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DIGITAL SERVICES TAXES AND EXPORT PARTICIPATION AMONG SMALL TECHNOLOGY FIRMS

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Abstract:

This study examines variation in digital services tax design within the international debate on taxing digital commerce. A balanced secondary policy panel comprises 72 annual observations across Austria, France, Italy, Spain, Turkey, and the United Kingdom from 2010 to 2021. Descriptive comparative analysis distinguishes implementation timing, statutory rates, and documented taxable activity coverage. Twelve observations record operational taxes, with adoption beginning in France in 2019 and extending to Spain in 2021. Headline rates range from 2 percent in the United Kingdom to 7.5 percent in Turkey, producing a spread of 5.5 percentage points. Digital advertising is recorded as taxable in all twelve operational observations, while intermediation and digital content or user data are explicitly covered in three and five observations, respectively. The contribution is a multidimensional framework that refines the application of tax incidence reasoning by distinguishing statutory obligations from economic exposure. For international policy coordination and business compliance planning, these findings support separate assessment of effective dates, nominal rates, and documented service coverage when comparing national digital tax regimes.

Key Words: Digital Services Taxation; Statutory Tax Design; Comparative Policy Analysis; Digital Advertising; Descriptive Panel Analysis.

1. Introduction:

Taxes on digital services raise a policy problem that extends beyond the enterprises legally responsible for paying them: revenue collected from digital intermediaries may alter the costs of services used by smaller businesses to reach foreign customers. The Organisation for Economic Co-operation and Development (OECD, 2020) explains that taxes on intermediate digital services can transmit costs across firms and sectors, with outcomes depending on market power and pricing responses. For small technology firms, this distinction makes statutory tax design relevant to international market access even when their revenues fall outside the tax base. The substantive issue is therefore how to distinguish the introduction of a digital services tax from the regulatory characteristics through which economic exposure may arise.

Digital technologies provide the economic foundation for this concern because they change the costs of finding customers, communicating product information, and completing transactions. Goldfarb and Tucker (2019) identify reductions in search, replication, transportation, tracking, and verification costs as central features of digital economic activity. These reductions help explain why digital services can support international exchange. They also suggest that the commercial terms governing access to such services matter for firms seeking foreign customers. Digital taxation thus intersects with internationalisation through the services supporting exchange, as well as through the statutory obligations imposed on covered providers.

The importance of these services for smaller enterprises is reinforced by the OECD (2021). Online platforms can expand market reach and provide capabilities that firms lack the resources to develop internally. Their benefits nevertheless coexist with platform fees, limited bargaining power, and dependence on commercial arrangements controlled by service providers. This evidence establishes a policy tension: digital intermediaries can reduce barriers associated with firm size while creating dependence on externally determined access conditions. Evidence concerning small and medium-sized enterprises generally provides relevant context, but the activities and service requirements of small technology exporters require distinct identification.

Tax incidence explains why statutory obligations and commercial exposure must be distinguished. A digital services tax establishes liability on a defined revenue base, but the resulting economic burden depends on adjustments in prices, quantities, and business practices. The OECD (2020) distinguishes revenue-based digital services taxes from taxes on corporate profits and identifies intermediate-service pricing as a potential transmission channel. Consequently, the existence of a tax does not establish the burden borne by a purchaser of digital services. A higher headline rate also cannot be interpreted as a proportionately greater increase in small firms' costs without evidence about the taxable base and supplier responses.

Platform taxation research further explains why tax design matters. Bourreau et al. (2018) model a two-sided monopoly platform linking personalised services and targeted advertising. Their analysis shows that fiscal

and welfare outcomes depend on the tax instrument and interactions between tax bases. Different forms of taxation therefore need not produce equivalent outcomes within a platform business model. Their analytical setting concerns platform behaviour and fiscal consequences rather than observed export participation among small technology firms. Extending this perspective to comparative policy analysis requires distinguishing the relevant statutory instruments before interpreting their implications for firms using digital services.

Three dimensions organise that distinction in this study: implementation, statutory rate structure, and taxable activity coverage. Implementation identifies the introduction and timing of a legal obligation. The statutory rate describes its nominal intensity relative to the specified revenue base. Coverage identifies the activities to which that obligation applies, including advertising, intermediation, and digital content or user data activities. These dimensions answer different questions and should not be treated as interchangeable indicators. Advertising coverage concerns a service used in customer acquisition, while intermediation coverage concerns services connecting market participants. Their separation makes the comparison sensitive to the location of taxation within digital commerce while preserving the distinction between legal provisions and economic responses.

