CHAPTER 6: ELECTRONIC INVOICING AND DIGITAL TRADE

6.1. Sector overview

Governments around the world are embracing electronic invoicing (EI) as a way to combat fraudulent activities and improve tax and other business services. The main advantages of EI includes: it shortens processing cycles, including tax recovery; it lessens the risk of human error; it cuts transaction costs (such as printing and storage); it aids the fight against fraud; and it helps modernize the economy and strengthen the technology sector through the large-scale use of communications technologies, digital signatures, and services development (OECD, 2017). However, in order to maximize the benefits of EI, policymakers need to better understand the negative implications that some data-related policies may have on its utilization.

EI represents a major improvement for tax, trade, and other services, as traditionally, invoicing, like any paper-based process, is manually intensive (and therefore inefficient) and is prone to human error, resulting in increased costs. According to a study by Nixon (2017), the global e-invoice and enablement market is estimated to be worth 3.3bn euros in 2017 and will reach 16.1bn by 2024. The reason for this huge growth is that more than 90 percent of all invoices worldwide are still processed manually. Latin America is a global leader in the adoption of EI and the region is estimated to see a compound annual growth rate of 32 percent in the use of EIs in the 2017-24 period, with Mexico the regional and global leader in terms of adoption. Asia is expected to see a compound annual growth rate of 62 percent (Nixon, 2017).

Governments around the world are using EI as part of a broader push to digitize public services to improve service delivery and business operations. The use of such digital technologies in the tax, finance, and accounting sectors can improve the efficiency of public finances and tax collection services, which need to adapt to the digital nature of modern business to make compliance with these public services easier and cheaper. EI offers tremendous potential benefits for tax control, as the accumulation of invoices of credits and debits for a taxpayer—contrasted with the periodic tax returns covering the corresponding tax period—creates a control capacity that is much greater than any of the traditional mass control practices used. The traditional sampling of invoices as part of verification and scrutiny processes become obsolete when the administration's systems have an electronic record of all the documents. An Inter-American Development Bank (IADB) report (Barreix and Zambrano, 2018) outlines the positive impact that EI has in five economies in Latin America, showing that using EIs has a positive effect in value added tax (VAT) tax returns and payments. However, the benefits are much broader, and include spillovers into the private sector. Used correctly, this type of technology can create a virtuous circle for the benefit of society in that firms can use digital technologies to run their operations more efficiently and effectively, while also using these same technologies to make taxes easier to pay.

Furthermore, the digitalization of invoices opens a range of potential new services and processes for economies' tax administrators (TAs). Digitalization allows for automation, in that submitting data in standard formats facilitates data authorities to use tax, accounting, as well as other source data for compliance purposes. For example, as EIs are reconciled with a taxpayer's accounting records in Mexico, it is possible for taxpayers to be selected for income tax and VAT inspection based on digital information (EY, 2016). Digitalization allows tax authorities and other firms to use data analytics to uncover complex business relationships that they can use to trigger audits if necessary. For example, consistency can be checked by cross-referencing VAT return information with sales amounts claimed on income tax returns. In addition, a natural extension of EI are electronic payrolls (EP), which include information on salaried employees, which makes the determination of the payment of personal income tax and social security contributions easier and more transparent (Barreix and Zambrano, 2018).

In terms of other public-sector spillovers, EI opens up new avenues for economic and market analysis. For example, in Ecuador, the traceability of EI has allowed government agencies to better identify and analyze the local value-added contribution, and market composition, of production networks and entire

economic sectors. Emerging technologies like blockchain, automation, and machine learning will not only speed up adoption of EI, but open up other new, innovative ways in which to use and leverage EI. Overall, EI and related digital technologies will change the role of tax authorities from controllers of taxpayers' compliance to suppliers of services to taxpayers and to the public sector itself, with a more flexible relationship with firms, who are able to use EIs and similar records for other business services (Barreix and Zambrano, 2018).

