogeneous ways. Some firms are well-positioned to expand to new markets or adjust suppliers, while others are not. If a government signs a free trade agreement with a new partner country, it may anticipate that "the country" will diversify its exports to that market. Yet, if only a few large firms have the capacity or interest to take advantage of the deal, the diversification at the country level might be marginal. Meanwhile, smaller firms might continue exporting to their traditional markets (if they export at all) regardless of the new agreement. The aggregated country-level outcome might show a slight increase in the number of export destinations, giving the impression of diversification, but the micro-level reality would be that most firms' behavior remained unchanged (Eaton et al., 2011). Thus, policy conclusions drawn solely from the country aggregate can misidentify how trade patterns are evolving on the ground. Moreover, even when economic logic suggests a country "should" diversify (for risk reduction or profit opportunities), political and organizational factors can intervene. Industries may lobby to preserve established market ties; governments might prioritize certain strategic partners over pure economic diversification. All these internal dynamics underscore that nations are not monolithic entities single-mindedly pursuing diversification, but collections of actors with differing objectives.

In short, treating countries as the primary units of trade oversimplifies a complex reality. It ignores the internal concentration of trade flows among firms and industries, and it overlooks the intricacies of global supply chains that intertwine national economies. This assumption can lead policymakers to overestimate the degree of independent diversification they have achieved. A more meso- and micro-level perspective reveals that the true units of trade – firms, industries, supply chain nodes – may be far less diversified and more interdependent than the country-level figures suggest. Recognizing this is the first step toward designing trade diversification policies that actually mitigate risk, rather than merely achieving a numerical target for spreading trade across countries.

3 "More Trading Partners = Less Risk": Myth and Reality

A second prevalent assumption in trade diversification strategy is that increasing the number of trading partners invariably reduces risk. At first glance, this idea seems intuitively true and is analogous to basic principles of portfolio diversification in finance: the more independent sources of revenue or supply a country has, the less it should suffer from a downturn in any one of them. Many governments thus encourage firms to expand into additional foreign markets and seek to sign trade agreements with a wider array of countries, all with the aim of diluting dependence on a handful of partners. The underlying premise is that if one partner falters – due to an economic recession, a political crisis, or a supply disruption – other partners can compensate, thereby stabilizing the

overall trade income or supply. While there is some validity to this logic under specific conditions, as a blanket statement it oversimplifies the complex nature of risk in international trade.

The key phrase in the diversification analogy is "independent sources." The risk-reducing benefit of adding more trading partners critically depends on the new partners providing truly independent (or at least low-correlated) markets or supplies. If the fortunes of these partners are correlated (akin to assets in a portfolio being correlated) – for instance, if they are all tied to the same regional business cycle or global commodity price – then a shock that affects one is likely to affect many of them simultaneously. In such cases, simply having more partners does not guarantee resilience; it may amount to diversifying in name only. In financial terms, one would say the portfolio is not truly diversified if all assets are exposed to the same systemic risk. A classic example is a global economic crisis: during the 2008–2009 financial crisis, export demand fell across almost all major markets simultaneously. Germany, for example, trades with markets worldwide yet still saw its exports fall sharply during systemic crises (e.g., down 9.3% in 2020 amid COVID-19) (Destatis, 2021). Similarly, during the COVID-19 pandemic in 2020, supply chain disruptions and demand shocks were so widespread that no amount of geographic diversification of suppliers could fully shield countries from shortages and slowdowns. Likewise, an oil-exporting country may boast a wide range of buyers across different continents, but if global demand drops or oil prices crash, all those buyers will simultaneously scale back purchases; the diversification of customers offers little protection against a worldwide glut. On the import side, a country might source wheat from a dozen countries, yet a severe drought affecting multiple breadbasket regions or a spike in global grain prices would hit nearly all suppliers, leaving the importing country exposed despite its ostensibly varied sources. These examples underscore that when shocks are systemic rather than idiosyncratic, the advantage of having many trading partners largely evaporates – all "baskets" drop together, to extend the eggs analogy.

