CHAPTER

5

DATA-RELATED RESTRICTIONS AND DIGITAL SERVICES TRADE: COMPARING ASIA WITH THE REST OF THE WORLD

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5.1 Introduction

Cross-border trade in services has steadily expanded over the last 2 decades and now represents more than 20% of global trade. Digital services trade is growing in importance, and its share of cross-border trade in services is dependent on digital infrastructure as the channel for the transmission of information over the internet (WTO 2019). Yet, as governments increasingly constrain this information—or, more specifically, data—trade in digital services is affected (Ferracane and van der Marel 2021). The focus of this chapter is to analyze what specific data-related policies produce a trade-reducing effect on cross-border trade in digital services, with a specific emphasis on Asia.

Data-related policies are defined in this chapter as regulatory measures that restrict the flow of electronic data between economies. We concentrate on three types: (i) data localization policies, (ii) local storage requirements, and (iii) conditional flow regimes. As these policies inhibit the free flow of data across borders, they also hamper trade in digital services, given that it relies on the transmission of data across economies. According to our definition of digital services, economies currently imposing data localization requirements alone already are involved in about 15% of global digital services trade, with Asian economies taking a rising share (Figure 5.1). Restricting the movement of data across borders impedes the ability of firms to source and send data where its value is best used, hindering their chances of exploiting comparative advantage in digital services.

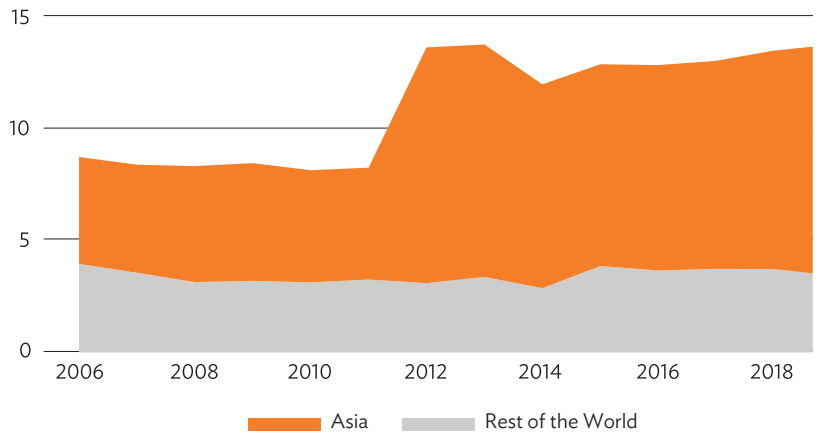
The three policy measures raise costs for firms to conduct business across borders by either mandating to keep data within a certain territory or by imposing additional requirements on data transferred abroad. Previous work has demonstrated that higher restrictiveness in these three measures is significantly associated with decreasing performance of firm productivity (Ferracane et al. 2018) and cross-border trade in services (Ferracane and van der Marel 2021). This chapter follows these two studies by investigating which of the three

data-related policy measures inhibit cross-border trade in digital services. Given that the identification strategy of both studies required the three policy measures to be aggregated, this chapter improves on this by carving out the specifics and the trade effect of each policy measure individually and analyzing the effect on digital services only.

This chapter extends the identification strategy to consider the Asian region too. Many economies in Asia have applied data-related restrictions in recent years. As Asia's involvement in global digital services trade has grown over the last 2 decades, recent data-related restrictions applied in the region have also grown and have most likely impeded the potential to benefit from digital services trade. Yet, the region is large and includes economies with very different characteristics. To tease out the extent to which data-related policies across the globe have reduced trade in Asian economies, the empirical approach in this chapter employs an interaction term consisting of economies in the region. This way, the results illustrate whether much of the adverse trade impact following data-related restrictions across the globe indeed takes place in Asia.

Figure 5.1: Share in Global Digital Services Trade Covered by Economies Imposing Data Localization Measures by Asia and Rest of the World

(%)



Notes: Digital services trade covers imports and exports of digital and digital-enabled services as defined in column 4 of Table 5.2. Data localization policies cover those for which an initial 1 and 0.5 was assigned to economies.

Source: Author's calculations.

The analysis is carried out by adopting a difference-in-difference (DID) approach. More specifically, we first interact our economy-wide variable assigning unity each time an economy enacts a data restriction in a given year, with another variable that indicates whether a sector is classified as a digital service. This interaction term differentiates the group of digital sectors that are proportionately more affected by the implementation of data-related policies economies impose during the period covered by the analysis. In the other group, the non-digital services, no economy-wide policy "treatment" is observable. We classify the treatment sectors as digital-intense on the basis of a sector's usage of software over labor: services measuring greater usage of software compared with labor are, in our view, more reliant on the cross-border flow of data across borders, such as cloud computing, and therefore more sensitive to changes in data-related policies.

In a second step, we interact this economy-sector variable with another dummy giving unity to Asian economies. This allows us to determine whether the average negative trade impact caused by economies imposing data-related restrictions is also happening in Asia. There is reason to believe that the region experiences much of the trade fall following the application of data-related restrictions across the globe. Several Asian economies have applied stricter data regulations in recent years, such as the People's Republic of China (PRC) and Indonesia. This chapter therefore tries to tease out whether (i) the imposition of data-related policies in Asia could have a negative trade impact similar to the rest of the world, and (ii) if so, which of the three data-related policies are primarily responsible for this potential effect.

The baseline results show that digital services imports do indeed decline in economies that implement data-related restrictions (exports are covered in section 5.4.3). This outcome is particularly strong for data localization and local storage requirements. Our findings also suggest that the imposition of a conditional flow regime is more complex as it does not necessarily have a significant negative trade impact. The results are different when including Asia in extended baseline regressions. Although Asian economies also appear to suffer a decline in digital services trade when strict data localization rules are applied, this is not the case for local storage requirements. Instead, strict rules as part of a conditional flow regime seem to be more burdensome for digital services trade in Asia, contrary to the rest of the world.

The next section discusses the three data-related policies in greater detail and explains how to quantify them. After that, the chapter presents an empirical strategy with the baseline and extended baseline specification considering Asia, before reporting the results of the regressions and finally discussing policy implications of the findings.

5.2 Data-Related Policies

The data-related policies this chapter covers are (i) data localization policies, (ii) local storage requirements, and (iii) conditional flow regimes. As these policies inhibit the free flow of data across borders, they also affect trade in digital services, given that these rely on the transmission of data between economies. Previous research has established either theoretically or empirically the triangular relationship between cross-border data flows, digital services trade, and data-related policies. Manyika et al. (2016), for instance, claim that the contribution of cross-border data flows to GDP has overtaken that of flows in goods during the current wave of globalization. Recent work by Goldfarb and Trefler (2018) discusses the potential theoretical implications of data-related policies, such as data localization, on international trade and how that connects to existing trade models.

This chapter follows up on the empirical work by Ferracane and van der Marel (2021), which studies the proportionate trade impact of data-related policies in digital services sectors. Ferracane and van der Marel examine this by constructing a composite indicator that interacts an index of regulatory restrictiveness in data with a measure of sector-level digital or data intensity. As such, this work applies a weighted approach of a self-developed index of data policy restrictiveness, with a measure of data intensity for each services sector covered. This index contains a long series of specific regulatory policies in data, including restrictions related to both cross-border and domestic data usage. The results show that, whereas cross-border restrictions had a negative and significant impact on digital services trade, rules governing domestic processing did not.

