Patterns of Specialisation of Intermediaries in Offshore Networks

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Abstract

Far from passive conduits, intermediaries like lawyers, accountants, and financial advisors actively design and manage the structures within the global offshore financial system that enables clients to avoid taxes and shield assets. This thesis investigates how intermediaries specialise within offshore networks, focusing on two primary dimensions: geographical concentration (clientele and jurisdiction use) and functional differentiation (service types and operational scale). This thesis leverages International Consortium of Investigative Journalist (ICIJ) leak data following the general direction of Chang et al. (2023a; 2023b) to investigate these patterns. This is supplemented by a novel agentic AI method to classify a sample of intermediaries into functional types.

Two key propositions are presented: 1) intermediaries display strong geographical specificity, predominantly serving distinct clienteles and regions, while selecting from a global and broader range of offshore jurisdictions; and 2) different intermediary types occupy distinct roles in the network, varying in systemic importance, operational scope (e.g., client volume), and diversity of services offered (e.g., jurisdiction and legal technology usage). These patterns of specialisation contributes to understanding the operational logic of tax haven networks better and offers pathways for more targeted and effective regulatory interventions against these networks.

Introduction

1.1 Introduction

"How Globalization Really Works", Palan et al. (2010) wrote, is tax havens. The global financial landscape is increasingly characterized by intricate cross-border structures, many of which operate within the opaque realm of offshore finance. The overall phenomenon is well-known as well as the individuals and entities involved are common wisdom, but knowledge on the exact workings of it are a lot rougher.

Keynes (apocryphally) quipped "the avoidance of taxes is the only intellectual pursuit that still carries any reward." It is no wonder that a whole industry has evolved around this facilitation of such avoidance as a "race" has emerged between those making the rules, and those putting their intellectual industries to work to circumvent it (Bustos et al. 2022; Slemrod, 2019). This industry is powered by a diverse array of professional intermediaries - lawyers, accountants, trust companies, and financial advisors, for example - who act as the architects and gatekeepers of the offshore world.

This thesis delves into the ecosystem of these offshore intermediaries, leveraging the extensive micro-data revealed by the International Consortium of Investigative Journalists (ICIJ). The central objective is to illuminate the operational logic of these crucial actors by advancing and empirically testing two primary claims: first, that intermediaries exhibit a high degree of geographical specialization, predominantly serving clients from their own home countries and regions; and second, that distinct patterns of functional specialization exist among the different types of intermediaries operating within the offshore system.

The claim to (moderate) originality of this research is twofold. It presents one of the first systematic empirical studies of intermediary specialization within the global offshore system, moving beyond anecdotal evidence or case studies to map broader patterns. Furthermore, it introduces a novel methodological approach, employing an agent-based classification technique to categorize intermediaries based on their online presence. By providing a more granular understanding of how these intermediaries operate, this thesis aims to shed light on the mechanisms that underpin the global offshore economy, offering insights relevant to policymakers, regulators, and scholars seeking to understand and address the challenges posed by financial opacity and cross-border tax avoidance. The "race" between regulators and intermediaries is a losing battle if nothing is known of them.

What follows is a brief overview of the issue of tax evasion and avoidance primarily motivating the research question, a historical account of the offshore world as a "wicked" problem, and a discussion of the intensification of regulation post-2008. This is followed by an overview of the role of intermediaries as targets of regulation, and finally, the research question and a roadmap for the thesis.

1.2 Tax Evasion, Tax Avoidance and the Offshore World

The ability of states to fund public goods and services, mitigate inequality, and ensure social mobility hinges critically on systems of taxation; "a nation", Burke (1774) wrote, "is its system of taxation." The ability of a state to collect the taxes it is owed is fundamental to state capacity (Tilly, 1990). The Offshore world has been a significant barrier to this as tax avoidance and evasion schemes have routed through here, challenging public finances worldwide, eroding tax morale and leading to significant revenue losses (Slemrod, 2019). These practices distort economic incentives, generates a class of socially undesirable rents accruing to groups like intermediaries and exacerbate societal inequalities, short-circuiting society's ability to deliberate about optimal taxation regimes, a concern brought to the forefront by scholars such as Piketty, Zucman and Saez (e.g., Piketty, 2014; Saez & Zucman, 2016).

The most important section of the income distribution in terms of tax revenues are the wealthiest and those who utilise these offshore structures (Alstadsæter et al., 2019; Londoño-Vélez et al., 2021) Traditional economic models of tax evasion and empirical detection methods, such as random tax audits, often fail to capture the full extent and sophistication of strategies employed by the wealthiest individuals (Allingham & Sandmo, 1972; Kleven et al., 2011). As Alstadsæter, Johannesen, and Zucman (2019) demonstrate through analyses of leaked offshore data, tax evasion among the ultra-wealthy is not only more prevalent but also qualitatively different, often involving complex offshore arrangements that render it largely invisible to conventional tax enforcement mechanisms. Indeed, for the wealthiest echelons, the line between aggressive tax avoidance and outright evasion can become blurred, facilitated by access to specialized advice and intricate financial engineering (Christensen, Seabrooke, & Wigan, 2021). While outright evasion has been significantly impacted by recent regulatory initiatives, falling as much as a factor of three, avoidance still represents a significant issue for the public purse (Alstadsæter et al. 2024).

The pervasive use of offshore financial centres (OFCs) is not limited to individual tax planning; it is also a cornerstone of corporate tax avoidance strategies on a global scale. Multinational corporations (MNCs) employ a range of mechanisms, most notably transfer pricing methods, to allocate profits to low-tax or no-tax jurisdictions, often disconnecting taxable income from the locations of substantive economic activity (Tørsløv, Wier, & Zucman, 2018). The magnitude of this profit shifting is significant. For instance, Saez and Zucman (2019, p. 77) estimate that approximately 60% of the foreign profits of US multinationals are booked in low-tax jurisdictions, far outpacing the real economic activity occurring in those locations; Wier & Zucman (2018) estimate 10% of global corporate tax revenues is expropriated from the state because of profit shifting; and Zucman (2015) estimates at least 8% of the world's financial wealth is held offshore.

Non-tax motivated reasons, it should be noted, for employing offshore structures do exist. These can include facilitating cross-border investments and pooling capital for private equity funds to avoid double-taxation, or seeking a legal and political stability not available in an investor's home country (Carter, 2017; Harrington, 2016). Likewise, its users also includes those wishing to protect assets from potential expropriation in unstable political environments, ensuring contractual enforcement through neutral legal systems, or distancing operations from local corruption (Hoang, 2022). Without these structures there would likely be a reduction in investment because of an introduction of superfluous frictions to capital, especially towards developing countries with weaker institutional frameworks (Carter, 2017).

As Harrington (2016, p. 171) observes in the context of wealth management, but remains equally pertinent more generally to the entities incorporated in offshore jurisdictions for both corporate and high-net-worth individual purposes: "Tax avoidance—which gets the lion's share of headlines whenever wealth management makes the news—is only the tip of the iceberg. The larger objective is defending wealth from the many risks it faces, both from without (in the form of political retribution or creditors) and from within (in the form of divorcing spouses or spendthrift heirs)." Thus, these entities are versatile tools used for a spectrum of objectives including liability shielding, asset protection, and succession planning, in addition to tax considerations.

1.3 A Brief History of the Offshore

The contemporary offshore financial system, with its complex web of tax avoidance, evasion, and financial secrecy, is not a recent anomaly but the outcome of a long historical evolution. This section presents the history of tax havens through the historical institutionalist account provided by Rixen (2010), traces the genesis of this system to the sequential manner in which international tax governance developed.

In the early to mid-20th century, the primary challenge confronting states was the issue of international double taxation, where the same income could be taxed by both the country of source and the country of residence of the taxpayer. This significantly hampered cross-border trade and investment. To address this, states engaged in a process of coordination, culminating in a network of bilateral Double Taxation Treaties (DTTs), largely based on model conventions developed by the League of Nations and later the OECD. This initial phase successfully mitigated double taxation by establishing rules for allocating taxing rights, such as the distinction between active business income (primarily taxed at source) and passive income (often taxed at residence), and foundational concepts like "permanent establishment" and the "arm's length principle" for intra-company transactions (Rixen, 2010).

However, the very architecture designed to resolve double taxation inadvertently sowed the seeds for a new, more intractable problem: international tax competition and widespread opportunities for tax avoidance and evasion. As Rixen (2010) argues, the DTA regime, by preserving national tax sovereignty (allowing countries to set their own rates and define key terms within the treaty framework) while facilitating capital mobility, transformed the strategic landscape. Once the risk of double taxation was largely removed, some jurisdictions suddenly stood in a position to gain by offering minimal or zero tax rates and high levels of financial secrecy, thereby attracting mobile capital and corporate profits at the expense of their previous domestic tax base. This shifted the international tax system from a coordination game to an asymmetric prisoner's dilemma. Larger, higher-tax nations faced erosion of their tax bases, while smaller jurisdictions could specialize in offering offshore services, effectively "commercializing their sovereignty" (Palan, 2002; Laffitte, 2024).

1.4 The Intensification of Regulation post-2008

The past two decades have witnessed a significant intensification of international regulatory efforts aimed at curbing offshore tax evasion, aggressive tax avoidance, and illicit financial flows. Spurred by the 2008-2009 global financial crisis, a series of high-profile data leaks (such as the Panama, Paradise, and Pandora Papers - serving as the central data for this thesis), and mounting public pressure, major economies and international bodies like the G20, the OECD, and the Financial Action Task Force (FATF) have brought a new wave of regulation. Key developments include the implementation of Automatic Exchange of Information (AEOI) through the Common Reporting Standard (CRS), heightened scrutiny of beneficial ownership information, and more stringent Anti-Money Laundering and Counter-Terrorist Financing (AML/CFT) obligations, the BEPS (Base Erosion and Profit Shifting) initiative (see, e.g., Carter, 2017; OECD, 2014; De Groen, 2017). This is of a *qualitatively* different caliber compared to the incrementalist regulations of yesteryear hesitant to work outside the bounds of old institutions (Hearson & Christensen, 2019). Alstadsæter et al. (2024) note the three-fold decrease in tax evasion, for example; BEPS is a historic 130+-country agreement to, among much else, enforce a minimum corporate tax; Switzerland as a tax haven, despite being historical cornerstone has been forced to make significant concessions with the aggressive regulations unilaterally imposed by the US under Obama with FATCA (Foreign Account Tax Compliance Act) (Zucman, 2015; Christensen, 2024). These are un-heard of developments, and harbingers of regulative proposals that are a lot less insistent to work within the historical scope of these institutions (Hearson & Christensen, 2019).

1.5 Intermediaries as a Target of Regulation

Professional intermediaries, right about now, seem particurlaly interesting strategic points of intervention because of their role as the human form that is "racing" against the regulators (to borrow the image of Bustos et al. (2022)) and actively countervailing the intended impact of laws and regulations (Christensen, 2024; Chang et al., 2023a). Several compelling reasons underpin why these actors represent particularly salient targets for regulatory action.

First, the incentives structuring the behavior of intermediaries are arguably much more sensitive to changes in the regulatory or reputational environment than their clients. For these professionals and firms - ranging from large financial institutions and global accounting firms to specialized law practices and corporate service providers - the provision of offshore services is not merely an ancillary option but often a core component of their business model and professional identity (Christensen, Seabrooke, & Wigan, 2021). Their professional existence and profitability are directly dependent on their continued ability to offer these specific services effectively and discreetly. Consequently, factors that threaten this ability - such as increased regulatory scrutiny, heightened enforcement risk, or significant reputational damage - can have a pronounced impact on their willingness and capacity to supply these services. In contrast, the demand for tax minimization or asset protection among potential clients, driven by factors like high tax rates or a desire for secrecy, can be seen as a relatively persistent force. While demand might fluctuate, the fundamental desire among some wealthy individuals and corporations to reduce tax burdens or shield assets is likely to remain, making demand potentially less elastic to targeted interventions than the specialized supply of enabling services. The threat of reputational and criminal consequences falls asymmetrically on intermediaries.

Second, the structure of the market for offshore services itself points towards the strategic importance of intermediaries. There often exists a many-to-one relationship between clients and intermediaries; that is, a relatively small number of specialized intermediary firms or key professionals service a large number of clients seeking offshore solutions (Stausholm & Garcia-Bernardo, 2024; Chang et al., 2023a). This concentration means that the intermediary sector represents a point of leverage, or a "chokepoint" in the network of offshore facilitation (Christensen, 2024). Regulatory actions or enforcement efforts focused on these key intermediary players could potentially have a cascading effect, impacting a wide network of clients far more efficiently than attempting to identify and pursue each individual client separately. This structural feature makes the intermediary supply-side particularly vulnerable, and thus relevant, from a regulatory perspective. A granular understanding of how these intermediaries specialize - geographically and functionally, as this thesis explores - can therefore offer further insights into the nature of these chokepoints and thus potentially the design of regulation.

1.6 Research Question: How do Intermediaries Specialise in Offshore Networks?

The preceding sections have established the significant scale of tax avoidance and evasion, a brief history of the offshore financial system that enables these practices, the increasing regulatory attention being paid to it, and why the professional intermediaries who facilitate access to this system might constitute good targets. This leads directly to the central research question of this thesis: **How do intermediaries specialise in offshore financial networks?**

While a growing body of literature addresses various facets of offshore finance, the specific patterns of intermediary specialization have not been explored systematically. Existing ethnographic research (e.g., Harrington, 2016; Hoang, 2022) has provided rich insights into the micro-level interactions, trust dynamics, and operational practices of wealth managers and their elite clients (cf. Neely, 2022). However, the qualitative nature of these studies, while offering depth, inherently limits the ability to generalize findings to broader, systemic patterns of intermediary behavior across the entire offshore ecosystem. Concurrently, a nascent but expanding stream of research has begun to leverage large-scale leaked datasets or developed novel ones to explore structural aspects of the offshore world (e.g., Chang et al., 2023a; 2023b using ICIJ data as well; Stausholm & Garcia-Bernardo, 2024; Kejriwal & Dang, 2020).

This thesis aims to fill this gap by empirically investigating patterns of intermediary specialisation along two principal dimensions: first, the *geographical specialisation*, examining the countries of the clients they serve and jurisdictions they incorporate entities in; and second, the *functional specialisation*, exploring whether there are distinct types of intermediaries that cater to different client segments or specialize in the provision of particular types of offshore structures or services.

1.7 Roadmap of the Thesis.

This thesis is structured as follows, moving from theoretical foundations and methodology to empirical analysis and discussion of implications.

Chapter 2 (Literature Review and Theoretical Framework) establishes the conceptual groundwork for the study. It reviews the extant literature on offshore finance, the evolving role of intermediaries, and theories relevant to understanding their behavior and specialization. This includes an exploration of 'where' intermediaries operate, drawing on the Global Wealth Chains framework (Seabrooke & Wigan, 2017); 'who' these actors are, informed by micro-sociological accounts emphasizing trust, relational capital, and professional networks (e.g., Harrington, 2016; Christensen, Seabrooke, & Wigan, 2021); and 'what' functions they perform through the deployment of specific legal and financial technologies (Lafitte, 2024; De Groen, 2017).

Chapter 3 (Data and Methodology) details the empirical strategy employed. It introduces the International Consortium of Investigative Journalists (ICIJ) dataset as the primary source of micro-data, discussing its provenance, structure, variables, strengths, and inherent limitations. This chapter will also present the methodological framework developed for classifying intermediaries and the statistical techniques applied for testing these patterns. A brief overview of prior academic usage of ICIJ data will also be provided to contextualize this thesis.

Chapter 4 (Empirical Analysis) forms the empirical core of the thesis. This chapter presents the findings from the investigation into the two primary dimensions of intermediary specialization. It will first detail the results concerning *geographical specialization*, analyzing patterns of intermediary activity in relation to client home countries and the offshore jurisdictions utilized. Subsequently, it will present findings on *functional specialization*, examining whether and how intermediaries focus on particular types of clients or specialize in facilitating specific offshore structures and services. The analysis will demonstrate that intermediaries are often not generalists but exhibit distinct patterns of specialization along multiple dimensions.

Chapter 5 (Discussion) interprets the empirical findings within the broader theoretical and policy context. It explores the implications of the identified patterns of intermediary specialization for understanding the offshore financial system, for national capacity in combating tax avoidance and evasion, and for the design of more effective and tailored regulatory enforcement strategies.

Finally, **Chapter 6** (Conclusion) summarizes the main contributions of the thesis, and outlines some avenues for future research in this area.

Theory

Four main sections are presented in this chapter to situate the theoretical background and existing literature of intermediaries. As a structural and narrative device, each subsection answers a specific "question" about intermediaries - the "who", "what", and "where" of intermediaries.

First, situating them within Global Wealth Chains (GWC), to answer the "Where" they are located, understood as in which structures. The micro-sociological accounts of primarily Harrington (2016) and Hoang (2022) will be viewed as answering "Who" these intermediaries are. Then, a section on the "What" - going more into their concrete activities as well as a typology of the functional specialisation of intermediaries from De Groen (2017). Lastly, the final section details how ICIJ data has previously been used to study the offshore financial system to generally situate the extent to which it can be validly in preparation of the next chapter on the overall empirical strategy.

Throughout the thesis, I will leverage the same broad definition of intermediaries ICIJ uses. They define them as follows:

> [...] [A]n Intermediary refers to a node representing individuals or firms that facilitate the creation and management of offshore entities. These intermediaries include lawyers, accountants, and service providers who assist in setting up and maintaining offshore companies, trusts, or other legal entities. (ICIJ, n. d.)

2.1 Where do Intermediaries fit in?

To understand the operational domain of intermediaries - the "where" of their activities - Global Wealth Chains (GWCs) offers a clear framework in which to place their activities. Seabrooke and Wigan (2017, p. 2) define GWCs as "transacted forms of capital operating multi-jurisdictionally for the purposes of wealth creation and protection." This framework moves beyond static geographical location to situate intermediaries within the dynamic, networked, and often opaque processes through which global wealth is managed, moved, and shielded. The "where" of intermediaries, then, is understood as their position within these complex, multi-jurisdictional chains that exploit the disjuncture between global capital mobility and territorially-bound fiscal and regulatory systems (Seabrooke & Wigan, 2017).

Intermediaries are active components within these chains and fundamental to shaping them. Professionals are the engineers and architects within the GWCs, acting as the micro-level agents who 1) connect disparate legal and financial systems, thereby enabling the macro-level structures of offshore finance, and 2) often are among the primary forces shaping the very regulation that they are subject to (Christensen et al., 2021; Christensen, 2020; Harrington, 2016). They are "located" at the critical junctures where different national regulations meet, exploiting the seams and gaps between them for the benefit of their clients (Seabrooke & Wigan, 2014; Christensen et al., 2021). This involves structuring entities, managing information flows, and ensuring (or circumventing) compliance across various legal territories, a process that often relies on cultivating opacity rather than transparency (Seabrooke & Wigan, 2017). While the term "offshore" explicitly evokes images of remote island nations, most intermediary activity in GWCs occurs within the major onshore financial centers themselves that Stausholm and Garcia-Bernardo (2024) identify as "tax coordination centers." The expertise driving GWCs is, therefore, often concentrated in the very OECD countries that ostensibly seek to regulate them.

As a role, they are only set to get bigger, benefitting from the increasing complexity of international regulation. As Bustos et al. (2022) suggest, new regulatory measures can create more business for specialized intermediaries like transfer pricing experts, who are then paid to navigate or even engineer pathways through these new rules. When new OECD transfer pricing regulations were implemented in Chile to counteract transfer pricing misuse for the sake of tax avoidance, the number of transfer pricing experts at the Big Four in the country increased from 8 to 95; needless to say, the regulation had no significant effect (Bustos et al., 2022).