Even for idiosyncratic shocks – those affecting only one country or a narrow region at a time – the benefit of additional trade partners is not linear and can exhibit diminishing returns. The first few partners a country engages with may indeed dramatically reduce its concentration risk. For instance, if a country moves from one major export market to two, it has immediately created an alternative should demand in the first market weaken. However, going from, say, 20 to 21 partners might yield very little incremental risk reduction, especially if by that point the largest markets still account for the bulk of trade. In practice, trade flows are usually highly skewed: a country might trade with 50 others, but its top 3 partners could account for, hypothetically, 60–70% of its total trade value. Adding a 51st partner that comprises only 1% of trade will not change the exposure to a downturn in the top 3 in any meaningful way. Thus, counting trading partners without regard to the distribution of trade volumes can give a false sense of security. What matters more is the share of trade covered by the largest partners and how easily that trade could shift in the event of a shock.

Indeed, measures of trade concentration (such as the Hirschman–Herfindahl Index) are often more informative for risk than a simple partner count (Hirschman, 1945; Herfindahl, 1950). A country with 10 fairly equally balanced trading partners is in a more resilient position than one

with 50 partners where one dominates all the rest. Policymakers sometimes conflate the two, celebrating an increase in the number of export destinations or import sources as an achievement in diversification, without noting whether the overall concentration of trade has actually decreased. Moreover, typical diversification indicators do not capture the correlations among trading partners. A country could have a balanced spread of export destinations, yet if those destinations' economies move in sync (highly correlated business cycles), the country's export earnings will still be volatile. In technical terms, the 'covariance' of partner outcomes matters as much as the distribution of export shares. Simple counts or even an HHI can overlook this. In practice, such covariance is often positive during global downturns, as discussed earlier. One implication is that policymakers and analysts should complement traditional diversification metrics with analyses that consider the likelihood of partners experiencing simultaneous distress. Tools borrowed from finance (like portfolio variance models) or network science can be useful in this context, helping to identify clusters of interdependent markets. Incorporating these approaches could lead to new, more informative indicators of trade resilience, beyond just partner counts or share-based indexes.

If diversification is pursued in a superficial way – for instance, encouraging companies to make token entries into many small markets just to "check the box" – it might only marginally improve the true diversification. Worse, it could introduce new costs or complexities (managing more trade relationships, complying with more regulatory regimes) without substantial risk reduction benefits. For businesses, diversification is not costless: each new export market or import source brings entry costs and operational complexity. Small and medium-sized enterprises, in particular, face high fixed costs to establish distribution channels and comply with foreign regulations, which they can ill afford if the expected sales in those markets are minimal. Thus, a firm that expands into many tiny markets may find itself overextended, incurring costs that outweigh the benefits. In extreme cases, chasing a target number of markets could even undermine a firm's core competitiveness by diverting attention and resources from its primary strengths. In other words, this is diversification done badly – what the legendary investor Peter Lynch famously termed "diworsification," where adding more holdings (or markets) actually worsens the risk–return tradeoff (Lynch & Rothchild, 1989). The same principle applies here: expanding into markets that a firm cannot support or that add negligible independent value can reduce overall performance. From a policy perspective, this means that promoting diversification should be about achieving meaningful alternative linkages, not just an impressive tally of partners.

Another trap in the "more partners, less risk" mindset is ignoring the capacity for substitution among partners. Having ten suppliers for a critical input is only protective if those ten can genuinely substitute for each other when needed. If nine of them are operating at full capacity under normal conditions and cannot easily ramp up output, then the failure of the tenth supplier (due to, say, a factory fire or a local crisis) might still cause a shortage. In other words, the resilience value of multiple partners hinges on flexibility and slack in the system, not just on count. In global supply chains, lean inventories and just-in-time production can mean that even diversified supplier bases have little surge capacity in a crisis. This became evident, for example, in the aftermath of certain natural disasters (like the 2011 Tōhoku earthquake in Japan) which knocked out one supplier of

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a specialized component: even companies that sourced that component from multiple countries faced difficulties, because all sources were strained and the component was not easily replaceable (Boehm, Flaaen, & Pandalai-Nayar, 2019; Carvalho, Nirei, Saito, & Tahbaz-Salehi, 2021). Thus, a nuanced analysis would examine not just how many partners exist, but how interdependent they are and what functional role each plays.

