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DATA LOCALIZATION AS A BARRIER FOR SMALL FIRMS: THE IMPACT OF FIXED COMPLIANCE COSTS AND THE LIMITATIONS OF WTO LAW

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Abstract

Institutional cronyism adversely affects an organization's merit-based By early 2023, data localization had evolved from a patchwork of sectoral regulations into a complex global mosaic. By then, nearly 100 data storage requirements had been implemented across 40 economies, and over two-thirds of those measures combined local storage with an outright ban on cross-border transfers. This article contends that both major framings of that expansion, as a tariff-equivalent trade barrier and as an act of regulatory sovereignty, miss the mark on the mechanism that determines who actually pays. Notably, localization compliance costs are far more rigid and do not vary with output. It thus acts as a regulatory MES (minimum efficient scale): a turnover threshold at which joining a foreign digital market is not profitable. The fixed-cost structure suggests effects above 10% of turnover for small micro-enterprises, but less than half a percentage point for larger companies with turnover exceeding EUR 50 million. The article then considers whether WTO law can level that asymmetry. While an affirmative response is an ideal normative outcome, it concludes that this is not possible in the current context. The Agreement on Electronic Commerce was pushed toward entry into force under interim arrangements adopted by 66 Members at the Fourteenth Ministerial Conference in March 2026, but it does not mention data flows or localization; instead, the Agreement on Electronic Commerce is left as a residual governing law under the 1995 General Agreement on Trade in Services. Structurally, GATS analysis is a mismatch, as the necessity test queries a measure's design rather than its incidence across firms of various sizes. Meanwhile, hyperscale cloud companies have reacted by re-verticalizing: their presence in Asia through sovereign subsidiaries, licensed local operators, and jurisdictionally segmented regions comes at a 10-20% premium, higher than most remaining, documented tariffs on merchandise trade. That answer alleviates the problem for large enterprise buyers, but it also renders the small-business downside built into the infrastructure layer itself. The article suggests that there is a size-indexed proportionality principle, the most promising path for reform, already evident in Chinese and Vietnamese practice.

Keywords: Trade Fragmentation; Data Localization; Small and Medium-sized Enterprises (SMEs); WTO Laws; Cross-Border Data Flow

1. Introduction

Over the past 10 years, the internet's regulatory landscape has been remapped twice. The first redrawing was normative: the number of jurisdictions with a general data protection statute increased to 172 (84% of the 203 United Nations members), at an average rate of 5.4 new laws per year between 2015 and 2025 (Greenleaf, 2025b). The second was geographical. Governments shifted from regulating how data could be used to regulating where data could be stored. As of late 2023, there were nearly a hundred explicit localization requirements in forty OECD economies, with over two-thirds at the highest level of regulation: a requirement for local storage combined with a ban on outbound transfer (Greenleaf, 2025a). The proportion of non-OECD economies was about 70%, and their measures were on average stricter. Two literatures have emerged around this change, and they do not speak to each other. The trade economics literature treats

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localization as a non-tariff barrier to trade, estimating aggregate costs that, in turn, bias estimates of effects on productivity, services trade, and downstream prices (OECD, 2023b). According to legal literature, the issue is debated as a matter of regulatory autonomy, or whether the mandate passes the test under the General Agreement on Trade in Services and its exceptions (Ferracane et al., 2020). Both are internally coherent. Both miss the point about who pays for gains from digital trade: who pays what and who pays more or less than who can pay.

This article addresses that question. The core argument is that the cost of complying with the localization policy is inherently predetermined and cannot be controlled; further, this differentiator is what allows the policy to define what is unique about it. Requiring a copy of the data centre within a territory, designating a data protection officer who lives in the jurisdiction, running a transfer impact assessment, obtaining a regulator's clearance, or securing a separate cloud refuge all come with costs and have little relation to the volume of business conducted. The result is a minimum efficient size for the regulator. At lower turnover, expected returns do not exceed the cost of legal access to a foreign market, and the firm leaves or never enters the market in the first place. Localization does not simply raise trade costs. It categorizes companies by size. Three propositions follow, and they structure the argument. First, localization is highly regressive: the Ratio of the tax rate on small versus large information-technology firms is about 2.6 to 1, based on a bounded estimate of the tax-rate impact using GDPR as a natural experiment. Second, WTO law cannot correct this asymmetry. This Agreement on Electronic Commerce, concluded in 2024, saw the initial few measures facilitating entry into force adopted by 66 Members, without any disciplines on data flows or localization (Chander, 2020; Yakovleva & Irion, 2020). As a result, there are no disciplines on data flows or localization at all, only the 1995 GATS, with an economy the GATS did not envision. Third, the constraint is not being challenged but absorbed by hyperscale cloud service providers, who have established sovereign subsidiaries and licensed local cloud service providers at a 10-20% price premium (Mishra, 2020). That approach opens market access for big buyers and makes it harder for others because the fixed cost of segregating jurisdictions no longer exists at the individual level; it now sits at the infrastructure level, which small firms cannot amortize. Stakes are not small in the economic realm. OECD and WTO modelling estimates the cost of complete data-flow fragmentation at approximately 4.5% of global GDP. In comparison, the benefit of universal adoption of open data-flow regimes with safeguard measures is 1.77% of global GDP (OECD, 2022a).

2. Conceptual Framework: A Taxonomy of Localization and Its Cost Structure

2.1 Definitional Boundaries

The definitions in this area have not yet stabilized, leading to divergent measurement. The term broadly covers encryption, including anything that makes encryption incur added costs for cross-border data transfer (Ferracane et al., 2020). Under the data protection acquis, the European Union has also adopted a very broad formulation: any obligation, prohibition, condition, or limit that imposes a location for storage or processing (WTO, n.d.). ITIF reported in 2021 that 144 measures in 62 countries restrict data storage or processing to the country of origin. A broader interpretation of this definition would also show data restrictions in OECD countries, but not to the same extent as the narrower one OECD employs. Much of this split is already reflected in Ferracane's previous taxonomy, which distinguishes measures according to what they regulate rather than their nominal form (OECD & WTO, 2025).

If there is a difference between those two numbers, it is a measurement error. The true analytical difference lies between the two types of mandates: one refers to a place, and the other to a flow and conditioning. From the small exporter's point of view, the distinction can often be blurred, as all the costs of the conditional-transfer system, including an ex-ante assessment of the adequacy of the laws and institutions, the inclusion of certain standard clauses, and an external impact assessment report, also apply to the small exporter who is asked to hold a copy on a local server. The critical literature on data nationalism has long held that it is hardly a useful proxy for arguing security or privacy (Savelyev, 2016), nor for the broader debate about the internet's fragmentation and its loss of common technical standards (Aaronson & Leblond, 2018; Adv. Ahmad Talha, 2022). *Table 1* presents a four-category typology that captures these two dimensions.