The empirical study in this chapter will disentangle which of the cross-border restrictions covered by the data restrictiveness index are driving the negative trade result. Restrictions related to the cross-border flow of data include the three categories of interest. This policy categorization follows Ferracane (2017) and Ferracane, Lee-Makiyama, and van der Marel (2018). Note that data localization policies can entail a summary label covering various policies that ban the transfer of data abroad or can include a requirement for local processing.

5.2.1 Cross-Border Data Flow Restrictions

More specifically, bans on the transfer of data across borders and local processing requirements are the measures with the most restrictive effect on cross-border data flows. In case of a ban on the transfer of data or a local processing requirement, a firm needs to either build data centers within the implementing jurisdiction or switch to local service providers. This increases costs if the domestic service providers are less efficient than foreign ones. The difference between transfer bans

and local processing requirements is quite subtle. In a transfer ban, the firm is not allowed to even send a copy of the data cross-border. Where a local processing requirement is in place, the firm can still send a copy of the data abroad—which can be important for communication between a subsidiary and its parent and, in general, for exchange of information within the group. In both cases, however, the main data processing activities need to be done in the imposing jurisdiction.

The second category covers local storage requirements. These measures require a firm to keep copies of certain data within the economy. Local storage requirements often apply to specific data such as accounts or bookkeeping. As long as the copy of the data remains within the national territory, the firm can operate as usual.

The third category of trade cost-enhancing measures related to cross-border flow of data is the case of a conditional flow regime. Measures under this regime forbid transfer of the data abroad unless certain conditions are fulfilled. If the conditions are stringent, the measure can easily result in a ban to transfer. The conditions can apply either to the recipient economy (e.g., some jurisdictions require that data can be transferred only to economies with an "adequate" protection) or to the firm (e.g., a condition might consist in the need to request the data subject to consent to the cross-border transfer of their data).

Contrary to Ferracane and van der Marel (2021), in this study, these policy categories are not lumped together and developed in a composite index measuring aggregate data restrictiveness. Instead, only a value of 1 is applied in case economies impose one of the three policy restrictions. However, to add nuance, given that not all economies have an equally strict applied set of data-related restrictions, we also assign a 0.5 in case economies impose less strict rules. An example is when economies apply data restriction only to one or a subset of sectors or type of data—and not the entire economy. As part of our empirical strategy, these 0.5 scoring will be transformed into either a 0 or 1 to allow for a DID method to assess their effect on digital services trade.

5.2.2 Asia's Part in Global Data Restrictions

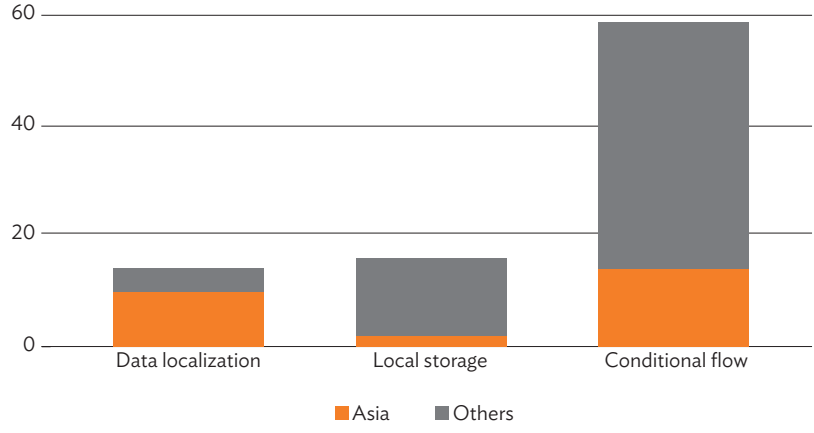
Asia's share in the total number of data-related restrictions globally is presented in Figure 5.2. The proportion of data localization measures occupied by Asian economies is larger than the rest of the world, representing a share of about 70%. Other economies besides the PRC and Indonesia also apply data localization policies.

In similar manner, Figure 5.2 also points to the number of economies in Asia and the rest of the world that apply local storage requirements and rules related to a conditional flow regime. The figure illustrates that Asia's share in local storage requirements is relatively small. Finally, conditional flow regimes are a lot more

frequent, as shown in Figure 5.2. Many economies across the globe apply this type of data-related policy restriction. Yet, Asia's global share remains modest, in part because many European and Latin American economies apply rules related to conditional flow regimes. Note however that in Asia, policies on conditional flow are greater in number than those for data localization (Table 5.1).

Even as data restrictiveness is not measured in levels, as developed with the data policy index in Ferracane and van der Marel (2021), we nonetheless can construct a global level for data restrictiveness and a separate one for the Asian region. Figure 5.3, using their weights and applying these to the updated set of the three measures deployed in this chapter, shows the development of the level of data restrictiveness over time, globally and for Asia. Notice that in both indexes, a second layer of weights is applied on the basis of an economy's GDP (in constant United States [US] dollars) to account for some economies being larger than others. Asia's development of restrictiveness level seems more severe than for the world as a whole. In large part, this is driven by the PRC's larger economic weight in Asia.

Figure 5.2: Number of Data-Related Measures Imposed by Asia and Other Economies, 2019



Notes: Economies assigned as Asian can be found in Table 5.1. Categorization of economies is performed on the basis of values assigned with an initial 0.5, meaning that economies also apply a partial restriction on the three types of data-related restrictions.

Source: Author's calculations.

Table 5.1: Economies Applying Data Restrictions

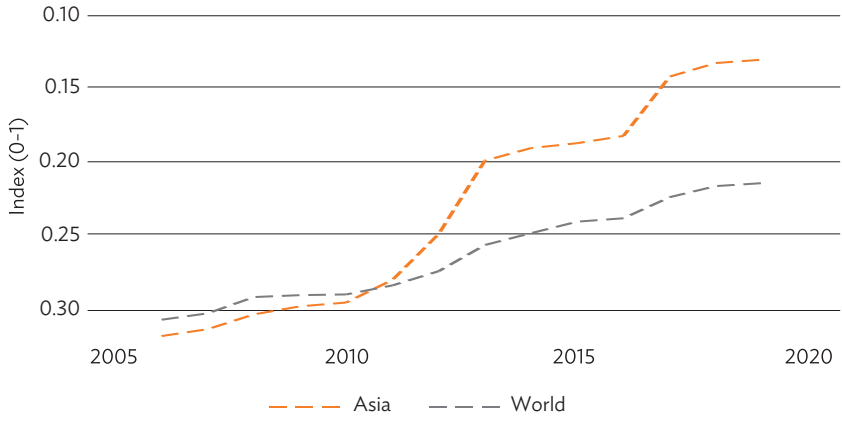
Data Localization	Local Storage	Conditional Flow Regime	
Australia[a]	Belgium	Argentina	Korea, Republic of[a]
Canada	Bulgaria	Australia[a]	Latvia
China, People's Rep. of[a]	Denmark	Austria	Lithuania
India[a]	Finland	Belgium	Luxembourg
Indonesia[a]	Germany	Brazil	Malaysia[a]
Korea, Republic of[a]	Greece	Brunei Darussalam[a]	Malta
Nigeria	India[a]	Bulgaria	Netherlands
Pakistan[a]	Italy	Canada	New Zealand[a]
Russian Federation	Netherlands	Chile	Nigeria
Taipei,China[a]	New Zealand[a]	China, People's Rep. of[a]	Norway
Thailand[a]	Poland	Colombia	Pakistan[a]
Türkiye	Romania	Costa Rica	Paraguay
Viet Nam[a]	Russian Federation	Croatia	Peru
	Sweden	Cyprus	Philippines[a]
	United Kingdom	Czech Republic	Poland
	United States	Denmark	Portugal
		Estonia	Romania
		Finland	Russian Federation
		France	Singapore[a]
		Germany	Slovakia
		Greece	Slovenia
		Hungary	South Africa
		Iceland	Spain
		India[a]	Sweden
		Indonesia[a]	Switzerland
		Ireland	Taipei,China[a]
		Israel	Thailand[a]
		Italy	Türkiye
		Japan[a]	United Kingdom