From a meso-level perspective (industry or regional networks), the assumption of risk reduction through partner count can be further challenged. Industries often have clustering dynamics – a given high-tech industry's supply chain might be regionally clustered in East Asia, for instance. A manufacturer might diversify its final assembly across several countries, yet all of those assembly plants rely on semiconductor chips from the same single hub. Here the industry-level lens reveals that diversification at the country level (different assembly locations) does not equate to diversification at the supply chain level (the chip source is concentrated). Similarly, on the demand side, several countries might constitute a firm's major export markets, but if those countries' economies move together (say, through financial linkages or commodity dependence), the firm is effectively exposed to one large synchronized market rather than many independent ones.

In sum, the notion that "more trading partners automatically means less risk" is an oversimplification. It holds true only under conditions of low correlation between partner economies and when trade volumes are more evenly spread – conditions which are often absent in reality. Policymakers should be wary of relying on partner count as a crude indicator of resilience. A deeper look at how much is traded with whom, the nature of those partners (size, economic structure, cyclical synchronicity), and the flexibility within those trading relationships is crucial. By incorporating a meso-level understanding of supply chain structure and a micro-level understanding of firm behavior, one can better assess which forms of diversification genuinely contribute to resilience and which are mostly cosmetic.

4 Macroeconomic Diversification vs. Micro-level Behavior

A third assumption that demands scrutiny is the belief that diversification observed at the macroeconomic level – across a country's whole export basket or set of trading partners – directly reflects diversification at the micro-level, such as the behavior of individual firms or the risk exposure of specific industries. In other words, policymakers often take a diversified national trade profile to imply that firms on average are spreading their risks in similar ways. This assumption underpins many policy narratives: if the country as a whole exports a broad mix of products to many markets, it is often presumed that its companies are broadly resilient, and by extension, the economy is secure. Unfortunately, this one-to-one mapping between macro patterns and micro behavior is more the exception than the rule.

In reality, macro-level diversification can emerge from very specialized micro-level behavior. A country might export 100 different products to 50 different countries, giving an impression of high diversification. Yet this could be the sum of numerous highly specialized firms and industries, each focusing on a narrow slice of that portfolio. For example, one set of firms might specialize

exclusively in agricultural commodities sold mainly to neighboring countries, another set might be in mining with entirely different trading partners, and a third cluster could be manufacturing firms each focused on their particular niche markets abroad. Each group, taken in isolation, might be quite concentrated in terms of products and destinations. But when aggregated, the country appears diversified because those concentrated niches are simply different from each other. The macro statistic (100 products, 50 countries) would suggest broad diversification, but most individual firms within that economy could remain extremely dependent on a single product–market combination. The risk is that a shock hitting one of those combinations – say a collapse in demand for a certain commodity in the neighboring countries – could devastate the firms involved, even if the effect on the national export earnings is partly cushioned by other sectors continuing unaffected. From a policy perspective, the pain would still be very real in the affected region or sector, and could warrant intervention, yet it might be obscured by rosy aggregate indicators.

Another way to phrase this disconnect is that diversification at the macro level does not guarantee risk-sharing at the micro level. Different firms face different risk profiles, and they do not automatically insure each other against shocks. If one industry suffers a downturn, workers and capital in that industry bear the brunt of the impact. Others may not be affected, which means the country's overall GDP or export revenues might not fall dramatically – an averaging effect masks the localized crisis. Policymakers who focus only on aggregate outcomes might thus underestimate vulnerabilities. A nation might look stable because losses in one sector are offset by stability elsewhere, but that is cold comfort to those directly hit, and it can become a broader issue if distress in one sector spills over (through unemployment, financial contagion, or political pressure). A nation's economy is a collection of many moving parts, and smooth aggregate performance can belie great turbulence among some of those parts.

Micro-level behavior in trade is driven by firm-specific strategies and constraints that often diverge from the diversified ideal envisioned by macro-level policy. Firms typically seek out foreign markets where they have a competitive edge and then often concentrate on their most profitable products and trading partners. Entering and establishing a presence in multiple markets is costly – it requires learning about local regulations, setting up distribution, tailoring products to local tastes, and bearing fixed costs. Many firms therefore export to only a handful of countries, even if others are theoretically accessible. As a result, it is common to find that the median exporting firm sells to only one or two foreign markets, while a rare few "superstar" firms export to dozens of countries. This skew means that the broad geography of a country's exports is usually attributable to a small fraction of firms. Those superstar firms may themselves be diversified across markets, but even within a single firm, diversification has limits: companies often have core markets that represent a disproportionate share of their sales. Moreover, some of the largest multinational enterprises manage risk not by spreading thinly across every country, but by focusing on key strategic markets and building robust operations there. Their diversification is partial – maybe a handful of major regions – rather than encompassing all possible markets (Eaton et al., 2011; Bernard et al., 2007; Freund & Pierola, 2015).