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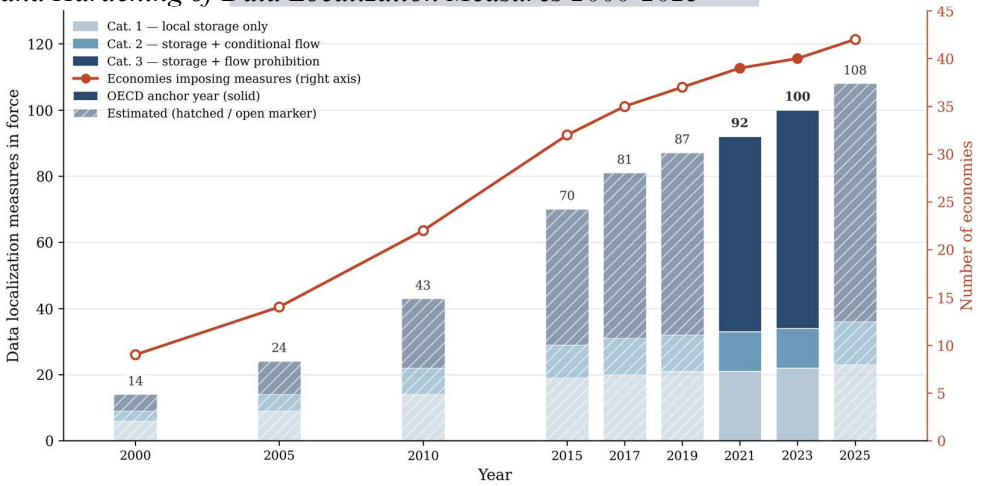
Table 1
A Four-Category Taxonomy of Data Location Requirements

Category	Legal Form	Representative Instruments	Compliance Cost Profile
Category 1 Local storage only	Data must be retained domestically; outbound transfer permitted in parallel.	Sweden's accounting records rules; various sectoral archiving obligations	Low fixed cost; storage duplication only
Category 2 Storage plus conditional flow	Transfer permitted subject to ex ante conditions or authorization	GDPR Chapter V; India DPDP Act s. 16; PIPL Art. 38 routes	Moderate to high fixed cost; legal and audit intensive
Category 3 Storage plus flow prohibition	Domestic storage and processing mandated; outbound transfer barred	Russia Federal Law 242-FZ; Chinese CIIO obligations; Vietnam PDPD and Data Law	High fixed cost; requires in-country infrastructure
Category 4 De facto localization	No explicit location rule, but conditions render transfer commercially impracticable.	Discretionary block listing powers; opaque security review; sectoral supervisory guidance	Indeterminate cost; priced as regulatory risk

2.2 Growth and Hardening

Two trends are unfolding concurrently and are linked. The measures stock has increased overall, and its composition has shifted. According to OECD 2021, 39 out of 92 countries had 92 policies, over half of which had been enacted in the previous five-year period; by early 2023, this had reached nearly 100 instruments in 40 countries, with more than two-thirds being the most stringent ones (Ahmad Talha et al., 2025; Greenleaf, 2025a). Alongside, measurement of the surrounding policy environment has also improved, with the OECD Digital Services Trade Restrictiveness Index (Pohle & Thiel, 2020), the work companions Digital Services trade restrictiveness and regulatory commonalities and barriers to DST (Farrell & Newman, 2019), respectively, as well as the ECIPE Digital Trade Restrictiveness Index (OECD, 2019) and the services restrictiveness literature more broadly, respectively. The overall picture is one of gradual accretion, rather than a series of well-defined shocks (H. K. Nordås & D. Rouzet, 2015). Not all sectors have an equal share of coverage: around one third of measures are cross-cutting, with measures covering about 16% of financial, banking and payments activity, 14% of public sector activity, and 11% of telecommunications activity(OECD & WTO, 2025); *Figure 1* shows this series.

Figure 1
Proliferation and Hardening of Data Localization Measures 2000-2025



Note: Bars decompose the stock of measures by restrictiveness category; the line reports the number of economies imposing at least one measure. Series are constructed from OECD anchor points (92 measures across 39 economies in 2021; approximately 100 measures across 40 economies in early 2023, with more than two-thirds in Category 3) with interpolation between anchors.

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2.3 The Cost-Structure Hypothesis

This article analyses cost structure. Consider a firm that must comply with the localization requirement at an extra cost consisting of a fixed amount plus a variable amount proportional to output. The fixed component includes legal analysis of the relevant regime, data mapping, contractual instruments, deployment of a resident officer or representative in the country, a storage footprint in the country or a segregated cloud tenancy for the data, and audit readiness and, if applicable, filing with the regulatory authority. The marginal costs are for incremental storage and egress. Experience indicates that the fixed component plays a significant role in the calculations. The first systematic attempt to cost data regulation reached the same conclusion from a different starting point, and subsequent industry surveys confirmed it (Mingfei et al., 2026; OECD, 2023a). Estimates of the first-year cost of GDPR compliance for small tech companies range from approximately USD 20,000 to USD 100,000. The sovereign cloud premium mentioned in Section 6 applies to the tenancy and not to the consumed cloud services. There are three mechanical consequences of that structure. There is a hyperbolic relationship between firm size and the compliance burden per dollar of turnover. Below a certain turnover level, the market cannot be served at any positive margin; the size-of-trade effect for the small-firm segment measures not average cost but the threshold's position (Mustafa et al., 2023). The result should come as no surprise in the economics of privacy: whether a disclosure rule will, on balance, raise or lower welfare depends on who bears what share of the costs, not simply the total costs, and it is analogous to the result that data-intensive technologies affect comparative advantage through fixed rather than marginal channels (Miller & Tucker, 2009; Roberto, 2026). The remainder of the article explores, measures, and implements these implications.

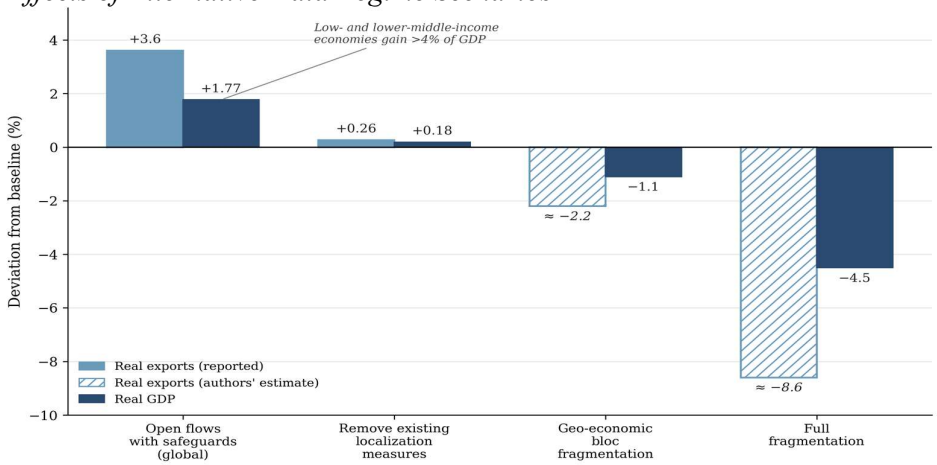
3. The Regressive Incidence of Localization on Small and Medium-Sized Enterprises

3.1 Aggregate Estimates and their Limits

The macroeconomic literature is now fairly conclusive about the magnitude, though not entirely so. The most careful current estimates come from the joint OECD and WTO modelling exercise based on the WTO Global Trade Model (WTGM), published in 2025 (Sardar et al., 2025). Complete fragmentation of data-flow regimes would reduce global GDP by approximately 4.5%. The costs of geo-economic bloc formation are lower, at less than 1% of real global GDP, reflecting the already highly fragmented global landscape. Global exports would increase by 0.26% and GDP by 0.18%, and low-income economies would benefit by over 1% of GDP if they removed existing localization measures. Overall, the exercise finds that the largest increase in exports comes from universal adoption of open regimes with safeguards, resulting in a 3.6% increase in exports, with low- and lower-middle-income economies gaining more than 4% in GDP (Campbell et al., 2015).