The reviewed literature establishes the relevance of a differentiated approach. Goldfarb and Tucker (2019) explain the cost changes associated with digital technologies, Bourreau et al. (2018) demonstrate the importance of instrument design within platform taxation, and the OECD (2020, 2021) examines broader tax consequences and the opportunities and constraints associated with platform use. Together, these contributions explain why adoption alone is an incomplete description of digital tax policy. The reviewed evidence does not establish that a binary implementation indicator adequately represents differences in the statutory environments relevant to smaller firms. This study addresses that comparative issue by examining adoption timing, headline rates, and documented activity coverage separately.

The empirical setting comprises Austria, France, Italy, Spain, Turkey, and the United Kingdom during 2010 to 2021. The secondary policy dataset contains 72 country-year records and documents differences in implementation timing and statutory rates across these jurisdictions. This setting supports comparison of distinct national approaches within a common annual structure. The country-year is the unit of analysis, and descriptive comparative analysis examines the policy dimensions separately. The resulting evidence concerns national statutory arrangements. Its international relevance rests on the transferable distinction between adoption, nominal intensity, and scope, while the particular combinations observed remain specific to the jurisdictions and period examined.

This study aims to characterise differences in digital services tax design across the six jurisdictions and clarify their relevance to the policy environment surrounding small technology firms' international market access. The research question is: How do implementation timing, statutory rates, and documented taxable activity coverage differ across the selected jurisdictions during 2010 to 2021? Specifically, the study compares the timing and duration of implementation, examines variation in headline statutory rates, and distinguishes the recorded coverage of digital activities. Its contribution is a comparative account that separates these dimensions rather than collapsing them into a uniform adoption measure. For policymakers and enterprise support institutions, this distinction provides a basis for identifying which statutory services and obligations warrant scrutiny when assessing the compatibility of digital taxation and support for smaller firms' internationalisation.

2. Theoretical Conceptual Framework and Hypotheses Development:

2.1 Theoretical Foundation and Conceptual Framework:

Digital services taxation operates within an interconnected economic system in which fiscal regulations influence digital platforms, service providers, and firms participating in international markets. The theoretical relationship between digital services taxes and export participation reflects the interaction between taxation, transaction costs, and market access. Digital taxation may alter the costs of advertising, intermediation, and digital service delivery, potentially affecting firms that depend on these services for international transactions. However, statutory tax obligations frequently target large digital enterprises rather than small technology firms directly. The economic implications for smaller enterprises therefore depend on tax incidence, market structure, and the transmission of compliance costs through digital service prices. OECD (2020a) identifies these mechanisms as relevant to assessing the economic implications of digital taxation, while OECD (2020b) establishes the importance of distinguishing statutory tax design from the economic allocation of tax burdens.

The conceptual framework identifies digital services tax policy as the independent variable, comprising tax implementation, statutory tax rate structure, and taxable digital activity coverage. Tax implementation captures whether and when a jurisdiction introduces digital services taxation. Statutory tax rates measure the nominal intensity of taxation, while tax coverage identifies the digital activities subject to taxation. These dimensions represent distinct regulatory characteristics rather than interchangeable indicators of tax exposure. OECD (2020c) emphasizes the importance of identifying the scope of taxable digital activities and the allocation of taxing rights when evaluating digital taxation frameworks. This distinction supports a multidimensional representation of digital services tax policy without assuming that all statutory measures impose equivalent economic burdens.

Export participation among small technology firms constitutes the dependent construct. Conceptually, it encompasses the proportion of firms engaged in exporting, the contribution of exports to firm sales, direct and indirect export participation, and entry into foreign markets. These dimensions distinguish the extensive margin of exporting from the intensity and channels of international market engagement. Nevertheless, the available country year dataset contains observations for digital services tax policy but lacks corresponding measurements of small technology firms' export activities. Consequently, the framework identifies a theoretically relevant relationship without treating unobserved export outcomes as established empirical evidence.

2.2 Digital Services Tax Implementation and Statutory Rate Structure:

Digital services tax implementation represents an institutional change in the taxation of specified digital transactions. Introducing a tax creates statutory obligations for covered businesses and may influence the commercial terms under which digital services are supplied. For smaller technology firms, potential consequences arise when affected providers adjust prices, contractual arrangements, or access conditions. These responses could increase export related operating costs, particularly where firms rely on digital platforms to reach foreign customers. Conversely, the absence of cost transmission could limit the effect on smaller firms. OECD (2020a) identifies the economic consequences of digital taxation as dependent on tax design and market responses, while OECD (2020b) highlights the importance of jurisdictional allocation and business activities in determining the application of digital tax rules.

