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Mapping the Tax Planning Incentives Behind Royalty Flows: A Qualitative Synthesis of Network Analysis, Gravity Models, and Multinational Profit Shifting Strategies

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Abstract: This qualitative literature review examines how tax planning incentives shape international royalty flows by synthesizing insights from network analysis, gravity models, and the literature on multinational profit shifting. The review highlights that royalty payments are not solely driven by economic fundamentals such as market size, innovation intensity, or bilateral trade costs, but are systematically influenced by corporate income tax differentials, withholding taxes, and the structure of international tax treaty networks. Network-based approaches reveal the central role of conduit jurisdictions and treaty shopping routes in facilitating the redirection of royalty flows, while gravity models provide counterfactual benchmarks to identify deviations attributable to tax-motivated behavior. The synthesis further shows that profit shifting via intellectual property relocation, although smaller in scale than other channels, generates non-trivial revenue losses and remains structurally embedded in the international tax system. Overall, the study underscores the value of integrating network and gravity frameworks to better understand royalty-based tax planning and its policy implications

Keywords: Royalty Flows; Tax Planning Incentives; Network Analysis; Gravity Models; Multinational Profit Shifting

1. Introduction

The globalization of intangible assets has fundamentally reshaped the landscape of international taxation, creating new opportunities for multinational enterprises (MNEs) to minimize corporate income tax liabilities through the strategic relocation of intellectual property (IP) rights and the redirection of royalty payments across jurisdictions (Dischinger & Riedel, 2011; Griffith et al., 2014). Unlike traditional profit-shifting channels such as transfer pricing in goods or intra-group debt financing, royalty-based tax planning operates through complex networks of legal ownership, treaty provisions, and withholding tax differentials, making it both less visible and more difficult to measure empirically (Beer et al., 2020; Kleinbard, 2011). As intangible-intensive business models continue to expand globally, understanding the tax planning incentives embedded in international royalty flows has become increasingly important for s cholars and policymakers alike. Tax incentives for income tax (PPh 21), income levels, and tax penalties simultaneously have a significant influence on taxpayer compliance (Rizal, M. & Gulo, F., 2022).

Despite growing recognition of the role of IP in corporate tax avoidance, empirical research on royalty flows remains comparatively underdeveloped. The literature on profit shifting has historically focused on transfer mispricing and debt shifting, documenting substantial elasticities of reported profits with respect to statutory tax differentials (Heckemeyer & Overesch, 2017; Tørsløv et al., 2023). By contrast, royalty payments—

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although explicitly recognized as a key conduit for profit shifting—have received less systematic attention, largely due to data constraints and the inherent difficulty of distinguishing tax-motivated flows from those driven by genuine business considerations (Collins & Shackelford, 1997; Dudar et al., 2015). This gap is particularly striking given the rapid growth of cross-border payments for the use of patents, trademarks, and proprietary technologies over the past two decades (OECD, n.d.; World Bank, n.d.). The variables of profitability, leverage and deferred tax expense have a significant effect on tax avoidance (Amelia, Y., & Waruwu, K. L., 2022).

Recent advances in network analysis and gravity modeling provide new methodological tools to address these challenges. Network-based approaches conceptualize international tax planning as a routing problem in which MNEs select optimal paths for income flows through jurisdictions to minimize overall tax burdens, subject to treaty networks and withholding taxes (van 't Riet & Lejour, 2018; Hong, 2018). This perspective highlights the role of conduit countries—such as the Netherlands or Switzerland—that facilitate income shifting without necessarily being final profit destinations (Garcia-Bernardo et al., 2017; Lejour, 2021). In parallel, gravity models, long established as the workhorse of international trade analysis, offer a structured framework to explain bilateral royalty flows based on economic mass, distance, and institutional frictions, while allowing deviations attributable to tax planning incentives to be identified econometrically (Anderson & van Wincoop, 2004; Head & Mayer, 2014). Profitability and debt to equity ratio have a significant impact on company value (Mohammad & Anis Y, 2022).

Building on these methodological developments, a growing body of recent literature explicitly links network analysis with gravity frameworks to disentangle tax-driven royalty flows from those motivated by underlying economic activity. Lejour and van 't Riet (2025) provide one of the first global estimates of tax revenue losses attributable to redirected royalty payments, combining a comprehensive international royalty network with bilateral tax parameters for over 100 countries. Their findings suggest that between 13% and 25% of global royalty flows are motivated by tax planning, resulting in tax revenue losses of at least USD 3.3 billion in 2018, even under conservative assumptions. Importantly, these estimates are likely lower bounds due to missing observations, particularly for flows involving tax havens—a limitation echoed throughout the profit shifting literature (Beer et al., 2024; Damgaard et al., 2024). Tax avoidance can encourage the use of debt as a more dominant source of financing (Kusnanto, E., et al, 2024).

