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When Machines Create Value: Rethinking Transfer Pricing for AI-Driven Economies

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Abstract: ***Artificial Intelligence (AI) is transforming how multinational enterprises (MNEs) generate, manage, and capture value—posing unprecedented challenges for international transfer pricing frameworks rooted in traditional human-performed functions and tangible asset ownership. This paper explores the disruptive implications of AI-driven business models for the arm's length principle, focusing on decentralized decision-making, data-based intangibles, and algorithmic value creation. By analyzing use cases across industries such as financial services, pharmaceuticals, and e-commerce, the study highlights core challenges including fragmented DEMPE functions, ambiguous data ownership, and comparability gaps in AI-to-AI intercompany transactions. The paper integrates extensive OECD Transfer Pricing Guidelines (2022) references, offering practical pathways for aligning AI transactions with the arm's length standard through revised DEMPE analyses, hybrid profit-split methods, and enhanced documentation of control over risk. In doing so, it proposes a conceptual framework for recognizing economic ownership of AI-generated intangibles and advocates for OECD policy evolution to address emerging forms of digital value creation. The findings underscore the need for both tax authorities and MNEs to reimagine transfer pricing compliance in an era defined by autonomous systems, synthetic outputs, and algorithmic control.***

Keywords: Artificial Intelligence, Transfer Pricing, OECD Guidelines, Algorithmic Decision-Making, Intangibles, Economic Substance, Profit Split Method

I. INTRODUCTION

Artificial intelligence (AI) is a suite of technologies that enable computers to perform tasks that typically require human intelligence, including problem solving, decision-making and learning from experience, and in the last two years, the adoption of AI and other digital technologies has accelerated at an unprecedented pace, transforming the operations and competitive landscape of multinational enterprises (MNEs).

The use of AI by MNEs is transforming their business models and AI is used by MNEs in areas such as R&D, marketing, supply chains, and finance. This redefines the global value chain because AI is not just a new technology, but it is also a new business model. AI fundamentally alters the ways in which companies create innovation and value and perform cross-border activities, therefore this has implications for international tax, and particularly for transfer pricing (TP). The traditional assumptions about human labor, location, and traditional intangibles are less transparent than before, thus they require a reevaluation in the context of AI-driven business models. The convergence of AI-driven automation and international tax policy introduces a new frontier for regulatory analysis. Existing TP frameworks, built on the arm's length principle and rooted in the allocation of functions, assets, and risks among related parties, are being tested by emerging business models and novel categories of economic intangibles—many of which defy traditional categorization or valuation methods. This paper explores how the implementation of AI technology is altering the Intra-group structures and how this may affect the application of the TP principles and raise new issues regarding the allocation of value, economic ownership and risk. This paper also offers tax and finance professionals a methodology to consider the impact of AI adoption on a macro level that can be used as a starting point for transactional analysis of specific TP arrangements.

II. AI TECHNOLOGIES AND THEIR ROLES IN MULTINATIONAL BUSINESS MODELS

AI technologies are transforming business operations at scale, particularly within globally integrated enterprises. This section outlines two key categories of AI systems—*Generative AI* and *AI Agents*, which are increasingly central to intercompany activities and value creation within MNEs.

A. Generative AI

Generative AI creates novel content, and it relies on large datasets. It generates text, images, audio, video, code, and designs, and it analyzes patterns in data. It relies on deep learning, as transformers and diffusion models are examples of deep learning, and thus generative AI creates novel content.

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1) Representative Use Cases in Business:

- Automated content creation platforms (e.g., ChatGPT) generating reports, marketing materials, and internal communications
- Visual generation tools producing custom images for global advertising campaigns
- Design engines creating product prototypes for rapid iteration in manufacturing
- Drug discovery applications proposing new molecular compounds for clinical testing

2) Functional Impact:

Generative AI can make creative and design processes more efficient, and it can also help localize content for various markets and speed up product development. Consider, for instance, a global marketing team that could leverage generative AI to create appropriate language materials while still controlling the brand, and this shifts the paradigm for monetization. Who should benefit from the profits, because this is a question that arises because of the new paradigm?

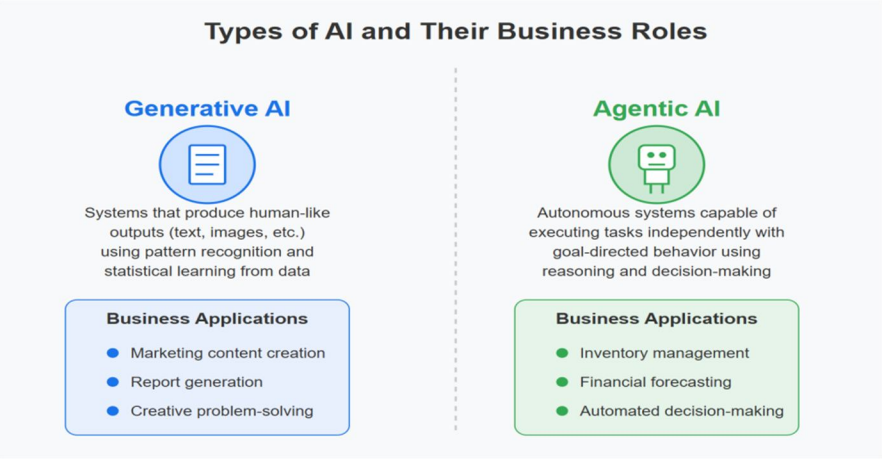
B. AI Agents

1) *Definition:* AI agents are autonomous agents that execute multi-step tasks based on predefined workflows. They operate based on AI modalities—such as natural language processing, machine vision, and reinforcement learning—to operate independently without regular human inputs.
AI agent is like a personal assistant tool that reads your e-mail or notes and calendar and books your flights, hotels, and meetings—based on a workflow without any regular instructions.