This analysis measures implementation through annual tax status, effective year, and elapsed years since implementation. These indicators distinguish jurisdictions without an implemented tax from those operating under an applicable statutory regime. They also permit comparisons of policy adoption across countries and over time. However, implementation status alone does not identify which small technology firms incur additional costs or change their exporting behavior. The expected relationship between implementation and export participation is therefore conditional on mechanisms that remain unmeasured in the available dataset. Statutory tax rate structure represents a separate dimension because the introduction of taxation and the intensity of taxation are analytically distinct. A higher statutory rate may increase the potential tax burden on covered digital revenue, but its economic consequences depend on the taxable base, market competition, and the capacity of providers to pass costs to customers. OECD (2020a) demonstrates the relevance of tax design for economic outcomes, while OECD (2020c) explains why different approaches to taxing digital activities may generate different obligations across jurisdictions. Accordingly, a higher nominal rate does not automatically imply a proportionate increase in the effective costs borne by small technology firms.

The dataset supports the measurement of statutory rates, annual rate changes, and rates prevailing before implementation. These indicators establish observable variation in national tax policy. Nevertheless, the absence of firm export observations prevents estimation of the relationship between tax implementation or statutory rate intensity and export participation. Directional hypotheses for these dimensions would therefore remain empirically unresolved.

2.3 Digital Services Tax Coverage and Hypothesis Development:

Digital services tax coverage defines the economic activities subject to statutory taxation and determines the extent to which digital business models fall within a jurisdiction's tax framework. This analysis distinguishes digital advertising, digital intermediation, and digital content or user data activities. These categories represent observable differences in policy design and potential channels through which digital taxation may influence international commercial transactions. OECD (2020b) identifies the importance of digital business activities and market jurisdictions in allocating taxing rights, while OECD (2020c) examines broader international tax coordination and the implications of differences in tax obligations.

The economic relationship between tax coverage and export participation depends on firms' reliance on taxable digital services. Advertising taxation may affect customer acquisition costs, while intermediation taxation may influence platform transaction charges. Taxation of digital content and user data activities may alter the commercial arrangements of firms supplying or purchasing these services. However, statutory coverage does not establish actual tax incidence. Providers may absorb additional costs, adjust prices, or reorganize transactions. OECD (2020a) emphasizes that the economic implications of digital taxation depend on policy design, business responses, and international coordination. Therefore, wider statutory coverage cannot independently establish either a positive or negative effect on small technology firms' export participation.

The conceptual framework specifies digital services tax implementation, statutory tax rate structure, and taxable activity coverage as three observable policy dimensions. Their theoretical relationships with export participation operate through potential changes in digital service costs and market access. The dataset permits measurement of these policy dimensions across 72 country year observations covering 2010 to 2021. However, the five proposed export participation indicators lack observed values. Consequently, this analysis retains the three policy dimensions as measurable constructs but does not formulate directional hypotheses that the available data cannot test. Empirical validation of the proposed relationships requires corresponding observations of small technology firms' export participation.

3. Data:

This analysis examines the evolution of digital services taxation across six countries during 2010 to 2021, establishing the provenance, structure, and measurement of the available policy data. The section documents sample construction, data quality, variable operationalization, and the analytical procedures supported by the observed records.

3.1 Data Sources, Population, and Sample Construction:

The analysis uses an annual country panel covering France, Austria, Italy, Spain, Turkey, and the United Kingdom from 2010 to 2021. The dataset consolidates statutory digital services tax implementation dates, tax rates, and the coverage of taxable digital activities. The underlying policy information is attributed to OECD tax policy publications and Tax Foundation country summaries. The OECD provides comparative evidence on tax policy reforms and the economic implications of digital taxation, while national policy summaries identify differences in implementation dates, statutory rates, and taxable activities. These sources establish the regulatory characteristics recorded in the dataset rather than observed outcomes among small technology firms (OECD, 2020a, 2020b; Tax Foundation, 2019, 2020).

The unit of analysis is the country year. Each observation represents the annual statutory tax position of one jurisdiction. The dataset contains six countries observed over twelve consecutive years, yielding 72 country year records. All six countries have observations for every year, producing a balanced policy panel. Twelve observations correspond to years in which digital services taxes are coded as operational, while sixty represent years without an operational tax under the dataset's annual classification. The dataset records five countries with initial implementation in 2019 or 2020 and Spain with implementation in 2021. The sample therefore captures both periods preceding implementation and the initial years following adoption.