Figure 2

Global Welfare Effects of Alternative Data Regime Scenarios



Note: Deviations from baseline in real GDP and real exports under four counterfactuals, with the source constructed from. Export figures for the two fragmentation scenarios are the authors' proportional

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scaling of the reported GDP losses, using the export-to-GDP elasticity implied by the two liberalization scenarios, and should be read as indicative.

Independent estimates point in the same direction. Adverse effects have been found in cross-country index regression, which estimates that a one-point increase in data restrictiveness decreases gross trade output by 7%, productivity by 2.9%, and increases downstream prices by 1.5% in firm-level and industry-level panels, which find significant total factor productivity losses in data-intensive downstream sectors; and in gravity estimation, which revealed that restrictions on the flow of data hurt trade in digital services (Campbell et al., 2015). Ex-ante analysis of the USMCA data provisions produced roughly the same estimated reductions in trade costs, and the data sets in the treaty text now allow for systematic monitoring of the binding commitments (Martin et al., 2019; Talha, 2022).

All gravity evidence should be viewed with the methodological caveat. These specifications build on and rely on the structural gravity framework and its standard estimation conventions, including multilateral resistance terms, Poisson pseudo-maximum-likelihood estimation to address zero flows and/or heteroskedasticity, fixed-effect representations that incorporate time-varying pair characteristics, and clustering assumptions that can materially affect inference (Brock & Evans, 1985; Garicano et al., 2016). Results also reflect how domestic flows are treated and the nature of the bilateral services data, which, for many developing economies, is imputed rather than reported (Bombardini, 2008; Talha, 2023a). Like other dyadic institutional variables, such as those that measure identification within bipartisan systems based on shared regime rather than exogenous variation, the policy variables used here are scalars (Melitz, 2003).

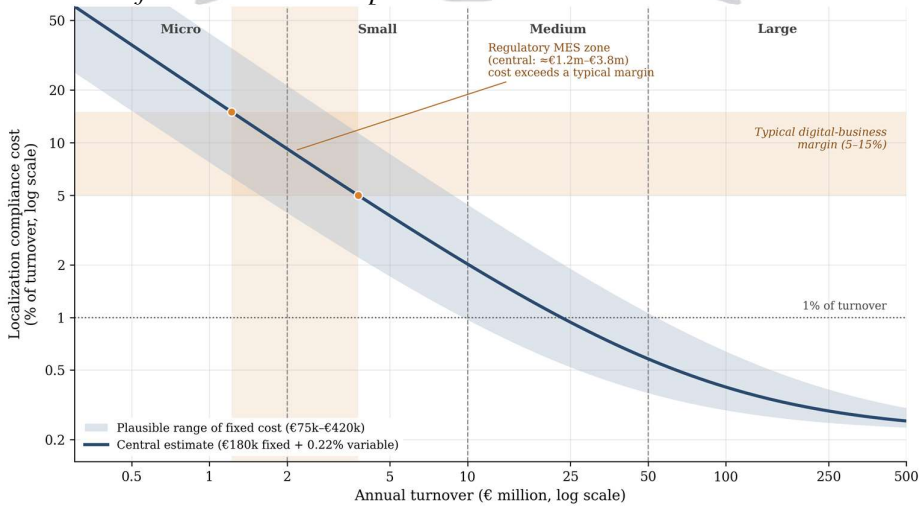
Two aspects of these estimates should be noted. Delocalization measures offer a small benefit, and an open regime with safeguards is possible at a higher order of magnitude. This asymmetry suggests that a binding constraint is regulatory heterogeneity, not location rules per se. Given how the distribution works out, liberalization is not bad for poorer economies; it is good for them. These aggregate models cannot disaggregate by firm size because they operate at the sector and economy levels. The assumption that the aggregate literature applies here does not hold.

3.2 Fixed Costs and The Compliance Scale Threshold

The incidence shown in *Figure 3* follows from the cost structure in Section 2.3. The fixed component is calibrated to EUR 180,000, and a plausible range of EUR 75,000–EUR 420,000 spans from EUR 75,000 under a light conditional-transfer regime to a hard Category 3 for in-country infrastructure. The rate is 22% of turnover and varies. The resulting curve does not represent a prediction. It's an accounting identity, not a specific level, and accounts for the shape's value (Helpman et al., 2004).

Figure 3

The Regressive Incidence of Localization Compliance Costs



Compliance cost as a percentage of annual turnover, plotted on log-log axes against firm turnover. Fixed-cost band of EUR 75,000 to EUR 420,000, with a central value of EUR 180,000; variable component

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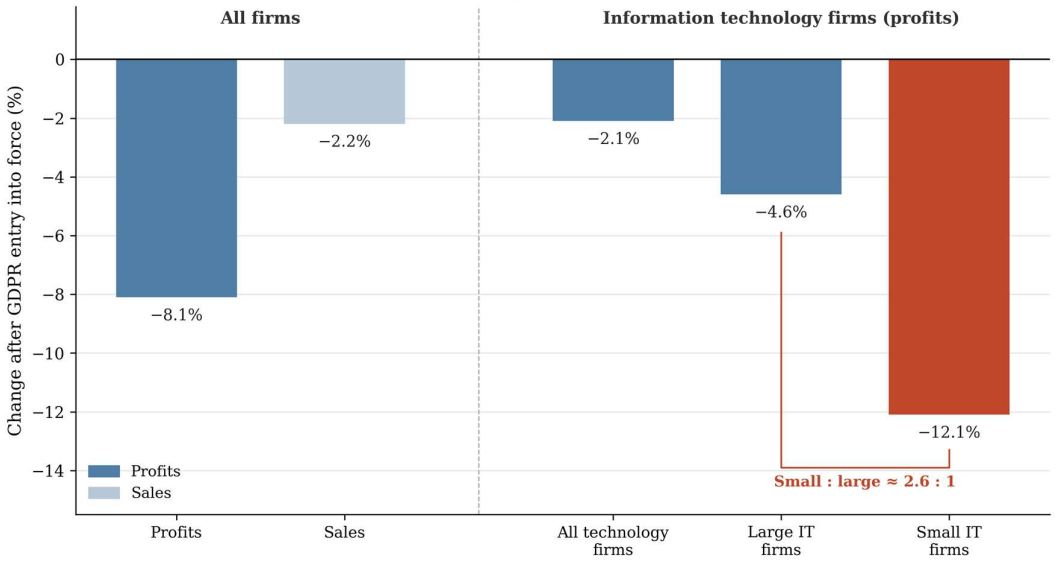
of 0.22% of turnover. Firm-size bands follow the European Commission definition (Recommendation 2003/361/EC). This is an illustrative model calibrated to reported GDPR implementation cost ranges for small technology firms, not an econometric estimate. The shape embeds an argument. The central parameters show that for a company with EUR 1 million in turnover, the burden is approximately 18%. For a company with EUR 100 million in turnover, the burden is approximately 0.4%. This is approximately 45 to 1. The normal margin in a digital business is 5% to 15%, so the micro-enterprise business is not under a fantastic margin threat. It is up against a minus one (Bernard et al., 2007; Talha, 2023b). The "compliance scale threshold" implies no adjustment or exit; this explains its invisibility in trade statistics, which capture only realized flows.