For all of these reasons, EIs are a global phenomenon, but one where regimes differ by economy and region. In Latin America, Argentina, Brazil, Chile, Costa Rica, Ecuador, Guatemala, Mexico, Peru, and Uruguay already use EI, while projects are underway in several other economies, including Costa Rica, Colombia, Guatemala, Panama, and Paraguay. In Asia, Singapore has allowed EI since 2003. Since 2011, Chinese Taipei has made EI mandatory for all companies that submit invoices to the finance ministry. EI is used in private-sector settings in several European Union economies, such as Austria, Germany, Sweden and the United Kingdom. Since 2005, Denmark has made it obligatory to use EI for all transactions with the public sector. Italy will require the use of EI for all business-to-business operations as of 2019. In Africa, both Angola and Kenya are considering EI services.

The case of EI in Mexico is worth exploring given that the firm interviewed in this chapter operated in this economy. In 2004, EI was allowed when Mexico's Tax Administration Service (TAS, the government taxation agency) created the legal framework that defined the implementation of the "digital tax receipt" (an e-invoice, known by its Spanish acronym CFD or CFDI). Use was not mandatory, but a large number of firms adopted it, which led TAS to establish a new model—the Digital Tax Receipt by Internet (known by its Spanish acronym as Comprobante Fiscal Digital por Internet)—model in 2010. TAS gradually expanded the compulsory use of the DTRI, requiring any company that generates an annual revenue of more than 250.000 pesos (approximately EUR 11.000) to use a CFDI. The success of the system is evident by the fact that the volume of EIs issued between 2011 and 2017 increased from 1.7 billion to 6.5 billion.[113]

EIs are also increasingly popular for different reasons. They support global efforts toward improved tax transparency and cooperation on tax issues and have the potential to play a key role in improving the international exchange of tax information as part of multilateral efforts, such as those outlined under the Multilateral Convention on Mutual Administrative Assistance in Tax Matters (so far signed by 114 economies). The Convention allows for the periodic and systematic transmission of information between economies on a range of income, such as dividends, interest, royalties, salaries, and pensions.

EIs also provide another example of how digital technologies, such as online platforms, payment services, and encryption, can help overcome costs, complexity, and other barriers to international trade, such as uncertainty about local tax compliance and a lack of trust in cross-border transactions (WTO, 2018). As such, EI supports greater cross-border digital trade and e-commerce since it improves the perception of trust in transactions, and therefore interaction with clients. For example, EIs facilitate the development of more transparent, efficient, and secure 'factoring,' which allows suppliers to meet their working capital needs by selling their invoices, or accounts receivable, to lenders for cash (i.e., getting paid upon completion of work rather than waiting weeks or months for customers to pay their bills)[114].

Finally, EI improves the real-time control of freight. For example, Brazilian TA are using EI as part of an innovative customs and tax management tool, whereby a freight-vehicle tracking project using radio

[113] "CFDI: Mexico's Electronic Invoicing Model That's Become a Reference Across all of Latin America," EDICOM, accessed January 31, 2019, https://cfdi.edicomgroup.com/en/cfdi-al-dia-en/cfdi-mexicos-electronic-invoicing-model-thats-become-a-reference-across-all-of-latin-america/.
[114] "Factoring," United Nations Economic Commission for Europe Trade Facilitation Implementation Guide, accessed January 31, 2019, http://tfig.unece.org/contents/factoring.htm.

frequency is integrated with the EI related to transported goods. While the vehicles are on the move, antennas scan them each time they pass by goods-transport control units located along the highways. This allows the TAs to monitor goods traffic in real time, and the goods are matched to their respective tax documents. In addition to the tax control, it is expected that the exchange of information will also help reduce the theft of vehicles and their cargo (Barreix and Zambrano, 2018). In a similar way, the digitalization of customs operations in a way broadly similar to EIs would facilitate the efficient movement of goods.