The qualitative insights emerging from this literature challenge popular narratives surrounding highly publicized tax avoidance schemes such as the "Double Irish–Dutch Sandwich." While these arrangements have attracted considerable media and political attention, empirical evidence indicates that their applicability is limited to a relatively small subset of country pairs and institutional configurations (Samarakoon, 2023; Petkova et al., 2020). Network analyses show that direct tax planning gains from royalty redirection exist for only about one-third of bilateral country pairs, and that treaty shopping further enhances tax advantages in fewer than 10% of cases (Lejour & van 't Riet, 2025). These findings underscore the importance of examining tax planning incentives within a global network context rather than focusing on isolated case studies or emblematic jurisdictions.

At the same time, the literature emphasizes that not all royalty flows involving low-tax jurisdictions are tax motivated. Gravity-based estimations reveal that substantial royalty payments occur between countries where no tax planning gains exist, suggesting that market size, technological specialization, and historical business linkages remain key drivers of IP-related transactions (Dijkstra, 1959; Santos Silva & Tenreyro, 2006). Notably, royalty flows between such country pairs tend to be sizeable only when no cheaper treaty-shopping alternative is available, indicating that firms balance tax minimization against administrative complexity and legal risk (Hebous & Johannesen, 2021; Sharma et al., 2023). This nuanced interaction between tax incentives and business fundamentals highlights the need for analytical frameworks capable of capturing both dimensions simultaneously.

From a policy perspective, understanding the magnitude and structure of royalty-based profit shifting is critical for evaluating the effectiveness of recent international tax reforms. Initiatives such as the OECD/G20 Base Erosion and Profit Shifting (BEPS) project and the introduction of global minimum taxation aim to curb aggressive tax planning, yet their impact on IP relocation and royalty routing remains uncertain (Bilicka et al., 2022; EU Tax Observatory, 2023). The persistence of conduit jurisdictions and the continued growth of intangible-intensive activities suggest that royalty flows may remain a viable channel for tax

planning even in a post-BEPS environment (Haufler & Schindler, 2023; Shehaj & Weichenrieder, 2024).

Against this backdrop, this qualitative literature review aims to synthesize and critically assess existing research on the tax planning incentives behind international royalty flows, with a particular focus on the integration of network analysis, gravity models, and multinational profit shifting strategies. By mapping the conceptual and empirical connections between these strands of literature, this study contributes to a more coherent understanding of how MNEs exploit institutional asymmetries in international tax systems to reallocate income from intangible assets. In doing so, it also identifies key limitations in existing data and methodologies, highlighting avenues for future research and informing ongoing debates on international tax coordination and reform.

2. Literature Review

Royalty Payments and Profit Shifting through Intangible Assets. The relocation of intellectual property (IP) and the redirection of royalty payments constitute a central yet comparatively underexplored channel of multinational profit shifting (Dischinger & Riedel, 2011; Griffith et al., 2014). Unlike transfer pricing in goods or debt shifting, royalty-based strategies exploit the mobility and non-rival nature of intangible assets, allowing multinational enterprises (MNEs) to separate the location of innovation from the location of taxable income (Karkinsky & Riedel, 2012; Kleinbard, 2011). Early empirical evidence demonstrates that corporate taxes significantly influence the internal allocation of patents and trademarks, with lower-tax jurisdictions attracting a disproportionate share of IP ownership within multinational groups (Dischinger & Riedel, 2011; Karkinsky & Riedel, 2012).

Subsequent studies confirm that royalty payments act as a mechanism for extracting profits from high-tax operating affiliates to low-tax IP-holding entities, particularly when withholding taxes are minimized through tax treaties or EU directives (Collins & Shackelford, 1997; EU, 2003; Dudar et al., 2015). Griffith et al. (2014) show that the ownership of intellectual property is highly sensitive to corporate tax differentials, reinforcing the view that royalty flows are not merely compensation for innovation but also instruments of tax planning. These findings align with broader estimates of global profit shifting, which attribute a substantial share of missing profits to intangible-related channels (Zucman, 2014; Tørsløv et al., 2023).

Tax Competition, Tax Havens, and Conduit Jurisdictions. The incentives underlying royalty redirection are embedded in a broader framework of international tax competition, where jurisdictions strategically set tax rates and treaty policies to attract mobile tax bases (Bucovetsky, 1991; Wilson, 1991; Kanbur & Keen, 1993). Dharmapala and Hines (2009) identify tax havens as countries that combine low effective tax rates with institutional features facilitating profit shifting, a characterization later expanded to include "conduit" jurisdictions that intermediate income flows without necessarily accumulating profits (Garcia-Bernardo et al., 2017; Lejour, 2021).