The target population comprises small technology firms potentially affected by digital services taxation, whereas the accessible sampling frame consists of six national tax jurisdictions. The countries form a selected comparative policy sample rather than a probability sample of firms or jurisdictions. Consequently, the 72 observations describe national policy environments and cannot be interpreted as observations of individual enterprises. The World Bank Enterprise Surveys provide a recognized framework for measuring firm characteristics and exporting activity, but the supplied dataset does not contain linked survey records. Similarly, the World Development Indicators identify national ICT service exports without directly identifying the exporting behavior of small technology enterprises (World Bank, 2020a, 2020b).

Table 1: Construction and Coverage of the Country Year Dataset

Sample Construction Stage	Countries	Observations	Inclusion Rule
Available country policy frame	6	72	Countries recorded in the supplied dataset
Annual coverage	6	72	Complete records for 2010 to 2021
Observations before DST implementation	6	60	DST implementation indicator equals zero
Observations with DST in force	6	12	DST implementation indicator equals one
Retained descriptive policy panel	6	72	Available country year policy observations

The policy panel is balanced because each jurisdiction contributes twelve annual observations. The distinction between observations preceding implementation and observations with an operational tax describes policy status rather than sample attrition. No additional country exclusions, successful external data merges, or model specific sample reductions are documented. The source workbook does not identify its original extraction date, dataset release identifiers, or a reproducible extraction log. These details cannot be reconstructed from the recorded values.

3.2 Data Integration, Cleaning, and Quality Assurance:

The consolidated dataset organizes policy observations using country identifiers and calendar years. Each country is represented by its name and three letter ISO identifier, while annual observations are indexed from 2010 to 2021. The resulting structure supports comparisons of policy implementation across jurisdictions and the construction of annual statutory tax indicators. Country year identifiers also provide a potential basis for integrating national economic indicators from the World Development Indicators, whose country and annual reporting structure is compatible with the policy panel (World Bank, 2020a).

Tax implementation is coded as a binary variable, taking the value one in years when the tax is recorded as operational and zero otherwise. The statutory tax rate is recorded as zero before implementation and at the published headline rate following implementation. Years since implementation are calculated from the recorded effective year, with zero assigned before implementation. Annual changes in the statutory rate are expressed in percentage points. The dataset also distinguishes advertising, digital intermediation, and digital content or user data coverage through separate binary indicators. These constructions reflect statutory policy classifications and do not measure effective tax burdens, compliance costs, or the economic incidence of taxation. OECD (2020a, 2020b) distinguishes statutory tax design from the broader economic consequences of digital taxation.

The annual coding convention assigns implementation status according to the recorded effective year. Consequently, the dataset does not distinguish full year exposure from partial year exposure. This limitation matters where implementation occurred during the calendar year or where legislation applied retrospectively. Statutory rates are retained in their reported percentage units, avoiding unnecessary currency conversion or inflation adjustment. The dataset contains no monetary observations requiring exchange rate conversion, deflation, or purchasing power adjustment.

The available records show complete country year coverage for the statutory policy variables. However, the fields reserved for ICT service exports, export shares, enterprise exporting indicators, and small technology firm export participation contain no observed values. These fields remain missing rather than being replaced with zero. The distinction is essential because zero export participation is an economic outcome, whereas a missing value indicates that no observation is available. The World Bank's enterprise survey methodology and international trade indicators provide possible measurement frameworks, but their existence does not establish that the corresponding observations have been extracted or matched to the policy panel (World Bank, 2020a, 2020b).

The supplied workbook does not document formal duplicate detection, cross source reconciliation, outlier treatment, imputation, or sensitivity testing. Accordingly, the analysis retains the reported policy observations without claiming that these procedures were completed. The principal data quality limitation is not missing statutory policy information but the absence of observed firm level outcomes needed to assess the proposed economic relationship.

3.3 Variable Measurement, Construction, and Validation:

The independent construct is digital services tax policy, represented by implementation, statutory rate structure, and taxable activity coverage. These dimensions describe the introduction, nominal intensity, and statutory scope of taxation. Their measurement follows the distinction between tax adoption, tax design, and economic incidence emphasized in comparative digital taxation research (OECD, 2020a, 2020b; Tax Foundation, 2019, 2020).

Implementation status is a binary annual indicator. Years since implementation measure elapsed calendar years following the effective year, while the effective year records the timing of initial adoption. Statutory tax rates are expressed as percentages of the relevant taxable revenue base. Annual rate changes are measured in percentage points, distinguishing absolute changes in tax rates from proportional percentage changes. Preimplementation rates are recorded as zero under the dataset's coding convention. The coverage indicators identify whether the statutory tax includes digital advertising, digital intermediation, or digital content and user data activities.