Indeed, the prominence of a few firms in underpinning macro-level diversification means that

shocks to those firms can reverberate at the national level. If one of these heavyweight exporters experiences a major disruption – for example, a factory accident, a product recall, or the loss of a key foreign buyer – it can cause a noticeable fall in the country's overall exports. In effect, what appears as a diversified export base from a macro viewpoint may be dangerously reliant on the smooth functioning of a handful of companies. Empirical research has highlighted this "granular" phenomenon, showing that idiosyncratic shocks to top firms can significantly impact aggregate economic outcomes (Gabaix, 2011). Such vulnerabilities remain hidden when one only considers aggregate diversification, underscoring again that true resilience requires looking at the fine-grained structure of trade.

The same principle applies to import sourcing and supply chains. A government might take comfort in the statistic that "our imports of critical input Y come from ten different countries, with none providing more than 30% of the total." But if we delve deeper, we might find that there are only a couple of foreign suppliers of input Y that all happen to have production facilities in multiple countries. The micro reality is that domestic firms rely on a very limited set of foreign companies – perhaps even a single multinational – for that input, even though customs data list ten source countries. Should that multinational's production be disrupted (due to a technical issue or a firm-level decision), the fact that its plants are spread across many countries offers little consolation; the supply could drop across all those countries at once. This hypothetical illustrates how macro diversification indicators can mislead: the diversification across countries in import data gave an illusion of security that does not hold once we identify the micro source of risk (OECD, 2011; WTO, 1996).

To properly map macro diversification onto micro resilience, one needs to incorporate both firm-level and network-level analyses. At the firm level, one could examine metrics like the average or median number of export markets per firm, or the distribution of export shares across a firm's clientele. At the industry (meso) level, input–output relationships and supply chain structures reveal points of concentration that country-level trade data hide. For instance, an economy might boast a diverse set of export industries, but if several of those industries all depend on one upstream component or technology (perhaps patented by a single foreign firm), then there is a common micro-level dependency underlying the macro diversity. Traditional trade statistics would not flag this vulnerability, because each industry's imports of that component might be small in value terms and spread across different trade categories. It requires a meso-level lens, examining the production network, to spot that single point of failure. From an economic standpoint today, adopting a meso-level lens means mapping out supply chain networks to spot critical nodes of dependence. To illustrate, consider the global semiconductor supply chain: a handful of firms in a few countries produce the bulk of the world's advanced microchips. A nation may diversify its import of electronic devices across many trading partners, but most of those devices may rely on chips made by the same single source. If that source is disrupted, the diversified import list offers scant protection – all products that depend on that source will be affected, regardless of which country they were purchased from. The 2021 semiconductor shortage in the aftermath of the COVID-19 pandemic starkly demonstrated this vulnerability. Indeed, automakers were

forced to cut production worldwide—losing an estimated \$210 billion in revenue in 2021 due to the chip shortage (AlixPartners, 2021). In this case, automakers around the world, despite procuring parts from numerous countries, faced simultaneous production halts because so many of those parts depended on chips from just a couple of key producer countries (UNCTAD, 2013). Only an industry-level analysis would reveal this risk. Recognizing such patterns can inform more effective policies, such as investing in alternative supply sources or maintaining strategic inventories of critical components, rather than assuming that a multitude of supplier countries automatically guarantees security.

In short, macroeconomic diversification metrics are at best rough proxies for the underlying distribution of risks. Assuming that what holds true at the aggregate level also holds true at the micro level can lead to blind spots. An uncritical use of country-level diversification measures might lull policymakers into believing the economy is more resilient than it actually is, as they overlook concentrated exposures brewing beneath the surface. The challenge is to re-express diversification in terms that capture these micro and meso realities – whether through new metrics or through qualitative assessments – so that trade policy can address not just the breadth of ties between countries, but the depth and nature of the ties that really matter in a crisis.