Network-based analyses of corporate ownership and financial flows reveal that countries such as the Netherlands, Switzerland, and Ireland function as key nodes in global tax avoidance structures by enabling treaty shopping and minimizing withholding taxes on royalties (Garcia-Bernardo et al., 2017; Lejour et al., 2022). These conduit roles are particularly relevant for royalty payments, which are highly sensitive to bilateral tax parameters and treaty networks (Hong, 2018; Petkova et al., 2020). Empirical evidence suggests that the attractiveness of these jurisdictions depends not only on statutory tax rates but also on their position within the global tax network (Bilicka et al., 2022).

Network Analysis of Tax Planning and Income Routing. Recent literature increasingly conceptualizes multinational tax avoidance as a network optimization problem, where firms select income routing paths that minimize global tax liabilities subject to legal constraints (Minieka, 1978; van 't Riet & Lejour, 2018). Drawing on graph theory and shortest-path algorithms originally developed by Dijkstra (1959), network analysis allows researchers to quantify both direct and indirect tax planning gains arising from treaty shopping and intermediate routing through third countries (van 't Riet & Lejour, 2018; Hong, 2018).

Lejour and van 't Riet (2025) extend this framework to international royalty flows, constructing a global royalty network covering over 100 countries and incorporating statutory corporate tax rates, withholding taxes, and treaty provisions. Their analysis demonstrates that only 37% of country pairs exhibit direct tax planning gains, while treaty shopping enhances gains in merely 7% of cases, challenging popular perceptions of ubiquitous tax avoidance

strategies such as the "Double Irish–Dutch Sandwich" (Lejour & van 't Riet, 2025; Samarakoon, 2023). These results highlight the importance of network position and bilateral constraints in shaping feasible tax planning routes.

Gravity Models and the Identification of Business-Motivated Royalty Flows. While network analysis identifies potential tax incentives, it does not distinguish between royalty flows driven by tax planning and those reflecting genuine economic activity. To address this limitation, researchers employ gravity models, which explain bilateral flows as a function of economic size, distance, and institutional frictions (Anderson & van Wincoop, 2004; Head & Mayer, 2014). Gravity models have become the standard empirical tool for analyzing trade in goods and services, including royalties and licensing payments (Dudar et al., 2015; Hebous & Johannesen, 2021).

Methodological advances by Santos Silva and Tenreyro (2006) emphasize the use of Poisson pseudo-maximum likelihood (PPML) estimators to address heteroskedasticity and zero flows, a practice widely adopted in recent royalty flow studies (Lejour & van 't Riet, 2025; Conte et al., 2022). By estimating gravity equations on subsets of bilateral flows where tax planning gains are absent, researchers can predict the counterfactual, business-motivated component of royalty payments (Lejour & van 't Riet, 2025). Deviations from these predictions are then interpreted as tax-motivated profit shifting, providing a structured identification strategy grounded in economic fundamentals.

Empirical Evidence on the Magnitude of Tax-Motivated Royalty Flows. Applying the combined network–gravity framework, Lejour and van 't Riet (2025) estimate that between 13% and 25% of global royalty flows are motivated by tax planning, corresponding to approximately USD 50 billion annually during the 2014–2019 period. The associated global tax revenue loss is estimated at a minimum of USD 3.3 billion in 2018, potentially rising to USD 13 billion when unobserved flows to tax havens are accounted for (Lejour & van 't Riet, 2025). These figures are consistent with broader macro-level estimates of profit shifting, which place global revenue losses at around USD 250 billion annually (EU Tax Observatory, 2023; Beer et al., 2024).

However, compared to total shifted profits—estimated at nearly USD 1 trillion—royalty-based profit shifting appears quantitatively smaller, though still economically meaningful for specific firms and jurisdictions (Tørsløv et al., 2023; Delis et al., 2024). Beer et al. (2020) emphasize that intangible-related channels remain a blind spot in many empirical studies due to data limitations, particularly the underreporting of bilateral service flows involving tax havens (Damgaard et al., 2024). This suggests that existing estimates of tax-motivated royalty flows likely represent lower bounds.

Policy Instruments and Institutional Responses. The literature also examines how policy instruments such as patent boxes, R&D subsidies, and anti-avoidance rules interact with royalty-based tax planning (Haufler & Schindler, 2023; Shehaj & Weichenrieder, 2024). While patent boxes are often justified as tools to foster innovation, empirical evidence indicates that they primarily affect the location of taxable income rather than real R&D activity, reinforcing incentives for IP relocation and royalty shifting (Griffith et al., 2014; Haufler & Schindler, 2023). Recent reforms under the OECD/G20 BEPS initiative and the global minimum tax aim to curtail such strategies, yet their effectiveness in addressing royalty routing through conduit jurisdictions remains uncertain (Bilicka et al., 2022; Sharma et al., 2023).