In essence, intermediaries are found "where" the legal, financial, and regulatory complexities of the globalized economy are most acute, and "where" expert knowledge can be leveraged to facilitate the multi-jurisdictional logic of wealth creation and protection inherent in Global Wealth Chains.

2.2 Who are "Intermediaries"?

To delineate "who" these intermediaries are, we turn to micro-sociological accounts that detail their professional identities in thick, ethnographic accounts allowing to get a sense of the nature of their relationships. Brooke Harrington (2016) vividly encapsulates the role through the evocative image of Mr. Tulkinghorn, the lawyer from Charles Dickens' Bleak House. Specializing in trusts and estates, Tulkinghorn is the quintessential keeper of secrets, the one who knows everything about everyone. As Harrington (2016, p. 1) quotes, "He is surrounded by a mysterious halo of family confidences, of which he is known to be the silent depository." The intermediary to their clients often serves as a guardian of sensitive information, whose core value lies in discretion and intimate knowledge, often cultivated through "relationships of long and uncertain duration, usually measured in lives" (Harrington, 2016, p. 79); particularly in the case of wealth managers, who are the primary focus of her ethnography.

While Harrington's deep dive centres on wealth managers, the fundamental characteristics she uncovers of the paramount importance of trust, discretion, and sophisticated relational work, resonates across the spectrum of intermediaries. Trust and relation-building is the quintessential capacity to these professionals serving this "politically and socially homogenous and autonomous group" of individuals (Harrington 2016, p. 81). Whether it be wealth managers, tax advisors or legal experts, these business relations are built on a foundation of trust, confidentiality and personal rapport (see, for example, Neely, 2022; Hoang, 2022; even Shiller, 2012, makes a large point of these mechanisms of trust as fundamentally underlying all financial intermediation). The entire edifice of offshore finance, designed to create and maintain opacity, hinges on such trusted relationships. In these specialized markets, as Hanlon (cited in Harrington, 2016, pp. 14-15) notes, *"Reputational capital [is] at the apex of selling complex products in professional markets."* Secrecy is the product, and trust is the indispensable service these intermediaries are selling. The case is often, as one source is quoted in Harrington (2016, p. 85), "No one in my family knows that this structure exists; only you, me and my lawyer know about it."

The question then obviously arises, *who* possesses the capabilities to cultivate and embody such profound trust, particularly in contexts demanding utmost confidentiality and navigating complex, often morally ambiguous, terrains? The literature points overwhelmingly to the power of homophily and shared cultural understanding (Neely, 2022; Ho, 2009). Intermediaries are those who can successfully traverse the "trust-barrier" by leveraging their own cultural and social similarity with their clients. This involves deploying a shared habitus, in Bourdieu's (1977) terms - a system of dispositions, tastes, and ways of being that resonate with the "politically and socially homogenous and autonomous group" of wealthy individuals they seek to serve (Harrington, 2016, p. 81). Hoang's (2020; 2022) ethnography of "spider-web capitalism" portrays it similarly. One of the primary tasks of Private Equity partners in foreign markets is selling an idea of similarity to investors through "homoerotic" relations and other bonding experiences. It is relational work all the way down (Hoang, 2020).

In sum, the "who" of intermediaries is defined by their capacity to embody trust in a deeply personal and culturally resonant manner for each client. They are professionals - often lawyers, accountants, or specialized wealth managers - who possess not only technical expertise but, more critically, the social, cultural, and relational capital required to become indispensable confidants. They are the human interfaces in a system built on opacity and the "silent depositories" of their clients' most sensitive financial affairs, adept at translating global systems into personalized solutions.

2.3 What Functions do Intermediaries Have?

Having established *where* intermediaries are situated GWCs and *who* these actors are in terms of their relational and cultural capital, this section addresses the "what": What specific functions do intermediaries perform, and what tools do they employ to achieve their clients' objectives? As the architects and engineers of the offshore world, their work relies on the deployment of specific "legal technologies" offered by various jurisdictions, instruments that are fundamental to facilitating the multi-jurisdictional arbitrage and opacity characteristic of GWCs (Seabrooke & Wigan, 2017; Christensen et al., 2021; Lafitte, 2024).

2.3.1 Legal Technologies used by Intermediaries

Jurisdictions compete on the legal technologies they offer, and the possibilities they offer intermediaries and beneficiaries in terms of the structures they can incorporate (Lafitte, 2024). Lafitte (2024) expanding on the view of states selling sovereignty as in the seminal account of Palan (2002), constructs a historical dataset containing time series on the specific legal technologies different sovereignties provide. In microeconomic parlance, the "selling" of sovereignty and their tax laws is the extensive margin (whether they offer it at all) and the "legal technologies" are the intensive margin (the extent to which they offer it) (Palan, 2002; Lafitte, 2024). The most important ones include trusts enabling the separation of legal and beneficial ownership, bearer shares allowing for anonymous ownership, and nominee services providing a layer of separation between the ultimate beneficial owner (UBO) and the legal entity (Lafitte, 2024; Harrington, 2016).

2.3.2 Functional Specialisation of Intermediaries

While the "who" section, drawing on Harrington (2016), highlighted the relational work of wealth managers, the offshore ecosystem involves a broader cast of professionals, each contributing distinct functions. De Groen (2017), in his analysis following the Panama Papers leak, provides a useful four-fold typology of advisors based on their primary area of expertise and function. It is here important to note that terminology from De Groen (2017) differs: what he calls "advisors" and "intermediaries" respectively, both fall under the broad definition we use from the ICIJ. This typology helps to disaggregate the "what" of intermediary work and understand how different specialists contribute to the GWC by utilizing the aforementioned legal technologies:

- **Tax Experts:** These intermediaries focus primarily on the tax implications of offshore structures. Their core function involves advising clients on tax planning strategies to minimize liabilities (potentially crossing into evasion) and ensuring compliance through the preparation of necessary tax documentation across relevant jurisdictions. This group can include accountants, auditors, and specialized tax advisors, whose advice may vary in aggressiveness.
- **Legal Experts:** This category encompasses professionals providing expertise on the legal design, establishment, and enforcement of offshore structures. Key activities include structuring entities to navigate or exploit laws in multiple jurisdictions, handling incorporation

(often via licensed entities), drafting legal documents, arranging nominee services, and providing formal legal opinions or representation. This group includes regulated lawyers, who often have exclusive rights for certain actions like court representation, and potentially notaries involved in document formalization.

- **Administrators:** The primary role of administrators is the ongoing operational maintenance and financial record-keeping of offshore entities. This includes preparing financial accounts, potentially handling tax returns (overlapping with Tax Experts), managing day-to-day administrative tasks, and sometimes auditing accounts. Accountants often fall into this category, focusing on financial recording and reporting.

- **Investment Advisors:** Distinct from those setting up the structure, investment advisors focus on managing the assets held within the offshore entity. Their core function is to develop strategies for wealth preservation or growth using the financial instruments (or other assets like property, art, etc.) owned by the offshore structure. Their role is centered on asset management rather than the legal or tax architecture itself.

2.4 How has ICIJ Data been used to Study the Offshore Financial System?

Researching the clandestine world of offshore finance, and the intermediaries who enable it, presents inherent challenges due to the system's defining characteristic of secrecy (Chang et al. 2023a). The International Consortium of Investigative Journalists (ICIJ) Offshore Leaks Database, however, offers an unparalleled entry-point into this world, given its scale and granularity. As Kejriwal & Dang (2020, p. 3) note, the database's strength lies in its mapping of an otherwise secret global system:

> [...] [P]recisely because the collection maps out a global system, the Panama Papers also present us with a golden opportunity to study the flow of information between firms, individuals and intermediaries. [...] Studying the structural properties of this complex system using applied networks science has the potential to reveal interesting trends about how such systems operate across geographies and economies.

The ICIJ database, however, is not a comprehensive or randomly sampled representation of the entire offshore world. It is a compilation of data from specific leaks, each with its own origins and potential biases. For instance, a significant portion of the data originates from particular service providers like Mossack Fonseca (Panama Papers) or Appleby (Paradise Papers). Consequently, observed patterns in clientele, jurisdictions, and service types may, to some extent, reflect the operational focus and market position of these specific firms rather than the offshore industry in its entirety (De Groen, 2017).

Another core challenge in studying offshore finance is identifying the Ultimate Beneficial Owners (UBOs), who often employ sophisticated techniques to obscure their connection to assets - even obfuscation robust to leaks. Hoang (2022), in her ethnography, notes an example of High Net Worth Individuals (HNWI) appearing as "fall guys" named in the ICIJ papers, while the Ultra-HNWI (UNHWI) remains obfuscated; there are layers to secrecy, and those exposed in the leaks often only represent the comparatively more visible part. While this opacity surrounding UBOs is a significant limitation for some research questions especially those focusing on the beneficiaries from the offshore using this dataset, it is less prohibitive for the study of intermediaries. Intermediaries, by their very nature as facilitators and often as the direct points of contact between clients and service providers, and can be expected to be named within the leaked data; they *are* the fall guys in Hoang's (2022) sense.

Even with those limitations in mind, its pragmatic value to get an inside look in this otherwise ever-so reclusive world is unrivalled and illustrated by the increasing use of the data to gauge general patterns in other academic research. Studies have employed it to gauge propensities for offshore use across income distributions (see, for example, Alstadsæter et al., 2019; Londoño-Vélez & Ávila-Mahecha, 2021), to explore relationships between offshore structures and political contexts (Chang et al., 2023a; Chang et al., 2023b), and to analyze the network structure of offshore finance (Kejriwal & Dang, 2020). This thesis will proceed with similar caution, focusing like the other papers on identifying general patterns and relational dynamics concerning intermediaries rather than laying claim to anything resembling precise numerical estimates.

Data and Methodology

This section details the data sources and methodological approaches employed in this thesis. It begins by describing the primary data source, the ICIJ Offshore Leaks Database (Section 3.1), and the external datasets used for constructing the primary features (Section 3.2). Subsequently, it introduces a novel methodology utilizing agentic AI to enrich a sample of the intermediaries from the ICIJ dataset, classifying them into the typology of De Groen (2017) based on their online presence (Section 3.3). Finally, there is an outline of the general quantitative techniques applied (Section 3.4).

3.1 The ICIJ Offshore Leaks Database

The primary empirical basis for this thesis is the International Consortium of Investigative Journalists (ICIJ) Offshore Leaks Database.

3.1.1 Overview

Our primary dataset is the International Consortium of Investigative Journalists (ICIJ) Offshore Leaks Database (ICIJ, n.d.). This publicly accessible repository is a collation of a series of leaks, most notably the Offshore Leaks (2013), Panama Papers (2016), Paradise Papers (2017/18), and Pandora Papers (2021/22). The database is substantial, cataloging information on over 810,000 offshore entities encompassing a range of structures such as companies, trusts, and foundations, and establishing connections to more than 750,000 individuals and corporate entities. These connections span over 200 countries and territories, with the underlying records covering a significant historical period, in some cases extending up to the year 2020. Figure 3.1 is an overview of when the entities included in the dataset were incorporated.

The fundamental data model leveraged by the ICIJ data is a graph. This model is used for its ability to represent interconnected information, conceptualizing data as **nodes** (the core informational units) and **edges** (the links defining how these units are connected). For the purposes of our study, the most pertinent node types are:

- **Entities**: These represent the diverse offshore legal structures documented in the leaks, such as Limited companies, S.A. (Société Anonyme), Inc. (Incorporated), trusts, and foundations.

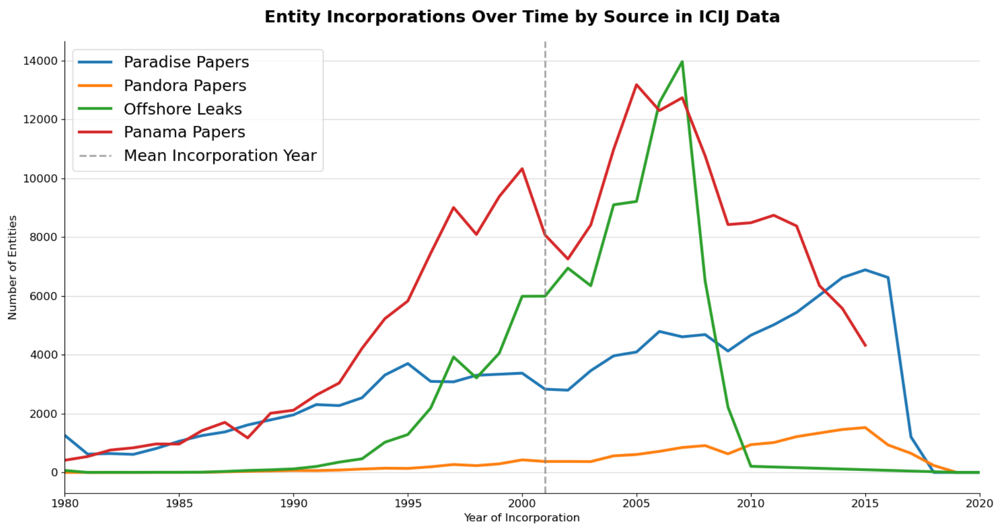

Figure 3.1: Overview of Entity Incorporations Over Time in ICIJ Data

- **Officers**: This category includes individuals or, in some instances, other corporate bodies that fulfill specific roles (e.g., director, shareholder, beneficial owner, trustee, protector, nominee) attachted to an Entity.
- **Intermediaries**: These are the professional facilitators - typically law firms, accounting practices, banks, trust companies, or specialized middlemen - who assist clients in the establishment and ongoing management of offshore entities. They often act as the liaison with offshore service providers like Mossack Fonseca or Appleby that provide the underlying incorporation service.

Relationships (edges) within this graph structure explicitly define the nature of the connections, for example, an Officer is an `officer_of` an Entity, or an Intermediary acts as an `intermediary_of` an Entity.

The two primary node types of interest for this thesis are **Entities** and, critically, **Intermediaries**. In the ICIJ data model, the role of intermediaries is, with very few exceptions, represented entirely through their connections to Entities. That is, at a high level, the relational pathway is: Intermediaries are `intermediary_of` Entities, which in turn have Officers (who are `officer_of` these Entities).

Figure 3.2 is a simplified illustration of how one sample sub-network of the ICIJ data model could look. Officers are connected to entities, that have been incorporated by intermediaries with the help of a service provider. The ICIJ dataset can, at a high level, be viewed as a collection of such sub-networks.

The following subsections will go more in detail with each of the node types.

3.1.2 Entities

At the entity level, key data points include the entity's registered `name`, its `jurisdiction` of incorporation (which is standardized to ISO3 country codes for consistent geographical anal-

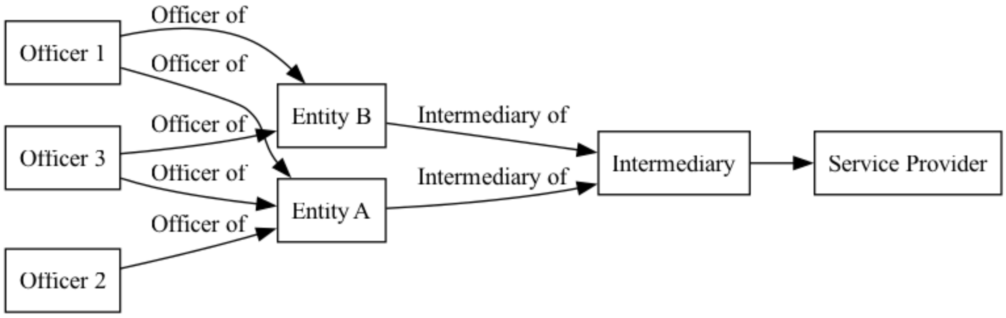

Figure 3.2: Overview of how Intermediaries appear in ICIJ Data Model

ysis), and the `country_codes` associated with its operational activities or linked addresses. These `country_codes` are often distinct from its legal `jurisdiction` of incorporation and provide information on the geographical location of the entity's actual business or connections. Additionally, we have the entity's `incorporation_date`, its operational `status` (e.g., Active, Struck Off, Dissolved), and its specific `entity_type` (e.g., Standard International Company, Trust, Business Company Limited by Shares).

A feature we construct at the entity-level is the `bearer_count`. This metric quantifies the number of associated officers explicitly identified as "Bearer" or its equivalents (e.g., "THE BEARER," "EL PORTADOR"). The presence of bearer instruments, as highlighted by Harrington (2016), is a critical indicator of mechanisms used to obscure true beneficial ownership. In such arrangements, legal ownership follows the physical possession of the share certificate rather than being recorded in a central register, thereby enhancing anonymity (Chang et al., 2023b).

3.1.3 Intermediaries and Feature Engineering

For **intermediaries**, the analysis extends beyond basic identifying information. Beyond their `name` and the `countries` associated with their operational addresses, we calculate their `degree`. In this context, the degree represents the total number of distinct entities an intermediary is connected to within the ICIJ network, serving as a proxy for their client base size and activity level.

More extensively, we construct several aggregated metrics that characterize each intermediary based on the collective properties of the entities they service. As our primary research interest lies in understanding the roles and specializations of intermediaries, we aggregate information at the intermediary-level about the entities they are connected to. While graph data models excel at representing complex, interrelated data, tabular data is a lot easier to work with. By this manner, sub-graphs composed of entities and intermediaries are summarised into tabular features, aggregating the most important information about the entities they service. This way, rather than having to work with the full graph structure, we can work with a table of intermediaries, each summarised by their connections to entities.

For every intermediary, we generate the following features:

- country_counts: A dictionary detailing the frequency of entities they are connected to, grouped by the country_codes associated with those entities. This reflects the geographical spread of the operational links of the entities they service. A concrete example would be an intermediary connected to 10 entities in the United States and 5 in the United Kingdom, resulting in this intermediary having a country_counts of { "USA": 10, "GBR": 5}.

- jurisdiction_counts: A dictionary detailing the frequency of entities they are connected to, grouped by the jurisdiction (ISO3 code) in which those entities are incorporated. This captures the intermediary's usage of different offshore legal environments.

- regime_counts: A dictionary detailing the frequency of entities they are connected to, grouped by the political regime type (e.g., Liberal Democracy, Closed Autocracy, as per V-Dem data detailed in Section 3.2) of the entities' associated country_codes at the time of entity incorporation. This provides insight into the political contexts linked to an intermediary's client base.

- legal_tech_counts: A dictionary detailing the frequency of entities they are connected to, grouped by the predominant types of "legal technologies" (e.g., Banking, Corporate, Dual-Purpose, as per Laffitte (2024), detailed in Section 3.2) prevalent in the entities' jurisdictions of incorporation at the time of their formation. This reflects an intermediary's engagement with specific offshore legal architectures.

- bearer_share: Lastly, we quantify for each intermediary the number of entities they are connected to that have bearers_connected (i.e., entities with a bearer_count > 0 - recall that this was based on the officers they were connected to) and calculate the bearer_share, representing the proportion of their serviced entities that utilize these anonymity-enhancing instruments.

To measure the diversity of their client entity portfolio across these dimensions, we also compute normalized entropy scores: country_entropy, jurisdiction_entropy, regime_entropy, and legal_tech_entropy. More on that specific measure in Section 3.4.1. The important part to take away at this stage is, that these scores provide a measure of the diversity of the intermediary's client base across the respective dimensions, with higher values indicating a more diverse portfolio. For example, a high jurisdiction-entropy means an intermediary uses a lot of jurisdictions relative to the number of entities they have incorporated.