5 Formal Model

To solidify these points, we can cast trade diversification in the formal framework of Modern Portfolio Theory (MPT) – a concept pioneered by early financial mathematicians like Louis Bachelier and later formalized by Harry Markowitz. Bachelier's turn-of-the-century work introduced the idea that financial fluctuations could be modeled probabilistically, laying the groundwork for quantitative risk analysis (Bachelier, 1900). Building on such foundations, Markowitz (1952) developed the theory of portfolio selection, which gave mathematical teeth to the old adage "don't put all your eggs in one basket" (Markowitz, 1952). In the Markowitz framework, an investor (or by analogy, an exporting country or firm) faces a choice of how to allocate resources among multiple assets (or export markets), each with an expected return and a risk (variance of returns). The core insight is that the risk of the aggregate portfolio is not the sum of risks of individual components, but depends crucially on their covariance. In other words, diversification can reduce overall risk, but the extent of risk reduction hinges on how the components co-move with each other.

We can formalize this in the context of trade. Consider an exporter (a country or a firm) that sells to N different foreign markets. Let X_i be the (random) revenue or growth derived from exports to market i (expressed as a deviation from its mean), and let w_i be the share of that market in the exporter's total exports (so $\sum_{i=1}^{N} w_i = 1$). The total export revenue can be viewed as a portfolio: $X_{\text{total}} = \sum_{i=1}^{N} w_i X_i$. The expected total (by linearity) is $\mathbb{E}[X_{\text{total}}] = \sum_i w_i \mathbb{E}[X_i]$, while the variance of total exports is:

$$\text{Var}(X_{\text{total}}) \;=\; \sum_{i=1}^{N} \sum_{j=1}^{N} w_i \, w_j \, \text{Cov}(X_i, \, X_j). \tag{1}$$

Equivalently, using $\sigma_i^2 = \mathrm{Var}(X_i)$ and $\rho_{ij} = \mathrm{Corr}(X_i, X_j)$, we can express the variance as:

$$\mathrm{Var}(X_{\text{total}}) = \sum_{i=1}^{N} w_i^2, \sigma_i^2 + 2\sum_{i<j} w_i w_j, \sigma_i, \sigma_j, \rho_{ij}, . \tag{2}$$

This equation is formally identical to the mean–variance portfolio risk formula in finance. It makes clear that two factors determine the total risk: the individual volatilities of each market (the σ_i terms) and the pairwise correlations between markets (the ρ_{ij} terms). An exporter heavily exposed to one market (a large w_i) will have high risk largely driven by σ_i^2. An exporter evenly spread across many markets (lower w_i^2 terms) can reduce the first part of the sum (a measure of concentration), but the second part involving correlations can undermine these gains if the ρ_{ij} are high. Markowitz showed that because of these covariance terms, the contribution of each asset (or market) to overall risk is what matters – not its standalone risk in isolation. In portfolio terms, an asset that is volatile can still reduce risk if it tends to move in the opposite direction of other assets; conversely, even a safe asset provides little diversification benefit if it fluctuates in sync with the rest.

Several illustrative special cases emerge from the above formula:

- **Perfect correlation (no diversification gain):** If all markets move together perfectly ($\rho_{ij} = 1$ for all i, j), then the variance formula simplifies to $\mathrm{Var}(X_{\text{total}}) = (\sum_i w_i \sigma_i)^2$. In the extreme homogeneous case where each market has the same volatility σ and the exporter spreads exports equally ($w_i = 1/N$), this further simplifies to $\mathrm{Var}(X_{\text{total}}) = \sigma^2$. In other words, with perfect positive correlation, N markets are effectively one big market – there is no risk reduction at all from having many partners. This corresponds to the notion of a purely systematic shock: a single risk factor (common to all markets) dominates the variance. A real-world example would be a global recession that causes demand in all export markets to contract simultaneously. No matter how many countries one exports to, if their business cycles are perfectly synchronized, the exporter's total earnings will rise and fall as if there were just one market.