3.3 Firm-level evidence: the GDPR natural experiment

The GDPR is the best implemented, as it introduced a Category Two regime to a large, well-measured population within a tight implementation window. An unbalanced sample of 276,638 firms in 31 countries from 2011 to 2020 matches firms by their intensity of trade with EU markets and finds an average profit reduction of roughly 8.1% but only a 2.2% sales loss (Goldfarb & Que, 2023). If demand had shrunk, sales and profits would have shrunk as well: that is the wedge. The fact that profits fell about four times as much as sales identifies the cost variable, not the demand variable. But the size gradient is even more striking. Large firms in the information-technology sector saw profits drop by approximately 4.6%, while small firms saw profits fall by approximately 12.1% (Goldfarb & Tucker, 2012; Talha, Hanif, et al., 2026). The estimates are shown in *Figure 3*. The aggregate sample of large technology companies showed no significant change. The fixed-costs mechanism not only produced results more damaging to smaller companies than GDPR did to the smallest employers but also showed that GDPR compliance led to higher wage bills and higher general expenses, not necessarily lower revenues.

Figure 3

Estimated Firm-Level Effects of the GDPR By Firm Size and Sector.



Percentage changes in profits and sales following the entry into force in May 2018, controlling for firm and country-industry-year fixed effects. There are two justifiable qualifications. These concern the minimum number of category 3 measures taken, as the GDPR is conditional-flow-based rather than a hard localization requirement. The estimates reflect that part of the fixed costs is spread over the following years and that adjustment is short-run (G. Johnson, 2022). Neither qualification affects the direction of the result. Evidence from parallel work on spillovers along the data supply chain and indications in the literature that the regulation may not have brought the desired trust effects are noted. Estimates from the gravity model across 54 African economies indicate that bilateral digital services trade falls by approximately 7.7% for each additional economy that adopts the EU-style conditional model, with the impact mainly on economies where compliance costs most clearly outweigh benefits(OECD, 2022b; Talha et al., 2023).

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Table 2

Summary Of Quantitative Estimates on Data Regulation and Trade

Estimate	Method and coverage
Full fragmentation: −4.5% global GDP. Open regime with safeguards: +1.77% GDP, +3.6% exports. Removing localization: +0.26% exports, +0.18% GDP	WTO Global Trade Model CGE simulation; OECD-WTO business questionnaire
A one-point rise in data restrictiveness cuts gross trade output 7%, productivity 2.9%, and raises downstream prices 1.5%	Cross-country index regression using OECD market-regulation data
Stricter data policies significantly reduce total factor productivity of downstream firms in data-reliant sectors.	Cross-country firm-level and industry-level panel
Restrictions on cross-border data movement significantly inhibit trade in digital services.	Gravity model, developed and developing economies.
−8.1% profits, −2.2% sales on average; −12.1% profits for small IT firms against −4.6% for large IT firms	Difference-in-differences, 276,638 firms, 31 countries, 2011–2020
Shared conditional model: −7.7% bilateral digital services trade. Open flows under AfCFTA: +10.3%, about USD 125 million	PPML gravity with four-way fixed effects, 54 African economies
Trade agreements containing digital trade provisions are associated with higher bilateral digital trade flows.	Gravity model combining digital trade policy datasets

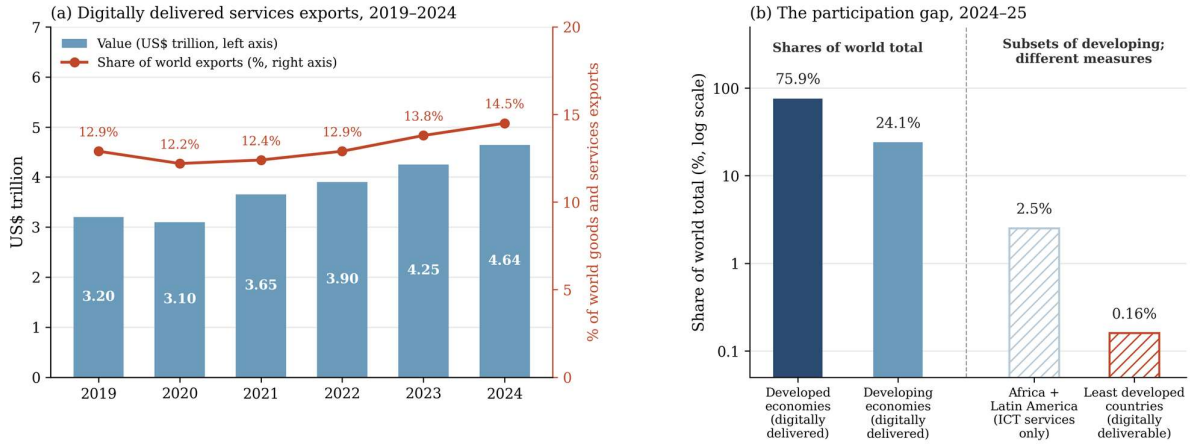
Note: Estimates are not directly comparable due to differences in coverage, identification strategy, and the definition of the policy variable. They are reported to indicate consistent signs across independent designs rather than convergence in magnitude.

3.4 The development dimension

Distributional claims continue to accumulate across countries. In 2024, exports of digitally delivered services were valued at USD 4.64 trillion, up 8.3%, and accounted for 14.5% of total world exports of goods and services, compared with 12.2% in 2020. Developing economies surpassed the trillion-dollar mark in 2023 and reached approximately USD 1.3 trillion in 2025, reflecting a higher growth rate than developed economies (12% compared with 9%) (Métivier et al., 2023; WTO, 2022). However, the intra-developing world divide has been widening, and the least developed countries' share of digitally deliverable services exports is around 0.16% of the world total. Africa and Latin America together produce approximately 2.5% of information and communication technology (ICT) services, valued at USD 1.2 trillion (Ferracane & Van Der Marel, 2020; Métivier et al., 2023). Measurement conventions apply here, as digitally delivered and digitally ordered trade are overlapping yet distinct constructs, as shown in *Figure 4*.

Figure 4

Digital Services Trade Growth and Its Uneven Distribution.



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Note: Panel (a) reports the value and export share of digitally delivered services for 2019–2024. Panel (b) shows the participation gap on a logarithmic scale.

Compliance with the foreign localization regime in these markets is relatively low, and fixed compliance costs are paid in the currency of the market where the foreign company is located, not in the country of origin. A Kenyan or Bangladeshi software company and a German software company invest the same amount to set up an EU transfer basis, and this cost is a fraction of the revenue base. The regressive incidence found in Section 3.2 thus operates at two levels: firm size and income level (J. López González et al., 2023). Economic forces explain why a comprehensive data protection regime harms trade at the low end of the distribution, which is the empirical imprint of this double incidence. Still, objective shortcomings in services trade policy and the performance of African industries provide some independent substantiation. In contrast, derogation from the international digital trade regime, as systematically secured by incumbents in the sector and counterposed by generic principles in place since the dawn of the IT age, has long been a feature (Burri & Polanco, 2020; Talha, Noor, et al., 2026). Ample measures to close the gap, such as trade facilitation specifically for MSMEs, remain underutilized.

4. WTO Compliance Challenges

4.1 General Partnership on Agriculture on Settlement

It is widely believed that digital trade now has its own multilateral "rulebook". Not in this matter, not on this question, anyway. In 2024, a stabilized text was advanced as a product of the Joint Statement Initiative on E-Commerce, launched by 72 Members at the Eleventh Ministerial Conference and later expanded to over ninety Members [10]. It does not include disciplines on cross-border data transfer, data localization, or source code. The provisions were phased out after the USA withdrew its support in October 2023, and no consensus emerged on an alternative. Such evaluations of the instrument's legal substance had foreseen precisely this (Burri et al., 2024).