3.2 Other Data Sources

To enrich the core ICIJ data, several external datasets are integrated, primarily to provide contextual information at the country or jurisdiction level, and to classify intermediaries by type.

Going into more detail with the external datasets:

1. The **Varieties of Democracy (V-Dem) Project data**: We utilize the `v2x_regime` variable from VDem's comprehensive dataset to enrich our entity data. This variable classifies countries into categories such as Closed Autocracy, Electoral Autocracy, Electoral Democracy, or Liberal Democracy. Its methodology relies on a sufficient number of experts to classify it, which are not available in Micro-states. Therefore, empty fields in V-Dem are imputed as "Microstate" though its not quite conceptually similar to the other categories, but a fitting descriptive label nonetheless. By matching an entity's associated `country_codes` (representing operational links) and its `incorporation_year` with the VDem data for the corresponding country and year, we assign a political regime classification to each entity. The idea is, regimes capture very concisely a lot of information about which context a client has and is established in e.g. Chang et al. (2023b). This entity-level regime information is then aggregated to construct the `regime_counts` at the intermediary level, providing insight into the political environments linked to an intermediary's clientele.

2. **Laffitte's (2024) "The Market for Tax Havens" dataset** (specifically `HTHD.csv`): This dataset offers a historical perspective on the "offshore legal architecture" of various jurisdictions, detailing their adoption of different "legal technologies" such as International Business Company (IBC) laws, trust legislation, or banking secrecy provisions. Laffitte categorizes these into broader types such as "Banking," "Corporate," "Dual-Purpose" (e.g., IBCs serving both personal and corporate needs), and "Personal" (e.g., trust laws). We merge this dataset onto our entity data by matching the entity's `jurisdiction` of incorporation and its `incorporation_year` with the HTHD data. This allows us to identify the specific legal technologies active in an entity's jurisdiction at its time of incorporation. This entity-level characterization is subsequently aggregated to create the `legal_tech_counts` at the intermediary level, reflecting the types of legal environments their serviced entities operate within.

3.3 Agentic AI for Intermediary Classification

Directly at the Intermediaries-level, we also enrich a random **subset of intermediaries** and another subset of the most connected intermediaries with information on their specific "type." This classification is based on the typology adapted from the De Groen (2017) and covered in the theory section.

The core idea is to use an AI agent loop to automate the process of gathering the information about intermediaries that's online, whether it be incorporation documents or their own online presence (e.g. a lot of them have some kind of LinkedIn profile). After three iterative searches, an LLM (gemini-2.0-flash) determines whether there is sufficent information to classify them, and if so, categorises them into the four-fold typology, providing a reasoning. The basic workflow is illustrated in Figure 3.3. More detail on the agentic AI methodology is provided appendix and the code on GitHub along with the rest of the replication code.

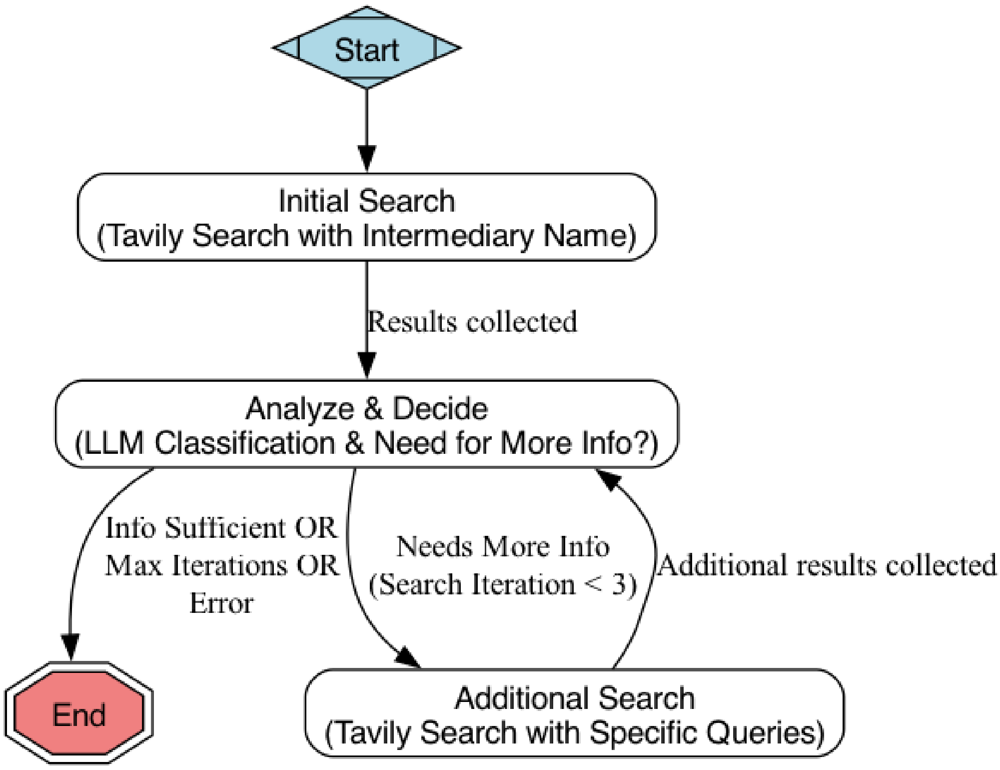

Figure 3.3: Agent Setup for Intermediary Classification

3.4 Analytical and Statistical Techniques

This section outlines the core analytical techniques applied to the processed data. At a high-level, they are 1) a measure of concentration/diversity, choosing entropy as the preferred one, 2) an approach to adjust significance thresholds, choosing the conservative Bonferroni method, given the exploratory nature of the analysis, and 3) a range of different statistical tests - mostly non-paremetric - to assess the significance of the results.

3.4.1 Entropy

Drawing on its application in prior studies of offshore finance (e.g., Chang et al., 2023b; Kejriwal & Dang, 2020), Shannon entropy is employed as a measure of diversity or concentration. For a discrete random variable X with n possible outcomes $x_1, ..., x_n$ and probabilities $p(x_i)$, entropy is defined as:

$$H(X) = -\sum_{i=1}^{n} p(x_i) \log_b p(x_i) \tag{3.1}$$

where b is the base of the logarithm (typically $b = 2$, yielding units of bits). Compared to other concentration measures like the Herfindahl-Hirschman Index (HHI), entropy gives more weight to smaller amounts of diversity. This characteristic is particularly useful in this thesis, as intermediaries' activities (e.g., choice of jurisdictions or countries) are often highly concentrated in one or two locations, so entropy yields greater variation and thereby more statistical power compared to other common concentration measures like HHI. Normalized entropy, calculated by dividing $H(X)$ by the maximum possible entropy ($\log_b n$), is used to provide a standardized measure (0 to 1) for comparing diversity across intermediaries with different breadths of activity. Entropy is used, for example, as a summary statistic at the intermediary-level to quantify the diversity of their client entity portfolio across dimensions like country, jurisdiction, or regime type, enabling subsequent comparisons of these distributions across different intermediary classifications.

3.4.2 Multiple Hypothesis Testing

Given that this thesis is highly exploratory and investigates a multitude of potential associations, it is important to address the issue of multiple hypothesis testing. When numerous statistical tests are performed, the Type I error rate (choosing here, as conventional, 5%) does not hold. To counteract this, a highly conservative approach is adopted, opting for the **Bonferroni correction** to control the Family-Wise Error Rate (FWER) at the conventional maximum of 5%. This method adjusts the significance threshold for each individual test to α/m, where α is the desired FWER (e.g., 0.05) and m is the total number of hypotheses tested. Concretely, if we test 100 hypotheses assuming no true effects, in expectation, we would expect 5 of them to be false positives at the conventional 5% significance level. To control for this, the Bonferroni correction would set the significance threshold for each individual test to $0.05/100 = 0.0005$ hereby ensuring that the overall probability of making at least one Type I error across all tests remains at or below 5%.

3.4.3 Significance Tests

The above covers our adjustments of when we consider a test significant; this subsection proceeds to cover the specific statistical tests we use to assess the significance of the results we observe. These tests are chosen for their robustness to violations of normality assumptions, which is critical given the nature of our data which often exhibits characteristics such as power-law distributions and involves categorical or count-based measures derived from network structures and financial activities where we cannot expect the Central Limit Theorem and the usual asymptotics to hold because of, for instance, the potentially non-finite moments of the distribution (Hastie et al. 2009; Kejriwal & Dang, 2020; Alstadsæter et al., 2019). The following methods are applied in the empirical analysis chapter. Zar (2010) is the main reference point for the statistical tests employed.

- **Mann-Whitney U test**: A non-parametric test used for comparing the central moments between two independent groups. It is particularly useful when the data is not normally distributed, as is often the case with metrics like entropy scores or network-derived measures. For this thesis, this is crucial for comparing, for example, the distribution of network centrality scores or jurisdiction diversity measures (e.g., entropy scores) between different classifications of intermediaries (e.g., 'Legal Expert' vs. 'Administrator'), where underlying normality cannot be assumed.

- **Fisher's exact test**: Employed for analyzing categorical data, particularly in contingency tables (e.g., 2x2 tables). This test is ideal for assessing associations between categorical variables, such as those resulting from association analysis or when examining the relationship between dummy variables (e.g., whether entities are connected to bearer instruments and intermediary type). It is an exact test, making it suitable for small sample sizes or when expected cell counts are low. Given that our dataset involves numerous categorical attributes-such as the classification of intermediaries, the jurisdiction of entity incorporation, or the use of specific secrecy tools like bearer shares - Fisher's exact test is indispensable.

- **Two-sample Kolmogorov-Smirnov test**: Used for comparing the underlying distributions of continuous variables from two independent samples. Unlike tests that compare central tendencies (like the t-test or Mann-Whitney U), the K-S test is sensitive to differences in location, scale, and shape of the distributions, offering a more comprehensive comparison. This test is particularly useful when we are interested in whether two groups of entities or intermediaries differ not just in their central tendencies but in the overall shape, spread, or skewness of their associated metrics and distribution. For example, the K-S test is used to compare the entire degree distribution of intermediaries specializing in 'Tax Expert' services versus those classified as 'Investment Advisors', providing more power and sensitivity beyond what a simple comparison of medians or means might offer. This is especially relevant for network-derived measures which, as discussed, often follow non-normal, potentially power-law, distributions (Kejriwal & Dang, 2020; Chang et al., 2023a).

Note: I have detailed how I have used LLMs in the Appendix.

Empirical Analysis

4.1 The Geography of Intermediaries

This section delves into the geographical patterns exhibited by intermediaries, focusing on the locations of the entities they service and the jurisdictions they select to incorporate in. First, an overview of the location of entities, officers and intermediaries is provided. Then, examining specialization at the country level, analyzing how intermediaries based in specific nations in the aggregate, are concentrated in different and distinct countries. Lastly, we shift to the individual intermediary level to investigate the concentration of their client networks and jurisdictional preferences.

Concentration of Entities, Intermediaries, and Officers

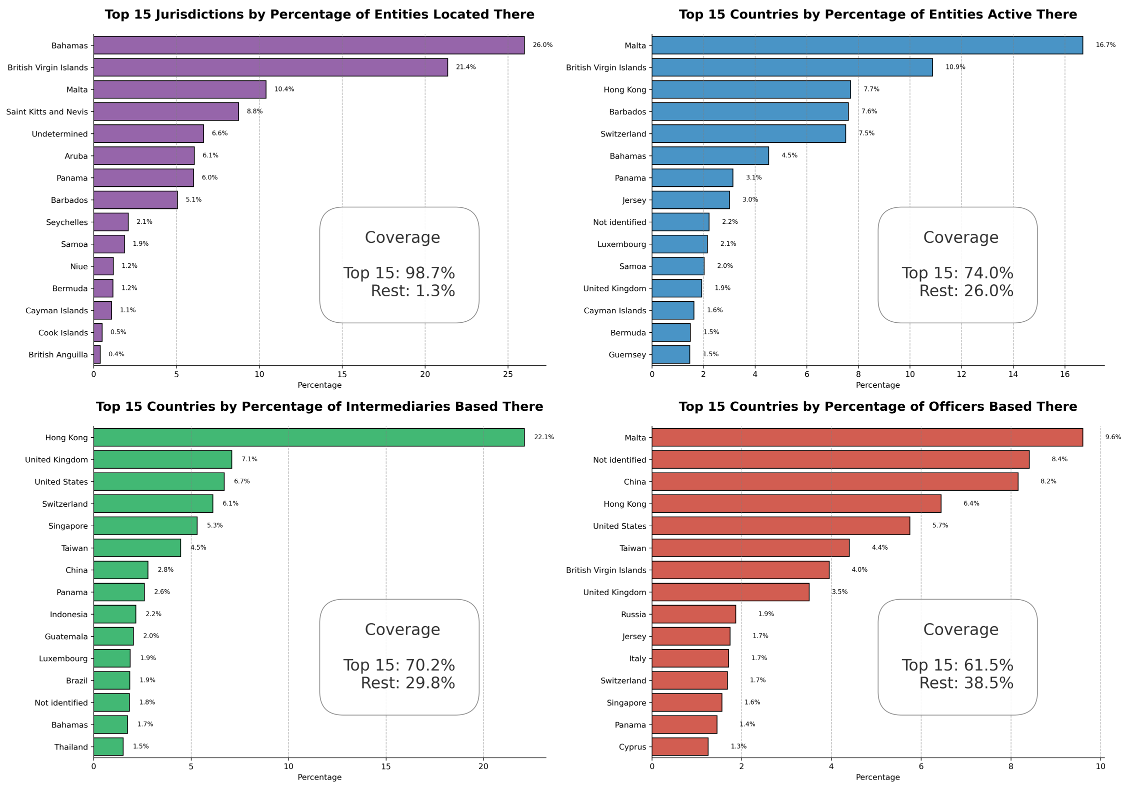

Figure 4.1: Geographical Concentration of Entities, Intermediaries, and Officers

A striking initial observation is the pronounced geographical concentration inherent in offshore financial activities, a characteristic that permeates all primary node types: entities, intermediaries, and officers.

While the dataset encompasses a vast network spanning over 200 countries and territories, these structures appear to be disproportionately concentrated within a relatively small cohort of key and recurring locations. Approximately 98.7% of all entities within the dataset are registered in just 15 jurisdictions (see Figure 4.1, top-left panel). This aligns with the literature, such as Laffitte (2024), which suggests that Offshore Financial Centers (OFCs) often develop specialized expertise in particular 'legal technologies'-be it specific corporate vehicles like International Business Companies (IBCs), banking secrecy laws, or tax-exempt trusts. The British Virgin Islands, Panama, and the Bahamas, for instance, emerge as clear leaders in this regard, collectively accounting for a substantial majority of entity incorporations in the dataset.

This pattern of concentration, however, is not confined to the legal domiciliation of entities; it extends to the operational footprint of these entities and the intermediaries. As seen in the top-right panel, approximately 74% of entities have their operational activities linked to the top 15 countries. These countries differ drastically, though, from the primary incorporation jurisdictions, featuring primarily the major financial centers such as Malta, Hong Kong, the United Kingdom, Switzerland, and Cyprus. This is to be expected as these same countries are highly linked to multinationals' tax avoidance. Malta and Hong Kong, for example, which rank first and second respectively for entity activity, also have exceptionally high ratios of corporate income tax revenues to national income, Malta being the highest, Hong Kong third (Saez and Zucman, 2019).

The concentration extends to the intermediaries. The bottom-left panel of Figure 4.1 shows that approximately 70.2% of intermediaries are based in the top 15 countries. These include prominent financial centers like Hong Kong, the United Kingdom, Switzerland, the United States, and China. This resonates with the previously cited findings of Stausholm and Garcia-Bernardo (2024), who argue that the professional services underpinning the offshore world, tend to cluster in major global financial centers rather than exclusively in traditional tax havens. These hubs provide the necessary infrastructure, talent pool, and network access for intermediaries to orchestrate these structures.

Finally, the bottom-right panel indicates that around 61.5% of officers are associated with the top 15 countries, with Hong Kong, China (excluding Hong Kong), the United Kingdom, Taiwan, and the United States being particularly prominent. As with intermediaries, this suggests that the individuals who hold positions of control or influence within these offshore entities are often based in the same major financial centers.

The varying degrees of concentration across these node types are also worth pointing out. The near-total concentration of entity incorporations (98.7% in the top 15) contrasts with the more diffuse, yet still significant, concentration for active entities (74.0%), intermediaries (70.2%), and officers (61.5%). This suggests that while the legal creation of offshore entities is highly centralized in a few specialized jurisdictions, the operational management, facilitation, and beneficial control of these entities are spread across a wider, though still limited, range of influential countries. This has both implications for what *type* of chokepoints exist as well as to which *extent*.

Intermediary Specialisation at the Country Level

To understand how intermediaries based in specific countries orient their services, we examine two key dimensions: the geographical distribution of countries where the entities are primarily active, and the jurisdictions they predominantly use for incorporating these entities. Heatmaps are used to visually represent these patterns for intermediaries headquartered in the top 5 countries by intermediary count within the dataset: Hong Kong (HKG), Great Britain (GBR), the United States (USA), Switzerland (CHE) and Singapore (SGP). The rest of the top 15 (thus accounting for 70.2% of all intermediaries as aforementioned) are left in the appendix, as well as Cyprus to illustrate the well-known Russia-Cyprus corridor, and how they manifest themselves in figures like these (e.g. ICIJ, n.d.; Garcia-Bernado et al., 2017)

Figures 4.2 display these heatmaps. Each panel within these figures corresponds to one of the top 5 intermediary home countries. The top bar in each panel illustrates the percentage distribution of client entities' countries of activity, while the bottom bar shows the percentage distribution of jurisdictions used for entity incorporation by intermediaries based in that home country. Darker shades indicate higher concentrations. Alongside each panel, normalized Shannon entropy values are provided for client country concentration (H_c) and incorporation jurisdiction concentration (H_j), where a value closer to 0 indicates higher concentration (less diversity) and a value closer to 1 indicates greater diversity. Common across all of them in this figure is being major global and regional financial centres.

- **Hong Kong (HKG):** Intermediaries in Hong Kong predominantly serve entities active within Hong Kong itself (63%), with a significant portion also linked to China (35%). This strong domestic and near-regional focus ($H_c = 0.23$) contrasts with their incorporations. For incorporations, the British Virgin Islands (VGB) is overwhelmingly favored (78%), followed by Samoa (WSM, 7%) and the Cayman Islands (CYM, 6%), resulting in a jurisdiction entropy ($H_j = 0.33$) that, while still concentrated, indicates slightly more diversity than their client base. This pattern suggests HKG intermediaries leverage specific offshore jurisdictions like VGB for their largely local and Chinese clientele. In other words, a corroboration that Hong Kong intermediaries act as a gateway for Chinese to access offshore structuring (see, for example, Wei, 2024).

- **Great Britain (GBR):** UK-based intermediaries also show a strong domestic client focus (GBR, 73%), with smaller but notable client links to Crown Dependencies like Jersey (JEY, 6%). Their client country entropy ($H_c = 0.37$) is relatively low. For incorporations, they too heavily rely on VGB (66%), followed by Panama (PAN, 15%) and the Bahamas (BHS, 13%), yielding a jurisdiction entropy ($H_j = 0.35$) similar to their client concentration. This suggests a model of serving primarily UK-based clients using a select few popular offshore jurisdictions.