Taken together, the literature demonstrates that international royalty flows are shaped by a complex interaction between tax incentives, treaty networks, and economic fundamentals. Network analysis reveals where tax planning is legally feasible, gravity models identify business-driven benchmarks, and profit shifting studies quantify the resulting revenue losses (Beer et al., 2020; Lejour & van 't Riet, 2025). Nevertheless, significant gaps remain, particularly regarding data coverage for bilateral royalty flows and the dynamic responses of MNEs to recent tax reforms (Damgaard et al., 2024; Beer et al., 2024). A qualitative synthesis of these strands is therefore essential to advance a more integrated understanding of royalty-based tax planning in the global economy.

3. Proposed Method

This study adopts a qualitative literature review methodology, designed to systematically identify, analyze, and synthesize existing scholarly research on the tax planning incentives underlying international royalty flows, with particular emphasis on network analysis, gravity models, and profit-shifting strategies. A qualitative literature review is appropriate for this

investigation because it allows the researcher to integrate conceptual insights from diverse disciplinary perspectives, address theoretical gaps, and construct a coherent narrative of how existing research collectively informs the phenomenon under study (Webster & Watson, 2002; Booth et al., 2016).

The research design is rooted in interpretive qualitative inquiry, which aims to critically explore meanings, assumptions, and relationships in existing literature rather than to quantify empirical relationships (Creswell & Poth, 2018; Denzin & Lincoln, 2018). This approach aligns with the research objective of synthesizing theoretical frameworks and empirical findings concerning tax planning mechanisms through royalty flows, wherein the focus is on conceptual integration, comparative analysis, and thematic interpretation rather than on statistical hypothesis testing (Hart, 1998; Torraco, 2005).

The literature review was conducted based on systematic and purposive searching of multiple academic databases that index high-impact research in economics, taxation, international business, and public policy. Specifically, databases were accessed to retrieve peer-reviewed articles, working papers, books, and major reports relevant to the study's topic. The selection of literature was guided by a predefined set of keywords and Boolean search combinations, including but not limited to: "royalty flows" and "tax planning", "profit shifting" and "multinational enterprises", "network analysis" and "tax avoidance", "gravity models" and "international payments", "intellectual property relocation" and "tax haven". These search terms were chosen based on their prominence in prior literature and their alignment with the core concepts of the study (Tranfield et al., 2003; Webster & Watson, 2002).

To ensure the relevance and quality of the reviewed sources, the following inclusion criteria were applied: Content relevance to royalty payments, tax planning, profit shifting, network analysis, or gravity model applications in international taxation. Publication type limited to peer-reviewed journals, published books, and authoritative working papers from reputed research institutions. Temporal scope focused primarily on literature published within the last two decades (2004–2025) to capture recent methodological developments, including seminal works such as Anderson and van Wincoop (2004) on gravity methodologies. Language limited to English. Studies that did not directly address tax planning, did not contextualize royalty flows within multinational structures, or were not empirically or theoretically rigorous were excluded from the final synthesis (Jesson et al., 2011; Kitchenham, 2004).

Once the initial set of studies was identified, a literature mapping exercise was undertaken to organize the sources into thematic clusters relevant to the research questions. Specifically, articles and books were grouped under the following primary themes: Theoretical foundations of tax planning and profit shifting. Network analysis in international tax avoidance studies. Gravity models applied to bilateral flows of royalties or services. Empirical findings related to intangible asset relocation and tax revenue implications. Grouping literature into these categories facilitated comparative analysis and synthesis of methods, findings, and theoretical assumptions across studies (Ridley, 2012; Snyder, 2019). This thematic categorization reflects an approach also recommended in qualitative review methodologies that aim to map intellectual structures and research traditions within a field (Grant & Booth, 2009).

The core analytical technique employed in this review is qualitative content analysis, which involves identifying, coding, and categorizing major themes and conceptual patterns across the selected literature (Schreier, 2012; Mayring, 2004). Content analysis was conducted at three levels: Descriptive coding of study objectives, research questions, methodologies used (e.g., network analysis, gravity estimators), and key findings. Conceptual coding that identifies overarching constructs such as tax incentives, withholding tax differentials, treaty shopping, conduit jurisdictions, and measurement challenges. Theoretical coding focusing on how these constructs interrelate in existing frameworks and what implications they hold for understanding royalty flows as tax planning instruments. This multi-layered coding strategy enables deeper interpretive synthesis that goes beyond mere summary of results towards integrative narrative building (Elo & Kyngäs, 2008; Saldaña, 2021).

A critical element of this review involves synthesizing results across different methodological traditions, particularly between network and gravity approaches. Where quantitative papers offer model results (e.g., Lejour & van 't Riet, 2025; Dudar et al., 2015), the review pays special attention to how methodological choices—such as use of Poisson pseudo-maximum likelihood (PPML) estimators (Santos Silva & Tenreyro, 2006) or network optimization algorithms (Dijkstra, 1959)—influence the interpretation of tax planning

incentives. This comparative synthesis allows the review to contextualize empirical evidence within broader theoretical frameworks.