The subsequent institutional history is instructive. In February 2025, 71 Members proposed including the Agreement on Electronic Commerce in Annex 4 of the Marrakesh Agreement at the General Council, but the proposal was not taken up; in December 2025, India, Indonesia, Pakistan, Brazil, Bangladesh, South Africa, and Turkiye opposed its inclusion at the General Council. In March 2026, all 66 Members, representing about seventy percent of global trade, agreed at the Fourteenth Ministerial Conference in Yaounde on a Declaration of Interim Arrangements to enter the Agreement into force outside the WTO legal structure, subject to acceptance by 45 of them (with a working target for mid-2027) (Anderson & Van Wincoop, 2003; Talha, Noor, & MA, 2024). Meanwhile, the moratorium on customs duties on electronic transmissions expired, and an August 2026 General Council meeting failed to narrow differences over its revival, leading the United States and eighteen other Members to impose open-ended bans on one another (Correia et al., 2020).

Preferential agreements have bridged some of this gap, and these, too, exhibit both the diffusion and the ambiguity of the resulting commitments. The bigger issue is that data is incorporated late and imperfectly into trade law, that key jurisdictions follow incompatible approaches, and that the role of the WTO's institutions in data governance is debated (Balistreri & Hillberry, 2007). The end effect is a 'sparkling' response from institutional players. Virtually unlimited multilateral efforts have been invested in a de facto moratorium on customs duties that has never been implemented. At the same time, the basket is not subject to any discipline in practice and applies to the 10–20% wedge imposed on digital cross-border supply. Thus, the remaining governing law is the 1995 GATS, written before the advent of commercial cloud computing (Silva & Tenreyro, 2006).

4.2 Scope, Classification and The Modal Problem

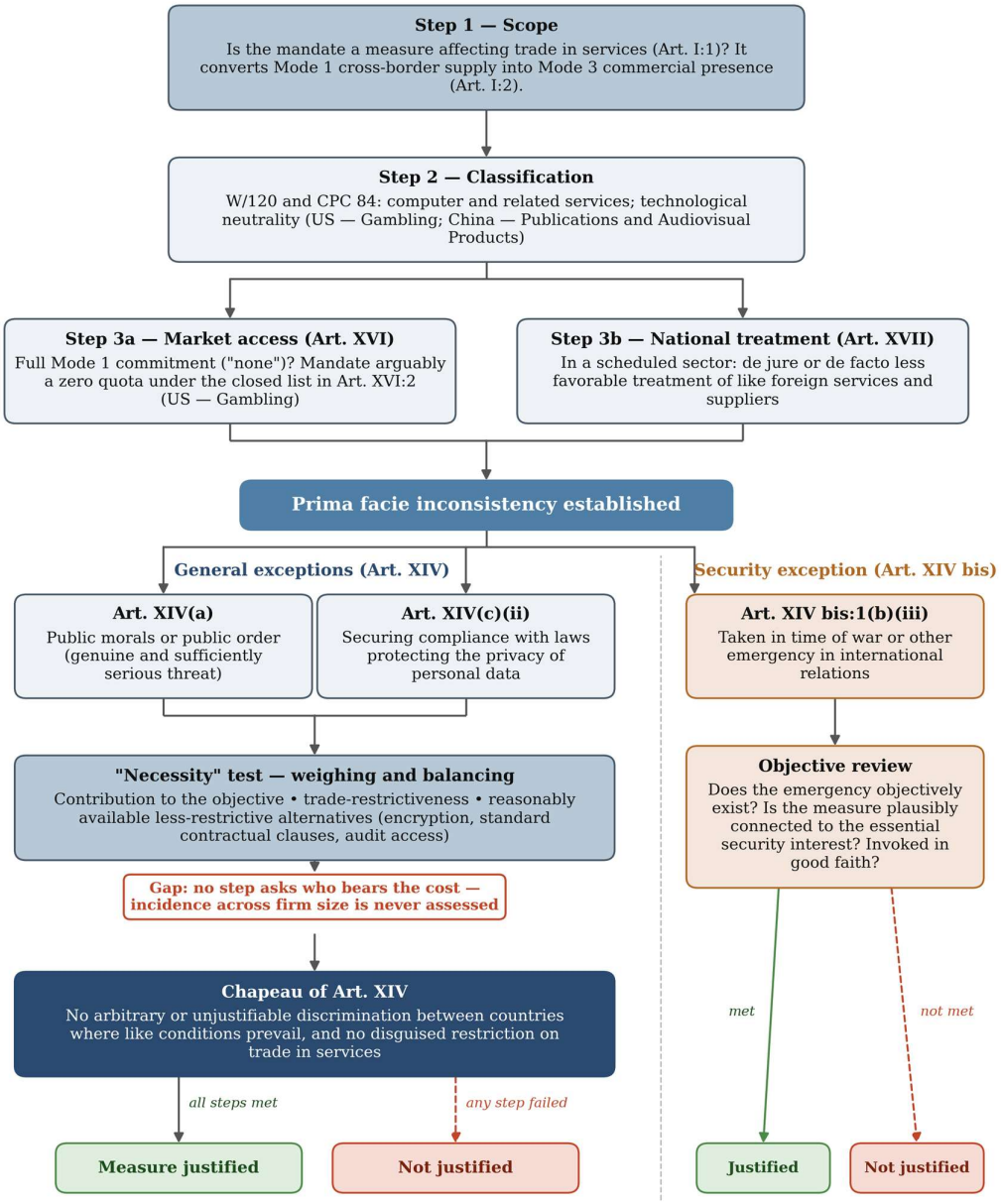
Under the definition of a measure affecting trade in services (MATS) in GATS Article I:1, the localization mandate constitutes a localization requirement. The classification process is informed by a review of the W/120 list and associated provisional Central Product Classification (CPC) headings, with computer and related services (CPC 84) being the most appropriate. In 1994, when gambling was supplied as a service, the Appellate Body's reasoning in United States Gambling supports technological neutrality (Yotov et al.,

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2016). Hence, a 1994 commitment for a service provided in other circumstances applies to the electronic version of that same service, as outlined in the complete analytical scenario in *Figure 5*.

Figure 5

The GATS Analytical Cascade Applied to A Data Localization Mandate.



The sequence runs from scope and classification through the market access and national treatment obligations to the general and security exceptions, terminating in the chapeau of Article XIV. The modal architecture poses the first real challenge. The localization mandate, based on the notion of commercial presence, converts a Mode 1 supply into a Mode 3 supply. This conversion may be sufficient to create a limitation inconsistent with Article XVI where a Member has pre-commitments for the full operation of Mode 1 in the concerned sector (Colin Cameron & Miller, 2015). The problem is not doctrinal; rather, it is empirical. Commitments on computer and related services are uneven, and many Members that now have the most restrictive commitments have planned for limited or no commitments in the future. The GATS positive-list formula, a negotiating convenience in 1994, now largely explains why market access little bite has where it matters most.

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Article XVII offers a more hopeful path, as localization can often be discriminatory in impact, if not in form. Requiring data to be stored on domestic servers imposes no additional cost on an existing provider with domestic operations (Baier & Bergstrand, 2007; Talha, Noor, Mingfei, et al., 2024). Still, it imposes a high cost on a foreign supplier who must set up or lease space in-country. It's the standard de facto operation of less favourable treatment. A parallel route is through national treatment and fair and equitable treatment standards of investment law, albeit with its own brackets. How realistic or feasible either avenue is as much a question of institutional form as of doctrine: the choice between 'hard' and 'soft' instruments determines the pressure a rule will exert for compliance (Frey & Presidente, 2024).