Table 2: Variable Dictionary and Measurement Coverage

Variable or Indicator	Analytical Role	Definition and Construction	Unit and Frequency	Coverage and Limitation
DST implementation status	Independent, implementation	One when DST is in force; zero otherwise	Binary, annual	72 observations
DST effective year	Independent, implementation	Recorded initial implementation year	Calendar year	72 records, six distinct country values
Years since implementation	Independent, implementation	Elapsed years since effective year, zero before adoption	Years, annual	72 observations
Statutory DST rate	Independent, rate structure	Published headline rate, zero before implementation	Percent, annual	72 observations
Annual DST rate change	Independent, rate structure	Current annual rate less preceding annual rate	Percentage points	72 recorded values
Preimplementation tax rate	Independent, rate structure	Statutory DST rate before implementation	Percent, annual	Derivable from policy records
Digital advertising coverage	Independent, tax coverage	One when advertising is covered; zero otherwise	Binary, annual	72 observations
Digital intermediation coverage	Independent, tax coverage	One when intermediation is covered; zero otherwise	Binary, annual	72 observations
Digital content and data coverage	Independent, tax coverage	One when content or user data is covered; zero otherwise	Binary, annual	72 observations
Small firm export participation	Dependent	Proportion of eligible small technology firms engaged in exporting	Percent	No observations

Small firm export sales share	Dependent	Export revenue relative to total firm sales	Percent	No observations
Direct export participation	Dependent	Proportion of eligible firms exporting directly	Percent	No observations
Indirect export participation	Dependent	Proportion of eligible firms exporting through intermediaries	Percent	No observations
New export market entry	Dependent	Entry into foreign markets	Binary or aggregated rate	No observations

The policy indicators are observed or calculated measures rather than latent variables requiring psychometric reliability analysis. Implementation status and effective year describe closely related features of the same policy event, while statutory rates and annual rate changes capture different aspects of tax intensity. Their inclusion in a common statistical specification would require attention to redundancy and the available variation. The binary coverage indicators describe statutory scope but do not establish whether individual small technology firms purchase the affected services.

The dependent construct is export participation among small technology firms. Five proposed indicators distinguish participation, export intensity, direct exporting, indirect exporting, and foreign market entry. These measures correspond to different dimensions of international business activity and should not be treated as interchangeable. However, the supplied workbook contains no observations for these indicators. Consequently, descriptive statistics, construct validation, correlations, and estimated relationships involving export participation cannot be reported. The available policy data establish measurement coverage for the independent variables only.

3.4 Analytical Framework, Identification, and Reproducibility:

The available dataset supports a descriptive comparative analysis of digital services tax policy across countries and years. The analytical framework distinguishes implementation timing, statutory rate intensity, and taxable activity coverage. These indicators permit examination of policy adoption patterns and differences in national tax design. OECD (2020a, 2020b) identifies statutory tax design and economic incidence as distinct analytical considerations, while Tax Foundation (2019, 2020) documents differences in national digital tax arrangements.

The country year panel contains 72 policy observations, including 60 observations preceding implementation and 12 observations classified as operational tax years. This variation permits descriptive comparisons of adoption timing and statutory policy characteristics. It does not, by itself, identify changes in small technology firms' export participation. The dependent variables have no observed values, preventing estimation of a statistical association between taxation and firm exporting activity.

The intended relationship concerns whether changes in digital services tax policy correspond to changes in export participation among small technology firms. Estimating that relationship requires observed export outcomes aligned with the country and year identifiers and a consistent definition of eligible technology enterprises. National ICT service exports cannot automatically substitute for these outcomes because aggregate export values may reflect large enterprises, other sectors, and changes in export intensity rather than participation by small firms. The World Bank distinguishes enterprise level survey measures from national trade indicators, supporting the need to preserve their different units of observation (World Bank, 2020a, 2020b).

No regression estimator, fixed effects specification, clustering procedure, or causal identification strategy is reported because no such model has been estimated using the available observations. Similarly, there are no verified coefficient estimates, statistical significance tests, or robustness results. The policy panel provides an empirical basis for describing digital services taxation, but not for resolving hypotheses concerning small firm export participation.

Reproducibility is supported by the recorded country identifiers, observation years, statutory rates, implementation indicators, coverage classifications, and source URLs. The dataset preserves the distinction between recorded policy observations and unobserved economic outcomes. The absence of firm level export measurements limits the analysis to descriptive policy evidence and prevents conclusions about the direction, magnitude, or statistical significance of the relationship between digital services taxation and export participation.

4. Methods:

4.1 Research Design and Analytical Scope:

The study adopts a descriptive comparative design to examine digital services tax arrangements across Austria, France, Italy, Spain, Turkey, and the United Kingdom during 2010 to 2021. The country-year is the unit of analysis. The objective is to characterise differences in implementation timing, statutory rates, and documented taxable activity coverage.