2) Representative Use Cases in Business:

- Procurement agents that autonomously negotiate with vendors
- Customer service chat boots which are capable of resolving complex issues
- Financial monitoring agents which prepare reconciliations and segments
- Research assistants that can access vast amount data and perform regular analysis

3) *Functional Impact:* AI agents function as digital employees and are part of core digital process. In an MNE context, a supply chain AI agent can negotiate with other AI agents across jurisdictions, predict demand fluctuations, select vendors, and execute procurement tasks. These tasks traditionally performed by humans now possible with limited or no human oversight—raising critical questions for TP professionals regarding functional allocation, risk assumption, and the economic control of algorithmic decision-making.



III. AI TRANSFORMING VALUE CHAINS AND SUPPLY CHAIN DYNAMICS

The global application of AI is fundamentally transforming the mechanics of value creation within MNEs. Consider a scenario in which an agentic AI system autonomously works on preparing budgets, forecast demands, optimize manufacturing strategies, manages logistics, and directly interacts with customers. Consequently, the focus of value creation shifts to AI-driven processes which bring significant levels of efficiency, accuracy and transparency in the entire system.

AI-powered agents are capable of real-time responsiveness, which significantly reduces operational costs, inventory lead times, and inefficiencies. As cross-border supply chains arrangement between two AI agents comes under autonomous AI control and the traditional concept of value creation needs to be redefined as there is no human involvement in decision making and control.

This transition raises pressing transfer pricing (TP) challenges, particularly in identifying the control behind AI-driven value-generating activities.

IV. INDUSTRY-SPECIFIC ADOPTION PATTERNS AND TP IMPLICATIONS

There is difficulty in transferring AI from one industry to another, and each industry has its own transfer pricing challenges. This is how it works for each sector:

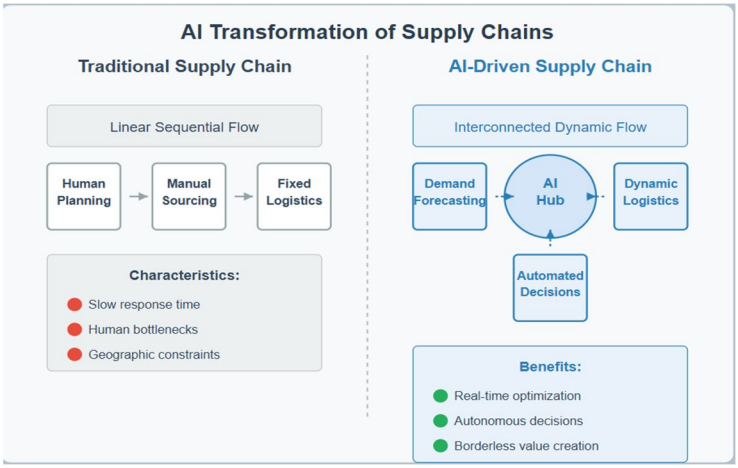
1) *Financial Services:* Banks and insurance companies deploy AI in one location for fraud detection, credit checks and customer assistance, which is also leveraged in other locations, therefore it is challenging to allocate the value and cost.
2) *Manufacturing:* AI on the factory floor is additive to Industry 4.0 such as preventative maintenance, quality assurance, and inventory monitoring; thus, AI is a complementary improvement.
3) *Pharma And Life Sciences:* AI accelerates drug discovery, trials and patient care, so intellectual property value is diffused throughout numerous countries, and it is difficult to allocate costs and DEMPE.
4) *Retail And Consumer Products:* AI supports customer demand, sales, and inventory, and it creates value by understanding the customer, optimizing operations, and building the brand
5) *Consulting:* Generative AI and Agentic AI can significantly transform the consulting world as AI can autonomously work on complex consulting projects.

V. MECHANISMS OF AI-DRIVEN VALUE CREATION

To establish transfer pricing arrangements that align with the arm's length principle and value creation, it is essential to understand the factors through which AI creates business value. Key drivers include:

1) *Cost Reduction:* AI may lower costs significantly, and transfer pricing questions arise, such as how to allocate the cost savings. If a single AI module reduces costs for multiple businesses, it is necessary to split the saved costs among the parties that contribute to the development, use and maintenance of the AI module, because this ensures fairness and equity.
2) *Profit Increase:* AI may increase profits, and therefore, a transfer pricing question arises, such as how to allocate the profit increase. If an AI module developed in one location leads to increased sales in another location, it is necessary to split the additional profits between the parties that contributed to the development and sales driven by the AI module, thus ensuring that all parties are fairly compensated.
3) *Risk Mitigation:* AI may mitigate risks, such as the risk of fraud and non-compliance with regulations, and so, it is essential to share the risk reduction value attributable to the design, deployment, and maintenance of AI.
4) *Accelerates Innovation:* AI accelerates the creation of new products, and for instance, the deployment of AI by a pharmaceutical company to discover new drugs enables it to bring new drugs to market more quickly, thereby creating new intangible assets, and thus, it is necessary to allocate the value of the new intangible assets based on where they were created, and therefore, apply a DEMPE (Development, Enhancement, Maintenance, Protection and Exploitation) methodology to allocate the profits in an equitable manner.