4.3 General Exception, Necessity Test

Upon taking a prima facie stance of inconsistency, the defending Member will consider Article XIV. This is what subparagraph (c)(ii) is intended to cover, namely measures required to obtain compliance with laws in accordance with the protection of the privacy of individuals connected to the processing and dissemination of their personal data (Aridor et al., 2024). The doctrinal question is whether a location requirement is necessary to secure compliance with a privacy law, which requires a weighing and balancing exercise, as in Article XX jurisprudence, involving proportionality between the measure's contribution to its purpose, its trade-restrictiveness, and less trade-restrictive means reasonably available. The public morals aspect in subparagraph (a) has been widely extended in equivalent case law developments, with both positive and negative consequences for a defending Member (Jia et al., 2021).

Hard localization requirements are subject to challenge on the merits. The technical literature agrees that physical location is an unreliable measure of security and that over-averaging can reduce a data center's resilience by eliminating geographic redundancy. It also holds that encryption with customer cards is less intrusive and can provide the same protective benefits (Talha, Sardar, Ahmed, et al., 2024; WTO, 2023). For most Category 3 measures, with a panel applying the necessity test and adequate technical evidence, the panel is likely to find those alternatives reasonably available. GDPR-style conditional-transfer regimes are much more defensible because they are based on the destination's risk profile and, at least in theory, are not intended to restrict transfers in the first place. However, a persistent strand of literature holds that a trade discipline can never compromise the protection of fundamental rights (World Bank, 2021).

This structural mismatch is what this article sought to expose. The necessity test determines whether a measure is more trade-restrictive than necessary to achieve its goal. It makes no distinction as to whom the restriction applies to. A proportionate abstract mandate can easily become unfeasible for smaller companies and insignificant for larger ones, with no flags to signal that. Distributional issues can at most be represented in the chapeau, which prohibits arbitrary or unjustifiable discrimination and disguised restrictions on trade and, in this context, relates to discrimination against countries, not classes of suppliers. In sum, trade law lacks a vocabulary for regressive incidence.

4.4 The Security Exception

Many localization requirements are national security-based and fall under Article XIV bis. As the panel explains in Russia Traffic in Transit and Saudi Arabia Intellectual Property Rights, the corresponding GATT provision is not self-judging. It leaves the invoking Member to decide what its essential security interests are. Still, a panel has jurisdiction to determine whether the invoked circumstances objectively fit one of the enumerated scenarios and whether the measures bear a "plausible relationship" to the asserted interest (Mattoo & Meltzer, 2019). The emergency in international relations limb in Article XIV bis:1(b)(iii) is the natural hook and a challenging one to pull. While generalized anxiety about foreign government access to data exists, it is hard to define that anxiety as an emergency in international relations, and human rights literature indicates that security is often used as a discourse to justify domestic control aspirations rather than foreign threats. Despite the risks, these reports defer to the invoking Member, and the Appellate Body has become paralyzed (Burri, 2021).

5. Regulatory Interoperability: The Transfer Architecture and Its Rivals

The multilateral track has been largely ineffective, so large markets set operating rules unilaterally and then export them. Chapter V of the GDPR centres on the adequacy decision under Article 45, with appropriate

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safeguards under Article 46 forming the basis for the conditional approach. A de jure Brussels effect has been well documented for its diffusion and for trade policy more broadly. I do not know whether the cost of diffusion has been negligible for adopting economies, but evidence from Africa indicates that it has not (Peressotti, 2025). The transatlantic arrangement demonstrates that interoperability has value yet remains fragile. Following the invalidation of Safe Harbor and Privacy Shield, the EU-US Data Privacy Framework took effect in July 2023 under Executive Order 14086 and the establishment of the Data Protection Review Court [125]. It has passed its first judicial test. In the "Latombe" case (Case T-553/23), filed against the Commission on 3 September 2025, the General Court held that essential equivalence does not require identity in institutional arrangements (Bradford, 2020). An appeal was filed on 31 October 2025, in Case C-703/25 P, and remains pending. The bilateral economic relationship is valued at about USD 8.3 trillion, and roughly 3400 US companies depend on it. Recurring exposures from third invalidations within 10 years would be borne disproportionately by firms without standing legal talent. If the regulatory bridge fails to stand a third time, it would be the third time in 10 years that it has been washed away. Enforcement reinforces this: by the start of 2026, cumulative GDPR fines were nearing EUR 7.1 billion, and breach notifications averaged more than 400 per day (Janßen et al., 2022; Jin et al., 2025).

Over the same period, China's approach moves in the opposite direction and is instructive for the argument advanced here. The Cyberspace Administration introduced an important easing of the previous regime with its Provisions on Promoting and Regulating Cross-Border Data Flows, issued on 22 March 2024. The Provisions raised the thresholds for triggering a mandatory security assessment and exempted transfers of non-sensitive PII by non-critical operators for fewer than 100,000 persons annually. They allowed free trade zones to publish negative lists, thereby exempting transfers of information not on those lists from the procedure. The negative lists in Beijing, Shanghai, Tianjin, Hainan, and Zhejiang now include 17 industry sectors and are mutually recognized across the zones. This is a valuable counterpoint to the traditional assertion of the “restrictiveness” of the Chinese model (Jin et al., 2024; OECD, 2022c). India has gone in the opposite direction, and its rules, issued on 13 November 2025, will allow the government to ban big data fiduciaries from transferring particular data categories offshore, with fines of up to INR 250 crore (OECD, 2024). Particularly notable is the Chinese 'threshing house,' the most evident example of the reform this article calls for in the marketplace. In substance, a volume threshold exempts several data subjects. It acknowledges that the nature of the regulation will tend to correspond to the magnitude of the transfer itself, and that imposing the same procedural burden on two firms, one with 500 records and one with 5 million, would not be proportionate or efficient. Pursuant to Vietnam's 2025 PDPL, there is also a similar, albeit more limited, exemption for small businesses (Kalemli-Ozcan et al., 2015). The thrust of this is made more salient, not weakened, by the fact that neither jurisdiction is typically pointed to as a paragon of digital-trade liberalism. With the ongoing worldwide collection of exhaustive statutes, the design inquiry turns and should turn from whether to regulate to how to scale the burden of the procedures.

Table 3

Comparative Transfer Architectures in Four Major Jurisdictions, Mid-2026

Jurisdiction	Governing instrument	Transfer mechanism	Size-sensitivity of the burden
European Union	GDPR Chapter V; DPF adequacy decision of July 2023	Adequacy, standard contractual clauses, binding corporate rules, derogations	None in the transfer rules; limited Art. 30 record-keeping relief below 250 employees
China	PIPL Art. 38; CAC Provisions of 22 March 2024 [28]	CAC security assessment, standard contract filing, certification; FTZ negative lists	Explicit: exemption below 100,000 individuals per year for non-critical operators
India	DPDP Act 2023 s. 16; DPDP Rules notified 13 Nov 2025	Open transfer subject to government restriction; Rule 13 constraints on significant data fiduciaries	Indirect: significant data fiduciary designation is threshold-based

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United States	Sectoral; DPF self-certification for EU-origin data	Self-certification and ex post accountability	None formally; low absolute cost limits the regressive effect

Note: Positions are as of mid-2026 and are subject to the pending appeal in Case C-703/25 P and to the phased commencement of the Indian rules.