- **United States (USA):** US-based intermediaries exhibit a very strong domestic client focus (USA, 71%), with a low client country entropy ($H_c = 0.24$). Their preferred incorporation jurisdictions are VGB (43%), Panama (PAN, 19%), and the Cook Islands (COK, 18%), showing more jurisdictional diversity ($H_j = 0.50$) than their client base.
- **Switzerland (CHE):** Swiss intermediaries show an exceptionally high concentration of domestic clients (CHE, 94%), reflected in a very low $H_c = 0.11$. This aligns with Switzerland's role as a wealth management hub primarily serving its own residents or those with assets managed through Swiss institutions. For incorporations, Panama (PAN, 50%) and VGB (32%) are dominant, leading to a moderate jurisdiction entropy ($H_j = 0.45$).
- **Singapore (SGP):** Intermediaries in Singapore serve a mix of domestic (SGP, 47%) and regional clients, particularly from Indonesia (IDN, not in top 5 shown but a known link). Their client country entropy ($H_c = 0.32$) is moderate. Like Hong Kong, they overwhelmingly prefer VGB (84%) for incorporations, resulting in a low jurisdiction entropy ($H_j = 0.26$).

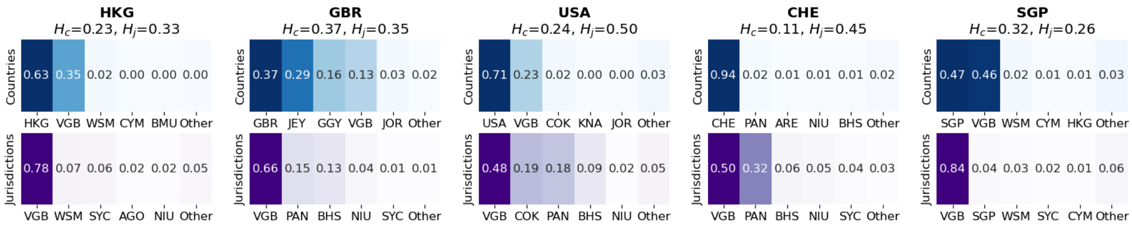

Figure 4.2: Client and Incorporation Jurisdiction Heatmap for Intermediaries in Top 5 Countries (HKG, GBR, USA, CHE, SGP)

Across these five countries, a general trend emerges: intermediaries often have a geographically concentrated client base, frequently dominated by entities active in their own country of operation or in close regional proximity. However, their choice of incorporation jurisdictions tends to be more outwardly focused, though often dominated by a few key OFCs like the British Virgin Islands, Panama, and Seychelles. This suggests that while client acquisition may be localized or regionally focused, intermediaries draw from a global "market for tax havens" to select specific "legal technologies" offered by these jurisdictions to meet diverse client structuring needs (Laffitte, 2024).

This observed difference in diversification is quantified by comparing the normalized entropy of jurisdictions used for incorporation (H_j) with the normalized entropy of client entity countries (H_c) at the aggregate level for intermediaries in all countries. Figure 4.3 displays the distributions of these two entropy measures. The distribution of jurisdiction entropy (purple curve) is visibly to the right compared to the distribution of client country entropy (blue curve). A higher entropy value indicates greater diversification. Given we are comparing two distributions, a two-sample Kolmogorov-Smirnov test confirms that these two distributions are statistically different (KS test: $p \approx 3 \times 10^{-7}$), providing robust evidence for this pattern. This confirms that while intermediaries' client acquisition strategies might be geographically focused, their operational toolkit for entity structuring draws upon a wider, more international palette of offshore jurisdictions.

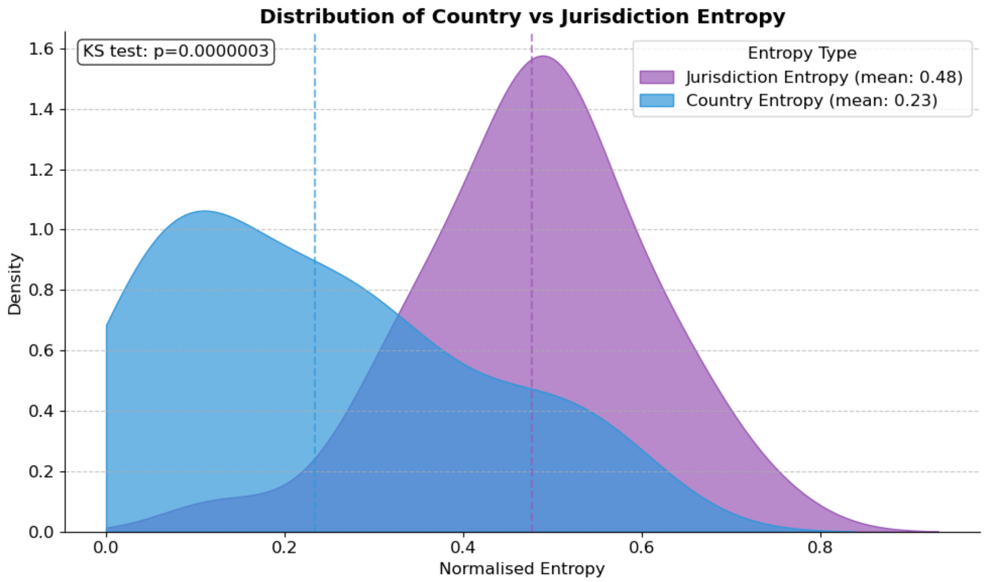

Figure 4.3: Distribution of Normalized Entropy for Entity0Countries vs. Incorporation Jurisdictions, Aggregated at the Country Level of Intermediaries

Intermediary Specialisation at the Individual Level

While intermediaries aggregated at the country level exhibit distinct geographical specializations, particularly in their client bases, this section shifts focus to the individual intermediary level. We examine the concentration of countries linked to the entities an individual intermediary serves, and the range of jurisdictions they employ for incorporations.

Figure 4.4 (left panel) presents the distribution of the number of distinct countries linked to the entities served by each intermediary. The distribution is heavily skewed to the right, with the vast majority of intermediaries (approximately 75%) serving entities linked to only one country across all the entities it is connected to. More than 90% of intermediaries are linked to no more than two countries. This indicates that most individual intermediaries, regardless of their home country, focus their client acquisition efforts very narrowly, often within a single national context. The right panel of Figure 4.4 plots the number of client countries against the log-degree of the intermediary. This scatter plot visually confirms a very low correlation: even intermediaries with a high degree (serving many entities) typically do not serve entities linked to a large number of different countries. This suggests that intermediaries tend to scale their operations by achieving deeper penetration within their existing client geographies rather than by expanding their client base across numerous new countries. This finding aligns with qualitative research suggesting that trust and local network knowledge are paramount in the client-intermediary relationship (Harrington, 2016), favoring localized client acquisition.

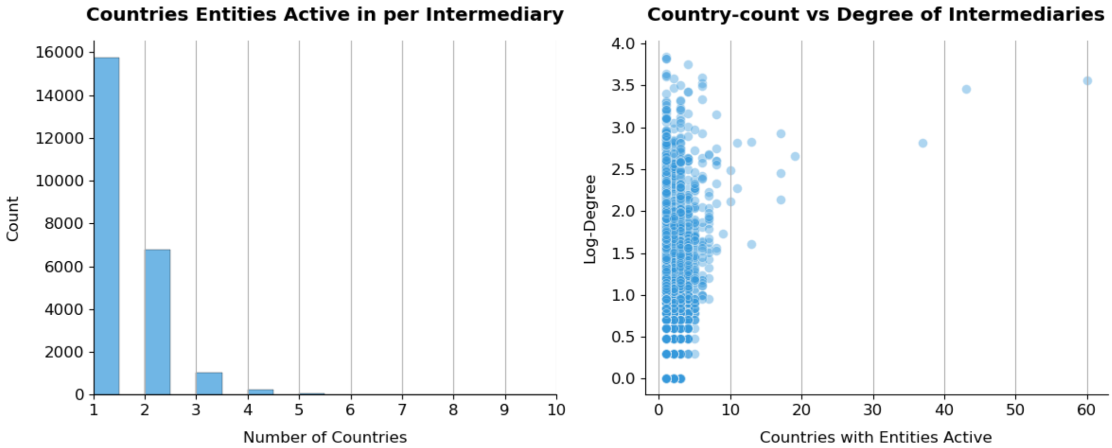

Figure 4.4: Left: Distribution of the Number of Countries Linked to Entities Served by Intermediary. Right: Scatterplot of Number of Countries vs. Log-Degree of Intermediary

Turning to the jurisdictions used for incorporation, Figure 4.5 (left panel) shows the distribution of the number of distinct jurisdictions each intermediary utilizes. Similar to the client country distribution, this is also heavily skewed, with most intermediaries (approximately 65%) using only one jurisdiction for incorporating entities, and around 85% using no more than two. This suggests that many intermediaries specialize in the "legal technologies" (Laffitte, 2024) of a very limited number of OFCs. However, comparing this to Figure 4.4, the skew appears slightly less extreme, hinting that some intermediaries might use a couple of jurisdictions even if their client base is from a single country. The right panel of Figure 4.5 plots the number of jurisdictions used against the log-degree of the intermediary. While still showing considerable concentration, there is a discernible, albeit weak, positive trend: some intermediaries with very high degrees (top 1-5%) do tend to utilize a broader portfolio of jurisdictions (e.g., 5 or more). This "tail" of highly connected intermediaries who also master a wider range of jurisdictions options may represent a distinct class of "super-enablers" within the offshore system, capable of offering more complex, multi-jurisdictional structuring.

Overall, at the individual level, intermediaries exhibit strong specialization in their client-facing operations, primarily serving entities linked to one or two countries. While many also specialize in using only one or two incorporation jurisdictions, there is a tendency, particularly among larger intermediaries, to command a slightly broader repertoire of jurisdictional tools. This echoes the aggregate finding that the "palette" of incorporation jurisdictions is often wider than the geographical spread of clients, suggesting that even a geographically focused client base may have diverse structuring needs that intermediaries meet by drawing on different OFCs.

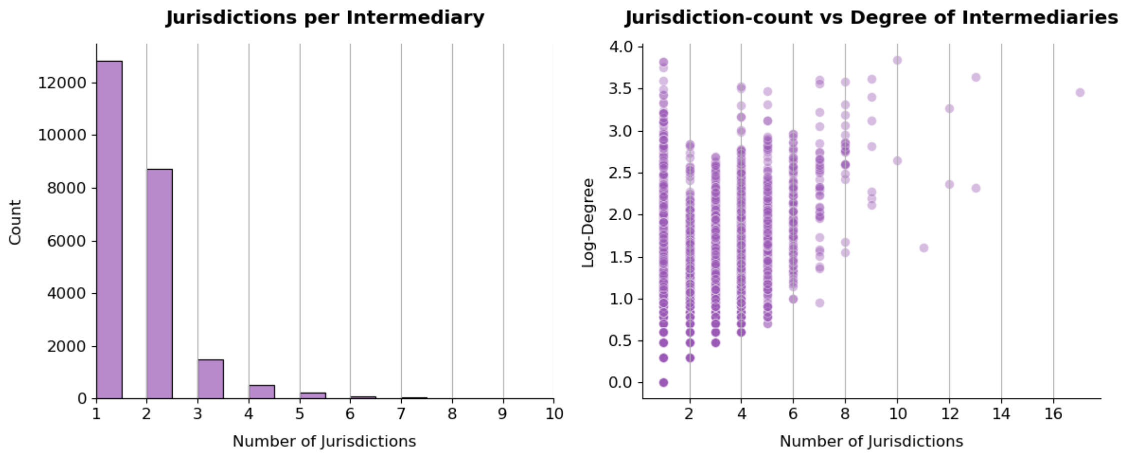

Figure 4.5: Left: Distribution of the Number of Distinct Jurisdictions Used by Intermediary. Right: Scatterplot of Number of Jurisdictions vs. Log-Degree of Intermediary

4.2 Roles and Functions of Intermediaries

This section transitions from the geographical patterns of intermediary activity to the functional roles within the offshore financial ecosystem. The objective is to understand whether distinct operational characteristics align with the established classifications of intermediary functions from De Groen (2017).

Different Levels of Connectivity: Personalised Advice vs. Aid in Incorporation

A primary hypothesis in differentiating intermediary functions is that their scale of operation, proxied by their network degree, will vary systematically. Intermediaries providing bespoke, personalised advice - such as Tax Experts offering specialised tax planning or Investment Advisors structuring wealth management solutions - will likely serve a smaller number of clients. Conversely, intermediaries whose core function is the more standardized provision of entity incorporation and ongoing administration—such as Administrators and certain Legal Experts specialising in high-volume corporate services - are expected to exhibit higher degrees, indicative of a larger client load.

Figure 4.6 presents the Cumulative Distribution Function (CDF) of degrees for each of the four intermediary classifications within our random sample, plotted on a log-scale - given the power-law distribution of degree noted earlier (see also appendix for reproduction of this core result in this dataset) - to accommodate the wide range. The CDF indicates the proportion of intermediaries (y-axis) whose degree is less than or equal to a given value (x-axis). A curve shifted towards the top-left signifies generally lower degrees.

The plot immediately suggests distinct degree profiles. The CDFs for Tax Experts (green line) and Investment Advisors (orange line) rise very steeply at the lower end of the degree spectrum, indicating that the vast majority of these intermediaries are connected to a relatively small number of entities (e.g., typically fewer than 10). Their curves plateau quickly,

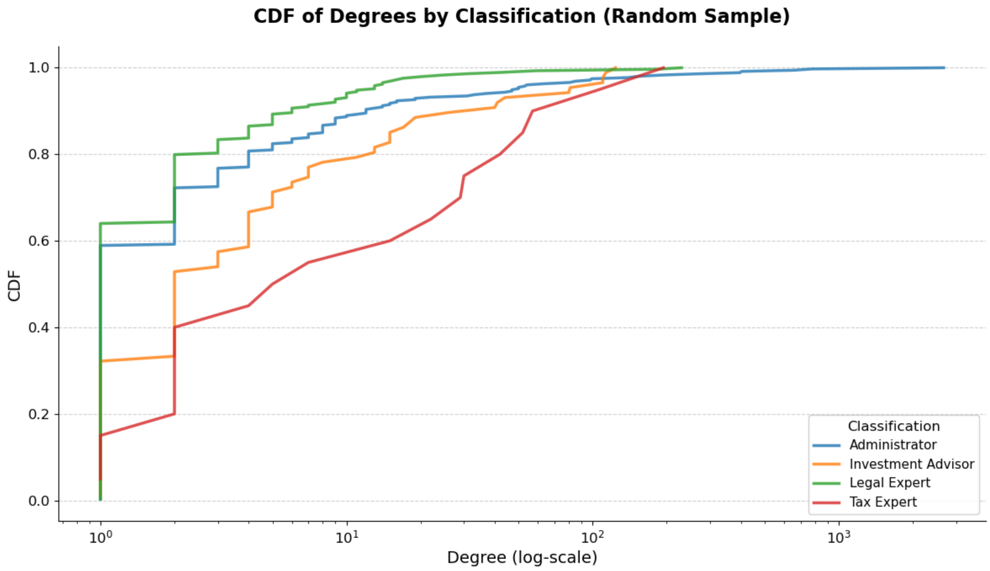

Figure 4.6: Cumulative Distribution Function (CDF) of Degrees by Intermediary Classification (Random Sample)

showing few instances of high-degree actors in these categories. In contrast, the CDFs for Administrators (blue line) and Legal Experts (red line) rise more gradually and extend further to the right, signifying a broader distribution of degrees, with a considerable proportion of these intermediaries connected to tens, hundreds, or even thousands of entities.

We are again dealing with comparing whether two distributions are significantly different, so we once again turn to the non-parametric two-sample KS test. However, it is a two-sample test, so subsequent pairwise two-sample Kolmogorov-Smirnov (KS) tests were conducted, with a Bonferroni correction applied for the multiple comparisons across the six unique pairs (corrected significance level $\alpha_c = 0.05/6 \approx 0.0083$).

- **Administrator vs. Investment Advisor:** A significant difference was found ($p \approx 0.0004$), with Administrators exhibiting significantly higher degrees. This supports the hypothesis that administrative services are typically higher volume than bespoke investment advice.

- **Administrator vs. Legal Expert:** No significant difference was detected ($p = 1.0000$). This suggests that, in terms of sheer connectivity, Administrators and Legal Experts in our sample operate at broadly similar scales, likely reflecting the involvement of many Legal Experts in high-volume incorporation and entity management tasks, similar to Administrators.

- **Administrator vs. Tax Expert:** A significant difference was observed ($p \approx 0.0047$, which suggests convincing evidence against the null hypothesis that the observed degrees are sampled from the same underlying distribution. Administrators tend to have higher degrees than Tax Experts, consistent with tax advice being more specialised and lower volume.

- **Investment Advisor vs. Legal Expert:** A significant difference was found ($p < 0.0001$), with Legal Experts having significantly higher degrees. This reinforces the distinction between high-volume legal/incorporation services and lower-volume investment advisory.

- **Investment Advisor vs. Tax Expert:** No significant difference was found ($p = 0.6899$). This lack of difference suggests that Investment Advisors and Tax Experts operate at comparable, generally lower scales of connectivity, consistent with their roles in providing personalised, in-depth advice rather than mass-produced services.

- **Legal Expert vs. Tax Expert:** A significant difference was detected $p \approx 0.0007$), with Legal Experts typically having higher degrees. This further distinguishes the often high-volume nature of legal services in this context from the more specialised, lower-volume nature of tax expertise.

These results broadly support the conceptual division: the "personalised advice" types (Tax Experts and Investment Advisors) tend to have lower degrees and do not significantly differ from each other in connectivity. The "aid in incorporation/management" types (Legal Experts and Administrators) tend to have higher degrees. Comparisons across these two broader functional groups generally reveal significant differences in their scale of operation. But we cannot distinguish between Legal Experts and Administrators in terms of degree, nor Tax Experts and Investment Advisors.

The importance of analysing a random sample, rather than focusing solely on the most connected intermediaries, is underscored by Figure 4.7. This figure compares the distribution of intermediary classifications within our random sample (n=434 after filtering) against a sample composed of the top ≈1.5% of intermediaries by degree (n=345 after filtering). The contrast is stark: the top-degree sample is overwhelmingly dominated by Administrators, who constitute 55.7% of this group compared to 45.4% in the random sample. Conversely, Legal Experts (22.6% in top-degree vs. 29.0% in random), Investment Advisors (19.1% vs. 20.5%), and particularly Tax Experts (a mere 2.6% vs. 5.1%) are notably underrepresented among the most connected players. This disparity highlights that an analysis focused only on "super-hub" intermediaries (Kejriwal & Dang, 2020) would provide a limited and skewed perspective on the functional diversity within the offshore intermediary ecosystem, largely missing the contributions and characteristics of those providing more specialised, lower-volume advisory services.