The analytical framework distinguishes statutory arrangements from economic incidence. Revenue-based taxation establishes legal obligations, while the distribution of economic costs depends on supplier responses and market conditions (Organisation for Economic Co-operation and Development [OECD], 2020). Platform taxation theory also demonstrates that different tax instruments can produce different outcomes because of interactions between platform activities and tax bases (Bourreau et al., 2018). These distinctions justify examining policy dimensions separately.

Comparisons use observed variation across jurisdictions and calendar years. Counts, proportions, distributional statistics, and country-specific descriptions characterise the selected policy records. The design supports interpretation of statutory differences without attributing enterprise behaviour to those differences.

4.2 Sample and Measurement Alignment:

The sample construction table in Section 3 identifies six jurisdictions observed over twelve consecutive years, yielding a balanced panel of 72 country-year records. The countries constitute a selected comparative policy sample. Conclusions therefore concern the recorded arrangements within these jurisdictions and the specified observation period.

Measurement follows the variable dictionary in Section 3. Implementation status distinguishes operational tax years from periods preceding implementation. The effective year identifies the recorded introduction of each arrangement. Statutory rates are expressed as percentages of the applicable revenue base, while annual rate changes are expressed in percentage points.

Separate classifications identify coverage of digital advertising, intermediation, and digital content or user data activities. Their separation reflects the importance of distinguishing the services subject to taxation rather than treating digital economic activity as homogeneous (OECD, 2020). These classifications describe statutory scope and are not combined into an index of effective economic burden.

Annual implementation status follows the recorded effective year. It does not imply a full calendar year of exposure. Preimplementation rates recorded as zero indicate the absence of the specified digital services tax under this coding convention.

4.3 Descriptive Analysis and Missing-Value Treatment:

Implementation is summarised through counts and proportions across the panel. Country-level comparisons report effective years, headline rates, and the number of operational tax years. These comparisons distinguish adoption timing from the duration represented within the observation window.

Numerical indicators are summarised using the observation count, arithmetic mean, sample standard deviation, median, minimum, and maximum. Full-panel rate summaries include the zero values recorded before implementation. Their interpretation therefore concerns the distribution across all country-years. Country-specific headline rates provide a separate comparison of nominal intensity.

Coverage classifications distinguish covered, not covered, and unclassified observations. Missing classifications remain unclassified rather than being converted into statutory exclusions. Operational-year comparisons are distinguished from summaries that include preimplementation periods, preserving the meaning of their respective denominators.

The analysis retains the reported statutory values. Differences in headline rates are interpreted alongside documented taxable activities. This approach follows the substantive distinction between tax instruments and their economic consequences established by Bourreau et al. (2018) and the OECD (2020).

4.4 Analytical Consistency and Interpretive Boundaries:

Analytical consistency rests on matching each summary to its unit of observation, measurement definition, and denominator. Country-level descriptions complement pooled statistics by identifying the national arrangements underlying the recorded variation. Separating missing classifications from recorded zeros preserves the distinction between incomplete documentation and an observed policy condition.

The analysis characterises the selected records without population weighting or sampling-based inference. Policy comparisons consequently do not include significance tests or confidence intervals. The contribution is a structured comparison of adoption, nominal intensity, and documented scope within a common annual framework.

Replication requires the underlying policy records, country-year identifiers, coding definitions, and stated summary conventions. The method answers the comparative research question through observed statutory variation. Interpretation preserves the distinction between national policy arrangements and the commercial responses through which taxation may affect users of digital services (OECD, 2020).

5. Findings:

This analysis evaluates the observed variation in digital services tax implementation, statutory rates, and taxable activity coverage across six countries during 2010 to 2021. The findings establish the distribution and timing of these policy measures and assess the empirical information available for evaluating the proposed relationships with export participation among small technology firms. The results distinguish verified policy patterns from economic relationships that cannot be estimated using the recorded observations.

5.1 Sample Characteristics and Descriptive Findings:

The analytical sample comprises 72 annual country observations from Austria, France, Italy, Spain, Turkey, and the United Kingdom. Each country contributes twelve observations, producing a balanced panel without missing country year records. The dataset captures variation in statutory digital services taxation, including implementation status, headline tax rates, elapsed years since implementation, and taxable activity coverage.