Fig. 1: AI Supply chain



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VI. STRATEGIC IMPLICATIONS FOR TRANSFER PRICING AND GLOBAL BUSINESS MODELS

AI is already shifting how companies operate, and it can forecast demand, procure supplies, set prices and manage supply chains. It is not confined to a location or bound by a contract because it is a centralized, scalable, virtual value creator. This shift blurs the historical understanding of where value is created and by whom, and it also alters the traditional approach to how countries allocate profits. New thinking is required as to how digital tools and AI decision making are linked to the creation of profits; therefore, the location of "algorithmic coordination" is unclear.

It's a new kind of activity that delivers business value through real-time data-driven decision-making; thus, we need to define it in the value chain. We need to model it in transfer pricing, and we need to be compliant and defendable in a digital world, so we need to rethink value, profit splits and methodologies for AI. As AI transforms businesses, transfer pricing needs to transform too, because it needs to be consistent with the arm's length principle and where value is created.

VII. PERSONAL JOURNEY INTO AI AND TRANSFER PRICING

My fascination with the intersection of taxation and technology began during my diploma studies in tax technology with CIOT UK. Through this educational journey, I came to understand that technology is far more than just a set of skills—it represents an entirely new mindset for approaching business challenges. This perspective has proven invaluable as I've navigated the rapidly evolving landscape of transfer pricing in the digital age. Over the past several weeks, I've been engaged in building a few AI agents for various smaller processes and analysis, exploring firsthand how these systems can transform our approach to intercompany transactions. There are several other ways where AI can contribute to transfer pricing, and it can perform tedious and time-consuming tasks more effectively. AI can be used to analyze and review the large volume of data relating to transfer pricing, including internal company data, inter-entity agreements and inter-entity related financial details, because it can also be used to draft transfer pricing reports and documents, which outline the functional analysis, financial flows and allocation of risk between the various entities. This demonstrates the potential impact that AI can have on transfer pricing, therefore it can reduce time and costs, improve accuracy, and ensure consistency. As AI develops, it is likely to become a key tool for addressing transfer pricing compliance and documentation requirements across multiple jurisdictions, thus it will continue to play a crucial role in this field.

VIII. EXECUTIVE BACKGROUND: HOW AI AGENTS WORK

A. AI is transforming transfer pricing practices and AI replaces human tasks, which can be conceptualized as agents within organizations. The AI framework includes:

1) *A Goal Interpreter:* The interpreter specifies the goal of the AI, and by analogy, the tax manager determines the transfer pricing policy of a company. The interpreter must be analyzed to understand the AI goals and how they intersect with the company's goals, therefore, the goal interpreter is a crucial component of the AI framework.
2) *A Planner:* The planner determines how to achieve the goal, so the planner is responsible for outlining the steps necessary to accomplish the objective.
3) *The AI Strategizing:* The AI develops strategies autonomously, which complicates the transfer pricing, and this complication arises because the AI's autonomous strategy development can lead to unpredictable outcomes.
4) *Functional specialization:* Functional specialization is comparable to the division of labor between different departments, thus, the AI is used for particular tasks, such as financial analysis or contract drafting. This has an impact on the allocation of value, because the AI's tasks can affect the way value is distributed within the organization.
5) *Memory And Learning Capacity:* The AI learns from previous actions, and in the context of transfer pricing, this means that the AI can learn how to price or how to organize the supply chain. The impact should be taken into account when allocating value, therefore, the AI's memory and learning capacity must be considered when determining the allocation of value.