Note: Categorization of economies is performed on the basis of values assigned with an initial 0.5, meaning that economies also apply a partial restriction with respect to the three types of data-related restrictions.

[a] Asian economies.

Source: Author's compilation.

Figure 5.3: Data Policy Index for Cross-Border Data-Related Measures for Asia and the World



Note: The methodology follows Ferracane and van der Marel (2021). The index is a weighted average across all economies using gross domestic product at constant 2010 prices for each economy as weight. Only the three cross-border data flow restrictions are covered: data localization, local storage requirement, and conditional flow regime.

Source: Author's calculations.

5.3 Empirical Strategy

The DID approach in the empirical strategy regresses the outcome variable against a set of dummies that separates two groups for two time periods. One group is the treatment group, the other is the control. As with a standard DID analysis, the treatment group is exposed to a "treatment" in the second period, whereas the control group is not subjected to the treatment at any point. In a later stage, a third group of Asian economies undergoes the treatment.

In this chapter, the outcome variable is services trade. It is regressed on the treatment group of software-intense sectors for the period after economies have implemented their data-related policies. More specifically, a dummy variable is assigned to software-intense sectors starting from the year that economies imposed one of the three data restrictions presented in Table 5.1. The untreated control group, comprising non-software-intense sectors, is given a zero during the

entire regression period. The DID approach is therefore composed of two levels of "differences": one that distinguishes between software-intense and non-software-intense services sectors (or digital services); and another that differentiates between pre- and post-year of implementation (known in the baseline as YIMP).

In more formal terms, we regress the following baseline specification:

$$ln(\mathrm{SM})_{cst} = \Phi + \theta \mathrm{D}_{cst} \bullet \text{Software intense}_s \geq \mathrm{YIMPL}_{ct-1} + \delta_{st} + \gamma_{ct} + \varepsilon_{cst} \quad (5.1)$$

In equation (5.1), the response variable is the logarithm (ln) of cross-border imports of services (SM) in economy *c*, for services sector *s* in time *t*. Data are taken from the World Trade Organization (WTO)–United Nations Conference on Trade and Development (UNCTAD)–International Trade Centre (ITC) annual trade in services dataset and the WTO–Organisation for Economic Co-operation and Development (OECD) BaTIS dataset for robustness checks. Then, the term D_{cst} denotes the dummy variable that is of interest. It captures any difference in services imports between software-intense and non-software-intense services before and after the year of implementation of an economy's data restriction denoted with YIMP_{ct}.

We also apply fixed effects that capture all other aggregate factors that otherwise would cause shifts in services trade over time, even in the presence of other regulatory changes. They are specified at sector-year, δ_{st}, and economy-year, γ_{ct}. The former group of fixed effects controls for sector-specific conditions, such as other sector intensities besides software. Examples are skill- and capital-intensities that affect production structures in sectors. They also cover services policy changes over the years specific to sectors. The latter set of fixed effects controls for economy-wide trends over time that are specific to an economy, such as macroeconomic conditions.[1] Sector fixed effects are applied at the 2-digit aggregate, given that the trade data are reported at this level. Finally, ε_{cst} is the residual term. Regressions are estimated with robust standard errors clustered by economy-sector-year and are performed over 2006–2019, the years for which we have policy data after taking a 1-year lag.

As said, our source of services trade is the WTO–UNCTAD–ITC annual dataset, which covers exports and imports of total commercial services. This database covers 222 entities and includes economies and regional aggregations

[1] Note that fixed effects by economy-sector would take out any variation across software-intense and non-software-intense sectors between economies imposing data-related restrictions and those who do not. We therefore do not apply these set of fixed effects. In case we did, we would only pick up total import developments of economies imposing data-related restrictions, compared to all other economies, given that no distinction could be made between an economy's sector trade patterns. Appendix Figure A5.1.1 presents an example for economies imposing data localization: they exhibit higher trade growth of total imports. Applying economy-sector fixed effects would measure this trend only. Using sector-year fixed effects, we are able to capture the fact that economies applying data localization policies experienced a decline in software-intensive imports compared to all other non-software-intense services imports over time, as illustrated in Appendix Figure A5.1.2.

or economic groupings during 2005–2020 at the two-digit level. The data are in line with the sixth edition of the International Monetary Fund's Balance of Payments and International Investment Position Manual (BPM6), as well as the 2010 edition of the Manual on Statistics of International Trade in Services (MSITS 2010). Compared with the BPM5 classification, major changes for the Balance of Payments classification for services have been introduced with regard to financial intermediation services, insurance services, intellectual property, and manufacturing and maintenance services, many of which we use in our empirical specification.

This chapter also uses a second source of service trade from the WTO–OECD BaTIS dataset. BaTIS stands for Balanced Trade in Services and is an experimental dataset containing a complete, consistent, and balanced matrix of international trade in services. Trade data cover 2005–2020, for over 200 reporters and partners, and 12 categories from the Extended Balance of Payments Services classification 2010 besides total services. In the data file, one can find reported values—trade data as reported by the relevant statistical authorities—as found in the WTO–UNCTAD–ITC database; final values, which include the reported data and all the estimations and adjustment procedures used to ensure complete consistency of the dataset; and balanced values, which are the reconciled trade value of reported exports and mirror imports. We choose final values as a midway of manipulated data given the reported values are already covered by the first annual dataset. See Fortanier et al. (2017) for details.

5.3.1 Software Intensities

Software intensities are measured using information on software usage by sector of the US. Specifically, this chapter takes the 2011 Census ICT Survey, which reports survey data at detailed four-digit North American Industry Classification System (NAICS) sector level. The data record how much each industry and services sector spend (in millions of US dollars) on information and communication technology (ICT) hardware equipment and computer software.

The survey reports two types of software expenditure: capitalized and non-capitalized. We select both because the two components together proxy the degree to which sectors are digital-intense and reliant on the transmission of data over the internet. Capitalized expenditure is closer to the concept of intensities for factors of production such as capital and labor, as developed in the previous literature (e.g., Chor 2011; Romalis 2004). Non-capitalized expenditure relates more to the input support of firms and enters in the production function as intermediate services. Capitalized expenditure is consisting of longer-term investments made in computer software. It excludes purchases and payroll for developing software, software licensing and services, and maintenance agreements for software, which are all components that are measured as non-capitalized purchases.