Consistent with best practices in qualitative synthesis (Hannes & Lockwood, 2011; Dixon-Woods et al., 2006), each study included in the review was evaluated for methodological rigor using criteria such as clarity of research question, appropriateness of methodology, transparency in reporting, and validity of conclusions. Particular emphasis was placed on recent contributions that address data limitations (e.g., missing bilateral royalty flows to tax havens) and identification challenges inherent in gravity analyses of service payments (Damgaard et al., 2024; Lejour & van 't Riet, 2025). Studies deemed methodologically weak, poorly documented, or tangential to the research questions were excluded or referenced only as background context.

The final stage of the qualitative review involved integrating the thematic insights into a coherent conceptual narrative that addresses the central research question: How do tax planning incentives manifest in international royalty flows, and in what ways do network analysis and gravity models illuminate these mechanisms?

This synthesis draws on multiple sources to: Compare conceptual frameworks (e.g., profit shifting theory from Kleinbard, 2011 vs empirical identification in Tørsløv et al., 2023), Map methodological advancements (e.g., network optimization to detect treaty shopping from van 't Riet & Lejour, 2018 vs gravity residual interpretation from Hebous & Johannesen, 2021), Assess empirical consistency (e.g., revenue loss estimates from Lejour & van 't Riet, 2025 vs global profit shifting benchmarks from EU Tax Observatory, 2023). The integration strategy reflects a narrative synthesis approach, which is well-suited for literature reviews that combine conceptual and empirical studies spanning multiple methodologies (Popay et al., 2006; Petticrew & Roberts, 2006).

Although this study does not involve primary data collection, ethical research practices were upheld by ensuring accurate representation of cited studies, avoidance of selective reporting, and transparency in the delineation of methodological decisions (Israel & Hay, 2006; American Psychological Association, 2020).

4. Results

Theoretical Foundations of Tax Planning and Royalty Flows. A substantial body of research establishes tax minimization through the relocation of intangible assets as a core driver of royalty flows within multinational enterprises (MNEs). Dischinger and Riedel (2011) demonstrate that multinational firms commonly choose the location of intangible assets such as patents or trademarks based on corporate tax differentials, which in turn drives royalty payment streams. This foundational insight is corroborated by Griffith et al. (2014), who show that decisions regarding IP ownership and associated royalty flows are systematically linked to differences in statutory tax rates across jurisdictions.

Studies on broader profit shifting similarly emphasize the role of intangible assets. Tørsløv, Wier, and Zucman (2023) estimate that much of the "missing profits" in global national accounts can be attributed to the shifting of intangible-related income to low-tax jurisdictions, signifying that royalty transactions should be understood as integral components of multinational tax planning strategies rather than isolated financial flows.

Network Structure and Royalty Routing Incentives. Network analysis literature reveals that the global tax treaty network and conduit jurisdictions significantly shape the incentives for redirecting royalty flows. Garcia-Bernardo et al. (2017) identify that certain countries function as conduits in global corporate ownership networks, enabling MNEs to route royalty payments through intermediate jurisdictions to exploit favorable treaty provisions. Similarly, Lejour (2021) demonstrates that not all countries are equally positioned to facilitate profit shifting; a small set of jurisdictions such as the Netherlands, Switzerland, and some Nordic economies occupy central roles in tax avoidance networks.

Lejour and van 't Riet (2025) apply network analysis specifically to royalty flows and find that direct tax planning gains are available for only about 37% of all bilateral country pairs. Moreover, they show that even when routing through a third country ("treaty shopping") is possible, this enhances the tax benefit in only around 7% of cases. These results emphasize that legal feasibility and network position moderate the attractiveness of royalty-based tax planning strategies.

Differentiating Tax-Motivated and Business-Driven Flows. A key challenge in the literature is distinguishing royalty payments motivated by tax planning from those reflecting genuine commercial relationships. Gravity model studies help address this distinction. Gravity

models, informed by established frameworks in trade literature (Anderson & van Wincoop, 2004; Santos Silva & Tenreyro, 2006), predict bilateral flows based on economic mass and trade frictions. When applied to royalty payments, these models show that a significant portion of bilateral flows can be explained by economic fundamentals such as market size and technological linkages, rather than tax incentives alone (Dudar, Spengel, & Voget, 2015).

Lejour and van 't Riet (2025) leverage such models to estimate the "business-motivated" component of royalty flows and use these predictions to infer the residual, tax-motivated component. They conclude that between 13% and 25% of global royalty flows are likely motivated, at least in part, by tax planning, corresponding to a sizable fraction of payments that cannot be explained by gravity fundamentals alone.