B. The ways in which AI influences the transfer pricing can be summarized as follows:

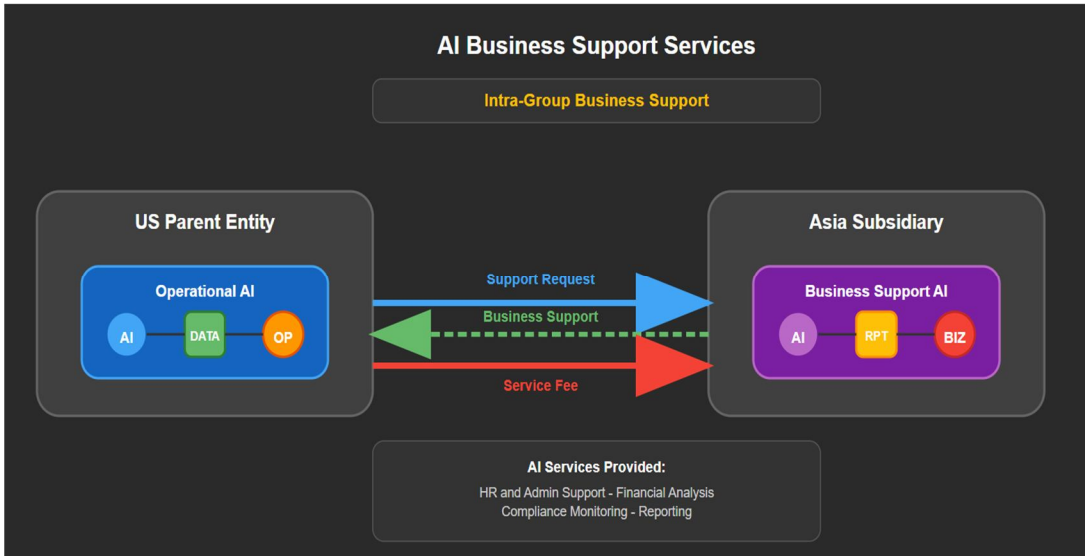
1) *Functions:* The AI performs tasks ranging from simple to highly complex, and these tasks can be performed simultaneously, thus increasing the complexity of transfer pricing.
2) *Assets:* Instead of physical assets or human know-how, the focus is on intangible assets such as AI code and data, and those are reproducible and can be used simultaneously in multiple places, presenting challenges to transfer pricing.
3) *Risks:* AI introduces new risks, such as software bugs or non-transparent decision making, and the risk allocation and the cost of mitigating those risks need to be considered, because these risks can have a significant impact on the organization's overall value.

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C. AI-Agent Ecosystem & Related-Party Transactions:

This diagram shows how AI systems interact across company entities, highlighting potential transfer pricing touchpoints.

Fig. 2: AI Related Party Transactions



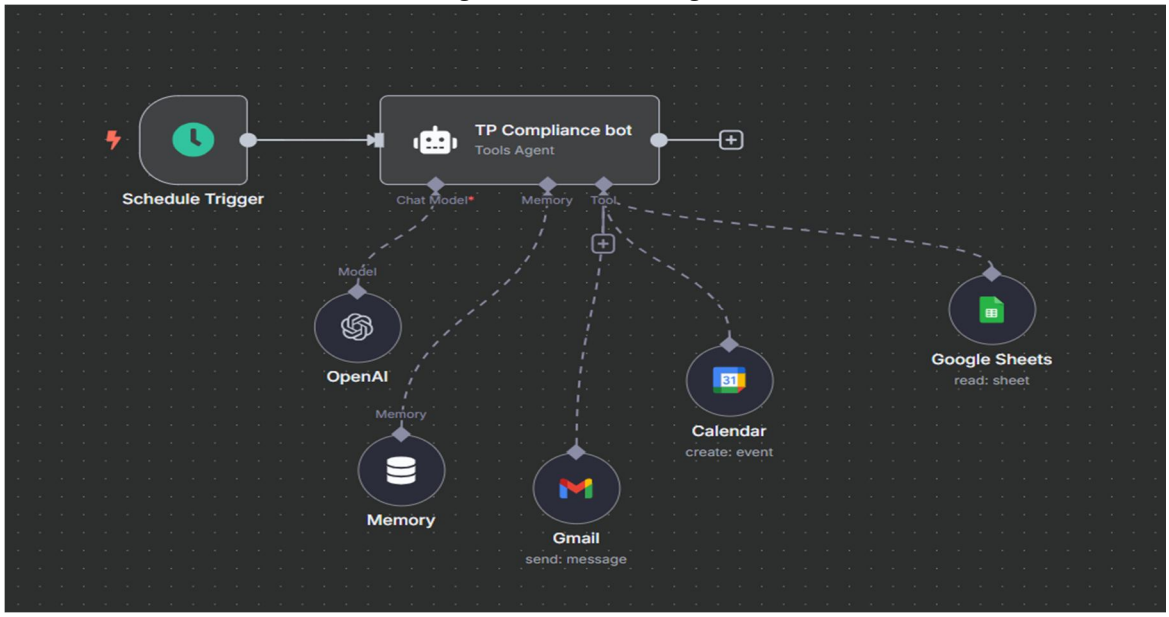
This diagram demonstrates how AI systems across related entities create intra-group transactions that require transfer pricing consideration. US parent's Operational AI sends automated support requests to the Asia subsidiary's Business Support AI, which then provides specialized services including HR administration, financial analysis, compliance monitoring, and reporting.

From a transfer pricing perspective, this AI-to-AI service arrangement represents a modern evolution of traditional shared service centers. The automated nature of these transactions means that AI systems are continuously exchanging data, processing requests, and delivering services without human intervention, creating a constant stream of intra-group value transfer.