Different Activities: Instruments and Service Offerings

Beyond sheer connectivity, functional specialisation may also manifest in the nature and diversity of the activities intermediaries undertake. To explore this, we examine five key metrics for each intermediary classification within the random sample:

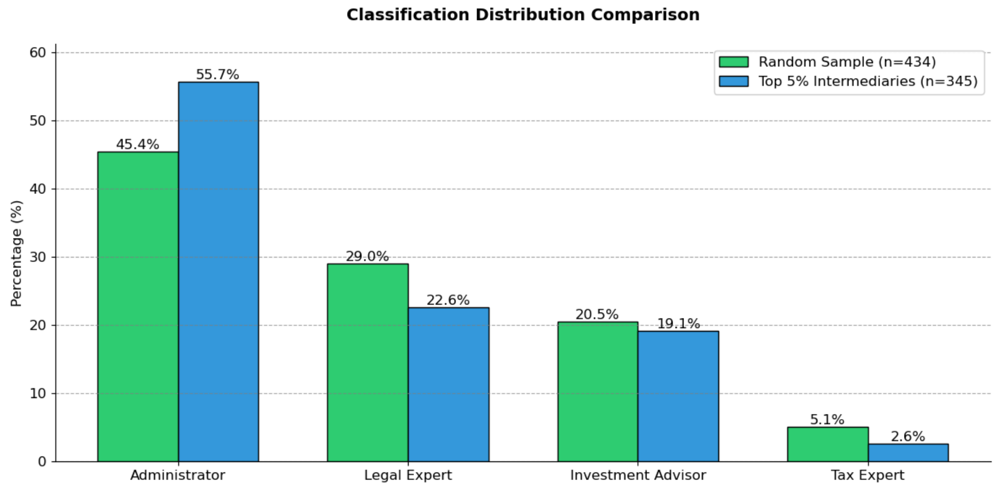

Figure 4.7: Distribution of Intermediary Classifications: Random Sample vs. Top ≈1.5% by Degree

1. **Jurisdiction Entropy** (H_j): The diversity in the portfolio of jurisdictions where an intermediary incorporates entities. Higher entropy indicates the use of a wider range of jurisdictions.

2. **Client Country Entropy** (H_c): The diversity in the countries to which their clients' entities are linked (by activity). Higher entropy suggests a more geographically diverse client base.

3. **Regime Entropy**: The diversity in the political regimes (e.g., democracy, autocracy, based on V-Dem data) of the countries where client entities are linked. Higher entropy implies engagement with clients from a broader spectrum of political systems.

4. **Legal Technology Entropy**: The diversity in the types of "legal technologies" (as conceptualised by Laffitte, 2024, e.g., specific trust laws, corporate vehicles, secrecy provisions) prevalent in the jurisdictions they use for incorporation. Higher entropy suggests the intermediary leverages a wider array of legal tools available in the global "market for tax havens."

5. **Bearer Instrument Usage**: A binary indicator (0 or 1) of whether the intermediary has serviced entities known to have used bearer instruments (e.g., bearer shares), which are high-anonymity tools often associated with obscuring beneficial ownership.

Figure 4.8 displays the average values of these metrics for each intermediary classification. Visually, Legal Experts and Administrators tend to show higher average values for most entropy measures, particularly Legal Technology Diversity and Jurisdiction Diversity, compared to Investment Advisors and Tax Experts. Bearer Share Usage appears relatively low across all types, with Tax Experts showing the highest average.

To formally assess these differences, pairwise comparisons were conducted using Mann-Whitney U tests for the (continuous) entropy measures and Fisher's exact test for the (binary)

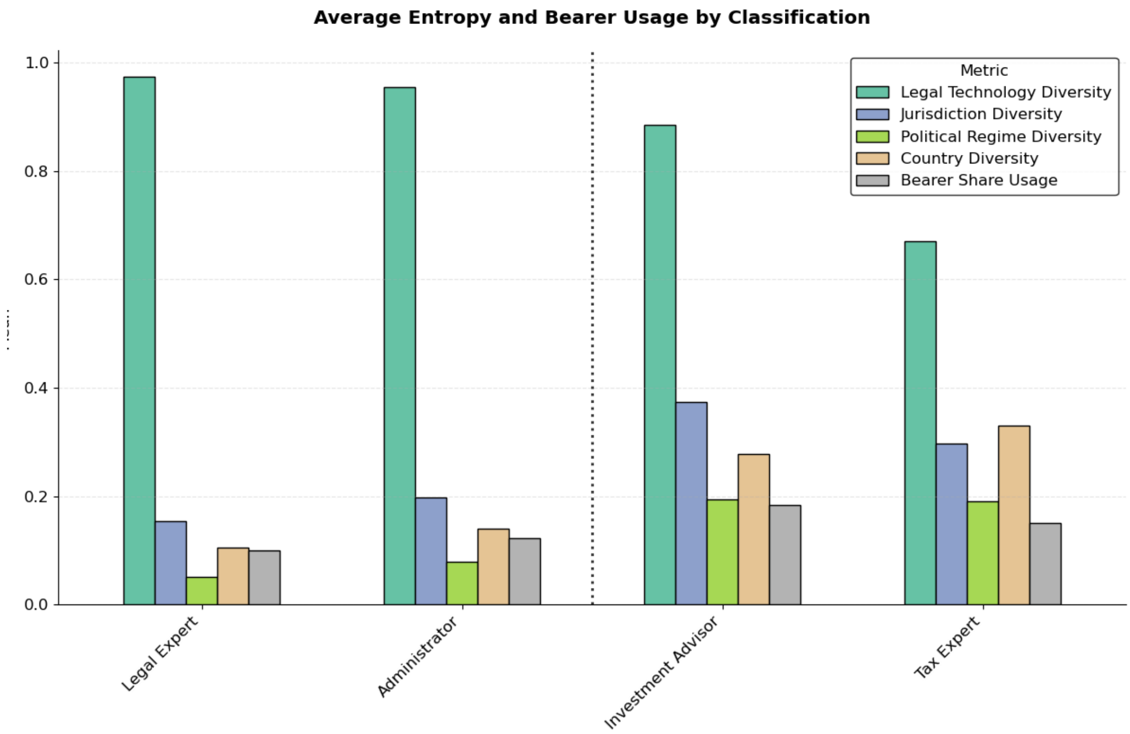

Figure 4.8: Average Entropy Measures and Bearer Instrument Usage by Intermediary Classification (Random Sample)

bearer instrument usage. A Bonferroni correction was applied to account for the 30 comparisons (5 metrics × 6 unique pairs of classifications), setting the corrected significance threshold at $\alpha_c = 0.05/30 \approx 0.00167$. Key significant findings are summarized below, going measure by measure:

Legal Technology Entropy: Legal Experts (mean $H_{LT} \approx 0.98$) and Administrators (mean $H_{LT} \approx 0.95$) exhibit significantly higher diversity in the legal technologies of the jurisdictions they utilize compared to Investment Advisors (mean $H_{LT} \approx 0.89$; $p < 0.0001$ vs Legal Experts, $p \approx 0.0047$ vs Administrators) and Tax Experts (mean $H_{LT} \approx 0.67$; $p < 0.0001$ vs Legal Experts, $p < 0.0001$ vs Administrators). This suggests that Legal Experts and Administrators, often involved in the mechanics of entity creation and management across various contexts, engage with a broader array of jurisdictional legal frameworks and offshore "products," as described by Laffitte (2024). No significant difference was found between Legal Experts and Administrators, nor between Investment Advisors and Tax Experts in this regard, reinforcing the two broad functional groupings proposed earlier.

Jurisdiction Entropy: Legal Experts (mean $H_j \approx 0.15$) show significantly higher diversity in the jurisdictions they use for incorporation compared to Investment Advisors (mean $H_j \approx 0.04$; $p < 0.0001$). Similarly, Administrators (mean $H_j \approx 0.20$) demonstrate greater jurisdiction diversity than Investment Advisors ($p \approx 0.0012$). This indicates that Legal Experts and Administrators tend to draw from a wider palette of offshore jurisdictions when structuring entities for their clients, which aligns with their higher connectivity and broader operational scope. Other pairwise comparisons for jurisdiction entropy did not yield statistically significant differences after Bonferroni correction.

Regime Entropy: Legal Experts (mean $H_{Regime} \approx 0.05$) exhibit significantly higher diversity in the political regimes of their client countries compared to Investment Advisors (mean $H_{Regime} \approx 0.02$; $p < 0.0001$) and Tax Experts (mean $H_{Regime} \approx 0.02$; $p \approx 0.0001$). Administrators (mean $H_{Regime} \approx 0.08$) also show significantly higher regime diversity than Investment Advisors ($p \approx 0.0044$). This pattern suggests that Legal Experts and Administrators may cater to clienteles originating from, or structuring activities in, a more diverse set of political environments, potentially reflecting more internationalized operations.

Client Country Entropy: Legal Experts (mean $H_c \approx 0.10$) demonstrate significantly higher diversity in their client countries compared to Investment Advisors (mean $H_c \approx 0.03$; $p \approx 0.0001$) and Tax Experts (mean $H_c \approx 0.03$; $p < 0.0001$). Administrators (mean $H_c \approx 0.14$) also have significantly more diverse client countries than Tax Experts ($p \approx 0.0057$). This implies that Legal Experts, and to some extent Administrators, engage with clients whose activities span a broader range of countries, consistent with their roles in facilitating complex, multi-jurisdictional structures for a larger number of entities.

Bearer Instrument Usage: After Bonferroni correction, **no statistically significant differences** were found in the propensity to use bearer instruments among any of the intermediary classifications (e.g., Administrator vs. Tax Expert, Fisher's exact $p \approx 0.13$). While Tax Experts show a slightly higher raw average usage in Figure 4.8, this difference is not statistically significant. This suggests that, within this classified random sample, the use of these high-anonymity instruments is not strongly associated with a particular functional type of intermediary. Their seemingly non-specialised use might imply either a more diffuse deployment across the offshore industry for specific client needs.

The activity metrics, therefore, largely reinforce the distinctions observed in connectivity. Legal Experts and Administrators, typically more connected, also tend to exhibit greater diversity across various geographical, political regime, and legal-technical dimensions of their service offerings - all measures, it should be noted, that are likely to be closely correlated between themselves. This is consistent with their roles in high-volume incorporation and management, potentially serving more international and varied clienteles or requiring a broader toolkit of jurisdictional solutions. The "personalised advice" groups (Tax Experts and Investment Advisors), with their lower connectivity, generally appear more focused in these activity respects.

Discussion

The data strongly suggests that the intermediary landscape is not homogenous. Instead, intermediaries appear to develop distinct specialisations, both in the types of services they offer (functional specialisation) and in the geographical markets they serve or utilise (geographical specialisation).

I here propose two core propositions based on the preceding empirical analysis.

5.1 Proposition 1. Functional Specialisation: Commodification and Customisation

Having established the at least moderate reinforcement of roles akin to the ones suggested by DeGroen (2017), there is a clear divergence in operational characteristics. Statistical significance, at least between the two groupings, did emerge. This does complicate it, but what it means is that within the groups themselves, there was no significance of roles, but across them in all pairs, there was significance.

Commodification: The first set, comprising Administrators and Legal Experts, tends to be associated with higher-volume activities. This is evidenced by their generally higher degree distributions (as seen in Figure 4.6), suggesting a larger client load. Furthermore, these types often exhibit greater diversity in their operational metrics, such as the legal technologies employed and the jurisdictions utilised for incorporation (Figure 4.8), consistent with a role in facilitating a wide array of entity formations and management tasks. This positioning suggests they occupy nodal positions within Global Wealth Chains, serving as infrastructure providers that enable multi-jurisdictional wealth structures through scale economies (Seabrooke & Wigan, 2017). Their operational characteristics align with what the professional services literature identifies as "platformization" strategies, where firms leverage standardized processes and technologies to serve high volumes of clients across multiple markets (Løwendahl, 2005; von Nordenflycht, 2010).

Customisation: The second set, consisting of Tax Experts and Investment Advisors, generally displays lower degrees of connectivity. Their operational profiles, as indicated by entropy measures, often show a more focused approach to client countries and incorporation jurisdictions. This pattern suggests these professionals occupy specialized advisory positions within wealth chains, capturing value through knowledge premiums rather than volume

(Seabrooke & Wigan, 2017). This aligns with the professional services literature on "customization" strategies, where expertise-intensive firms prioritize bespoke solutions and close client relationships over scale (Maister, 1993; Empson et al., 2015). It is likely under these categories that Harrington's (2016) wealth managers would fall, rather than implicitly generalizing their characteristics to all intermediaries in the ICIJ data as Chang et al. (2023a, footnote 2) do.

The method employed will very likely have introduced some kind of measurement error. Random measurement error is not an issue in itself apart from the fact that it will simply reduce the power of the tests conducted, but systematic (non-classic) measurement error is, however, a potential source of bias (e.g. Angrist & Pischke, 2008). One situtation where it could plausibly arise is when intermediaries straddle multiple functional categories as inevitably happens in a lot of these cases - there is even a lot of overlap in the underlying typology - and they are systematically classified into one category over another. This is something that should have been verified using a robustness check, but was not. There was undoubtedly also an overreliance on De Groen (2017); an obvious extension would be more inductive discovery of the roles.

5.2 Proposition 2. Geographical Specialisation: Local Anchors, Global Reach

Beyond functional roles, intermediaries demonstrate marked geographical specialisation. The major results in support of this are as follows:

Local Anchors: The heatmaps of client countries and incorporation jurisdictions (Figure 4.2) point towards distinctly **regional** profiles. Many intermediaries, even those in major global financial centres, show a strong tendency to serve entities linked to their own country of operation or immediate region. Likewise, even if they serve many entities, they often do so in a very limited number of countries.

Global Reach: At the jurisdiction-level, they are however far more spread out across a larger band of OFCs, not displaying the same kind of regional concentration. This is evidenced by the significantly higher jurisdiction entropy measures (Figure 4.3), the heatmaps providing individual examples and the distribution of jurisdiction linked to entities served per intermediary by their degree revealing a weak correlation in contrast to degree-countries served (Figure 4.4).

This geographical concentration in client sourcing likely reflects the importance of local knowledge, networks, and trust (Granovetter, 1973; Harrington, 2016; Hoang, 2022). The Hong Kong-China corridor (Figure A.4), for instance, illustrates a highly specific linkage, echoing findings by Alstadsæter et al. (2022) on specialized financial conduits (see also Cyprus-Russia corridor in appendix). While distinct client corridors emerge, the empirical analysis also hints at the existence of universal hubs (like the BVI for incorporations) that connect many of these otherwise specialised pathways (a more rigorous treatment using network analysis and beyond the individual cases leveraged here are discussed in the appendix in Proposition 3 in case one is interested, though it is only an extension of the thesis).

However, this localised client focus is often paired with a strategic selection from a global "market for tax havens" Laffitte2024 when it comes to incorporation jurisdictions. Intermediaries draw upon a wider, more diverse palette of offshore jurisdictions to structure entities, even for a geographically concentrated client base. This points to a higher sensitivity of the specific "legal technologies" offered by different OFCs.

This is the core value proposition of intermediary specialisation: they have the capacity to connect these local or regional clients to a diversified global offshore architecture. Intermediaries act as bridges, translating local client needs into structures in the international financial and regulatory system that transcend purely domestic options. This duality - local trust and access combined with global operational capability - positions intermediaries as critical as well as vulnerable nodes in the broader offshore network.

The results here were quite robust to the different tests and methods employed, but nevertheless the temporal dimension is the most significant limitation. The analysis is largely static, providing a snapshot based on the aggregated data though ICIJ data includes information at an entity-level; this was too difficult to integrate satisfactorily within the time-frame of the thesis. The offshore world is dynamic, with intermediaries and their clients constantly adapting to regulatory changes and market opportunities.

5.3 Implications for Regulation

The propositions derived from the empirical analysis carry significant implications for regulatory strategy.

5.3.1 Layered Liability and Due Diligence Regimes

The functional specialisation identified in Proposition 1 provides an empirical foundation for designing more effective risk-based regulatory frameworks. Rather than proposing entirely novel regulatory mechanisms, the focus here lies in demonstrating how existing regulatory tools can be deployed recognising the heterogeneous nature of intermediaries uncovered here. Different types of intermediaries pose fundamentally different risks.

The higher degree distributions observed among Administrators and Legal Experts (the "commoditizers") compared to Tax Experts and Investment Advisors (the "customizers") suggests that current regulatory frameworks, which typically treat all intermediaries uniformly (e.g. FATF, 2025, recommendations are still broad, and undifferentiated, though increasingly less so), may be misallocating supervisory resources. Commoditizers manage significantly larger client volumes and exhibit greater operational diversity across jurisdictions and legal technologies, making them natural candidates for enhanced regulatory scrutiny. Their high connectivity means that compliance failures have multiplicative effects across the network - a single compromised Administrator can facilitate misconduct across hundreds of client relationships.

The power-law distribution characteristics coupled with these types identified in the intermediary network provide regulators with a strategic advantage: targeting a relatively small number of highly connected "commoditizer" intermediaries can achieve disproportionate regulatory impact. This transforms the traditional challenge of monitoring a vast, opaque network into a more manageable problem of intensive supervision of key nodes. Conversely, the lower connectivity but higher specialisation of Tax Experts and Investment Advisors suggests they pose different risks that require quality-focused rather than volume-based oversight. Their focused operational profiles and closer client relationships position them as potential facilitators of sophisticated, high-value schemes that might escape detection under traditional monitoring systems. This differentiated approach addresses limitations in current regulatory frameworks highlighted by e.g. Alzola (2017): uniform liability regimes can create perverse incentives, leading to either over-auditing or selection effects that drive activities underground. By tailoring regulatory requirements to empirically observed operational patterns, regulators can achieve more effective oversight while reducing compliance burdens.

5.3.2 Collapsing Multi-Level Games: No Wealth Chain is an Island

Intermediaries become clear potential targets of *national* regulation. Chang et al. (2023a) provide a clear argument for the level of vulnerability in these networks with targeted removal of the key nodes that emerge because of the power-law distribution. This thesis goes further with the "local anchor" and regional specificity attribute of these intermediaries uncovered: they can potentially even be regulated the domestic level instead. Such an approach offers a strategy to "collapse" the often-intractable multi-level games of international tax governance, which, as Rixen's (2010) work illustrates, can become mired in asymmetric prisoner's dilemmas when attempting to address under-taxation globally. If intermediaries are indeed primarily facilitating offshore arrangements for domestic clients, then national authorities possess a direct regulatory entry-point into these chains. This aspect of the wealth chain clearly anchors them back to the domestic tax base that is otherwise dead in the hold and being sailed offshore: "Give me a lever and a place to stand and I will move the earth."

Indeed, Christensen (2024) identifies the targeting of intermediaries as a key application of the concept "weaponised interdependence," a mechanism by which to "reinvigorate regulation." He argues this offers an "effective counterweight to mobile capital's structural power" (Christensen, 2024, p. 180) precisely because it exploits asymmetries in the global system. The United States' Foreign Accounts Tax Compliance Act (FATCA) serves as his example of choice: it "weaponised" the US's indispensable role in the global financial system, leveraging the fact that "banks in the liberal economic system can no longer survive without access to the US-controlled, dollar-based financial system" (Emmenegger, cited in Christensen, 2024,

p. 179) to compel foreign financial institutions into compliance. This thesis suggests that the "local anchor" status of certain intermediaries provides a similar, albeit domestically focused, leverage point. Such an approach reinforces the arguments of scholars like Saez & Zucman (2019) and Christensen (2020; 2024) that the potential for effective regulation, even unilaterally or at the national level, has been underestimated. For instance, just as Saez and Zucman advocate for remedial taxes on profits booked in low-tax jurisdictions, financial hubs could target their domestic intermediaries with specific regulations designed to curtail their ability to facilitate offshore schemes, potentially crippling these key nodes in GWCs. The overarching point is that it offers individual nations more options to play the regulatory game at the domestic level.