6.2. Profile of firm interviewed

Founded in 2011, Gosocket is a mid-sized firm (total staff of 150) based in Santiago, Chile, but with offices and operations across Latin America (a total of 12 economies, including Brazil, Colombia, Cost Rica, and Mexico). It provides a range of EI services. For example, it provides a single platform to integrate and transform invoices from different enterprise resource planning (ERP) services into an electronic format, which is transferred to local tax authorities for validation and processing. It also provides a service for receiving and validating e-invoices that suppliers send to their clients, which means it also stores data of e-invoices not issued directly by them. Gosocket provides an application programming interface (API) so enterprise users and third-party vendors can offer additional solutions and capabilities to augment the platform, such as through accounting or inventory services. For example, its platform allows customers to analyze the information in their EIs to help them make better business decisions.

Gosocket has over 20,000 firms using its services, processing 5 million EIs daily. It has processed over USD $7 billion in EIs. Gosocket provides EI services for local and foreign firms that operate throughout Latin America. Their services are cloud-based, allowing customers to efficiently manage issued (sales) and received (purchases) documents remotely. In a first, Gosocket has set up a project (in cooperation with Microsoft) to provide its services for the Colombia government. Gosocket has support centers across Latin America.

6.3. Role of data in firms' business models

EIs are simply invoices that record an entity's commercial transactions in electronic form. Being digital, it means that there are no differences between originals and copies, but that there needs to be a common set of rules and defined processes that enable the standardized interpretation of this digital documentation. Each economy's TA regulates a single electronic format to be used by all certified tax-related firms and taxpayers. The data of an EI needs to be in a particular format so that it can be entered (integrated) into the TA's IT systems and the buyer's account payable accounting system without requiring any manual data input (from the buyer's own accounts payable administrator). Many TAs use Extensible Markup Language (XML) file formats (which is a plain text file that uses custom tags to describe the structure and other features of the document). For example, clients connect their ERP software to Gosocket's services in order to process their invoicing information into EIs. This transformation involves turning the data into an XML file format. Gosocket is then able to send EIs to the digital platform used by TAs for validation.

Gosocket stores, aggregates, processes, and transfers significant amounts of data from clients using its EI services. This data takes the form of the invoices themselves, encryption keys, and electronic signatures and communication that confirms an EI has been received, protected, decrypted, authenticated, and stored. Gosocket stores all its data on a cloud storage service (Microsoft Azure), given the low-cost, secure, and flexible services it allows them to provide clients in multiple economies. It is important to recognize that the data Gosocket manages has two owners—the issuer and the recipient involved in the transaction—so its platform has to be accessible to both parties. Gosocket helps improve communication between the parties as it allows the easy exchange of these digital documents. The data

Gosocket stores is confidential business data, and given it has two owners, it cannot be shared without explicit authorization or other legal requirements.

Gosocket has announced some world-first partnerships to provide quick and secure liquidity for clients via invoice financing. Gosocket believes that blockchain will be the next step in the digitalization of financial services. The goal is to launch the service in Mexico, Guatemala, Costa Rica, Colombia, Ecuador, Peru, Chile, Uruguay, Argentina, and Brazil.

6.4. How data-related policies and regulations impact their business model

Before analyzing how specific policies can affect the use of data by EI-related services, it is important to recognize that economies need to address a few fundamental issues if they are to be able to benefit from EIs. TAs must have the institutional capacity to perform their basic functions (e.g., registration, collection, auditing and recovery). TAs must also have sufficient data processing capacity, adequate ICT infrastructure, and a minimum degree of computer literacy among TA staff, the business community, and taxpayers. In particular, moving to EIs obviously entails investment in ICT infrastructure, as TAs will likely store and process more EIs in a few days than the total number of tax returns and other traditional documents they would receive in a year.