The year 2010 is selected for computing software intensities. Choosing this year avoids the risk of being endogenous to the trade data as it lies in the middle of the time period. Software expenditure is divided over labor, for which we also use data from 2010. The labor data are sourced from the US Bureau of Labor Statistics (BLS). These software intensities are therefore similar to the ones computed in Ferracane and van der Marel (2021). For our DID analysis, all we need is an indicator that assigns unity to a services sector classified as software intense. In doing so, we determine whether a sector adheres to this condition when it shows a software-over-labor ratio higher than the sample median. Sectors showing a ratio below this threshold are assigned a zero.

Intensities are computed at four-digit NAICS level and then concorded into two-digit BPM6, from where the median is computed. Because no concordance table exists between NAICS and BPM6, a self-constructed matrix is used. Numbers are aggregated at two-digit BPM6 level by taking the simple average. Note that one sector—royalties and license fees and intellectual property—forms a mismatch between the two classification tables. This category is neither reported in the US Census nor in the US BLS database. Nonetheless, it is an important sector as it covers, among other items, patents, trademarks, and copyrights—all activities that are digital-intense and for which the trade data record high volumes of services exports. For this reason, this chapter uses a self-constructed concordance table to incorporate this sector.[2]

Table 5.2 reports the sectors classified as software-intense and separates between two types of digital services. One category is digital services, which are data-reliant sectors that show extremely high software-over-labor ratios. The table also shows sectors exhibiting high software intensities, but which typically are not part of what the policy literature classifies as pure data sectors. We call these digital-enabled services. Even though data and digitalization penetrate all parts of the economy, not all services classify as data or digital sectors. This separation follows broadly the Organisation for Economic Co-operation and Development (OECD)–World Trade Organization (WTO)–International Monetary Fund (IMF) Handbook on Measuring Digital Trade, which breaks down digital trade into two categories: ICT and ICT-enabled services. The ICT-enabled services can cover many sectors, not just digital services such as health and education. To account for this distinction, we include a second column, digital-enabled services, that expands the core list of digital services but excludes types of services that are not necessarily digital (yet).

[2] The concordance table between four-digit NAICS and two-digit BPM6 can be obtained upon request. Admittedly, the inclusion of intellectual property or royalties and license fees as a service is a balance of payments decision, and there is some debate about whether this is truly a service. In addition, for some economies, this may also reflect tax and transfer pricing as drivers of observable trade in this sector. However, since this sector is included in all publicly available data sources that record trade in services, we prefer to include it. Nonetheless, in our regression we have also dropped this sector entirely as additional (unreported) robustness checks. Results do not alter apart from slight coefficient size changes. Results are available and can be obtained upon request.

Table 5.2: Sectors Classified as Software-Intensive (Over Labor)

Code	Sector Description	Digital	Digital-Enabled
SI1	Telecommunication	●	●
SI2	Computer	●	●
SI3	Information	●	●
SF	Insurance	●	●
SG	Financial	●	●
SH	Intellectual property		●
SJ1	Research and development		●
SJ2	Professional and management		●
SJ3	Technology, trade-related, and other		●
SB	Maintenance and repair		
SD	Travel		
SE	Construction		
SC1	Sea transport		
SC2	Air transport		
SC3	Other transport		
SC4	Postal and courier		
SK1	Audiovisual and related		
SK2	Personal, cultural, and recreation		

Source: Author's compilation.

Digital services tabulated in the third column of Table 5.2 cover telecommunications, computer services, and information services, and form natural contenders of data, given that these sectors are highly digital. Information services involve activities such as data processing and web search, all of which are high users of software. This column includes financial and insurance services, which are also assessed as greater consumers of software than labor and rely on cross-border data flows. The two sectors are broadly considered as very digital-intense, given that over the years internet technologies have brought massive changes to the financial services industry.[3] The next column expands the list of digital sectors with services that are also commonly understood as

[3] Another non-ICT sector that is software-intense is retail. However, neither the US Census nor the BPM6 classification shows a separate entry for retail or wholesale distribution services, which is the reason why this sector is omitted in our analysis of intensities and is not covered in our regression analysis.

digital-intense and are not always pure digital services even as they rely on the cross-border flow of data and the internet and do show a software-over-labor ratio above the median or mean. These are mostly business services.[4]

5.3.2 Extended Baseline for Asia

We extend the baseline specification to consider additional effects for the Asian region. As has been explained, much of the global policy action related to data restrictions took place in Asian economies. By extending the baseline regressions, we can uncover whether the changes in data-related policies of the region really resulted in the negative trade effect in digital services observed at global level in previous empirical works. In other words, the aim is to find out whether Asian economies have experienced a differential effect of a reduction in imports after data-related policies are changed. The way in which we apply this extended baseline is to interact the variable of interest D_{cst} with another dummy called ASIA_c, which assigns unity for each Asian economy. It means that these economies are interacted with the DID dummy that signifies the group of digital sectors, starting from the year each policy was implemented.

In more formal terms, we augment the baseline specification with a triple interaction term as follows:

$$ln(\mathrm{SM})_{cst} = \Phi + \theta \mathrm{D}_{cst} \bullet \text{Software intense}_s \geq \mathrm{YIMP}_{ct-1} * \mathrm{ASIA}_c + \delta_{st} + \gamma_{ct} + \varepsilon_{cst} \quad (5.2)$$

As stated in equation (5.2), we cover for the Asian region by the term ASIA_c. This is a dummy for the 16 Asian economies in the 64 economies covered by the dataset. The Asian economies covered are duly noted in Table 5.1.[5] Together this group is therefore separately interacted with our DID dummy, in addition to the average effect for all economies as a control variable. Typically, the interaction term now comprises three terms for which all components should be controlled for, including the Asian region. Yet, given that the Asian economies themselves are subsumed in the economy-year fixed effects, no separate control variable for these economies can be included. All other terms in the equation remain unchanged and follow the baseline specification stated in equation (5.1).

The interpretation of the Asian dummy becomes somewhat different than the baseline specification. That is, given the interaction variable with Asian economies, a significant result on this triple interaction term confirms whether

[4] Note that the BaTIS dataset follows exactly the same sector division but at slightly more aggregate level.

[5] Asian economies were selected in consultation with ADB staff.

any differential effect is apparent for the Asian region compared with the baseline interaction term for all economies. As always, the result of the baseline coefficient becomes somewhat less informative regardless of its significance. Therefore, we also put for every regression a Wald test of joint significance using the result of the F-statistic.[6] For each regression, the p-values are reported for this F-statistic. Keeping in mind a threshold of 0.05, a p-value exceeding this means that the null hypothesis of a joint significance can be rejected. If not, the baseline coefficient result is jointly significant with the Asian interaction dummy.

5.4 Results

Results of the baseline and extended regressions are reported from Table 5.3 onward. Table 5.3 shows the regression results by taking the three data-related restrictions together and checking whether the aggregate assessment is consistent with findings in the literature. That is, we create a separate dummy variable each time an economy implements at least one of the three data-related policies. We call this variable CB, denoting cross-border data restrictions. Following our DID equations (5.1) and (5.2), this variable is then interacted with the list of digital services sectors, called DS, following Table 5.2. In the next step, we interact this term with the Asia dummy, called Asia, that singles out the region and, in effect, therefore creates a triple interaction term. Notice that for columns (1) and (2) in Table 5.3, we put a score of 0 for those economies that have implemented data restrictions initially assigned a 0.5, whereas in columns (3) and (4), we give these partial restrictions a full score of 1 to check results.