D. My experience with AI Agents

I have included an illustrative image here showing one of my recent implementations in action

Figure Number 3: AI Agent



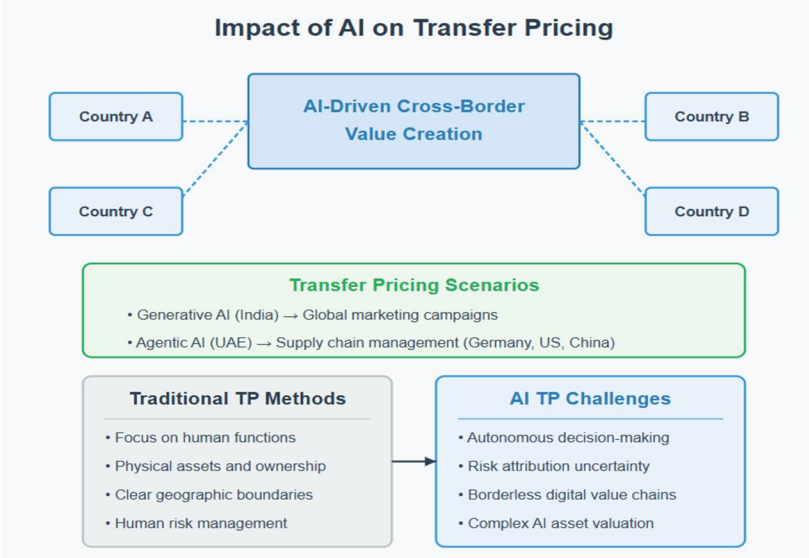
This AI agent represents an automated transfer pricing compliance monitoring system. The system operates by reading transfer pricing data and policy information stored in Google Sheets, including related party transaction details, compliance deadlines, and entity-specific TP policies. Using OpenAI's processing capabilities, the agent continuously analyzes this data and automatically generates compliance reminders, due date alerts, and policy updates. The system then sends these notifications directly to relevant stakeholders via Gmail and can create calendar events to ensure critical transfer pricing deadlines are never missed.

From a transfer pricing perspective, this AI agent addresses one of the most challenges facing MNEs: maintaining consistent compliance across multiple jurisdictions with varying deadlines and requirements. The automated nature of this system ensures that transfer pricing teams receive timely reminders about documentation filing dates, policy reviews, and regulatory changes without manual monitoring. This reduces the risk of missed deadlines and penalties while allowing TP professionals to focus on higher-value activities such as economic analysis and strategic planning. The integration of memory capabilities means the agent learns from past interactions and can provide increasingly relevant and personalized compliance guidance over time.

IX. ARTIFICIAL INTELLIGENCE AND ARM'S LENGTH PRICING

The rise of AI in the business world is fundamentally reshaping how substances are created, delivered, and captured across multinational enterprises. As AI systems are also involved in key decision-making processes, often across jurisdictions— and across operations, this traditional framework becomes strained from a transfer pricing perspective. The core challenge becomes how to delineate and allocate income when AI performs economically significant functions without direct human intervention & control.

Fig No. 4: Impact on TP method



This section captures the challenges and implications of applying the arm's length principle in inter-company transactions involving AI. From identification of transactions to selecting appropriate methods and redefining comparability, each section discusses how the arm's length principle or related guidance must transform to address machine-led value creation in a practical, principled way.

A. Delineation of Related Party Transactions in AI Ecosystem

The OECD emphasizes that 'where there is doubt as to what transaction was agreed between the associated enterprises, it is necessary to take into account all the relevant evidence from the economically relevant characteristics of the transaction' (OECD ¶1.47). In AI-driven environments, this principle becomes critical as traditional contractual terms may not capture the autonomous decision-making and value creation performed by AI systems

The Guidelines require that 'the actual transaction between the parties will have been deduced from written contracts and the conduct of the parties... Where the characteristics of the transaction that are economically significant are inconsistent with the written contract, then the actual transaction will have been delineated in accordance with the characteristics of the transaction reflected in the conduct of the parties' (OECD ¶1.140). For AI-to-AI transactions, this 'conduct' must be interpreted through the lens of programmed decision-making protocols and algorithmic behavior

The accurate delineation of related party transactions is the foundation of any transfer pricing analysis under the arm's length principle. This involves identifying the economically relevant characteristics of the transaction, including the functions performed, assets used, and risks assumed. In AI-driven arrangements, this delineation becomes complicated. AI systems often operate autonomously across multiple jurisdictions without human control and perform various functions on their own. This raises the fundamental question: what constitutes the transaction when value is created by AI-to-AI instructions or arrangement. There can be the following scenarios:

1) One AI system is built by humans using data and following processes across various jurisdictions
2) AI to AI transactions without human involvement e.g. AI in India is negotiating with AI of Singapore (related party) for procurement process.

B. Practical Example

Consider a group where:

1) Entity A located in Switzerland develops the AI model, and if they sell the right to use the AI model, it's a license, so if they allow others to use the AI model they own, it's a service.
2) Entity B located in Singapore runs the AI model; therefore, this is a service.
3) Entity C in Brazil provides data to train the model and fine tunes the model, thus the provision of data may be a license or service, because fine tuning is a service.
4) Entity D in Canada receives AI reports and uses them for planning purposes, so this is a service.

OECD para. 1.42 emphasizes that contracts alone are not sufficient. The real conduct of the parties—and in this case, the conduct of autonomous systems—must drive the TP analysis.

An entity in Singapore runs an AI model which was initially developed in Switzerland, but the Singapore entity decides how it is used, adapts it to real-world needs and takes the risk if it doesn't perform. The value-creating activities are in Singapore, even if the AI model is just static code, because the value is created by the way it is applied, integrated and adapted in real-time, thus these activities are crucial in determining the economic substance. These dynamic activities must be considered in functional and comparability analysis; therefore, they play a significant role in understanding the true economic value created by the AI model.