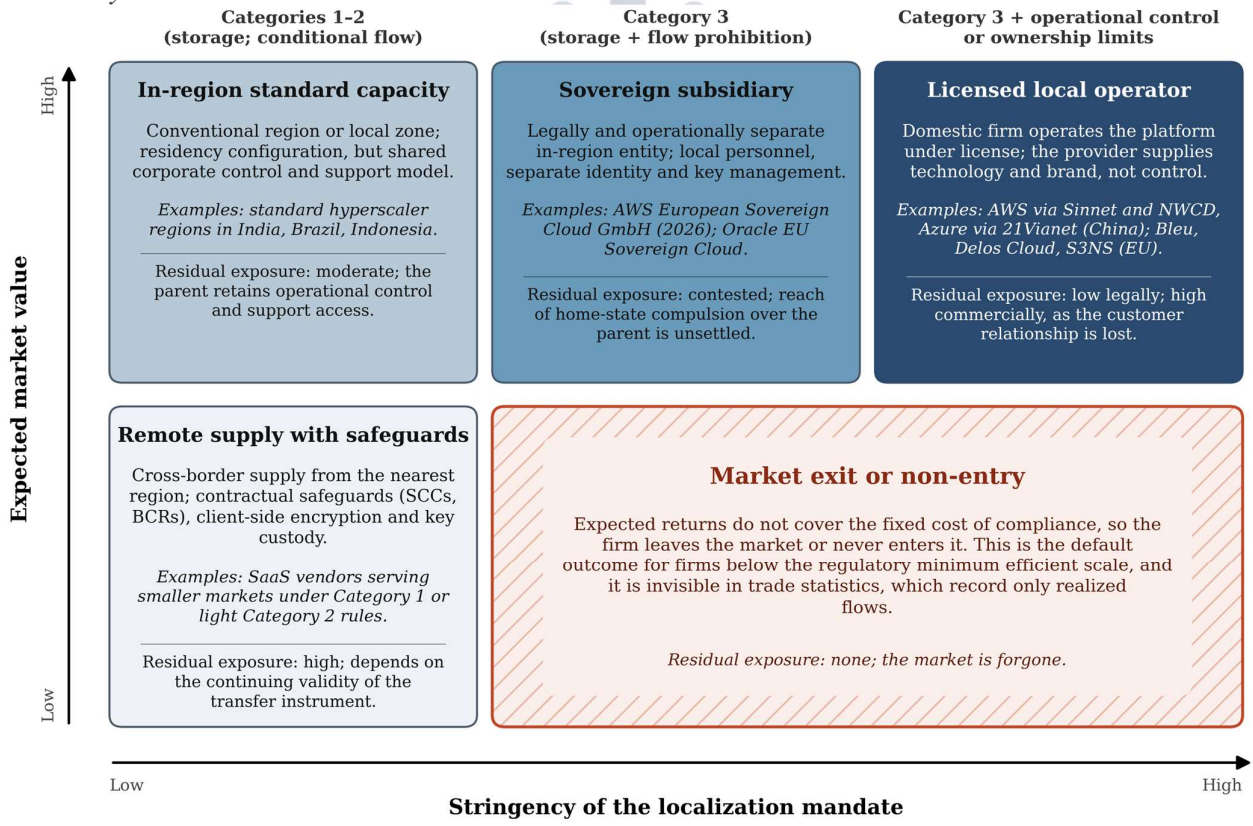
6. Cloud Service Providers' Market Entry Strategies

6.1 Market Structure and The Entry Problem

Cloud-based infrastructure is highly centralized. According to Synergy Research Group data for the first quarter of 2026, Amazon Web Services (AWS) holds 28% of the global market, with quarterly revenue of USD 129 billion, up 35% year over year. Microsoft Azure follows with 21% and USD 82 billion in quarterly revenue, and Google Cloud with 14% and USD 57 billion. As of mid-2026, AWS has 123 availability zones across 39 regions, Azure has over seventy regions, and Google Cloud has 42 regions. The geography of the build-out is determined by trade and security politics as well as demand (Peukert et al., 2022). For such firms, the localization mandate is not about market access, but a capital allocation question, and the calculations are not the same as for customers. *Figure 6* lists the available options, presented in two dimensions: mandate strength and expected market value.

Figure 6

Market entry mode selection under data localization constraints.



Note: Entry modes are arrayed by the stringency of the applicable mandate and the expected value of the target market. The vertical axis represents a strategic, not empirical, ordering.

The lower-left quadrant, remote supply with contractual safeguards, will support Category 1 and lighter Category 2 regimes and is the only option realistically available to non-hyperscale providers. It meets residency requirements with standard regional capacity without surrendering operational control. If the mandate extends to the "operation," two more substantial possibilities exist. The "sovereign subsidiary" is a creation of law and operates in the target jurisdiction. Using this model, AWS launched its European

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Sovereign Cloud in Brandenburg on January 15, 2026, as a dedicated German company with executive teams in Germany, physically separated European data centre infrastructure, and isolation of that infrastructure from the rest of the worldwide estate. That isn't enough: the local operator is also licensed, and operations are handed over to a domestic firm. In China, AWS is run by a local firm called Sinnet, and Azure by another called 21Vianet; in Europe, there is also the joint venture between Orange and Capgemini, or Microsoft and Google technology is provided by a local firm (Delos Cloud, an SAP subsidiary; S3NS, formed with Thales). The forced-localization literature could already predict this accommodating trend 10 years ago (G. A. Johnson et al., 2023).

Table 4

Entry mode characteristics and residual jurisdictional exposure

Entry mode	Capital intensity	Speed to market	Localization stringency addressed	Residual exposure
Remote supply with safeguards	Minimal	Immediate	Category 1; light Category 2	High: dependent on the continuing validity of the transfer instrument
In-region standard capacity	High	18–36 months	Category 1 and 2 residencies	Moderate: parent retains operational control and support access
Sovereign subsidiary	Very high	24–48 months	Most Category 3 regimes	Contested: extraterritorial compulsion of the parent remains unsettled
Licensed local operator	Low for the licensor	12–24 months	Category 3 including operational control	Low legally; high commercially through loss of the customer relationship
Market exit or non-entry	None	n/a	All	None

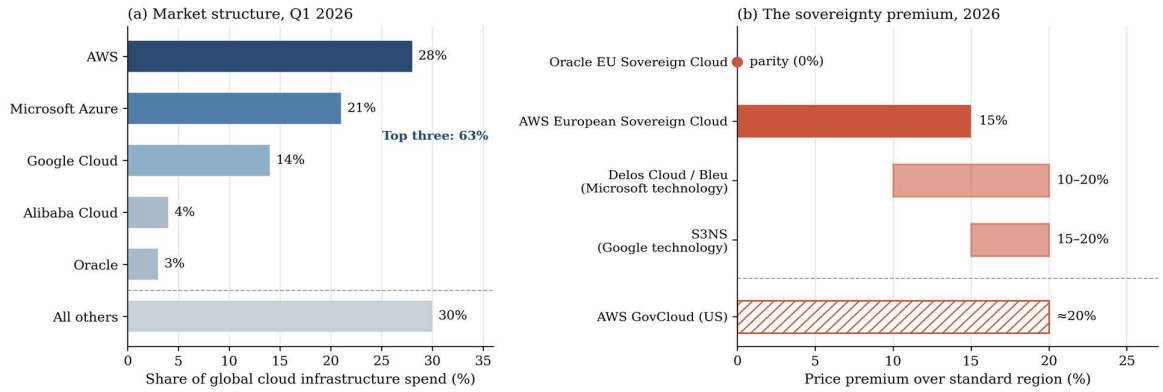
Note: Time-to-market ranges are indicative and drawn from announced-to-operational intervals for the sovereign cloud deployments discussed in Section 6.