Table 3: Descriptive Statistics of Digital Services Tax Policy, 2010 to 2021

Variable	N	Mean	SD	Median	Minimum	Maximum
DST implementation status	72	0.167	0.375	0	0	1
Statutory DST rate, percent	72	0.653	1.652	0	0	7.5
Years since implementation	72	0.264	0.650	0	0	3
Annual DST rate change, percentage points	72	0.326	1.214	0	0	7.5
Digital advertising coverage	72	0.167	0.375	0	0	1

The implementation indicator has a mean of 0.167, indicating that 16.7 percent of the country year observations are classified as having an operational digital services tax. The median of zero reflects the concentration of observations in periods preceding tax implementation. The statutory rate has a mean of 0.653 percent across all country years, including observations coded at zero before implementation. Its maximum of 7.5 percent demonstrates variation in nominal tax intensity across the observed jurisdictions.

The mean elapsed implementation period is 0.264 years, with a maximum of three years. This distribution indicates that the panel predominantly captures periods before implementation and the initial stages of tax adoption. Consequently, the evidence is more informative about the introduction of digital services taxes than their longer-term economic consequences.

5.2 Digital Services Tax Implementation and Rate Differentiation:

The dataset identifies variation in the timing of digital services tax adoption across the six jurisdictions. France is recorded as introducing its tax in 2019, followed by Austria, Italy, Turkey, and the United Kingdom in 2020, and Spain in 2021. This staggered implementation creates differences in the number of years during which countries operate under the recorded tax regimes.

Table 4: Digital Services Tax Implementation and Statutory Rates by Country

Country	Implementation Year	Statutory Rate, Percent	Observed Years With DST
France	2019	3.0	3
Austria	2020	5.0	2
Italy	2020	3.0	2
Spain	2021	3.0	1
Turkey	2020	7.5	2
United Kingdom	2020	2.0	2
Total			12

The statutory rates range from 2 percent in the United Kingdom to 7.5 percent in Turkey, a difference of 5.5 percentage points. France, Italy, and Spain share a statutory rate of 3 percent, while Austria applies 5 percent. These differences establish that the introduction of digital services taxation did not produce a uniform statutory rate across the observed jurisdictions.

Implementation timing also determines the number of observations available after adoption. France contributes three operational tax years, Spain contributes one, and the remaining four countries contribute two each. This uneven exposure limits direct comparisons of postimplementation experience because the countries do not contribute equivalent observation periods.

The findings establish measurable differences in policy timing and nominal tax intensity. They do not establish differences in the effective tax burdens borne by small technology firms. The OECD (2020a, 2020b) distinguishes statutory tax measures from their broader economic consequences, particularly where business responses and tax incidence influence the distribution of costs.

5.3 Taxable Activity Coverage and Policy Heterogeneity:

The coverage indicators identify which digital activities fall within each country's recorded statutory tax base. Digital advertising is classified as covered in all twelve observations with an operational digital services tax. Digital intermediation is explicitly coded as covered in three operational observations, while digital content or user data coverage is explicitly coded as present in five observations.

Table 5: Recorded Coverage of Taxable Digital Activities

Coverage Indicator	Covered	Not Covered	Unclassified	Total
Digital advertising	12	60	0	72

Digital intermediation	3	60	9	72
Digital content or user data	5	60	7	72

The advertising indicator shows complete recorded coverage among operational tax observations. By contrast, the intermediation and content indicators contain missing classifications for some operational years. The observed differences therefore establish variation in documented coverage, but do not provide sufficient evidence to classify every country's taxable activity comprehensively.

This distinction matters for comparing policy scope. A missing coverage classification cannot be interpreted as evidence that a particular digital activity was legally excluded. Consequently, the dataset supports comparisons of explicitly recorded coverage but not a complete ranking of countries by the breadth of their statutory tax bases.

The differences in implementation timing, statutory rates, and documented coverage are consistent with the broader heterogeneity in digital taxation arrangements identified by the OECD (2020a, 2020b). However, these descriptive patterns do not establish differences in tax incidence or firm responses.

6. Discussion:

Digital services taxation is reshaping the regulatory conditions of international digital commerce, yet the distinction between statutory tax design and its economic consequences remains central to understanding its implications for smaller enterprises. The findings in Tables 1 and 2 reveal substantial heterogeneity in implementation timing, statutory rates, and the duration of tax exposure across six jurisdictions during 2010 to 2021. The difference between the lowest and highest statutory rates reaches 5.5 percentage points, demonstrating that digital services taxation cannot be represented adequately as a uniform regulatory intervention. This distinction advances the comparative interpretation of digital tax policy by separating the decision to introduce taxation from the intensity of the resulting statutory obligations. The variation is consistent with the institutional fragmentation identified in international tax policy debates, where unilateral measures create differences in tax treatment across markets. Devereux and Vella (2018) demonstrate that taxing the digitalized economy raises questions about the allocation of taxing rights, while Olbert and Spengel (2017) identify tensions between traditional international tax principles and digital business models. The present evidence adds a structured country year comparison of adoption and statutory intensity, although it does not establish whether these differences translate into measurable changes in small technology firms' export participation. The findings therefore support a more differentiated interpretation of digital taxation without implying an estimated causal relationship.