This is not to say that this class of solutions is a panacea; unilateral actions have limits, and pose different threats to the global system. While Christensen (2024) highlights The United States, with its FATCA regime, as a highly impactful unilateral approach, they have at the same time been reluctant to engage with broader multilateral regulations like the OECD's Common Reporting Standard (CRS) and FATCA does not provide reciprocal information (Tax Justice Network, 2022); the result, like Stiglitz (2025) for example comments, is that the US itself has become the most significant tax haven, attracting capital seeking to avoid the multilateral regulations most of the rest of the world has agreed upon. This potential threat is also remarked by Farrell & Newman (2023) that the dynamic aspects introduced by such (mis)uses of the interdependence of the system; the EU, for one, could for example de-lever their reliance if such a mechanism is, say, used by the US too frequently. The original difficulty of coordinating international tax policy remains, although in different form, and with power shifted toward those major powers like the US that can unilaterally impose their will on the rest of the world, in contrast to the micro-states that previously had the asymmetric advantage of "selling" their sovereignty.

Conclusion

This thesis covered an exploration of the often-shadowy world of offshore finance, not by chasing the beneficiaries, but by focusing on its architects: the intermediaries. We sought to understand how these crucial enablers specialize, asking *how* they carve out their niches in a system that thrives on complexity and opacity.

The core contention - that intermediaries exhibit significant geographical and functional specialization - finds support in the analysis. Geographically, many intermediaries are "local anchors with a global reach," deeply embedded in specific national or regional client markets, yet access the global "supermarket" of offshore jurisdictions and their varied "legal technologies." This duality is key to their value proposition. Functionally, the data sketches distinct profiles: the high-volume "commoditizers" like Administrators and Legal Experts, building broad infrastructures of entities, stand in contrast to the more bespoke "customizers" like Tax Experts and Investment Advisors, who offer tailored, often lower-volume, strategic counsel. They point to different operational logics, different scales of connectivity, and potentially different vulnerabilities.

I argue that the implications for those engaged in the "race" against tax avoidance are considerable. If intermediaries are indeed locally anchored, national regulators may possess more direct leverage than often thought, offering a route to bypass the multi-level game of international tax governance. Furthermore, functional differentiation allows for better reasoned regulatory strategies - perhaps layered liability or tailored due diligence as proposed - rather than a "one-size-fits-all" approach.

This thesis has so far scratched the surface, and many interesting avenues remain. Of more theoretical interest, the typology from De Groen (2017) has largely been taken for granted, but how would a bottom-up typology (e.g. using techniques like hierarchical clustering) compare? Here, regime has been one of the lenses taken, but what about, for example, cultural dimensions or geographical distance functions to more firmly accept/reject the "local anchor" proposition? Exploring Microstates in this respect is a particularly interesting case, given their lack of "local" client bases. Finally there's the more empirical side, where lots of interesting questions also arise. The Hong-Kong-China and Cyprus-Russia corridor has briefly been discussed and how they arise in the data, but this could in principle be explored algorithmically to find new corridors using tools like Association Analysis. Much interesting work remains and lots lay out there to be there discovered.

Appendix

A.1 Replication Code and Classification dataset

All code to replicate the results as well as all enrichment data classifying the samples of intermediaries can be found here on my GitHub. https://github.com/OscarAdserballe/topologies-of-intermediaries-in-the-offshore-world

Note, it can be difficult to navigate the current codebase given the sheer amount of imperative code on there. I've tried keeping it as clean as possible for external eyes as well as documenting continuously, but it is nonetheless difficult.

A.2 Use of LLMs in the Broader Paper

LLMs have also been - beyond the classification method - been used to proof-read and edit the finished paper, contributing to writing the code. This also includes setting up the LaTeX document etc.

The main ones used have been:

- gemini-2.5-pro-preview-05-06
- gemini-2.5-pro-experimental-03-25
- gemini-2.5-flash-experimental-04-17
- claude-3.7-sonnet-latest
- claude-4-sonnet-20250514

General, multi-choice ones during the process like Cursor and claude-3.5-sonnet in Avante in Neovim have also been used, but these are the main ones.

Russell (1946, p. 558) said of Descartes that he wrote "as a discoverer and explorer," and that his style was "easy and unpedantic"; and while the goal, I cannot say the same of my own writing. Hence, the use of LLMs to help curb the worst excesses.

A.3 Classification of Intermediaries

To instruct the AI agent on how to perform the classification and the specific structure of the information to return, the following prompt template is utilized. This prompt defines the categories, provides keywords for guidance, and specifies the desired output fields. The agent's output for each intermediary is a structured data record, typically resembling a JSON object or a Python dictionary, which includes the fields detailed in the prompt.

Classification Prompt

The core prompt provided to the AI agent for classification is as follows (where `{intermediary_name}` and `{log_summary_for_classification}` are dynamically inserted):

```
Classify the intermediary: {intermediary_name}

Based *only* on the information gathered in the following search log.
{log_summary_for_classification}

Classify this intermediary into ONE of these categories based on their
likely primary role in offshore activities:
- Tax Expert: Focuses on tax planning, compliance, advisory. Keywords:
  tax advisory, international tax, tax compliance, tax returns,
  transfer pricing, VAT, tax structuring.
- Legal Expert: Focuses on legal structuring, compliance, incorporation,
  representation. Keywords: legal services, corporate law, entity formation,
  incorporation, contracts, litigation, legal opinions, regulatory
  compliance, M&A legal, lawyer, attorney, solicitor.
- Administrator: Focuses on accounting, auditing, financial reporting,
  company administration. Keywords: accounting, bookkeeping, audit,
  financial statements, reporting, company secretarial, payroll,
  administration services, domiciliation, accountant, auditor.
- Investment Advisor: Focuses on managing financial assets and investments.
  Keywords: investment management, wealth management, asset management,
  portfolio management, financial planning, investment strategy,
  securities, funds, financial advisor.

Provide a structured classification including:
- classification (Enum: Tax Expert, Legal Expert, Administrator, Investment Advisor)
- role_muddled (bool: true if the role seems mixed or unclear)
- role_muddled_reasoning (str: explanation if role_muddled is true)
- is_individual (bool: based on the name and findings, is this likely a person?)
```

```
- job_title (str: inferred job title if possible, e.g., "Lawyer", "Accountant",
  "Director", or "Unknown")
- confidence (Enum: Low, High - Use Low if evidence is sparse, contradictory,
  or confidence in the source/relevance is low)
- justification (str: detailed reasoning for the classification, referencing the
  search log)
- key_evidence (list[str]: specific snippets or findings from the search
  results supporting the classification)

Analyze the content of the search results carefully. Prioritize information
directly describing the intermediary's services or professional role.
```

Examples of Dynamic Search and Structured Output

The agent's search process is dynamic. It begins with a general query (the intermediary's name) and, based on the retrieved information's relevance and completeness, may formulate up to two additional, more specific queries. For instance, if initial results for a company are vague, subsequent queries might include terms like "services offered" or "business activity." The classification is then made based on the entirety of the gathered search logs.

Sometimes it's just not possible to find anything useful, hence the confidence section. Any cases where ‘confidence‘ is low, they are excluded from the analysis sections.

The output for each intermediary is a structured record. While the ‘key_evidence‘ field in the prompt requests specific snippets, for comprehensiveness in these examples, it contains the full, somewhat verbose, search log detailing each iteration of the dynamic search process.

The following examples illustrate this process and the resulting structured output, taken directly from the enrichment process. The first provides an example of where it's impossible to find clear information linked to the interemediary resulting in low confidence, while the second is a clear case of a legal expert.

Example 1: OPULENT OPAL HOLDINGS LIMITED

Dynamic Search Summary:

- **Iteration 0 Query:** ‘OPULENT OPAL HOLDINGS LIMITED‘
- **Findings:** Results were ambiguous, pointing to "OPULENT OPAL CONSTRUCTION LIMITED," a subsidiary link to "Opal Holdings Pte Ltd" (itself a subsidiary of CapitaLand, suggesting a holding structure), and unrelated products (paint, home decor).
- **Iteration 1 Query:** ‘OPULENT OPAL HOLDINGS LIMITED primary business activities‘

- **Findings:** Retrieved general information on Bank Secrecy Act compliance for businesses, potentially triggered by "holdings," and another mention of the CapitaLand subsidiary link.
- **Iteration 2 Query:** ‘OPULENT OPAL HOLDINGS LIMITED services offered‘
- **Findings:** Largely irrelevant results (gemstones, furniture), again highlighting the difficulty in pinpointing specific services for this entity.

Structured Output (Simplified Representation):

- **intermediary_name:** OPULENT OPAL HOLDINGS LIMITED
- **classification:** Administrator
- **confidence:** Low
- **role_muddled:** True
- **role_muddled_reasoning:** "The role is muddled as the search results are ambiguous and could indicate construction, holding company activities, or other possibilities. There is no clear indication of their primary business activities."
- **is_individual:** False
- **job_title:** Unknown
- **justification:** "The search results provide limited information about OPULENT OPAL HOLDINGS LIMITED. One result mentions ’OPULENT OPAL CONSTRUCTION LIMITED’ which suggests involvement in construction, potentially as a specialty trade contractor. Another result indicates that ’Opal Holdings Pte Ltd’ is a subsidiary of CapitaLand, implying a holding company structure. The lack of direct evidence about their services or role leads to a low confidence classification as an administrator, potentially involved in company administration or holding activities."
- **key_evidence (Full Search Log):** (Content of the JSON-like string representing the three search iterations and their results, as provided in the original example, would be detailed here. For brevity, it is summarized above and omitted in this representation.)

Example 2: Cheo Yeoh & Associates

Dynamic Search Summary:

- **Iteration 0 Query:** ‘Cheo Yeoh & Associates‘
- **Findings:** Immediately yielded relevant results identifying the entity as "CHEO YEOH & ASSOCIATES LLC," a Singapore-based company providing legal services, with details on its registration and directors.

- **Iteration 1 Query:** ‘Cheo Yeoh & Associates services‘
- **Findings:** Reinforced the legal nature, with results like "Cheo Yeoh & Associates provides legal services" and official listings specifying "LEGAL ACTIVITIES."
- **Iteration 2 Query:** ‘Cheo Yeoh & Associates client testimonials‘
- **Findings:** Could uncover legal case mentions, lawyer profiles, or further business directory listings, solidifying its role. (The provided log indicates successful identification primarily from the first two iterations).

Structured Output (Simplified Representation):

- **intermediary_name:** Cheo Yeoh & Associates
- **classification:** Legal Expert
- **confidence:** High
- **role_muddled:** False
- **role_muddled_reasoning:** (Empty or N/A)
- **is_individual:** False
- **job_title:** Lawyer (Implicitly, as a law firm)
- **justification:** "Cheo Yeoh & Associates LLC provides legal services in Singapore. The company's principal activity is LEGAL ACTIVITIES (EXCLUDING ONLINE MARKETPLACES). Johnny Cheo is a Director at the firm. The firm has been operating for 23 years. The search results consistently point to legal services."
- **key_evidence (Full Search Log):** (Content of the JSON-like string representing the search iterations and their results, as provided in the original example, would be detailed here. For brevity, it is summarized above and omitted in this representation.)

A decent chunk, especially of the random sample, needs to be filtered out as seen in Figure A.1.

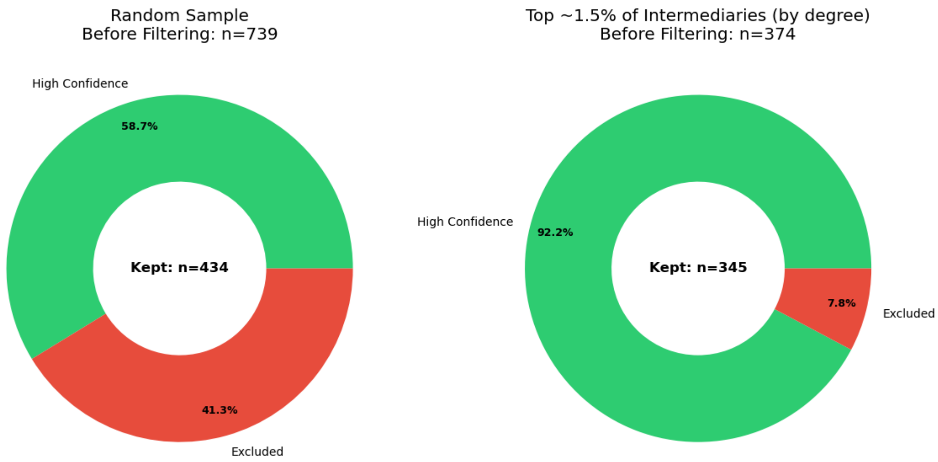

Figure A.1: Filtering Process of the Samples for Function-Classification

A.4 (More) Geography and Jurisdiction Heatmaps for Intermediaries at Country-Level

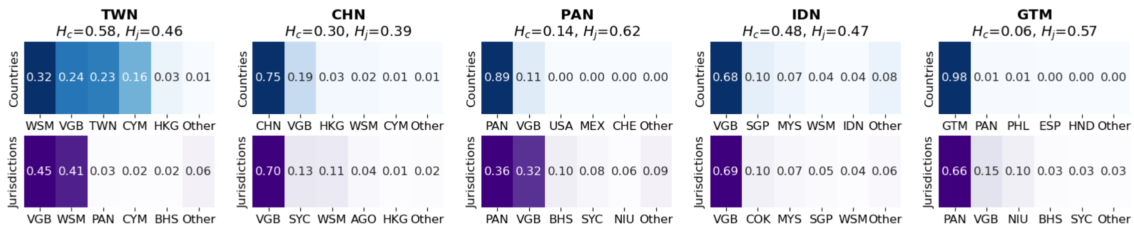

Figure A.2: Client and Incorporation Jurisdiction Heatmap for Intermediaries in Top 6-10 Countries (TWN, CHN, PAN, IDN, GTM)

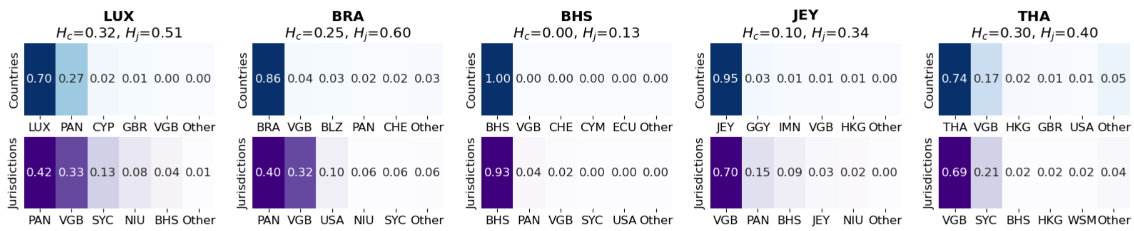

Figure A.3: Client and Incorporation Jurisdiction Heatmap for Intermediaries in Top 11-15 Countries (LUX, BRA, BHS, JEY, THA)

Figures A.2 and A.3 – Intermediaries in Top 6-15 Countries: These figures reveal patterns for other significant intermediary locations, including emerging economies and traditional OFCs.

- **China (CHN)** (Figure A.2): Similar to Hong Kong, shows a strong domestic client focus (CHN, 75%; $H_c = 0.30$) and a preference for VGB (70%) and Samoa (WSM, 13%) for incorporations ($H_j = 0.39$).

- **Panama (PAN)** (Figure A.2): As a major OFC itself, Panamanian intermediaries overwhelmingly serve entities active in Panama (PAN, 89%; $H_c = 0.14$). They primarily use their own jurisdiction for incorporation (PAN, 36%), but also VGB (32%) and USA (10%), leading to higher jurisdictional diversity ($H_j = 0.62$). This suggests a role in both domestic incorporation and facilitating access to other OFCs for local clients.

- **Luxembourg (LUX)** (Figure A.3): Another key European financial center, Luxembourg-based intermediaries primarily serve domestic clients (LUX, 70%; $H_c = 0.32$). Their incorporation choices are relatively diverse ($H_j = 0.51$), favoring Panama (PAN, 42%), VGB (33%), and Seychelles (SYC, 13%).

- **Bahamas (BHS)** (Figure A.3): Shows an extreme domestic client focus (BHS, 100%; $H_c = 0.00$), with intermediaries almost exclusively using the Bahamas itself for incorporation (BHS, 93%; $H_j = 0.13$). This points to a highly localized service model within the OFC.

- **Jersey (JEY)** (Figure A.3): Intermediaries in this Crown Dependency also exhibit a very strong domestic client focus (JEY, 93%; $H_c = 0.10$) and primarily use VGB (70%) for incorporations ($H_j = 0.34$).

An illustrative example of specific geographical specialization is provided by Cyprus-based intermediaries (Figure A.4). Cyprus is well-documented in academic and policy literature for its strong financial links to Russia (e.g., Alstadsæter et al., 2022, note similar patterns for Dubai facilitating Russian wealth). While Russia is generally underrepresented as a client country in the broader ICIJ dataset for intermediaries from most other nations, entities serviced by Cypriot intermediaries show a significant Russian presence. As seen in the top bar of Figure A.4, 12% of entities serviced by Cypriot intermediaries are linked to activity in Russia (RUS). This proportion is notably higher than Russia's typical share in the client portfolios of intermediaries from the other top 15 countries (often negligible or grouped under "Other"), suggesting a strong, specific association—a high "lift" in association analysis terms—for the Cyprus-Russia connection. Beyond Russia, Cypriot intermediaries primarily serve entities active in Cyprus itself (CYP, 34%), the United Arab Emirates (ARE, 27%), and, interestingly, the British Virgin Islands (VGB, 26%). The VGB share here might reflect entities whose ultimate beneficial owners or complex operational activities are channeled through or managed from VGB, rather than VGB being a primary country of economic activity in the traditional sense. For incorporations (bottom bar), Cypriot intermediaries heavily favor VGB (56%), followed by Seychelles (SYC, 15%), the Bahamas (BHS, 15%), and Panama (PAN, 9%). The entropy values for Cyprus-based intermediaries ($H_c = 0.55, H_j = 0.53$) are both above the median values observed in Figure 4.3, indicating a moderately diversified client base and a similarly moderate diversification in their choice of incorporation jurisdictions, despite the prominent Russian nexus.

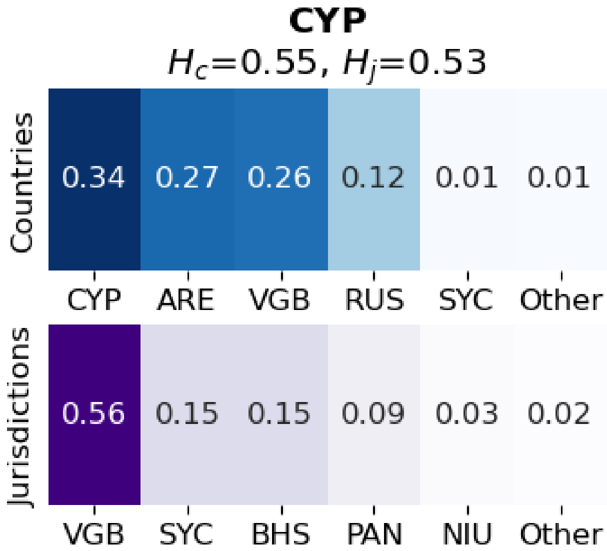

Figure A.4: Client and Incorporation Jurisdiction Heatmap for Cyprus-based Intermediaries

A.5 Degree Distribution of Intermediaries

A recurring theme in the study of complex networks, and one that underpins much of the analytical framework of this thesis, is the prevalence of power-law-like distributions in various network metrics. This characteristic is particularly evident in the degree distribution of intermediaries within the ICIJ dataset, as illustrated in Figure A.5. This is an established finding in the literature (e.g. Chang et al., 2023a), however, it is replicated here because of its importance for the thesis - and also serves as an indirect robustness check for the data. We essentially reproduce their finding, though the overlaw power-law estimates arrived at are different compared to Chang et al. (2023a) who find even fatter tails in the subset of countries (USA, Hong Kong, China, and Russia) they analyze. They land on an exponent of $\alpha \approx 1.2 - 1.4$ for the degree distribution of intermediaries in their sample, while we find $\alpha \approx 2.08$ for the full dataset.