Once these key components are in place, economies can enact a system that uses EIs; however, in doing so, they can inadvertently enact policies which create barriers to the cross-border supply of EI services. As the interview with Gosocket shows, these typically arise as an economy's TA enacts and enforces economy-specific certification requirements that affect how/if firms can use a range of cloud-based data services and economy-specific cryptographic processes (both explained below). TAs in Mexico, Brazil, and elsewhere enforce these as part of their certification of third-parties to allow them to be the recipient of EIs and to conduct tax-related activities, such as tax collection and the processing of digital tax returns. For example, Mexico has authorized 70 or so third-party operators (known as Authorized Certification Providers (PACs)) to provide the service of the initial certification and collection of receipts. Other economies (such as Peru) are also considering this model. Gosocket's experience shows how certain TAs can enact requirements around electronic/digital signatures and cybersecurity that act as a barrier to data flows across borders. This is a major problem for firms like Gosocket which rely on cloud-based solutions to provide their services across markets. It also raises issues for customer support, as cloud-based firms like Gosocket tend to setup regional support centers to manage services across economies (which may be prevented from accessing and analyzing data as part of customer-support activities).

This chapter explains in detail how two specific policies—economy-specific cryptographic and e-signature requirements—affect Gosocket and its ability to use data. In general terms, as outlined in the table (below) of responses from Gosocket, these data-related measures negatively affect a broad range of Gosocket's business. Gosocket indicated that these barriers lead to increased operational and compliance costs and undermine cross-border sales of services, affiliate activities (such as after-sales service and research), and investment. Gosocket outlined that, generally, these measures have a varying, but significant impact on:

Table 14. The Impact of Data-related Barriers to Data Flows – Gosocket's Response

Function	Impact (Low/Moderate/High)
Efficiently managing firm's operational costs	Low
Gathering, transferring, analyzing, and otherwise using data	Moderate
Offering the full variety of or quality of products/services	High
Innovating products and services as well as conducting or assessing firm R&D	Moderate

Managing cybersecurity risks, including protecting firm's sensitive data	High
Investing in or acquiring competing or complementary technology/assets	High
Leveraging the value of customer and/or supplier networks (network effects)	High
Expanding customer base (scalability)	Low
Accessing financing/funding	High

Source: Author's own elaboration

The general impact these data barriers have is not unique to the policies outlined below, but extend to all types of data-related restrictions that affect foreign tech firms which rely on centralized global IT services to provide fairly standardized, cost-efficient, and secure services across markets. These behind-the-border restrictions on data and related digital technologies are often difficult to identify and may only have an indirect effect on (a specific type of) trade and economic activity. However, in an era where digital technologies allow firms to provide any number of services across borders, these barriers can act as a formidable barrier to firms trying to achieve economies of scale as they make it costlier and more complex to enter and operate across multiple markets. This is especially the case for SMEs, which are more likely to lack the resources and expertise to adjust to requirements in multiple local markets.

Data-related laws and regulations that support the role and flow of data

Electronic and digital signatures – Key building block to digital trade

In the broadest sense, every economy needs to ensure that electronic and digital signatures[115] are allowed, recognized, and enforced in order to allow firms to conclude contracts and agreements online. According to the United Nations Conference on Trade and Development (UNCTAD, 2015), 145 economies have enacted such laws, of which 104 are developing or transitioning economies. Almost half, 46.3 percent, of African economies have adopted e-transactions laws, compared to 72 percent of Asian, 81.8 percent of Latin American and Caribbean, and 97.6 percent of developed economies.

Latin America (Gosocket's home regions) have economies which have (generally) permissive and useful policy frameworks for EIs (exceptions are explained in the next section). For instance, Chile is considered a 'two-tiered' jurisdiction as it gives digital signatures the same status as handwritten signatures. At the same time, it recognizes simple e-signatures as legal and hence enforceable. Mexico is also considered a 'two-tiered' jurisdiction with digital and electronic signatures. While digital signatures are preferred under this system, parties are generally free to determine the form of acceptance for an agreement. Last but not least, Peruvian law also recognizes the legal status of electronic and digital signatures. The law specifies the minimum requirements for acceptable digital certificates and their issuers. A digital certificate must be issued by a certification provider who meets these standards