The economic relevance of digital services taxation depends not only on statutory rates but also on the channels through which tax obligations may influence businesses outside the formal tax base. Table 3 distinguishes digital advertising, intermediation, and digital content or user data activities, identifying different potential points of interaction between taxable platforms and smaller technology enterprises. These distinctions matter because firms may depend on advertising services for international customer acquisition, digital intermediaries for market access, and content platforms for service delivery. The theoretical mechanisms therefore involve possible changes in transaction costs, platform prices, and commercial access rather than direct taxation of every exporting enterprise. Goldfarb and Tucker (2019) explain how digital technologies influence economic transactions through changes in search costs, information flows, and market organization. Brynjolfsson et al. (2019) similarly demonstrate the importance of distinguishing digital economic activity from conventional measures of market output. These contributions provide a basis for interpreting potential transmission channels, but the present dataset contains no observations of platform price adjustments, firm responses, or export outcomes. Consequently, mediation effects cannot be estimated, and no mechanism can be classified as empirically dominant. The conceptual contribution is the identification of distinct regulatory channels that require separate measurement before their economic significance can be established.

The differentiation between tax implementation, statutory intensity, and taxable activity coverage also has implications for interpreting regulatory exposure. Tables 2 and 3 indicate that jurisdictions with similar implementation periods may nevertheless impose different statutory rates and define different taxable activities. This finding challenges the assumption that tax adoption alone provides a sufficient measure of regulatory intensity. A binary implementation indicator captures the existence of a tax but conceals variation in its design. However, the available observations do not establish the relative contribution of each dimension to firm outcomes, and no decomposition of economic effects can be supported. Devereux and Vella (2018) argue that digitalization complicates international corporate taxation because business activities and customers can be distributed across jurisdictions. This analysis adds an empirical distinction between the timing, rate, and scope of unilateral digital taxation. The theoretical implication is that regulatory exposure should be represented through separate statutory dimensions before evaluating their economic consequences. Such differentiation improves the interpretation of policy heterogeneity without establishing the dominance of any transmission mechanism.

A central challenge emerges from the mismatch between the availability of statutory policy information and the measurement of firm economic responses. Table 4 establishes that none of the five proposed export

participation outcomes contains observed values, despite complete annual coverage of the principal policy indicators. This distinction has substantive implications for the interpretation of digital taxation research. National policy records can identify regulatory changes, but they cannot independently establish how smaller enterprises respond to those changes. The problem is particularly relevant where digital economic activity is inadequately represented by conventional aggregate measures.

7. Conclusion and Implications:

Digital taxation creates different regulatory environments across markets, making policy design central to understanding the conditions surrounding international digital commerce. This study shows that the introduction of taxation, its nominal intensity, and the activities it encompasses form distinct dimensions of national policy arrangements. Their comparative interpretation provides a clearer account of regulatory heterogeneity than treating adoption as a uniform intervention. The contribution lies in organising these dimensions within a common comparative framework that separates statutory obligations from the economic burdens potentially transmitted through digital services. This distinction sharpens the application of tax incidence reasoning by identifying where legal exposure ends and evidence about commercial responses must begin. For managers, the findings support jurisdiction-specific reviews of service procurement, contractual terms, and regulatory obligations rather than reliance on headline rates alone. Policymakers can use the framework to clarify taxable boundaries and improve the comparability of national arrangements. Operationally, maintaining separate records of effective dates, applicable rates, and covered services can strengthen compliance planning and policy monitoring. These practices may improve transparency for smaller enterprises navigating international markets. The broader social relevance concerns more informed public debate about revenue collection and business access to digital infrastructure, with statutory comparisons providing a foundation for evaluating distributional consequences.

The comparative policy panel provides a foundation for linking statutory arrangements to enterprise outcomes. Future research should combine verified legal records with longitudinal observations of consistently defined small technology firms, distinguishing export entry from export intensity. Service-level prices and contractual changes would permit direct investigation of cost transmission. Longer observation windows and additional jurisdictions could establish whether patterns persist across institutional settings. Explicit measures of platform dependence and competitive conditions would support tests of conditional responses. Designs addressing concurrent policy changes and selection into exporting could strengthen identification and extend the framework from statutory comparison to economic evaluation.

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