The coefficient results from the baseline regression presented in column (1) confirms our prior that any of the implemented data-related restrictions are associated with lower levels of digital services imports. This result echoes the empirical findings in Ferracane and van der Marel (2021) even as our study lacks their use of a restrictiveness index. Instead, we simply employ a dummy variable following the requirement for a DID specification. The fact that, in both cases, results are negative and significant is reassuring even if our coefficient size is smaller than in previous work. This lower coefficient size is unsurprising given the nature of the explanatory variables. In economic terms, it implies an average negative trade effect in digital services of about 15% for economies implementing any of these three data-related restrictions compared with economies that do not implement them.

[6] A significant result on the Wald test of joint significance means that both variables, i.e., the baseline and the extended one, are both significant and therefore retain their predictive power and should be added in the regression.

Table 5.3: Baseline and Extended Difference-in-Difference Regression for Any Data-Related Restrictions

	(1)	(2)	(3)	(4)
	ln(SM)			
	0.5 > 0		0.5 > 1	
CB * DS	-0.138*** (0.003)	-0.090* (0.050)	-0.097 (0.115)	-0.044 (0.478)
CB * DS * Asia		-0.614*** (0.000)		-0.325*** (0.000)
FE Economy-Year	Yes	Yes	Yes	Yes
FE Sector-Year	Yes	Yes	Yes	Yes
Observations	11,454	11,454	11,454	11,454
Adjusted R-squared	0.774	0.775	0.774	0.775
p-values F-stat		0.000		0.000

CB = cross-border data restrictions, DS = digital services sector, FE = fixed effects, ln = natural logarithm, SM = cross-border imports of services.

Notes: * p<0.10, ** p<0.05, *** p<0.01; p-values in parentheses.

Source: Author's calculations.

Next, we report the results from the extended regression in column (2). It now becomes clear that the differential impact for Asia becomes highly significant with a negative coefficient sign, whereas the control variable for the average effect remains only weakly significant, though still negative. The size of the coefficient results could be interpreted as Asian economies exhibit a higher-than-average effect compared with the rest of the world, given its higher value compared with columns (1) and (2). However, one needs to be careful with such inference given that, in principle, there is no reason why certain groups of economies would be innately more sensitive to data-related restrictions than others. Instead, the coefficient result should be interpreted as indicating that much of the global trade adjustment in digital services due to data-related restrictions occurs in Asia, as the differential effect on the significant triple interaction suggests. Note that the null hypothesis of a joint significance cannot be rejected.

Results for Asia retain their negative significance when fully incorporating the partial scores for the data restrictions, as reported in the last column. The average effect for the rest of the world loses its significance entirely in both columns (3) and (4). This may mean that, unlike in Asia, moderate data-related restrictions have no trade-reducing associations in the rest of the world, although the p-values suggest the two variables are still jointly significant. One potential explanation is that the enabling environment at the economy-sector level may

compensate for this effect in other economies, which in Asia is not the case—a factor that is only controlled for at the economy and sector individually.[7] However, using the alternative dataset from BaTIS shows in Table 5.4 that, when assigning a full score for economies having these partial data restrictions, the coefficient results for the average effect do come out as negative and significant in column (3) but not in column (4), although with a joint significance.

Table 5.4: Baseline and Extended Difference-in-Difference Regression for Any Data-Related Restrictions Using BaTIS Database

	(1)	(2)	(3)	(4)
	ln(SM)			
	0.5 > 0		0.5 > 1	
CB * DS	-0.142*** (0.009)	-0.098* (0.072)	-0.185** (0.014)	-0.118 (0.119)
CB * DS * Asia		-0.436*** (0.000)		-0.361*** (0.000)
FE Economy-Year	Yes	Yes	Yes	Yes
FE Sector-Year	Yes	Yes	Yes	Yes
Observations	8,569	8,569	8,569	8,569
Adjusted R-squared	0.782	0.783	0.782	0.783
p-values F-stat		0.000		0.000

BaTIS = WTO–OECD Balanced Trade in Services dataset, CB = cross-border data restrictions, DS = digital services sector, FE = fixed effects, ln = natural logarithm, OECD = Organisation for Economic Co-operation and Development, SM = border imports of services, WTO = World Trade Organization.

Notes: * p<0.10, ** p<0.05, *** p<0.01; p-values in parentheses.

Source: Author's calculations.

[7] For instance, some economies may have developed a strong digital infrastructure with sophisticated internet connection or constructed data centers that help develop trade in digital services sectors —something that is hard to control for at the economy-sector level. By similar token, economies may still suffer from high restriction in digital sectors themselves such as telecommunications, an issue we control for as part of our robustness checks.

5.4.1 Specific Data Restrictions

Tables 5.5 and 5.6 report the results for the three specific data restrictions. They are labeled in the two tables as follows: data localization as DL; local storage requirement as LS; and conditional flow regimes as CF. Table 5.5 reports the results for using the WTO–UNCTAD–ITC annual trade in services dataset, Table 5.6 reports the results for BaTIS.

The results in Table 5.5 show that the average effect for data localization policies disappears but becomes highly significant for the Asian region, both when entered alone and when entered together with all the other variables in column (4). The reverse appears the case for local storage requirements in column (2). This variable remains significant for the average effect across all economies but becomes insignificant when interacting with the Asia dummy. Note that the joint significance is nearly rejected. This suggests that the trade-reducing impact of economies imposing local storage requirements may not be as great in Asia as elsewhere in the world. This is not the case for the restrictions related to a conditional flow regime, where results show a negative coefficient for the triple interaction term for Asia when entered alone in column (3) and when putting together with the other restrictions in column (4). Interestingly, the average effect for conditional flow regimes stays significant in the last column, albeit weakly.

Table 5.5: Extended Difference-in-Difference Regression for the Three Data-Related Restrictions Separately

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(SM)				ln(SM)			
	0.5 > 0				0.5 > 1			
DL * DS	-0.069 (0.704)			-0.006 (0.978)	0.128 (0.115)			0.104 (0.202)
DL * DS * Asia	-0.873*** (0.000)			-0.931*** (0.000)	-0.580*** (0.000)			-0.578*** (0.000)
LS * DS		-0.213** (0.013)		-0.239** (0.015)		-0.099** (0.024)		-0.157*** (0.001)
LS * DS * Asia		0.061 (0.883)		-0.050 (0.905)		0.047 (0.704)		0.136 (0.302)
CF * DS			-0.022 (0.618)	-0.082* (0.075)			-0.019 (0.708)	-0.080 (0.148)
CF * DS * Asia			-0.480*** (0.000)	-0.369*** (0.000)			-0.352*** (0.000)	-0.072 (0.400)

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Table 5.5 *continued*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(SM)				ln(SM)			
	0.5 > 0				0.5 > 1			
FE Economy-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE Sector-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,454	11,454	11,454	11,454	11,454	11,454	11,454	11,454
Adjusted R-squared	0.775	0.774	0.775	0.776	0.775	0.774	0.775	0.775
p-values F-stat	0.000	0.042	0.000	0.000	0.000	0.076	0.000	0.000

CF = conditional flow regimes, DL = data localization, DS = digital services sector, FE = fixed effects, ln = natural logarithm, LS = local storage requirements, SM = cross-border imports of services.