[115] The terms "electronic signature" and "digital signature" are often used interchangeably. An electronic signature is a process of signaling intent, including acceptance, as to the content of an electronic record, such as through email addresses, enterprise IDs, personal ID numbers, scanned copies of handwritten signatures, and clickable "I accept" boxes. A digital signature (also known as an advanced e-signature) is essentially the equivalent of an in-person notarized signature (where a trusted third party, known as a certificate authority, serves as the notary in terms of verifying a person's identity). The certificate authority binds a person's identity to a public key infrastructure (PKI, which manages public-key encryption), thereby allowing them to apply digital signatures to documents. When a person applies a digital signature to a document, this cryptographic operation binds the person's digital certificate and the data of the document being signed into one unique fingerprint. The combination of the two components is what makes digital signatures a viable replacement for wet-ink signatures.

for it to be considered as valid. While it recognizes the validity of digital certificates issued in other economies, these certificates must meet Peruvian standards (Adobe Inc, 2016).

Data-related laws and regulations that limit the role of data

Electronic and digital signatures – Differential policies with local technical requirements

The first issue that firms like Gosocket encounter is when economies do not have the legal framework in place for electronic and digital signatures, which thereby means that users must rely on paper documents. The second major issue is that there is no universal approach to regulating the exchange and authentication of electronic transactions (World Economic Forum, 2017). However, the United Nations Commission on International Trade Law (UNCITRAL) has taken steps to increase the uniformity of economies' legal rules governing e-transactions, e-signatures, and digital authentication, mainly through the development and deployment of model laws (with various versions – 1996, 2001, 2005, and 2017). Over 70 economies have enacted the 1996 model law, while more than 30 have also used the 2001 model law[116].

However, UNCITRAL model laws are not legally binding, instead being designed to guide economies in drafting their own legislation, which means that there are substantial differences between how economies enact their own e-signature laws. This creates friction and increases the cost of doing business. According to the OECD-WTO Global Review 2017 Aid for Trade Monitoring Exercise (OECD and WTO, 2017), e-signatures were ranked 4th among the top ten challenges facing firm and consumers when accessing and using Internet services. The World Economic Forum (2017) considers that the absence of mutual recognition and divergent rules between economies can create additional costs that may be particularly difficult for SMEs to manage.

For example, while local technology standards and use are not required for an e-signature to be considered valid under Brazilian law, there are exceptions for certain, government-regulated cases, such as when parties are engaged in foreign exchange transactions, factoring (accounts receivable), and transactions with the Brazilian government. In these cases, Brazil requires the various parties to use e-signatures that use Brazilian IT infrastructure and services, in the form of a local government-authorized certification authority, called ICP Brazil. ICP Brazil maintains the root certification authority and requirements that must be met for both government-recognized timestamping and PKI signature policies. The use of this local tech standard diverges from UNCITRAL model law.

Gosocket has found these local certification protocols to be a barrier to its use of a fairly standardized, region-wide IT system. Gosocket explained that many firms in Brazil have had to invest considerable capital in setting up redundant local IT operations, such as by setting up a local hardware security module (explained below). As DocuSign (a major electronic signature and digital transaction management company) explains, due to the difficulty of distributing and maintaining these digital certificates, use of ICP Brazil-backed electronic signatures in Brazil is generally limited to these few high-value, high-volume transactions (DocuSign, 2017). This limits the broader adoption and use of EIs in Brazil's economy.

This highlights the operational and technical complexity for firms like Gosocket who have to adjust to certificate authorities (which act as the guarantor of a digital signature) in different economies changing

[116] The United Nations Commission on International Trade Law (UNCITRAL) Model Law on Electronic Commerce (MLEC) (1996), UNCITRAL Model Law on Electronic Signatures (MLES) (2001), United Nations Convention on the Use of Electronic Communications in International Contracts (ECC) (2005), and the UNCITRAL Model Law on Electronic Transferable Records (MLETR) (2017).

their requirements for approved digital certificate. A digital certificate contains the public key for a digital signature and specifies the identity associated with the key (e.g. the name of the organization). Digital certificates are required in order to create a digital signature. When a local certificate authority, such as a tax administrator, update their digital certificate requirements (e.g. so that they can apply the best security measures available at the time), all digital services providers need to revise their economy-level services to account for this, which can cause brief complications around compatibility. It also highlights security issues when tax authorities require the use of obsolete digital certificates.