Empirical Estimates of Tax Revenue Losses. Empirical evidence consistently suggests that tax revenue losses from royalty-based profit shifting are material but smaller relative to broader measures of profit shifting. Lejour and van 't Riet (2025) estimate that in 2018 alone, the tax revenue loss attributable to redirected royalty flows was at least USD 3.3 billion, and potentially as much as USD 13 billion once unreported flows—especially those involving tax havens—are considered. Although these figures are modest compared to the nearly USD 250 billion in estimated global revenues lost to profit shifting overall (EU Tax Observatory, 2023), they indicate that royalty flows represent a meaningful, non-trivial channel of tax avoidance.

Supporting this, Damgaard, Elkjaer, and Johannesen (2024) highlight that data limitations—particularly missing bilateral royalty reports involving low-tax jurisdictions—bias such estimates downward. This suggests that the true scale of revenue loss associated with royalty tax planning may be higher than most current estimates indicate.

Role of Tax Policy and Institutional Structures. The literature also underscores the role of tax policy designs, including preferential regimes, in shaping royalty routing incentives. Haufler and Schindler (2023) discuss how R&D incentives and patent box regimes, while often justified on innovation grounds, can inadvertently enhance royalty-based tax planning by lowering effective tax rates on income derived from intellectual property. Shehaj and Weichenrieder (2024) further find that IP box regimes and related preferential tax treatments influence the location choices of R&D and IP ownership, reinforcing incentives to channel royalties through low-tax jurisdictions.

Other studies emphasize the function of withholding tax treaties and double tax agreements in affecting royalty routing decisions. Petkova, Stasio, and Zagler (2020) show that treaty networks, and the resulting withholding tax reductions they offer, significantly influence the pattern of cross-border service and royalty payments.

Relative Importance of Royalty-Based Profit Shifting. Whilst royalty flows are an identifiable component of multinational tax planning, the literature generally portrays them as complementary to broader profit-shifting mechanisms, such as transfer pricing and intra-group financial flows (Beer & Loeprick, 2015; Heckemeyer & Overesch, 2017). Beer, De Mooij, and Liu (2020) emphasize that despite the complexity and sophistication of intangible-related tax planning, traditional channels remain quantitatively dominant in global profit shifting.

Delis, Delis, Laeven, and Onega (2024) provide further evidence that profit shifting within firms spans multiple channels, with royalty payments being one among several mechanisms that collectively reduce aggregate tax burdens. This reinforces the view that no single channel fully captures the totality of multinational tax planning, and that understanding royalty flows requires integration with broader tax avoidance research.

Overall, the literature converges on several key insights. Intangible assets and royalty flows are structurally linked to tax planning incentives because of their geographic mobility and fungibility in multinational structures (Dischinger & Riedel, 2011; Griffith et al., 2014). Network positions and treaty relations decisively shape where and how royalty streams can be redirected for tax benefits (Lejour & van 't Riet, 2025; Garcia-Bernardo et al., 2017).

Quantitative tools like gravity models offer robust means to separate tax-motivated from business-motivated flows, though data limitations remain a serious constraint (Dudar et al., 2015; Damgaard et al., 2024). The magnitude of tax revenue loss from royalty tax planning is meaningful but a subset of larger profit-shifting impacts, reinforcing the need for integrated analyses across multiple avoidance channels (EU Tax Observatory, 2023; Tørsløv et al., 2023). Notably, gaps persist in data coverage, especially for low-tax jurisdiction flows, and in dynamic analyses of how multinational firms respond to recent policy reforms, as called for by both Lejour and van 't Riet (2025) and Beer et al. (2024). These gaps limit the precision of current estimates and represent opportunities for future research.

5. Discussion

This study synthesizes extant literature to understand how tax planning incentives shape international royalty flows—with particular focus on network analysis, gravity modeling, and profit shifting strategies. The findings reveal that royalty flows are shaped by interacting forces: tax differentials, treaty networks, economic fundamentals, and institutional frameworks. Across the literature, there is broad agreement that royalty flows cannot be fully understood without considering both economic drivers and strategic tax planning, but there remain unresolved methodological challenges and empirical gaps that warrant careful interpretation.

A central theme emerging from the literature is how intangible assets and tax planning incentives interact. Dischinger and Riedel (2011) provide foundational evidence that multinationals allocate intangible asset ownership in ways sensitive to corporate tax differentials, laying the groundwork for understanding royalty payment patterns. Their findings are supported by Griffith, Miller, and O'Connell (2014), who find that IP ownership and associated royalty flows are systematically influenced by tax rate differences across jurisdictions, consistent with the theory that firms shift profits toward low-tax affiliates (Dischinger & Riedel, 2011; Griffith et al., 2014). This theme aligns with broader profit-shifting research showing that intangible-related income constitutes a significant component of global mismatches between where income is earned and where taxes are paid (Tørsløv, Wier, & Zucman, 2023).