Notes: * p<0.10, ** p<0.05, *** p<0.01; p-values in parentheses.

Source: Author's calculations.

Table 5.6: Extended Difference-in-Difference Regression for the Three Data-Related Restrictions Separately Using BaTIS Database

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(SM)				ln(SM)			
	0.5 > 0				0.5 > 1			
DL * DS	0.024 (0.915)			0.118 (0.601)	0.171* (0.056)			0.120 (0.171)
DL * DS * Asia	-0.434* (0.089)			-0.505* (0.053)	-0.642*** (0.000)			-0.600*** (0.000)
LS * DS		-0.307*** (0.002)		-0.350*** (0.002)		-0.210*** (0.000)		-0.279*** (0.000)
LS * DS * Asia		0.296 (0.595)		0.207 (0.713)		0.171 (0.108)		0.152 (0.218)
CF * DS			-0.067 (0.200)	-0.098* (0.072)			-0.094 (0.110)	-0.151** (0.023)
CF * DS * Asia			-0.546*** (0.000)	-0.463*** (0.000)			-0.483*** (0.000)	-0.200* (0.053)
FE Economy-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE Sector-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,569	8,569	8,569	8,569	8,569	8,569	8,569	8,569

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Table 5.6 *continued*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(SM)				ln(SM)			
	0.5 > 0				0.5 > 1			
Adjusted R-squared	0.782	0.782	0.783	0.783	0.783	0.782	0.783	0.784
p-values F-stat	0.008	0.008	0.000	0.000	0.000	0.001	0.000	0.000

BaTIS = WTO–OECD Balanced Trade in Services dataset, CF = conditional flow regimes, DL = data localization, DS = digital services sector, FE = fixed effects, ln = natural logarithm, LS = local storage requirements, OECD = Organisation for Economic Co-operation and Development, SM = cross-border imports of services, WTO = World Trade Organization.

Notes: * p<0.10, ** p<0.05, *** p<0.01; p-values in parentheses.

Source: Author's calculations.

These results are largely similar when leveling up all partial restrictions into a full score and when using the BaTIS dataset. Columns (5)–(8) in Table 5.5 report coefficient results that largely match the first four columns, although the coefficient sizes of all significant results are lower. Moreover, the significant and negative results for the conditional flow restrictions disappear when entered in combination with the other two restrictions in the last column. This is the case for both the average effect and the Asian triple effect. Looking at Table 5.6, use of BaTIS data shows the results for data localization measures for the Asian interaction term now come out as weakly significant. Otherwise, all other results are similar to those reported in Table 5.4. This measure of data localization again becomes strongly significant when assigning a full score for the partial data restrictions, and the same applies for the conditional flow restrictions in column (8).

5.4.2 Digital-Enabled Services

We repeat the last set of regressions by expanding the list of sectors with digital-enabled services. As explained, these sectors include intellectual property, research and development services, professional and management activities, and other business services. These sectors are found to have relatively high software-over-labor ratios and heavily rely on cross-border flows of data too. In turn, these four additional sectors are therefore also likely to be sensitive to regulatory changes in the free flow of data. When reporting results, the list of digital-enabled services is now denoted with DEnS instead of DS.

Results for digital-enabled services are reported in Table 5.7 using the WTO–UNCTAD–ITC annual trade in services dataset and in Table 5.8 using the BaTIS. The results in Table 5.7 show that, again, the variable measuring data localization comes out as strongly negative and significant for the Asian interaction

term. This variable stays significant when entered with all other policy measures in column (4). The results for both data storage requirement and conditional flow restrictions remain largely insignificant for the Asian economies with an F-statistic rejected or almost rejected. For restrictions related to conditional flow regimes, these policies are not negatively associated with trade for the expanded list of digital-enabled services in Asia, contrary to the results for the narrow list in Table 5.5. However, when assigning the partial restrictions into full scoring, results for this policy become significant again for Asia in column (7). The full scoring method provides negative and strongly significant results for Asia for the local storage requirements, although surprisingly positive coefficient results are recorded for the average effects.

Using BaTIS, the results in Table 5.8 show a more consistent pattern across the two scoring systems for the partial measures. That is, data localization measures come out with a negative and significant coefficient result for the Asian triple interaction term, with also a stable coefficient size. Similarly, the negative and significant result for local storage requirement is consistent for the non-Asian variable across columns (2), (4), (6), and (8). Also, the interaction term for Asia regarding conditional flow restrictions remains intact across the reporting columns but loses its significance once entered with the other policy restrictions as reported in the last column. A further surprising result is the positive and weakly significant result found for local storage requirement for digital-enabled services, although this is only the case when partial scores are set to 1 instead of 0. One likely explanation is that some overscoring takes place that, in the regressions, picks up a mere trade expansion of economies in which otherwise only limited restrictions apply in reality.

Table 5.7: Extended Difference-in-Difference Regression for the Three Data-Related Restrictions Separately for Digital-Enabled Services

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(SM)				ln(SM)			
	0.5 > 0				0.5 > 1			
DL * DEnS	-0.042			0.086	0.129			0.134
	(0.836)			(0.697)	(0.114)			(0.105)
DL * DEnS * Asia	-1.046***			-1.148***	-0.538***			-0.568***
	(0.000)			(0.000)	(0.000)			(0.000)
LS * DEnS		-0.159		-0.230**		0.092**		0.045
		(0.102)		(0.034)		(0.029)		(0.306)
LS * DEnS * Asia		0.039		0.121		-0.442***		-0.342***
		(0.935)		(0.801)		(0.000)		(0.003)

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Table 5.7 *continued*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(SM)				ln(SM)			
	0.5 > 0				0.5 > 1			
CF * DEnS			0.116** (0.011)	0.061 (0.190)			0.141*** (0.006)	0.044 (0.432)
CF * DEnS * Asia			-0.094 (0.362)	0.014 (0.894)			-0.226*** (0.002)	0.099 (0.291)
FE Economy-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE Sector-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,454	11,454	11,454	11,454	11,454	11,454	11,454	11,454
Adjusted R-squared	0.776	0.774	0.774	0.776	0.775	0.774	0.775	0.775
p-values F-stat	0.000	0.256	0.031	0.000	0.000	0.000	0.000	0.000

CF = conditional flow regimes, DEns = digital-enabled services, DL = data localization, DS = digital services sector, FE = fixed effects, ln = natural logarithm, LS = local storage requirements, SM = cross-border imports of services.

Notes: * p<0.10, ** p<0.05, *** p<0.01; p-values in parentheses.

Source: Author's calculations.