- **Zero correlation (maximal diversification gain):** If each market's fluctuations are completely independent ($\rho_{ij} = 0$ for $i \neq j$), the covariance terms drop out. The total variance becomes $\sum_i w_i^2 \sigma_i^2$. In the equal-weights, equal-volatility scenario, $\mathrm{Var}(X_{\text{total}}) = \frac{1}{N}\sigma^2$. Thus, the standard deviation (risk) of the total exports is $\sigma/\sqrt{N}$, implying that risk decreases with the square root of the number of independent markets. Intuitively, independent ups and downs in different markets average out, making the aggregate outcome more stable. In the limit of a very large number of truly uncorrelated markets, idiosyncratic fluctuations would wash out almost entirely. This is the classical "not all eggs in one basket" result: with enough unrelated baskets, the impact of any single broken egg (market downturn) is negligible. However, such a scenario of zero correlation is an idealized benchmark rarely met in reality – especially in an interconnected global economy.

- **Intermediate correlations and diminishing returns:** In the general case, correlations lie between 0 and 1, and typically some markets (especially those in the same region or influenced by common global trends) will have positive correlation. Here we see diminishing marginal risk reduction as N increases. For example, if each pair of markets has a modest positive correlation $\rho > 0$, one can show that adding more markets still lowers the variance, but only up to a point. In fact, if we assume equal shares and identical σ for simplicity, the above formula yields $\text{Var}(X_{\text{total}}) = \sigma^2 \frac{1+(N-1)\rho}{N}$. As N grows large, $\text{Var}(X_{\text{total}}) \to \rho\,\sigma^2$. This means the risk approaches a floor determined by ρ, the average correlation. The portion of volatility that is common across partners (the systematic component) cannot be diversified away. Only the idiosyncratic portion (the part uncorrelated with others) shrinks with more partners. In practical terms, the first few new trade partners may significantly reduce volatility (as they contribute largely independent demand sources), but beyond a certain number, additional partners add progressively less risk reduction. The exporter's trade portfolio becomes dominated by the global cycle or other shared factors. This formalizes the intuition from earlier: diversification has diminishing returns when correlations are present, and it provides no protection against a shock that hits all markets at once.

Another insight from the portfolio model is the importance of the weight distribution (the w_i's). Even with many partners, if the distribution is highly uneven – say one or two partners constitute the bulk of exports – the diversification benefit will be limited. The term $\sum_i w_i^2$ (which is essentially the Hirschman–Herfindahl Index (HHI) for export concentration) acts as a penalty on risk reduction. A perfectly balanced export portfolio (all $w_i = 1/N$) minimizes this term, whereas a lopsided portfolio (one w_i close to 1) maximizes it. In the latter case, the variance is dominated by the largest partner's variance and its correlations with others. This underscores why simply counting the number of trading partners is an inadequate measure of diversification – one must account for how evenly trade is distributed among them. Two countries might each trade with 20 partners, but if one has equal 5% shares across all 20 while the other has 90% of its trade with a single partner and 19 others sharing the remaining 10%, their risk profiles differ drastically. In portfolio terms, the second country has a highly concentrated position masquerading as a diversified one. No surprise, its aggregate risk will be almost as high as if it had only that one dominant partner (Herfindahl, 1950; Hirschman, 1945). Relatedly, entropy-based measures provide an alternative lens on concentration/diversification that is sensitive to the entire distribution rather than just squared shares (Shannon, 1948; Theil, 1967).

It is worth noting that this framework can be applied at multiple levels of analysis. At the firm level, one can interpret w_i as the share of a single company's sales in market i, and X_i as its sales fluctuation in that market. The same risk formula would describe the volatility of that firm's total revenue. A firm that relies on only one or two markets has a high $\sum_i w_i^2$ (a concentrated sales base) and is vulnerable to those markets' swings, whereas a firm with a more balanced global sales portfolio (lower $\sum w_i^2$) can stabilize its revenues—so long as its markets aren't all hit by the same shock. Now, at the country level, think of the national export basket as the sum

of all firms' export portfolios. The country's effective w_i for a given market reflects how many firms (and how much output) depend on that market. If many firms concentrate on Market 1, the country's aggregate w_1 will be large, and the country's trade volatility will closely track Market 1's fortunes. If instead different firms specialize in different markets, the country's overall exports are more buffered—when one market slumps, only the firms tied to it suffer, while others in different markets may still do well. In this sense, the macro variance formula has an analogy in a two-level diversification problem: diversification by firms across markets, and diversification of the economy across firms. The country-level risk will depend on both the diversification of individual firms and the composition of the export sector by firm. This layered structure means that micro-level concentration (a few firms or markets dominating) can transmit into macro volatility. Conversely, if different firms specialize in different markets, they provide a form of insurance for the aggregate economy by offsetting each other's downturns. This underscores again why looking at micro data is crucial: a nation's true exposure to a given market shock depends on how many of its firms and industries are tied to that market.