However, the literature diverges on the quantitative magnitude of tax-motivated royalty flows. Lejour and van 't Riet (2025) estimate that between 13% and 25% of global royalty flows are tax-motivated, translating into tax revenue losses of USD 3.3–13 billion in 2018. These estimates, based on a combined network and gravity model approach, provide an empirical benchmark (Lejour & van 't Riet, 2025). In contrast, earlier, simpler frameworks such as Dudar, Spengel, and Voget (2015) focus primarily on bilateral tax effects and find evidence that lower withholding taxes correlate with higher reported royalty flows, but they do not integrate structural network features or predictions of business-driven flows. This suggests that without explicit identification strategies (e.g., counterfactual gravity predictions), estimates may overstate or understate tax-motivated flows (Dudar et al., 2015; Lejour & van 't Riet, 2025).

A related point of divergence concerns the role of treaty shopping and conduit jurisdictions. Garcia-Bernardo et al. (2017) introduce the idea of conduit nodes in global corporate ownership networks—jurisdictions that intermediary income flows through favorable treaties and regulatory environments. Their network-based classification identifies countries like the Netherlands and Switzerland as frequent intermediaries facilitating profit shifting. This concept is largely corroborated by Lejour (2021), who emphasizes that not all low-tax jurisdictions function equally; countries with extensive treaty networks and low withholding taxes provide more navigable paths for royalty routing. These network insights contrast with traditional bilateral analyses (e.g., Petkova, Stasio, & Zagler, 2020) that focus narrowly on double tax treaties without considering indirect routing via third jurisdictions. Thus, while Dudar et al. (2015) show bilateral tax effects, and Petkova et al. (2020) document treaty relevance, only network-oriented approaches (Garcia-Bernardo et al., 2017; Lejour, 2021) reveal the systemic routing incentives embedded in the global tax network.

This synthesis highlights an important methodological insight: network analysis and gravity models complement one another. Network analysis identifies structurally feasible tax planning routes and quantifies potential tax gains, while gravity models contextualize observed flows by controlling for economic fundamentals such as GDP, distance, and demand linkages (Anderson & van Wincoop, 2004; Head & Mayer, 2014). Lejour and van 't Riet's (2025) integration of both methods addresses the common critique that royalty payments may reflect business-driven economic relationships rather than tax motivations. By estimating a gravity benchmark for business-motivated flows and using the residuals to infer tax-motivated flows, they produce estimates that are arguably more robust than those derived from either method in isolation.

Yet, the literature reveals persistent data limitations that constrain inference. Damgaard, Elkjaer, and Johannesen (2024) demonstrate that many bilateral royalty flows—especially those involving tax havens—are either misreported or omitted from official datasets, leading to potential underestimation of tax-motivated flows. Such reporting issues cast doubt on magnitude estimates produced even by advanced models. This underscores the need for expanded bilateral data coverage, especially from jurisdictions that either do not report or

selectively report service and royalty flows. Without comprehensive data, even rigorous methodological frameworks produce lower bound estimates that may not capture the full extent of tax planning activities (Damgaard et al., 2024; Lejour & van 't Riet, 2025).

Another key discussion point revolves around the policy instruments that shape tax planning incentives. Haufler and Schindler (2023) examine the effects of patent boxes and R&D subsidies, showing how preferential regimes interact with international tax planning. They find that patent box regimes can exacerbate incentives to relocate IP ownership and associated royalties to favorable jurisdictions, often with ambiguous effects on real R&D investment. This insight resonates with Shehaj and Weichenrieder (2024), who show that IP tax preferences (e.g., IP boxes) influence where firms locate R&D and intangible assets. These studies collectively suggest that tax policy complexity—particularly the proliferation of preferential IP regimes—may unintentionally strengthen royalty-based tax planning strategies, even as broader international reforms (e.g., BEPS and global minimum taxes) seek to curb profit shifting.

Comparative analysis of the eight key prior studies reveals several consistent patterns worth emphasizing: Intangible assets and tax differentials consistently drive royalty routing decisions (Dischinger & Riedel, 2011; Griffith et al., 2014). Multilateral treaty networks and withholding tax differences matter more than bilateral tax rates alone (Garcia-Bernardo et al., 2017; Petkova et al., 2020). Network centrality and gateway roles of conduits amplify tax planning incentives (Lejour, 2021; Lejour & van 't Riet, 2025). Gravity models are indispensable for distinguishing business versus tax motives (Anderson & van Wincoop, 2004; Lejour & van 't Riet, 2025). Data gaps, particularly for tax havens, reduce confidence in quantitative estimates (Damgaard et al., 2024). Preferential tax regimes (e.g., patent boxes) can unintentionally heighten royalty tax planning incentives (Haufler & Schindler, 2023; Shehaj & Weichenrieder, 2024). Royalty flows are part of broader profit-shifting strategies that include transfer pricing and financing channels (Beer, De Mooij, & Liu, 2020; Tørsløv et al., 2023). Empirical magnitude estimates vary widely depending on methodology and data coverage (Dudar et al., 2015; Lejour & van 't Riet, 2025).