Local Encryption and Security Requirements

Until recently, Mexico had a policy in place which created local data storage, protection, and encryption issues. Mexico's Tax Authority (known by its Spanish acronym—SAT) mandated that firms wanting to manage EIs in Mexico (known by their Spanish acronym—PAC) need to use a local Hardware Security Module (HSM)[117].Gosocket had to pay for a duplicative and expensive HSM in order to install and use SAT's digital certificate, which is mandatory to be able to provide EI services and submissions to the SAT in Mexico. A HSM is a dedicated crypto processor that is specifically designed for the protection of the crypto key lifecycle. HSMs act as "trust anchors" that protect the cryptographic infrastructure by securely managing, processing, and storing cryptographic keys inside a hardened, tamper-resistant device within the data center. This requirement acted as a de facto data localization requirement given the crypto key, and associated EI data, needed to be stored within Mexico in case of an SAT query or audit (FutureX n.d.).

Mexico's SAT recently decided to remove this local data storage and protection requirement and allow PACs to use cloud-based data protection and storage services. For example, Gosocket's cloud service provider (Microsoft Azure) offers a dedicated HSM service for clients. This service has been certified by the Federal Information Processing Standard (FIPS) 140 (Security Requirements for Cryptographic Modules). This is a U.S. and Canadian government standard that defines a minimum set of security requirements for products that implement cryptography. This standard is designed for cryptographic modules that are used to secure sensitive but unclassified information. Microsoft Azure's HSM is certified as a level 4 device (on a scale of 1-4, with 4 being the highest level)[118]. This certification allows clients to meet the most stringent security and compliance requirements of clients. As part of this service, clients have full administrative and cryptographic control over Azure's dedicated HSMs. Microsoft does not have visibility into its client's cryptographic keys. This service is provided directly on a client's virtual network on Azure and can be connected to on-premises infrastructure via a virtual private network (Tiwari, 2018).

What this shows is that data protection does not depend on the geography of data storage, as many leading data storage providers can provided audited, best-in-class cybersecurity protection.

6.5. Conclusion

EIs represent an innovative improvement in how firms and government authorities manage accounting and taxation services. The widespread adoption of EI-based taxation and accounting systems would support digital and traditional trade by facilitating easier accounting and tax reporting in multiple jurisdictions (through services such as Gosocket) and also help firms engaged in trade (such as through more efficient factoring). However, it also highlights how data and related processes (such as e-

[117] These firms are known as "Authorized Provider Certification" (known by its Spanish acronym PAC)
[118] "FIPS 140 Validation," Microsoft Windows IT Pro Center website, April 2, 2018, https://docs.microsoft.com/en-us/windows/security/threat-protection/fips-140-validation#ID0EWFAC.

signatures and cryptographic measures) can be affected by laws and regulations from a wide range of government agencies. It shows how indirect measures can affect data just as much as explicit, direct local data storage. Both cases highlighted by Gosocket (in Brazil and Mexico) entail significant costs and complications for firms using data related to these restrictions. Yet, in the case of Mexico's TA, it also shows how government agencies can replace these measure with readily available and reliable alternatives that satisfy concerns about cybersecurity which were not dependent upon local technical requirements and data storage. Similar to its efforts working with Mexico's TAs, Gosocket has worked with tax authorities throughout Latin America to share their examples of best practices, details about their operations and corresponding policy recommendations. For example, Gosocket and IADB provided formal advice to Colombia's tax administrator in 2012-2013 to help them design their EI system. Similarly, Gosocket is working with other economies (by using as an example the HSM issue it faced in Mexico previously) to show that there are secure alternatives to local key storage. This highlights a process that other economies should consider as they look at allowing electronic invoicing and expanding its use.