Figure A.5 plots the probability density function (PDF) of intermediary degrees on a log-log scale. This type of scaling is standard for visualizing heavy-tailed distributions, as a true power law will appear as a straight line. The empirical data (blue line) clearly shows a long tail, indicating that while the vast majority of intermediaries are connected to a relatively small number of entities, a few intermediaries possess an extraordinarily high number of connections. These are the "super-hubs" of the offshore world, intermediaries that facilitate the creation and administration of thousands, or even tens of thousands, of offshore entities. This visual observation aligns with findings from structural studies of similar large-scale datasets, such as Kejriwal and Dang's (2020) network analysis of the Panama Papers (a subset of the ICIJ data, we are working with), which also identified power-law degree distributions for actors within that leak. Such a distribution points to a highly heterogeneous system where certain intermediaries play a disproportionately significant role in structuring offshore

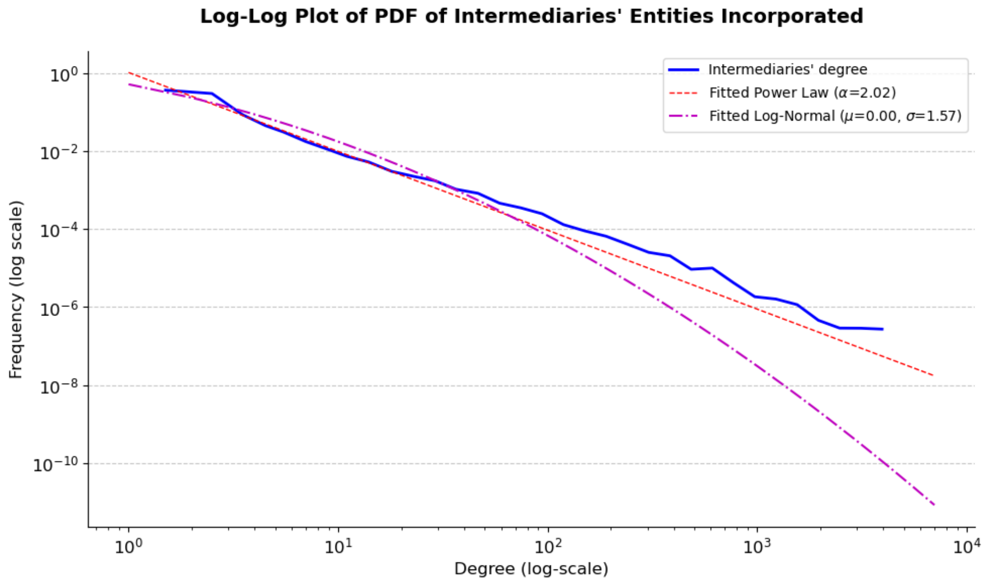

Figure A.5: Degree Distribution of Intermediaries and Model Fits

financial networks.

To formally assess the nature of this distribution, the fit of a power-law model was compared to that of a log-normal distribution, a common alternative for heavy-tailed data. A log-likelihood ratio test yielded $R = 57.0287$ with a p-value < 0.0001. This result provides strong statistical evidence that a power-law model offers a significantly better fit to the empirical intermediary degree distribution than a log-normal model, or at the very least, confirms that the distribution is distinctly heavy-tailed. The fitted power-law distribution (red dashed line in Figure A.5) has an exponent $\alpha \approx 2.08$. In scale-free networks, α typically falls between 2 and 3; a value closer to 2, as observed here, signifies a particularly "fat" tail, indicating an even more pronounced dominance of the largest hubs compared to networks with higher α values. The log-normal fit (purple dash-dot line), by contrast, visibly underestimates the probability of observing these extremely high-degree intermediaries.

The implications of this scale-free or heavy-tailed characteristic are profound for understanding the architecture and dynamics of the offshore financial system. It suggests a system that is not randomly organized but has an inherent structure where a few key intermediaries may act as critical "enablers" or "chokepoints" (Chang et al., 2023b; Christensen, 2024). The existence of these super-hubs implies that a significant portion of offshore activity is channeled through a limited number of actors. This concentration has several potential consequences:

- **Efficiency and Scalability:** These hubs may provide economies of scale, making it easier and more efficient to create and manage large numbers of offshore entities.

- **Vulnerability:** As demonstrated by Chang et al. (2023b) in their study of oligarch networks, systems with such scale-free properties are often robust to the random removal of nodes but critically vulnerable to the targeted disruption of their main hubs. This suggests that regulatory or law enforcement actions focused on these key intermediaries could have a disproportionately large impact on the overall network.

- **Influence and Diffusion:** Highly connected intermediaries could be pivotal in disseminating specific tax planning strategies, financial products, or even compliance norms throughout the network.

A.6 Proposition 3: Structural Centrality of Microstates in Intermediation Network

The hardest part has been to leave so much material on the cutting-floor. I've, however, not had the willpower to completely relinquish this section of my thesis, and so with the brazen immaturity of a Bachelor's student, I've put it here, in the vain hope that the efforts won't feel wasted.

I here propose a third proposition. Briefly stated, it posits a core set of Offshore Financial Centers (OFCs), that is central in the jurisdictions and countries that intermediaries *co-service*. This is to be understood as, whenever that intermediaries do business in multiple countries, the countries they take advantage of are these microstates; that these OFCs constitute "anonymous" jurisdiction and countries, cosmopolitan and therefore not tied to any specific client base, but rather a global clientele. This is in contrast to the "local anchors" of intermediaries, which are often tied to specific client bases, and therefore more likely to be found in larger countries.

This may also be due to their offering of versatile "legal technologies" like "Dual-Purpose" vehicles as for example is proposed in Laffitte (2024). Empirical confirmation that they form the structural backbone of the global offshore network, and are countries that intermediaries from all countries whose residents they do business and jurisdiction they incorporate. Critical hubs and bridges in chains of intermediation, facilitating complex offshore strategies regardless of client or intermediary home country. Looking at the central actors in these networks of countries that intermediaries make use of. This is where network analysis shines, with its cohsive langauge of "centrality" and "community detection".

There are three main facts in support of this proposition, that will be covered later in the appendix.

- High centrality (betweenness, eigenvector) of jurisdictions like VGB, BHS, PAN, CYM, HKG in your co-service and co-usage networks.
- Dominance of "Dual-Purpose" legal technologies in the central core of the jurisdiction co-usage network.
- High lift values between key OFCs in association analysis.

This section proceeds in "reverse order", first having described the overall proposition, and then the methods.

A.6.1 Concepts from Network Analysis

Specifically, network analysis is employed here to uncover the roles intermediaries play based on their positions within the interconnected offshore financial system revealed by the ICIJ data. As described in Section 3.1, the ICIJ data forms a multi-modal graph (comprising entities, officers, intermediaries, etc.). Directly applying many standard network analysis concepts to such a multipartite graph can be challenging. Therefore, our approach often involves analyzing specific projections or subsets of the global graph to make the analytical tools from network theory applicable. The foundational textbook by Newman (2010) serves as the primary reference for this section.

- **Centrality Scores**: To identify nodes of critical importance within specific network representations, we utilize two fundamental centrality measures. In the context of understanding the key countries for intermediary activity, these measures are applied to a network derived from intermediary incorporation patterns.
  - **Eigenvector Centrality**: This measure assigns scores to nodes based on the principle that connections to high-scoring nodes contribute more to the score of the node in question than equal connections to low-scoring nodes. It is calculated as the principal eigenvector of the adjacency matrix $\mathbf{A}$ of the network, satisfying $x_i = \frac{1}{\lambda}\sum_j A_{ij}x_j$, where x_i is the centrality score of node i, A_{ij} is 1 if node i is connected to node j and 0 otherwise (or the weight of the edge), and λ is the largest eigenvalue of $\mathbf{A}$ (cf. Perron-Frobenius theorem). Eigenvector centrality is chosen for its ability to identify nodes that are influential not just by having many connections, but by being connected to other influential nodes, providing a robust reading of which countries are most central in the network of intermediary incorporations.
  - **Betweenness Centrality**: This metric quantifies the extent to which a node lies on shortest paths between other pairs of nodes. For a node v, it is defined as $C_B(v) = \sum_{s\neq v\neq t}\frac{\sigma_{st}(v)}{\sigma_{st}}$, where σ_{st} is the total number of shortest paths between nodes s and t, and $\sigma_{st}(v)$ is the number of those paths that pass through v. Betweenness centrality is used here to gauge which countries act as crucial "bridges" or conduits within the network, potentially connecting otherwise disparate segments, a role distinct from simply being a high-degree hub.
- **Community Detection: Modularity Maximization**: To uncover clusters or communities of closely related nodes within the country network, we employ modularity maximization. This approach provides an atheoretical method for identifying densely connected groups of countries, which may reflect underlying similarities in how intermediaries utilize them. Such clustering could be influenced by factors like shared regime types (Chang et al., 2023c) or the trust dynamics inherent in relational capitalism. While traditional clustering algorithms could be applied, defining a meaningful distance or dissimilarity metric for nodes in these networks is non-trivial. Modularity maximization, conversely, assesses the quality of a partition by comparing the number of intra-community edges to what would be expected in a random network with similar properties (a null model). The quality of a partition C is measured by the modularity

Q:

$$Q = \frac{1}{2m} \sum_{i,j} [A_{ij} - P_{ij}]\, \delta(c_i, c_j) \tag{A.1}$$

where m is the total number of edges, A_{ij} is the actual weight of the edge between nodes i and j, P_{ij} is the expected weight of an edge between i and j under the Newman-Girvan null model (a configuration model preserving the degree sequence, where $P_{ij} = \frac{k_i k_j}{2m}$ for unweighted graphs, k_i being the degree of node i), and $\delta(c_i, c_j)$ is 1 if nodes i and j are in the same community ($c_i = c_j$) and 0 otherwise. Since finding the optimal partition is an NP-hard (although, to be honest, at the size we reduce our graph sizes, search space isn't an issue...) problem, we utilize the Louvain method (Blondel et al., 2008), an efficient and widely adopted greedy algorithm, as implemented in the `networkx` library.

- **Power-law Distribution**: The distribution of node degrees (number of connections) and other network properties are examined for characteristics of power-law distributions. A power law, $P(k) \sim k^{-\alpha}$, describes a "fat-tailed" distribution where a few nodes (hubs) have a disproportionately high number of connections, while most nodes have few. Such distributions are frequently observed in real-world networks (Clauset et al., 2009; Kejriwal & Dang, 2020) and their presence can indicate significant heterogeneity in node importance.

- **Density of a Graph**: Network density, the ratio of actual edges to the total number of possible edges in the network ($D = \frac{L}{N(N-1)/2}$ for an undirected graph with L edges and N nodes), is used to measure the general level of connectedness. Low density is typical for large, sparse networks and indicates that connections are selective rather than ubiquitous.

A.6.2 Association Analysis

In line with the highly exploratory nature of this thesis, unsupervised learning techniques are employed to discover notable patterns within the data. Association analysis (Hastie et al., 2009) is particularly opportune for identifying non-obvious relationships or co-occurrences in large datasets, such as the ICIJ networks. For example, it can help determine which connections (e.g., between a type of intermediary and the use of a specific jurisdiction or legal technology) are particularly remarkable. This approach relies on a **non-parametric notion** of pattern discovery, aiming to **discover patterns of high density** or co-occurrence.

Two main tools from association analysis, based on simple set-theoretical notions, are used:

- **Support**: This measures the overall frequency of an itemset (e.g., a specific attribute or combination of attributes) in the dataset. For an itemset X, $Support(X) = P(X) = \frac{\text{count}(X)}{N}$, where N is the total number of transactions (e.g., intermediaries). For an association rule $A \to B$, $Support(A \to B) = P(A \cup B)$.

- **Lift**: This measures how much more likely item B is to be present when item A is present, compared to the baseline probability of B. It indicates the strength of an association beyond what would be expected by chance.

$$Lift(A \rightarrow B) = \frac{P(B|A)}{P(B)} = \frac{Support(A \cup B)}{Support(A) \times Support(B)} \quad \text{(A.2)}$$

A lift value greater than 1 suggests a positive association, a value less than 1 suggests a negative association, and a value of 1 suggests independence. **Lift scores** will be used to quantify the strength of associations found, indicating, for example, how much more likely an intermediary of a certain type is to use a specific jurisdiction compared to the overall likelihood.

A.6.3 Patterns of Co-Specialisation

To explore these co-service relationships further, a network of countries was constructed. In this network, countries are nodes, and an edge exists between two countries if at least one intermediary serves clients (entities) linked to both. The weight of the edge reflects the number of distinct intermediaries serving clients in both countries. The resulting full country network consists of 121 nodes (countries) and 2,716 edges. Key summary statistics for this network are presented in Table A.1.

Table A.1: Summary Statistics for the Full Country Co-Service Network

Metric	**Value**
Number of Nodes	121
Number of Edges	2716
Network Density	0.3741
Average Degree	44.89
Average Clustering Coefficient	0.7728

Visualising such dense graphs is incredibly challenging. Therefore, to identify the most important connections, the network was filtered using principles from association analysis. Edges are displayed only if they 1) meet a minimum support threshold (representing at least 0.008 of all intermediaries' country-pair connections, meaning the pair is co-serviced by at least that fraction of intermediaries who service multiple countries) and 2) a lift score of 1.5 or higher. Lift measures how much more frequently two countries are co-serviced than would be expected if their servicing by intermediaries were independent. This filtering ensures that the visualized connections are not only reasonably frequent but also represent associations significantly stronger than chance, that they are both common links as well as carrying statistical signal. The resulting filtered network, or "backbone," thus highlights the most robust and significant co-service relationships. While the exact number of nodes included is sensitive to the choice of the lift and support thresholds here, this "backbone" as I term it, is relatively stable across a range of thresholds.

The nodes in the network visualization (Figure A.6) are coloured in two ways: first, by communities identified using the Louvain modularity maximization algorithm (Blondel et al., 2008), which groups densely interconnected countries; and second, by regime type using VDem data, as described in Section 3.2. This dual coloring was intended to explore whether regime type influences intermediary operations and co-service patterns, a factor suggested by literature on offshore secrecy strategies (e.g. Chang et al., 2023b).

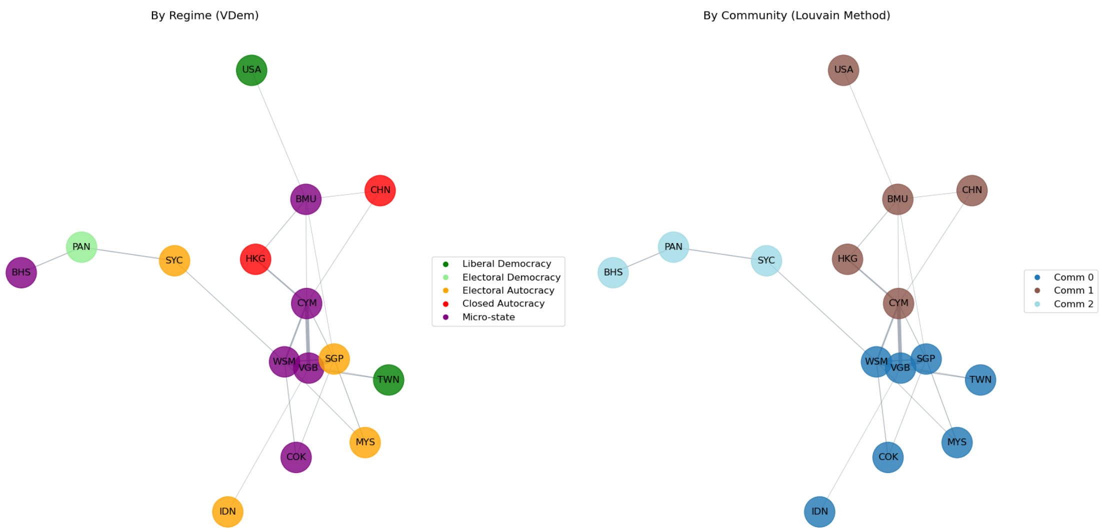

Figure A.6: Filtered Network of Co-Served Countries, Coloured by Louvain Community (left) and Regime Type (right). Edges shown have support ≥ 0.008 and lift ≥ 1.5

A.6.4 Interpretation of the Filtered Country Network Structure

The filtered network (Figure A.6) reveals a sparse yet highly structured set of relationships, forming a distinct core-periphery structure. A central core of interconnected nodes is evident, particularly involving VGB (British Virgin Islands), CYM (Cayman Islands), and SGP (Singapore), along with their strong links to HKG (Hong Kong) and BMU (Bermuda).

When coloured by regime type, no clear large-scale clustering emerges that aligns strictly with political systems. The central cluster itself is diverse, including Micro-states (VGB, CYM, BMU), jurisdictions classified as Closed Autocracies (HKG, reflecting its unique status), and Electoral Autocracies (SGP). Liberal Democracies such as the USA and TWN (Taiwan) are present but connect to nodes of various different regime types. This visual evidence supports the notion that regime type, while potentially a factor in individual elite choices (Chang et al., 2023c), is not a primary driver of these strong, systemic co-service relationships at the country-network level. Economic roles, historical ties, and financial infrastructure likely play more dominant roles in shaping this backbone.

The Louvain community detection method, which is data-driven, reveals distinct groupings based on the density of co-service links:

- **Community 0 (Dark Blue):** This is the largest community, featuring prominent offshore centers like VGB and CYM, major Asian economies/financial hubs like SGP, TWN (Taiwan), MYS (Malaysia), IDN (Indonesia), and Pacific jurisdictions like COK (Cook Islands) and likely WSM (Samoa, if present in the filtered graph). This highlights strong ties between several offshore financial centers and key Asian economies.
- **Community 1 (Brown):** This community comprises major economies like the USA and CHN (China), alongside HKG (Hong Kong) and the offshore jurisdiction BMU (Bermuda), indicating a distinct Atlantic-Pacific nexus involving Bermuda.
- **Community 2 (Light Blue):** A smaller, distinct community consisting of PAN (Panama), SYC (Seychelles), and BHS (Bahamas), all of which are significant offshore jurisdictions.

Most nodes in this backbone network are connected within two to three steps, indicating a relatively compact structure despite the filtering.

Centrality metrics calculated on the full 121-node co-service network (detailed in Appendix Tables A.3 and A.4) identify key players. **VGB (British Virgin Islands)** is dominant, exhibiting the highest betweenness and eigenvector centrality, underscoring its pivotal role in connecting diverse client countries through shared intermediaries. The **USA** ranks second in both measures, reflecting its economic importance and the global reach of its client base serviced by international intermediaries. The USA is linked to BMU (Bermuda) in the filtered graph's Community 1. **HKG (Hong Kong) & CHN (China)** also feature prominently in centrality scores and are central to Community 1. Numerous **Micro-states** (BMU, BHS, CYM) show high centrality, consistent with their specialized roles in offshore finance. **SGP (Singapore)** is another key, highly central node, bridging various parts of the network. In general, high centrality in the full network translates to a significant structural role in this filtered backbone, indicating that the most connected countries in the overall system also form the core of the strongest co-service relationships.