Summing up the formal perspective: Diversification can indeed reduce trade risk, but only to the extent that trade flows are spread across truly independent streams. The mathematics of MPT, inspired by Bachelier's stochastic modeling and articulated by Markowitz, tells us that what matters is not just how many partners a country has, but how much their fortunes differ. Idiosyncratic (partner-specific) risks can be "washed out" through diversification, but systemic risks remain as an undiversifiable core (Markowitz, 1952). This formal model echoes and supports the arguments raised in the previous sections: focusing on country counts alone is insufficient, and hidden correlations or concentrations can nullify the presumed benefits of having multiple trading partners.

6   Discussion

The foregoing critique of uncritical country-level diversification can be cast in a broader perspective by returning to the historical scenario that opened this paper. The example of early 20th-century trade interdependence – the world of 1913 – encapsulates many of the pitfalls identified in our analysis. Leaders and intellectuals before World War I looked at the dense network of trade and financial ties binding the great powers and concluded that those macro-level linkages would prevent any one country from rationally choosing war. In essence, they assumed that the extensive country-level diversification of economic relations (Assumption 2) guaranteed a form of stability, and that nations as unitary actors would be guided by the aggregate economic interest (Assumption 1). Moreover, they believed that the pacifying effect of interdependence at the system level would operate through the actions of firms and financiers who, enjoying the fruits of global commerce, would supposedly act to avert conflict – effectively presuming a macro-to-micro transmission of rational behavior (Assumption 3). These assumptions, as we now know, did not hold: systemic forces overwhelmed the logic of diversification, and the outbreak of a general war demonstrated that the relationship between economic ties and risk was not as simple as they had imagined. In

subsequent decades, this realization led to efforts to build systemic safeguards beyond reliance on market forces alone—evident in the creation of international institutions after World War II to regulate trade and finance, aiming to prevent economic collapse from spilling over into conflict again. Such efforts acknowledged that stability required conscious coordination and rules, not just the invisible hand of interdependence.

The collapse of the "Great Illusion" in 1914 provides a vivid illustration of the danger of conflating systemic and idiosyncratic exposures. Prior to the war, it was true that no single bilateral break in relations would have made economic sense given the interdependence – that is, an idiosyncratic conflict between any two trading partners would have been costly to both. However, the risk that materialized was not an isolated break but a systemic conflagration that engulfed most major economies simultaneously. The interconnections that were supposed to provide resilience turned out to be channels of contagion: once war began, it spread through alliance obligations and security dilemmas, leading to a cascade of trade disruptions. Countries that had many trading partners did not find safety by turning to alternative markets or suppliers, because the war's reach was so broad that nearly all those partners were either directly involved in the conflict or indirectly crippled by its effects (via blockades, financial crises, etc.). In short, the systemic exposure – a general war – swamped the benefits of diversification that would hold in more limited, idiosyncratic crises. The pre-WWI belief that partner diversification equaled risk insulation was tragically disproven. Just as having ten trading partners in 1913 did not save a country from collapse of trade in 1914–1918, so today, a country that adds trading partners without understanding the structure of its dependencies may find that those numbers offer little protection in a truly global shock. When policymakers focus myopically on increasing partner count as a metric of success, they risk ignoring lurking correlations and common exposures that can render that count meaningless in a crisis.

Modern parallels to this insight are not hard to find. Consider global financial crises, pandemic-related disruptions, or worldwide commodity shocks – events in which virtually all markets move together. A country can trade with dozens of partners and still see its exports and imports plummet if the shock is global. The systemic nature of such events means that resilience must be sought in ways other than just expanding the roster of partners. These could include building buffers (financial reserves, strategic stockpiles of critical goods), coordinating international responses, or diversifying at deeper levels (such as ensuring multiple technologies or production processes can supply a need, not just multiple countries on paper). For example, global crises often necessitate systemic responses like coordinated fiscal stimulus or central bank swap lines, as no pattern of trade diversification alone could offset a simultaneous collapse in demand. Conversely, to guard against an idiosyncratic shock—say, the failure of a single supplier or a sudden downturn in one export market—a country benefits from having fallback options, whether in the form of strategic reserves or ready alternative trading partners. However, as emphasized, those alternatives provide security only if they possess the capacity and willingness to compensate when the primary link falters, which circles back to the importance of genuine diversification rather than surface-level spread.