In AI-to-AI transactions, it gets even more complicated, e.g. between two related parties, an Indian procurement AI and a Singaporean supply-chain AI negotiating autonomously, without human involvement, and what does "conduct" and "control" mean. The focus shifts to upstream human inputs and controls: how the AI was trained, override mechanisms and real-time human supervision, because for example, if the Indian party programmed its AI with tight margin thresholds and retained veto rights over certain deals, it is the decision-maker, even though the AI autonomously conducts the transactions. The negotiation function (and value created) should be allocated to India, where the control and decision-making are located, thus requiring more detailed documentation around upstream human inputs and controls. It also requires a rethink of OECD Chapters I-III and how functions, assets and risks are interpreted in AI-driven transactions, therefore demanding a thorough analysis of the existing frameworks and their application to AI-driven transactions. The principle of substance over form should be given greater importance in the case of AI transactions, and the substance of the relevant parties and their functions in relation to the AI must be examined. That is, who controls AI, who has the AI programmed with the logic to act and who has the risk of AI decision-making, because autonomous systems may make it difficult to define the functional role of the parties involved, but transfer pricing should always be based on the economic reality of the transaction. For example, who is controlling the AI and who is bearing the risk of the AI underperforming or making mistakes, thus requiring a thorough examination of the parties involved and their respective roles in the AI transaction.

X. FUNCTIONAL ANALYSIS AND IDENTIFICATION OF VALUE CREATION

One of the biggest challenges in applying traditional transfer pricing approaches to AI is the lack of human involvement in the actual creation of value, and traditional transfer pricing focuses on how people contribute to the value and profitability of a business, but the value of an AI-driven business is often generated by machines. To address this issue, the DEMPE (Develop, Enhance, Maintain, Protect and Exploit) analysis can be used to identify each party's contributions to the development and implementation of AI, because this analysis provides a framework for understanding the different roles and responsibilities involved in the creation and exploitation of AI.

1) *Develop:* Who created AI, and this is the initial development of algorithms and data, so it is a critical component of the AI's overall value.
2) *Enhance:* Who is improving the AI, and this relates to the development of additional features or refinement of the AI to improve its functionality, thus making it more valuable and effective.

3) *Maintain:* Who is maintaining the functionality of the AI, and this refers to the maintenance of the AI to ensure it is operating effectively and keeping it up to date, therefore requiring ongoing effort and resources.
4) *Protect:* Who protects the AI, and this is all about patents, copyright, and keeping the AI from theft, because protecting the AI's intellectual property is essential to its long-term value.
5) *Exploit:* Who exploits AI, and this is about using the AI to generate income, so it is a critical aspect of the AI's commercialization.

It can be challenging to determine the value of each element, particularly when there are multiple participants from multiple countries, and one person may create AI, another may maintain and improve it, and a third may exploit it, thus making it challenging to allocate the revenue generated by the AI. Since AI is autonomous, it is often difficult to determine where humans fit in and who gets what cut of the revenue, therefore requiring a careful analysis of the different contributions and roles involved in the AI's development and exploitation.

The OECD recognizes that 'it may be the case that outsourced functions performed by associated enterprises will be controlled by an entity other than the legal owner of the intangibles. In such cases, the legal owner of the intangible should also compensate the entity performing control functions related to the development, enhancement, maintenance, protection, and exploitation of intangibles on an arm's length basis (OECD ¶6.53). This principle is particularly relevant for AI systems where control functions may be distributed across multiple jurisdictions through algorithmic governance

A. AI functions to be Analyzed Include

1) Algorithm development (e.g., model architecture, coding)
2) Training and fine-tuning (e.g., localized datasets, reinforcement learning)
3) Deployment and monitoring (e.g., real-time validation, safety protocols)
4) Governance (e.g., setting operational thresholds, risk audits)

In the case of machines displacing humans, we must consider the economics of who benefits from the machine and so we must analyze the contribution of various parties to the system and how the system creates value. OECD Guidelines paragraph 1.51 states that to identify the actual conduct of the parties, it is necessary to look beyond labels and formal legal relationships and to focus on the substance, therefore this is true for both humans and machines. If an AI system is making key decisions, optimizing processes or creating value, we must consider who has programmed and trained the system, who controls the system and who bears the risk of the system failing, thus we must use this information in the transfer pricing analysis. The fact that the function is performed by a machine does not diminish its value-added contribution to the chain, because instead, we must use this in the transfer pricing analysis and consider the economics of who benefits from the machine.

In AI-driven models, the functional analysis should be focused on the activities of humans that support the AI-driven models. It should be done to identify the persons who design, operate and bear risks of the AI-driven models, because it is essential to understand the role of humans in AI-driven models. The DEMPE method is used to identify the actions of people that contribute to the AI-driven model, thus it helps to answer questions such as:

a) Who develops the AI-driven model and trains the computer programs?
b) Who enhances the AI-driven model and feeds new data?
c) Who monitors the AI-driven model and solves issues?
d) Who owns the intellectual property of the AI-driven model (patents, copyright, trade secrets)?
e) Who exploits the AI-driven model for economic purposes?