Table 5.8: Extended Difference-in-Difference Regression for the Three Data-Related Restrictions Separately for Digital-Enabled Services Using BaTIS Database

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(SM)				ln(SM)			
	0.5 > 0				0.5 > 1			
DL * DEnS	0.110 (0.643)			0.281 (0.256)	0.209** (0.030)			0.178* (0.065)
DL * DEnS * Asia	-0.543** (0.047)			-0.716** (0.012)	-0.537*** (0.000)			-0.522*** (0.000)
LS * DEnS		-0.366*** (0.000)		-0.452*** (0.000)		-0.171*** (0.000)		-0.227*** (0.000)
LS * DEnS * Asia		0.539 (0.362)		0.538 (0.366)		0.201* (0.054)		0.238** (0.044)
CF * DEnS			-0.032 (0.548)	-0.062 (0.253)			-0.012 (0.841)	-0.041 (0.542)
CF * DEnS * Asia			-0.302*** (0.008)	-0.208* (0.079)			-0.293*** (0.000)	-0.098 (0.366)

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Table 5.8 *continued*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(SM)				ln(SM)			
	0.5 > 0				0.5 > 1			
FE Economy-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE Sector-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,569	8,569	8,569	8,569	8,569	8,569	8,569	8,569
Adjusted R-squared	0.783	0.782	0.782	0.783	0.783	0.782	0.782	0.783
p-values F-stat	0.009	0.001	0.020	0.000	0.000	0.001	0.001	0.000

BaTIS = WTO–OECD Balanced Trade in Services dataset, CF = conditional flow regimes, DEns = digital-enabled services, DL = data localization, DS = digital services sector, FE = fixed effects, ln = natural logarithm, LS = local storage requirements, OECD = Organisation for Economic Co-operation and Development, SM = cross-border imports of services, WTO = World Trade Organization.

Notes: * p<0.10, ** p<0.05, *** p<0.01; p-values in parentheses.

Source: Author's calculations.

5.4.3 Exports

A further check is to see whether the reported results also hold as true for exports as they do for imports. Even as conceptually the relationship between data-related restrictions and exports is weaker than for imports, it is a natural question to ask if there is a two-way effect in digital services trade. That question becomes even more acute in a global context, where about half of total international trade, and increasingly also digital services trade, is characterized by global value chains (World Bank 2020). In other words, the increase in exports experienced within global value chains correlates positively with the extent to which economies are able to source imports. Given that digital services markets are becoming increasingly global, and that supply chain trade takes place within services sectors (Heuser and Mattoo 2017; De Backer and Miroudot 2013), interest in the impacts on exports is warranted.

Results for the same set of baseline regressions but for exports, ln(SX), are reported in Tables 5.9 for digital services and in Table 5.10 for digital-enabled services. Table 5.9 shows that the coefficient result for data localization restrictions comes out with a negative sign but is only significant when entered with the other three policy variables in both column (4) and column (8) for the Asian interaction term.[8] A further result is that the coefficient for local storage

[8] Note that the two variables in column 1 and column 4 are still jointly significant, although in column 4 above a p-value threshold of 0.05.

requirement is positive when partial restrictions are fully accounted, which again may be a result from overshooting the measured regulatory burden in case of assigning a full score. Also, their joint significance is largely rejected, similar to the result in column (2). Next, restrictions for a conditional flow regime give a negative and significant coefficient result on the average effect variable, and a nonsignificant one in column (3) and column (7). Results for digital-enabled services in Table 5.10 are in line; however, they show a stronger negative result for both data localization measures for the average effect and local storage requirement for Asia, but not for the results on conditional flow regimes.

Table 5.9: Extended Difference-in-Difference Regression for the Three Data-Related Restrictions Separately for Digital Services Using Exports

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(SX)				ln(SX)			
	0.5 > 0				0.5 > 1			
DL * DS	-0.105 (0.600)			-0.135 (0.540)	-0.102 (0.255)			-0.040 (0.664)
DL * DS * Asia	-0.372 (0.125)			-0.519** (0.047)	-0.061 (0.591)			-0.395*** (0.003)
LS * DS		-0.136 (0.164)		-0.020 (0.862)		0.053 (0.307)		0.115** (0.035)
LS * DS * Asia		0.805 (0.151)		0.366 (0.520)		-0.155 (0.345)		-0.443** (0.014)
CF * DS			-0.318*** (0.000)	-0.362*** (0.000)			-0.360*** (0.000)	-0.475*** (0.000)
CF * DS * Asia			-0.141 (0.211)	-0.057 (0.616)			0.045 (0.589)	0.381*** (0.000)
FE Economy-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE Sector-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,209	11,209	11,209	11,209	11,209	11,209	11,209	11,209
Adjusted R-squared	0.733	0.733	0.734	0.734	0.733	0.733	0.734	0.734
p-values F-stat	0.004	0.178	0.000	0.000	0.076	0.450	0.000	0.000

CF = conditional flow regimes, DL = data localization, DS = digital services sector, FE = fixed effects, ln = natural logarithm, LS = local storage requirements, SX = cross-border exports of services.

Notes: * p<0.10, ** p<0.05, *** p<0.01; p-values in parentheses.

Source: Author's calculations.

Table 5.10: Extended Difference-in-Difference Regression for the Three Data-Related Restrictions Separately for Digital-Enabled Services Using Exports

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(SX)				ln(SX)			
	0.5 > 0				0.5 > 1			
DL * DEnS	-0.639*** (0.001)			-0.943*** (0.000)	-0.171* (0.062)			-0.074 (0.435)
DL * DEnS * Asia	-0.456* (0.057)			-0.198 (0.475)	-0.099 (0.399)			-0.345** (0.013)
LS * DEnS		0.199** (0.044)		0.449*** (0.000)		0.547*** (0.000)		0.572*** (0.000)
LS * DEnS * Asia		0.828 (0.138)		0.447 (0.430)		-0.486*** (0.001)		-0.594*** (0.000)
CF * DEnS			-0.018 (0.738)	-0.096* (0.082)			0.037 (0.541)	-0.135** (0.044)
CF * DEnS * Asia			-0.089 (0.450)	0.044 (0.713)			0.050 (0.560)	0.504*** (0.000)
FE Economy-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE Sector-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,209	11,209	11,209	11,209	11,209	11,209	11,209	11,209
Adjusted R-squared	0.734	0.733	0.733	0.735	0.733	0.735	0.733	0.736
p-values F-stat	0.000	0.025	0.690	0.000	0.001	0.000	0.671	0.000

CF = conditional flow regimes, DEns = digital-enabled services, DL = data localization, DS = digital services sector, FE = fixed effects, ln = natural logarithm, LS = local storage requirements, SX = cross-border exports of services.

Notes: * p<0.10, ** p<0.05, *** p<0.01; p-values in parentheses.

Source: Author's calculations.

5.4.4 People's Republic of China

Having a large market, and therefore being a relatively large trader in the Asian region, inclusion of the PRC could drive much of the significant results obtained in the baseline regressions. Therefore, we perform regressions by excluding the PRC from our sample to check at whether the baseline results remain stable and are not skewed into a negative direction just because the economy is included.

In doing so, the baseline regression results reported in Tables 5.3 and 5.5 are repeated and reported in Tables 5.11 and 5.12—i.e., for the aggregate dummy capturing all three types of data policies together and for separating them, respectively. The coefficient outcomes show that excluding the PRC from the sample does not affect the results, which remain stable and statistically significant compared with the initial baseline regression. This is true when using the annual dataset and when using the BaTIS dataset (output omitted). Similarly, the results remain stable when performing the regressions for digital-enabled services (output omitted).[9] A marginal difference, nonetheless, apparent in both tables is that, when the PRC is excluded, the coefficient sizes are somewhat bigger. One potential explanation is that other economies are much smaller and therefore have a higher dependency on global markets, which explains their economic effects as captured by the coefficient size.