These insights bear directly on today's policy choices. Consider the push for "friend-shoring" – redirecting supply chains to allied or friendly countries to mitigate geopolitical risks. While this strategy aims to reduce dependence on any single rival nation, its effectiveness hinges on whether it actually diversifies supply sources or simply shifts concentration to a different set of countries. If all "friendly" suppliers are similarly exposed to a common shock (geographic, technological, or otherwise), then friend-shoring could end up as a cosmetic change, not a substantive risk reduction. Likewise, "re-shoring" production back home may protect against foreign disruptions but concentrates risk domestically and can sacrifice the benefits of global specialization. Our analysis implies that each of these approaches must be scrutinized through the micro-meso lens: will they create new independent streams of trade, or just rearrange existing ones? Truly enhancing resilience might require measures beyond partner diversification—such as developing alternative technologies, building strategic stockpiles for critical inputs, or cooperative agreements for crisis support—so that even systemic shocks can be absorbed (UNCTAD, 2013; Yellen, 2022). In short, the key is to diversify what really matters (supply lines, technologies, and capabilities), not just the flags attached to trade flows.

7 Conclusion

In this paper, we have critiqued three implicit assumptions that often accompany the advocacy of country-level trade diversification as a risk management tool. We showed that treating countries as the primary units of trade can conceal critical concentrations and interdependencies at the firm and supply-chain levels. We argued that simply increasing the number of trading partners does not always equate to less risk, especially in the face of correlated shocks and uneven trade distributions. We also demonstrated that macro-level diversification does not automatically translate into diversified behavior or resilience at the micro level. Through historical and contemporary examples, we illustrated how these assumptions, if left unexamined, can lead to policy errors – specifically, policies that overestimate the robustness gained by expanding trade links and underestimate the underlying vulnerabilities that persist.

Above all, our critique serves as a reminder that policy must be guided by a realistic understanding of how trade actually operates. Failing to account for the microeconomic underpinnings and network characteristics of trade can lead to strategies that look good on paper but falter under stress. As the global economy navigates an era of heightened uncertainty—from pandemics to geopolitical rivalries—implementing the lessons from this analysis will be crucial. The challenge is significant, but so are the stakes: getting diversification right can mean the difference between an economy that bends in the face of shocks and one that breaks.

Going forward, an important area for research and policy development is the creation of metrics and diagnostic tools that integrate micro- and meso-level information. For example, stress-testing an economy's trade network under various scenarios could reveal hidden fragilities that aggregate statistics miss. Likewise, firm-level data can shed light on barriers to diversification that companies face in practice, informing more targeted support programs. By aligning trade policy design

with insights from network analysis and firm behavior, governments can better promote forms of diversification that truly enhance resilience.

Ultimately, the goal is to avoid the complacency that comes from misleading aggregates. The world of international trade is complex, and robust policy must embrace that complexity rather than simplify it away. A century ago, the world learned that extensive trade ties did not prevent a devastating war; today's policymakers must ensure that they have learned that lesson well. True insulation from risk comes not from the mere existence of many connections, but from the nature of those connections and the flexibility and redundancy built into them. By grounding trade diversification policies in micro-level reality and meso-level context, countries can better prepare for future disruptions – and avoid repeating the mistakes of the past. Policymakers, like prudent investors, must also beware of "diworsification" – diversification efforts that create a false sense of security without addressing core vulnerabilities.

Looking ahead, refining the analysis of trade diversification remains an important task. Traditional metrics can be improved by incorporating information on cross-market correlations and the network structure of supply chains. Future research could develop composite risk indices that flag when a country's trade network has hidden single points of failure. Empirical studies comparing how countries fared during recent shocks – based on their firm-level trade structures – would be especially illuminating. Such work would help translate the conceptual insights of this paper into concrete policy tools. Ultimately, a better understanding of diversification's nuances will enable policymakers to distinguish between superficial spread and substantive resilience, ensuring that efforts to secure their economies against shocks achieve the intended results.

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