A.6.5 Significant Country Associations

Lift scores from the association analysis (top associations detailed in Appendix Table A.5, filtered for co-occurrences ≥ 20) reveal particularly strong and statistically significant pairings, many of which are visualized in Figure A.6 (those with lift ≥ 1.5). Key findings include:

- Strong **Micro-state synergies** are evident. For instance, the WSM-CYM (Samoa-Cayman Islands) pairing shows a high lift of 6.78, and VGB-CYM (British Virgin Islands-Cayman Islands) has a lift of 1.91. These indicate that intermediaries servicing clients in one of these micro-states are substantially more likely to also service clients in the other, suggesting complementary service offerings or established pathways for specific client types. The CYM-BMU (Cayman Islands-Bermuda) link is exceptionally strong with a lift of 13.5.

- A critical **China-Bermuda nexus** emerges with CHN-BMU showing a very high lift of 15.3. This suggests Bermuda acts as a particularly favored intermediary hub for clients linked to China. This is complemented by the USA-BMU link (lift 4.92), highlighting Bermuda's role in Community 1 of the filtered network, connecting major economic powers.
- Robust **Asian connections** are underscored by pairs like SGP-MYS (Singapore-Malaysia, lift 5.27). Singapore (SGP) also shows strong co-service patterns with various Micro-states such as WSM (Samoa, lift 3.04) and CYM (Cayman Islands, lift 3.89), reinforcing its role as a key hub in Community 0.
- A distinct **PAN-SYC-BHS nexus** (Community 2) is confirmed with pairings like PAN-SYC (Panama-Seychelles) having a lift of 3.89.
- Crucially, high lift values are common **across different regime types**. For example, China (Closed Autocracy) has a very high lift with Bermuda (Micro-state), and the USA (Liberal Democracy) also has a significant lift with Bermuda. This reinforces the earlier observation that factors beyond regime similarity, such as specialized financial services, established legal and commercial pathways, or historical ties, are potent drivers of these strong co-service relationships.

Network of Jurisdictions Used by Intermediaries

Shifting focus from client locations to incorporation locations, this section analyzes the network of jurisdictions that intermediaries use in combination. The full jurisdiction co-usage network, where an edge exists if an intermediary incorporates entities in both jurisdictions (weighted by the number of such intermediaries), comprises 41 nodes and 347 edges. Summary statistics are provided in Table A.2. The distribution of the number of distinct jurisdictions used per intermediary is shown in Figure 4.5, indicating that most intermediaries utilize a small portfolio of jurisdictions, though some use many.

Table A.2: Summary Statistics for the Full Jurisdiction Co-Service Network

Metric	Value
Number of Nodes	41
Number of Edges	347
Network Density	0.4232
Average Degree	16.93
Average Clustering Coefficient	0.8155

Figure A.7 presents a filtered "backbone" of these co-usage patterns, applying the same support (≥ 0.008) and lift (≥ 1.5) thresholds as for the country co-service network. Nodes are coloured by their predominant legal technology profile (derived from Laffitte, 2024, as detailed in Section 3.2) and by Louvain communities. The image displays the most prominent nodes in this filtered network, including CRI (Costa Rica), SGP (Singapore), CYP (Cyprus), GBR (Great Britain), BLZ (Belize), AGO (Angola), HKG (Hong Kong), CYM (Cayman Islands), COK (Cook Islands), MYS (Malaysia), BHS (Bahamas), SYC (Seychelles), PAN (Panama), NIU (Niue), WSM (Samoa), and USA.

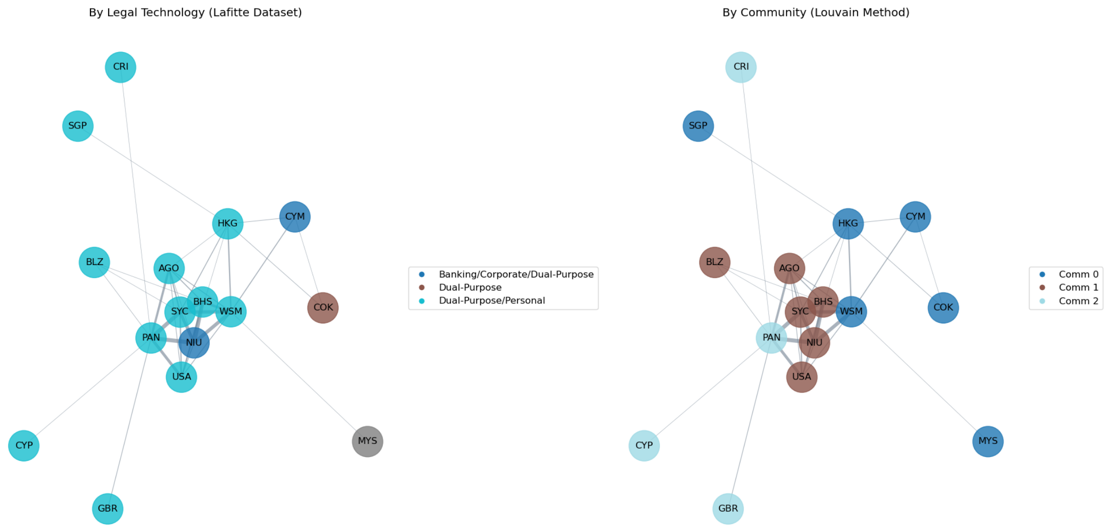

Figure A.7: Filtered Network of Co-Used Jurisdictions, Coloured by Legal Technology (left) and Louvain Community (right). Edges shown have support ≥ 0.008 and lift ≥ 1.5.

A.6.6 Interpretation of the Filtered Jurisdiction Network Structure

The filtered jurisdiction network (Figure A.7) reveals a central, densely connected core. Key jurisdictions in this core include BHS (Bahamas), SYC (Seychelles), AGO (Angola), WSM (Samoa), NIU (Niue), PAN (Panama), USA, and HKG (Hong Kong).

When coloured by their predominant legal technology profile (Laffitte, 2024), the central cluster is overwhelmingly dominated by jurisdictions offering **"Dual-Purpose"** legal technologies (e.g., International Business Companies - IBCs). This strongly supports the observation that central jurisdictions in this co-usage network are those providing flexible, widely applicable corporate vehicles suitable for both corporate and personal wealth structuring.

Louvain community detection identifies the following groupings based on co-usage patterns:

- **Community 1 (Brown):** This is the largest and most central community, encompassing jurisdictions like USA, PAN, NIU, BHS, SYC, AGO, and WSM. These are largely characterized by "Dual-Purpose" legal technologies.
- **Community 0 (Dark Blue):** This community includes HKG, CYM (Cayman Islands), and COK (Cook Islands), combining jurisdictions known for "Banking/Corporate/Dual-Purpose" (like HKG) with those strong in "Dual-Purpose/Personal" (like CYM, COK).

- **Community 2 (Light Blue):** This community is more peripheral in the filtered network and includes SGP (Singapore), CRI (Costa Rica), CYP (Cyprus), GBR (Great Britain), BLZ (Belize), and MYS (Malaysia), representing a mix of financial centers and specialized offshore jurisdictions.

A.6.7 Centrality in the Jurisdiction Network

Centrality metrics for the full 41-jurisdiction co-usage network (detailed in Appendix Tables A.6 and A.7) are revealing. **VGB (British Virgin Islands)** ranks first in both betweenness and eigenvector centrality in the full network, confirming its paramount importance as an incorporation jurisdiction. However, it is strikingly absent from the filtered graph in Figure A.7. This implies that while VGB is co-used with many other jurisdictions by numerous intermediaries, these individual pairings might not meet the specific high support and lift thresholds chosen for this backbone view (requiring at least 20 co-occurrences and lift ≥ 1.5). This suggests VGB's role might be more as a general-purpose, widely connected jurisdiction whose strong pairings are numerous but perhaps more diffuse, rather than concentrated in extremely high-lift niche combinations that also meet the co-occurrence threshold. **BHS (Bahamas)** and **PAN (Panama)** rank second and third, respectively, in overall centrality and are visibly central within the filtered graph, particularly in Community 1. **HKG (Hong Kong)** and **CYM (Cayman Islands)** are also highly central in the full network and form a core part of Community 0 in the filtered view. Most other top-ranked jurisdictions by centrality align with their prominence in the backbone, with VGB being the main exception due to the filtering criteria.

A.6.8 Significant Jurisdiction Associations

Association analysis, focusing on lift scores from statistically significant pairs with at least 20 co-occurrences (detailed in Appendix Table A.8), highlights robust co-usage patterns:

- The dominant **Community 1 (largely "Dual-Purpose" hubs)** shows very high mutual lift values. For instance, BHS-NIU (Bahamas-Niue) has a lift of 4.6 (support 0.016), and NIU-WSM (Niue-Samoa) has a lift of 5.3 (support 0.012). NIU (Niue) appears as a critical connector within this cluster of Pacific and Caribbean jurisdictions, also showing strong lift with SYC (Seychelles, lift 4.1, support 0.010).

- **Community 0 (financial centers and specialized OFCs)**: The HKG-CYM (Hong Kong-Cayman Islands) pairing shows a strong lift of 5.8 (support 0.0018), indicating a significant tendency for intermediaries using one to also use the other. WSM-CYM (Samoa-Cayman Islands) also shows a notable lift of 4.6 (support 0.0031).

- Strong co-usage is observed between jurisdictions offering **similar legal technology profiles**. For example, many of the high-lift pairs within Community 1 involve jurisdictions predominantly offering "Dual-Purpose" or "Dual-Purpose/Personal" technologies.

A.6.9 Country Network Centrality and Associations

Table A.3 lists the top 10 countries by betweenness centrality and Table A.4 by eigenvector centrality in the full co-service network. Table A.5 details significant country associations.

Table A.3: Top 10 Countries by Betweenness Centrality in the Full Co-Service Network

Node	Betweenness	Eigenvalue	Appearances	Regime
VGB	0.18	0.14	6285	Micro-state
USA	0.053	0.13	1042	Liberal Democracy
CHE	0.039	0.13	1545	Liberal Democracy
GBR	0.028	0.13	1258	Liberal Democracy
MUS	0.024	0.13	139	Liberal Democracy
BHS	0.021	0.13	489	Micro-state
BMU	0.020	0.13	103	Micro-state
PAN	0.020	0.096	1203	Electoral Democracy
SGP	0.019	0.13	578	Electoral Autocracy
URY	0.017	0.031	318	Liberal Democracy

Table A.4: Top 10 Countries by Eigenvector Centrality in the Full Co-Service Network

Node	Eigenvalue	Betweenness	Appearances	Regime
VGB	0.14	0.18	6285	Micro-state
USA	0.13	0.053	1042	Liberal Democracy
GBR	0.13	0.028	1258	Liberal Democracy
HKG	0.13	0.016	2865	Closed Autocracy
JEY	0.13	0.013	390	Micro-state
CHN	0.13	0.0085	320	Closed Autocracy
CAN	0.13	0.0088	195	Liberal Democracy
BHS	0.13	0.021	489	Micro-state
SGP	0.13	0.019	578	Electoral Autocracy
CYM	0.13	0.012	363	Micro-state

Table A.5: Significant Country Associations in Co-Service Network (Bonferroni Corrected $p < 6.89 \times 10^{-6}$)

	u	v	u_regime	v_regime	support	lift	p_value
76	VGB	WSM	Micro-state	Micro-state	0.017	1.87	7.24e-46
498	WSM	CYM	Micro-state	Micro-state	0.0035	6.78	1.34e-45
105	VGB	CYM	Micro-state	Micro-state	0.0076	1.91	9.58e-23
775	CHN	BMU	Closed Autocracy	Micro-state	0.00088	15.3	3.36e-19
2405	CYM	BMU	Micro-state	Micro-state	0.00088	13.5	4.46e-18
2032	SGP	MYS	Electoral Autocracy	Electoral Autocracy	0.0016	5.27	5.66e-17
102	VGB	SGP	Micro-state	Electoral Autocracy	0.010	1.60	9.75e-17
351	PAN	SYC	Electoral Democracy	Electoral Autocracy	0.0020	3.89	8.08e-16
501	WSM	COK	Micro-state	Micro-state	0.0015	4.84	1.57e-15
496	WSM	SGP	Micro-state	Electoral Autocracy	0.0025	3.04	1.89e-14
2044	SGP	BMU	Electoral Autocracy	Micro-state	0.00083	8.06	5.07e-13
488	WSM	SYC	Micro-state	Electoral Autocracy	0.0014	4.14	2.36e-12
2033	SGP	CYM	Electoral Autocracy	Micro-state	0.0014	3.89	1.75e-11
2035	SGP	COK	Electoral Autocracy	Micro-state	0.0010	4.63	2.23e-10
1190	USA	BMU	Liberal Democracy	Micro-state	0.00092	4.92	4.62e-10
497	WSM	TWN	Micro-state	Liberal Democracy	0.00083	5.48	5.27e-10
768	CHN	CYM	Closed Autocracy	Micro-state	0.00096	4.75	8.31e-10
2034	SGP	MUS	Electoral Autocracy	Liberal Democracy	0.00071	5.07	4.46e-08
419	JEY	BMU	Micro-state	Micro-state	0.00050	7.16	1.17e-07
642	HKG	CYM	Closed Autocracy	Micro-state	0.0032	1.75	6.61e-07
650	HKG	BMU	Closed Autocracy	Micro-state	0.0013	2.52	6.83e-07
502	WSM	MYS	Micro-state	Electoral Autocracy	0.0012	2.75	1.54e-06
2039	SGP	TWN	Electoral Autocracy	Liberal Democracy	0.00054	5.04	1.85e-06
2307	AUS	IRL	Liberal Democracy	Liberal Democracy	0.00021	22.0	3.25e-06

A.6.10 Jurisdiction Network Centrality and Associations

Table A.6 shows the top 10 jurisdictions by betweenness centrality and Table A.7 by eigenvector centrality in the full co-usage network. Significant jurisdiction associations are detailed in Table A.8.

Table A.6: Top 10 Jurisdictions by Betweenness Centrality in the Full Co-Service Network

Node	Betweenness	Eigenvalue	Appearances	Jurisdiction Legal Technology
VGB	0.20	0.26	13533	Dual-Purpose/Personal
BHS	0.084	0.26	2099	Banking/Corporate/Dual-Purpose/Other Technologies/Personal
PAN	0.060	0.25	6533	Banking/Corporate/Dual-Purpose
HKG	0.058	0.24	625	Banking/Corporate/Other Technologies
CYM	0.048	0.21	290	Banking/Corporate/Dual-Purpose
WSM	0.027	0.20	1352	Dual-Purpose/Personal
USA	0.019	0.23	387	None
COK	0.018	0.12	954	Banking/Corporate/Dual-Purpose/Personal
CYP	0.017	0.22	45	Banking/Corporate/Dual-Purpose
SGP	0.013	0.19	355	Banking/Other Technologies

Table A.7: Top 10 Jurisdictions by Eigenvector Centrality in the Full Co-Service Network

Node	Eigenvalue	Betweenness	Appearances	Jurisdiction Legal Technology
VGB	0.26	0.20	13533	Dual-Purpose/Personal
BHS	0.26	0.084	2099	Banking/Corporate/Dual-Purpose/Other Technologies/Personal
PAN	0.25	0.060	6533	Banking/Corporate/Dual-Purpose
HKG	0.24	0.058	625	Banking/Corporate/Other Technologies
USA	0.23	0.019	387	None
CYP	0.22	0.017	45	Banking/Corporate/Dual-Purpose
CYM	0.21	0.048	290	Banking/Corporate/Dual-Purpose
WSM	0.20	0.027	1352	Dual-Purpose/Personal
JEY	0.20	0.011	28	Dual-Purpose/Other Technologies
SGP	0.19	0.013	355	Banking/Other Technologies

Table A.8: Significant Jurisdiction Associations in Co-Service Network (Bonferroni Corrected $p < 6.10 \times 10^{-5}$)

	u	v	u_legal_technology	v_legal_technology	support	lift	p_value
72	BHS	NIU	Bnk/Corp/Dual/Oth Tech/Pers	Dual-Purpose	0.016	4.6	1.80e-165
108	NIU	WSM	Dual-Purpose	Dual-Purpose/Personal	0.012	5.3	9.68e-134
106	NIU	SYC	Dual-Purpose	Dual-Purpose/Personal	0.010	4.1	1.89e-85
122	SYC	WSM	Dual-Purpose/Personal	Dual-Purpose/Personal	0.011	3.3	4.50e-73
3	PAN	SYC	Bnk/Corp/Dual-Purpose	Dual-Purpose/Personal	0.027	1.6	2.50e-49
73	BHS	SYC	Bnk/Corp/Dual/Oth Tech/Pers	Dual-Purpose/Personal	0.013	2.3	2.62e-48
123	SYC	AGO	Dual-Purpose/Personal	None	0.0043	4.6	2.20e-40
4	PAN	USA	Bnk/Corp/Dual-Purpose	None	0.0095	2.2	1.33e-39
121	SYC	USA	Dual-Purpose/Personal	None	0.0041	4.2	9.61e-36
143	USA	AGO	None	None	0.0021	8.6	1.49e-32
2	PAN	NIU	Bnk/Corp/Dual-Purpose	Dual-Purpose	0.018	1.6	1.88e-32
174	WSM	CYM	Dual-Purpose/Personal	Bnk/Corp/Dual-Purpose	0.0031	4.6	1.31e-29
1	PAN	BHS	Bnk/Corp/Dual-Purpose	Bnk/Corp/Dual/Oth Tech/Pers	0.033	1.4	3.87e-29
74	BHS	USA	Bnk/Corp/Dual/Oth Tech/Pers	None	0.0042	3.0	1.33e-23
162	WSM	HKG	Dual-Purpose/Personal	Bnk/Corp/Oth Tech	0.0043	2.9	4.59e-23
204	HKG	CYM	Bnk/Corp/Oth Tech	Bnk/Corp/Dual-Purpose	0.0018	5.8	3.16e-21
107	NIU	USA	Dual-Purpose	None	0.0025	3.9	1.05e-19
6	PAN	AGO	Bnk/Corp/Dual-Purpose	None	0.0074	1.8	3.80e-18
163	WSM	AGO	Dual-Purpose/Personal	None	0.0027	3.2	1.30e-16
140	USA	WSM	None	Dual-Purpose/Personal	0.0026	2.8	8.95e-14
7	PAN	GBR	Bnk/Corp/Dual-Purpose	None	0.0023	2.4	1.50e-13
76	BHS	AGO	Bnk/Corp/Dual/Oth Tech/Pers	None	0.0032	2.4	3.06e-13
128	SYC	BLZ	Dual-Purpose/Personal	Bnk/Corp/Dual-Purpose/Pers	0.00092	6.0	3.06e-12
75	BHS	WSM	Bnk/Corp/Dual/Oth Tech/Pers	Dual-Purpose/Personal	0.0080	1.6	3.94e-12
10	PAN	CRI	Bnk/Corp/Dual-Purpose	None	0.0011	3.1	7.44e-11
109	NIU	AGO	Dual-Purpose	None	0.0017	2.8	2.41e-09
81	BHS	BLZ	Bnk/Corp/Dual/Oth Tech/Pers	Bnk/Corp/Dual-Purpose/Pers	0.00083	3.7	1.18e-07
34	VGB	NIU	Dual-Purpose/Personal	Dual-Purpose	0.025	1.1	4.69e-07
9	PAN	CYP	Bnk/Corp/Dual-Purpose	Bnk/Corp/Dual-Purpose	0.0012	2.3	9.42e-07
207	HKG	SGP	Bnk/Corp/Oth Tech	Bnk/Oth Tech	0.0011	2.8	2.53e-06
125	SYC	HKG	Dual-Purpose/Personal	Bnk/Corp/Oth Tech	0.0028	1.8	3.98e-06

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