Despite these convergences, there are notable divergences and open questions. For instance, while Lejour and van 't Riet (2025) find clear evidence of tax-motivated royalty flows, their conclusion that only about one-third of bilateral pairs exhibit direct planning gains suggests that tax avoidance via royalties may be more selective and context-dependent than previously thought. In contrast, Tørsløv et al. (2023) emphasize the ubiquity of profit shifting related to intangible assets more broadly, implying that royalty flows might be just one visible part of a larger set of strategies. This discrepancy highlights the possibility that royalty-specific planning may co-occur with other channels, such as transfer pricing or strategic financing.

Moreover, regulatory responses add complexity. Global initiatives like the OECD/G20 BEPS project and the global minimum tax framework aim to limit profit shifting by reducing tax asymmetries and closing loopholes. However, the literature suggests that such reforms may have uneven impacts on royalty routing. For example, preferential IP regimes may persist or evolve in response to reform pressures, diminishing the effectiveness of global minimum taxes in curbing royalty-based planning (Haufler & Schindler, 2023). Thus, policy developments intended to reduce avoidance could generate second-order effects that maintain or even amplify certain incentives.

Overall, this qualitative synthesis reveals that while advanced analytical tools (e.g., network and gravity models) bring greater clarity to the study of royalty flows and tax planning incentives, the field still faces empirical limitations and conceptual challenges. Key among these are the incomplete data, differing methodological assumptions, and dynamic responses of multinational firms to evolving tax rules. Future research would benefit substantially from richer bilateral service and royalty flow datasets, longitudinal analyses that capture firm-level strategic adjustments, and comparative policy evaluations across different tax regimes.

The literature collectively portrays royalty flows as a multifaceted phenomenon driven by both economic relationships and tax planning incentives embedded within global networks and shaped by policy frameworks. Integrating network analysis with gravity modeling—while accounting for data limitations—offers a promising path forward for understanding how MNEs strategically route royalties in pursuit of tax minimization. However, translating these insights into effective policy requires careful consideration of unintended consequences and ongoing monitoring of how international firms adapt to regulatory changes.

6. Conclusions

Sections must summarize briefly and concisely the contents of the document or essay. This section may contain (1) A summary of the main results, findings, and evidence from your research or analysis. (2) Synthesis of findings, namely the relationship between findings and research objectives, and show how these findings support arguments or hypotheses. (3) The author may also be able to discuss the implications of research findings for research benefits. What is the contribution or impact on the knowledge or topic discussed? (4) Limitations and suggestions for further research.

This qualitative literature review synthesizes interdisciplinary evidence on how tax planning incentives shape international royalty flows through the interaction of network structures, gravity-based economic forces, and multinational profit shifting strategies. The reviewed studies collectively demonstrate that royalty flows are not solely driven by genuine economic relationships linked to production, innovation, or market access, but are significantly influenced by tax differentials, treaty provisions, and the strategic positioning of multinational enterprises (MNEs) within global legal and financial networks.

A key conclusion is that the combination of network analysis and gravity models provides a robust conceptual and empirical framework for distinguishing business-motivated royalty payments from tax-motivated income routing. Network-based approaches reveal how conduit jurisdictions and treaty hubs function as central nodes facilitating royalty redirection, while gravity models establish counterfactual benchmarks for expected bilateral flows based on economic fundamentals. When used jointly, these methods significantly improve identification of tax planning behavior embedded in observed royalty patterns.

The literature further highlights that tax planning incentives are amplified by asymmetric tax competition, preferential intellectual property regimes, and uneven treaty coverage. Jurisdictions offering low effective tax rates on royalties, extensive treaty networks, and legal certainty emerge as key intermediaries in global royalty routing strategies. These findings confirm that royalty-based profit shifting is a structural outcome of the international tax architecture rather than a marginal or opportunistic phenomenon.

From a policy perspective, the review suggests that recent international tax reforms—such as anti–treaty shopping rules, BEPS measures, and global minimum taxation—may reduce some incentives for royalty shifting but are unlikely to eliminate them entirely. The persistence of preferential IP regimes, combined with data opacity in services trade and intangible asset transactions, allows MNEs to adapt their strategies. Consequently, effective policy responses require coordinated reforms that integrate withholding tax design, treaty networks, and transparency in cross-border royalty reporting.

Overall, this study contributes to the literature by clarifying the mechanisms through which royalty flows reflect strategic tax planning, demonstrating the analytical value of integrating network and gravity frameworks, and highlighting the structural nature of profit shifting via intangibles in the global economy.

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