6.2 The Sovereignty Premium

Segregation isn't free, and it now has a price tag. AWS European Sovereign Cloud carries a premium of approximately 15% on compute, storage, database services, and serverless across all services and regions, compared with standard EU Regions, and it has no free tier. AWS GovCloud is about 20%. Microsoft's Delos and Google's S3NS are between 15% and 20%; Microsoft is at 10% to 20%. Oracle's EU Sovereign Cloud offering is priced at parity. These premiums are shown in *Figure 7* along with market shares.

Figure 7

Cloud market concentration and the price of jurisdictional segregation.



Note: Panel (a) reports share of global cloud infrastructure spends. Panel (b) reports price premiums for sovereign offerings relative to standard regions.

At a trading price, that premium is substantial. Over the past few years, MFN tariffs on manufactured goods across major economies have fallen to the low single digits. The wedge applied to delivering a digital service is therefore 15 to 20% higher than the tariff protection available on most merchandise trade, and it

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results from the design of the regulated service rather than any tariff schedule. Non-price costs exacerbate it. The AWS European Sovereign Cloud came with two, instead of the usual three, availability zones for enterprise resilience designs, as well as a limited model catalogue in its managed AI service. Implementing segregation would be to sacrifice the very attributes of a hyperscale cloud that make it appealing to many customers: scale and scope of service, just what opponents of data nationalism advocated against. This section focuses on the distributional consequences. Also note that the price increase, the "sovereignty premium," is regressive because the premium applies to all consumption, and price increases are regressive. Regressive jurisdictional segregation has been shifted to infrastructure. Before any work for compliance at the firm level, the compliant architecture is now the only compliant architecture. It is 15-20% more expensive than a cheaper architecture, so a small business can no longer choose to ignore compliance costs on an architecture-alone basis. Localization compliance is no longer an overhead cost that small, savvy companies can manage; it has become a required input cost they must cover.

7. Policy Implications: Toward a Size-Indexed Proportionality Principle

The basic reform plan presented here is misdirected if this article's diagnosis is correct. Politically, calls to ban localization are dead ends, as was the Agreement on Electronic Commerce data provision, which collapsed. But calls for full regulatory harmonization are flawed because the underlying disagreement is not a technical matter of convergence. Rather, it is centred on the individual and the state, neither of which addresses incidence (Zhuo et al., 2021). A more manageable way of thinking begins with an already underlying premise of much domestic regulation: the procedural burden that regulations impose should depend on the risk of the regulated activity, and scope should be a sensible proxy for risk. The following three concrete design elements are identified.

The first threshold is known as a de minimis threshold. Transfer regimes should be flexible in their procedural requirements for transfers involving the processing of fewer than a certain number of data subjects. They should ensure that substantive obligations and ex post liability remain unaffected. The Chinese exemption (100,000 people per year) and the Vietnamese small-enterprise carve-out are two templates in progress. The difference is important: it's not a lowering of the level of protection; it's a shift of the procedural burden from firms that present the lowest overall risk in their activities. A firm with a couple of thousand records that is breached will be fully liable; it just doesn't have to buy the compliance machine up front. The second relates to the mutual recognition of compliance tools; this is not about recognizing regimes. Adequacy determinations lag, are subject to litigation, and are fraught with politics, especially as seen in the transatlantic history (Abbott & Snidal, 2000; OECD, 2024). If recognition were at the instrument level, so that what's accepted in one jurisdiction would be accepted in another, it would be a pass at the fixed cost, as a single compliance investment would support multiple markets. This is more a convergence at the instrument level than at the regime level itself; hence, it is a tractable process. The Global Cross-Border Privacy Rules Forum offers some precedent, and the institutional framework for capacity-building in the Agreement on Electronic Commerce could be a reasonable option. Tavengerwei's parallel case for trade facilitation as an M/E instrument for e-commerce in developing nations is similar: it removes the fixed cost, not the substantive rule (OECD, 2022c).

The third is a shift in "the measure of what trade law measures". If the Agreement on Electronic Commerce comes into force in 2027 and the review occurs five years later, the review of the moratorium should focus on the prevalence of data measures by firm size, not just their overall trade impact. This would require a study the WTO Secretariat does not currently conduct. Still, the OECD-WTO business questionnaire provides a basis, and the Trade in Services for Development provides a delivery mechanism. Because excluded small businesses don't produce any trade, a measurement framework that focuses only on realized flows will understate the barrier, since it excludes the very phenomenon, it aims to capture. Rather, the soft-law option might be more fruitful here; a reporting requirement is less controversial than a binding discipline, especially on sequencing (Goldberg et al., 2024). OECD and WTO estimates suggest that the benefit of eliminating localization measures is small, but the benefit of open regimes with safeguards is high. That ordering implies that learning lessons in favour of interoperability, rather than prohibition, is the most

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effective use of reform effort, as it lowers the fixed cost of compliance rather than challenging the right to regulate. The second ones have politics that are hard to deal with. The economics of the first are favourable, and low-income economies will benefit most (OECD, 2016).

8. Conclusion

Data localization is typically framed as a clash between free trade and regulatory sovereignty. That framing has fuelled 20 years of debate and very little action, in part because both sides' arguments have merit. This article suggests that the more helpful question is the "distributional" one. Localization compliance costs are 'fixed' costs that create a scale threshold that smaller firms cannot meet. They fall behind. The evidence assembled here supports that account. The GDPR's imposition of profit losses, which doubled and a half for small information-technology firms compared to large ones, was driven by a cost channel rather than a demand channel. Based on model depth, model incidence varies across plausible parameters from more than ten to under half a per cent of turnover for micro-enterprises and large enterprises, respectively. Gravity estimates suggest that the negative trade effects of conditional-transfer regimes stem from their implementation in low-income countries, which face the greatest difficulty absorbing compliance costs. Providing a hyperscale service at a price premium of 15-20% for large infrastructure buyers shifts the limitation up a layer, to the infrastructural service offering, where it crops up as an unavoidable infrastructure cost or input price for small businesses. This is currently not within the realm of WTO law. The Agreement on Electronic Commerce (AEC) does not address data flows or localization, and the rest of the GATS framework asks whether a measure is necessary, not what it excludes or whom it excludes. To close that gap, a new prohibition is unnecessary. This demands a proportionality principle based on firm size, a level of mutual recognition based on compliance instruments rather than entire regimes, and a measurement regime that can observe trade not subject to localization. Several elements of the first already exist in Chinese and Vietnamese practice. Regulatory design in other sectors has emerged outside the trading system, and the question is whether it transfers.

Ethics Statement

This study adhered to all ethical standards of research during the conducting of this study. We collected data from secondary sources, and no human participants were involved in the collection of data. Therefore, there is no conflict of interest of any human participant to this study.

Author's Contributions

All authors participated in ideation, development, and writing the manuscript. All authors read and approved the final manuscript.

Conflict of Interest Statement

The authors declare that there is no conflict of interest regarding the publication of this article.

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Data Availability

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

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