This way, the contribution of people and artificial intelligence can be shared fairly according to their real contribution, therefore it ensures a fair allocation of value. It is, besides, in line with the OECD's approach to focus on substance over form, so it ensures that the contribution of the AI-driven model is considered and allocated to the persons that contributed to the value of the AI-driven model.

XI. SELECTION OF TP METHOD FOR AI-BASED TRANSACTIONS

The OECD acknowledges that 'it will often be the case in matters involving transfers of intangibles or rights in intangibles that the comparability analysis reveals that there are no reliable comparable uncontrolled transactions that can be used to determine the arm's length price and other conditions. This can occur if the intangibles in question have unique characteristics, or if they are of such critical importance that such intangibles are transferred only among associated enterprises' (OECD ¶6.138). This situation is particularly acute for AI systems, which are often proprietary and highly customized."

AI-driven transactions pose a threat to traditional TP, and the self-learning nature of technology and decentralized value contribution make the application of traditional TP methodologies challenging. These methodologies are predicated on the existence of human-driven centralized activities and the existence of reliable comparables; therefore, they may not be suitable for AI-driven transactions.

A. The main challenges for AI-driven transactions are:

1) *The Nature of The Transaction:* AI technology performs many functions simultaneously, such as content generation, supply chain optimization and customer engagement, and it is difficult to isolate the respective contributions for the purpose of transfer pricing.
2) *Multiple Entities Contributing to Value:* The AI lifecycle (development, enhancement, maintenance, protection and exploitation) will typically involve multiple entities in different jurisdictions, because multiple entities will contribute to the development, training, deployment or commercial exploitation of AI technology.
3) *Lack Of Comparables:* AI processes are unique, proprietary and self-improving, thus, there are limited external benchmarks for arm's length pricing.
4) *Examples of These Issues are:*

- Generative AI in India creates marketing content around the world, and how do you allocate value between the developer and the country where the content is used and monetized, so this is a complex issue.
- AI agent in UAE optimizes supply chains in Germany, US, and China, and how do you allocate value, because the AI's decisions impact multiple countries.
- Conventional methods such as CUP, Cost Plus, or Resale Price may not be applicable due to the lack of comparables and the difficulty in separating costs or resale margins, therefore, the use of the Profit Split Method or a modified version may be more appropriate, where profits are allocated based on each party's contribution to the AI lifecycle. However, a thorough functional analysis is needed to determine: Who developed and trained the AI, who controls and enhances the AI, who bears the risk if the AI fails, and who utilizes its output and generates revenue, because these are critical questions.
- It is important to consider the substance over form, as outlined by the OECD Guidelines, and consider what the parties actually do, who controls the AI's functions, and who bears the risks, thus, you may need additional documentation and new TP rules for AI-driven transactions, because the existing rules may not be sufficient.

B. Methodological Considerations

1) The Comparable Uncontrolled Price (CUP) method may apply in limited scenarios, such as standardized AI APIs offered to third parties and related parties under similar terms.
2) Cost Plus or TNMM may be suitable for routine support functions, such as data labeling, quality control, or server hosting.
3) In cases involving co-development, shared datasets, or joint AI training across entities, the Transactional Profit Split Method (TPSM) is typically most aligned with the economic reality. OECD ¶2.108–2.124 specifically recommends TPSM for transactions involving highly integrated operations and unique intangibles.

Example:

Consider an MNE that develops a fraud detection system in the United States, and the Indian and Mexican partners then contribute all local transactions and any tagged issues to the model. The partners then also train the model with localized data, so in this case, each partner contributes significantly to the development of the model and its ultimate commercial success. The allocation of profits based on activities, data contributions, and risk assumed, therefore, more closely aligns with an arm's length outcome than a fixed profit split, because this approach takes into account the various contributions made by each partner.

The OECD's hard-to-value intangibles framework becomes particularly relevant for AI systems, where 'income and cash flow projections in such situations can sometimes be especially speculative' (OECD ¶6.151). AI valuations must account for the inherent uncertainty in algorithmic performance, model obsolescence risk, and rapidly evolving technological landscape.

In summary, for AI systems, the economic activity analysis should be an essential consideration in selecting an appropriate method, thus where value creation is widely distributed, highly intangible, and machine driven, a profit split may be the most appropriate method to align the activities of the parties and the arm's length standard.

XII. COMPARABILITY ANALYSIS IN AI CONTEXT

Traditional transfer pricing comparability hinges on finding transactions that are "sufficiently similar" under the five OECD comparability factors. However, AI-driven transactions routinely break these anchors due to:

1) *Proprietary Learning Feedback Loops:* Unlike static software, AI systems improve via continuous data ingestion and model training, making their performance—and thus value—dependent on user-specific usage patterns. This dynamic evolution resists benchmarking.
2) *Lack of External Market Analogues:* Most transformative AI technologies (e.g., large language models, diagnostic engines) are developed and exploited internally by leading firms, with limited or no third-party licensing data.
3) *Extreme Customization:* Deployment often requires tailored tuning (e.g., model fine-tuning, dataset curation, latency calibration), leading to a degree of transactional specificity that makes even broad financial ratios like return on assets (RoA) or Berry ratios non-comparable.
4) *Economies of Scale and Compute Differentiation:* Compute cost, latency sensitivity, inference frequency, and model size (parameter count) dramatically affect economic value but are difficult to standardize across transactions.