Table 5.11: Baseline and Extended Difference-in-Difference Regression for Any Data-Related Restrictions, Excluding the PRC

	(1)	(2)	(3)	(4)
	ln(SM)			
	0.5 > 0		0.5 > 1	
CB * DS	-0.121*** (0.008)	-0.089* (0.054)	-0.083 (0.180)	-0.044 (0.482)
CB * DS * Asia		-0.505*** (0.000)		-0.258*** (0.000)
FE Economy-Year	Yes	Yes	Yes	Yes
FE Sector-Year	Yes	Yes	Yes	Yes
Observations	11,352	11,352	11,352	11,352
Adjusted R-squared	0.772	0.773	0.772	0.773
p-values F-stat		0.000		0.000

CB = cross-border data restrictions, DS = digital services sector, FE = fixed effects, ln = natural logarithm, PRC = People's Republic of China, SM = cross-border imports of services.

Notes: * p<0.10, ** p<0.05, *** p<0.01; p-values in parentheses.

Source: Author's calculations.

[9] Regressions results are omitted to save space and preserve conciseness but are available upon request. A further remark for the results for digital-enabled services is that the positive coefficient results come out as having weaker statistical significance when the PRC is excluded.

Table 5.12: Extended Difference-in-Difference Regression for the Three Data-Related Restrictions Separately, Excluding the PRC

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(SM)				ln(SM)			
	0.5 > 0				0.5 > 1			
DL * DS	-0.070 (0.702)			-0.005 (0.981)	0.127 (0.115)			0.104 (0.200)
DL * DS * Asia	-0.739*** (0.001)			-0.888*** (0.000)	-0.501*** (0.000)			-0.502*** (0.000)
LS * DS		-0.226*** (0.008)		-0.239** (0.015)		-0.115*** (0.009)		-0.156*** (0.001)
LS * DS * Asia		0.058 (0.889)		-0.047 (0.911)		0.046 (0.711)		0.115 (0.384)
CF * DS			-0.036 (0.417)	-0.081* (0.078)			-0.038 (0.460)	-0.080 (0.149)
CF * DS * Asia			-0.347*** (0.000)	-0.368*** (0.000)			-0.286*** (0.000)	-0.065 (0.457)
FE Economy-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE Sector-Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,352	11,352	11,352	11,352	11,352	11,352	11,352	11,352
Adjusted R-squared	0.773	0.772	0.773	0.773	0.773	0.772	0.773	0.773
p-values F-stat	0.000	0.028	0.000	0.000	0.000	0.031	0.000	0.000

CF = conditional flow regimes, DL = data localization, DS = digital services sector, FE = fixed effects, ln = natural logarithm, LS = local storage requirements, PRC = People's Republic of China, SM = cross-border imports of services.

Notes: * p<0.10, ** p<0.05, *** p<0.01; p-values in parentheses.

Source: Author's calculations.

5.5 Conclusion

This chapter finds that Asian economies are more impacted than the rest of the world by the negative and significant association between data-related policy restrictions and global trade in digital services.

It comes to this conclusion through a difference-in-difference approach, in which Asian economies are singled out through the use of an interaction term and then assessed as a separate entity. As such, the significant results for the Asian region should be interpreted against the global benchmark. Our question is, does

the Asian region show any differential impact when it comes to the data-related restrictions it implements on digital services trade? This was assessed for three specific data-related restrictions: data localization, local storage requirement, and strict conditional flow regime. Two definitions of digital and data-reliant services, one narrow in scope and one broad, were employed.

The differential effect in Asia regarding data-related restrictions are—at the very minimum using our baseline specification—particularly true for data localization and strict conditional flow regimes enacted in Asian economies. The results remain stable when using an alternative source of trade in services, when expanding the scope of digital services to digital-enabled services, and when assigning partial restrictions for a full score. The results of local storage requirement for the Asian region are less clear. At times, no significant coefficient results were found, and the results were not consistent for the Asian region across the different specifications and robustness checks. Moreover, as far as the variation in the data allows, the results are not mainly driven by one economy, even as the PRC has the highest number of restrictions.

The Asian region is a dynamic area where digital activity continues to accelerate. The PRC, as a particularly large market, has great potential for expansion of its digital services sectors, given that the success of many digital services depends on scale. Asia, therefore, retains a huge potential to catalyze the digital services trade as a driving force for economic growth, along with structural transformation under a fast-evolving digital economy. Rationalizing and lowering data flow restrictions, although having to be vetted against multiple policy objectives at the same time, will contribute to garnering greater trade performances in digital services, as this chapter demonstrates.

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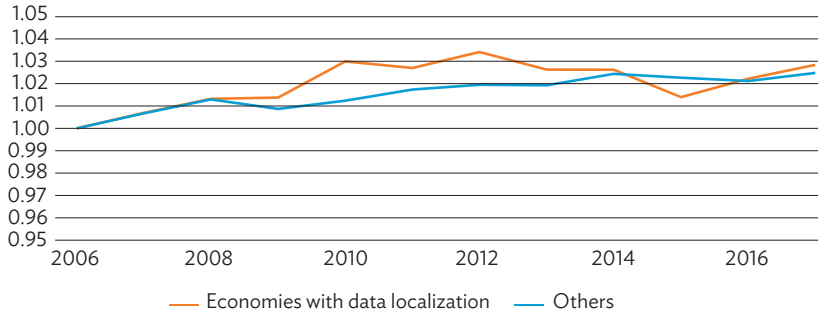
Appendix A5.1: Import Growth of Economies Imposing Data Localization Policies

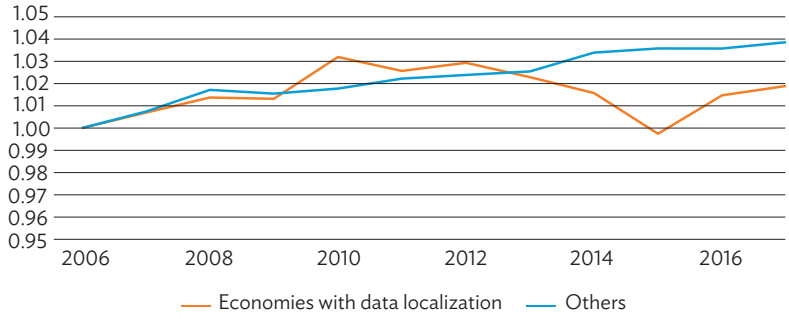
Figure A5.1.1: Growth Index of Total Imports by Economies Imposing Data Localization



Note: Digital services trade covers imports and exports of digital and digital-enabled services as defined in column 3 of Table 5.2. Data localization policies only cover those for which an initial 1 was assigned to economies, leaving out those that were assigned with an initial 0.5.

Source: Author's calculations.

Figure A5.1.2: Growth Index of Software-Intense Imports by Economies Imposing Data Localization



Note: Digital services trade covers imports and exports of digital and digital-enabled services as defined in column 3 of Table 5.2. Data localization policies only cover those for which an initial 1 was assigned to economies, leaving out those that were assigned with an initial 0.5.

Source: Author's calculations.