These constraints render many traditional CUP or TNMM-based comparisons unusable without extreme adjustments arising reliability concerns under OECD.

XIII. OECD-COMPLIANT ADAPTIVE TECHNIQUES

A. OECD allows for "reasonable alternatives" when comparables are lacking. Three pragmatic solutions emerge in AI contexts:

1) *Internal Comparables (If Available):* If the same AI system is licensed across related parties under materially similar conditions (e.g., cloud-based LLM access under consistent SLAs), internal CUPs may be defensible—provided functional intensity and data contributions are reasonably matched.
2) *Synthetic Benchmarking:* MNEs may construct synthetic comparables by applying risk-adjusted cost-based mark-ups. This is particularly relevant for high R&D cost centres or AI inference-as-a-service models. Adjustments may include:
   - Adding mark-ups on computers and engineering costs.
   - Layering IP valuation proxies (e.g., using relief-from-royalty where market royalties for "narrow AI" functions exist).
   - Risk premiums adjusted for model deployment exposure and data reliability.
3) *Contribution-Weighted Profit Split:* In scenarios where the AI's effectiveness is co-determined by each user entity's local data contributions, engineering refinements, or regulatory alignment (e.g., GDPR-compliant retraining), a residual or contribution-based profit split may better reflect value creation (OECD ¶6.65, ¶2.126). Contribution keys may include:
   - Volume and quality of anonymized data supplied.
   - Number of validated local model enhancement cycles.
   - Cost and responsibility for local regulatory adaptation.

B. Practical Example: AI Diagnostics Engine Deployment

Scenario: A multinational licenses a proprietary AI-powered diagnostics tool (e.g., for radiology image interpretation) to five subsidiaries. Each entity's local dataset influences the system's accuracy due to federated learning cycles.

1) *Challenge:*
   No third-party comparables exist. The AI's value varies depending on the dataset volume and clinical accuracy feedback loop, both of which differ across entities.

2) *Approach*

The group adopts a residual profit split with contribution keys tied to:

- Local patient dataset volume (proxy for enhancement potential),
- Governance efforts (e.g., data sanitisation, annotation quality),
- Feedback loop integration frequency.

3) *Rationale*

This method reflects the co-development nature of the AI model and aligns with the OECD's principle of aligning profits with value creation.

C. Risk & Next Steps

MNEs should meticulously document:

- Why reliable external comparables are absent
- Functional contribution metrics for synthetic or PSM models,
- Sensitivity of AI value to local factors (compute, data, latency),
- How contribution keys were constructed and validated.

Proactive dialogue via APA or MAP frameworks is recommended where aggressive IP-based returns are allocated using synthetic or residual methods.

XIV. RECOMMENDED CHANGES TO THE OECD TRANSFER PRICING GUIDELINES

Artificial intelligence systems are increasingly substituting for human activity, and they can take decisions, optimize processes, and produce content without human intervention. This raises issues with the application of the OECD Transfer Pricing Guidelines because the Guidelines are based on human activity. The OECD Guidelines do not provide guidance on value creation by autonomous systems; therefore, they should be amended to account for autonomous systems and also how to take account of the ownership of data and algorithms. The value generated by humans and robots would be taken into account, and this would allow for the arm's length principle to be applied in the new world of value creation.

The Guidelines acknowledge that 'intangibles that are important to consider for transfer pricing purposes are not always recognized as intangible assets for accounting purposes... Such intangibles may nevertheless be used to generate significant economic value and may need to be considered for transfer pricing purposes' (OECD ¶6.7). This recognition is particularly relevant for AI-generated content, algorithmic improvements, and machine learning outputs that may not appear on traditional balance sheets

A. Below are detailed, structured recommendations to update the OECD Guidelines, grounded in established principles but tailored for AI-driven environments:

1) Creation of a Dedicated Chapter on AI-Driven Transactions:

The OECD should introduce a new chapter, similar to Chapter VI (Intangibles) or Chapter X (Financial Transactions), that comprehensively addresses AI-specific transfer pricing issues. This chapter should:

- First, it should define what intangibles are in an AI context, and these include pre-trained model weights, reinforcement feedback, and synthetic outputs. These intangibles are critical for AI value creation, and therefore, they should be carefully considered.
- Second, it should separate static intangibles from dynamic capabilities, because static intangibles include codebase and architecture, and dynamic capabilities include self-learning models and algorithm refinement. They evolve over time and have value, thus requiring special attention.
- Third, it should provide AI-tailored guidance on DEMPE, so it can address the complexities of AI, and this is because continual learning and reinforcement loops blur "Enhancement" and "Maintenance". For instance, fine-tuning a self-learning model is an enhancement while keeping it relevant, and therefore, it should be guided by the new chapter.

This addition would help clarify ownership, valuation, and attribution of AI systems in a manner that reflects technological realities.

2) Formal Recognition of Machine-to-Machine (M2M) Transactions:

The OECD's principle that analysis should focus on 'the factual substance of the commercial or financial relations between the parties and accurately delineate the actual transaction' (OECD ¶1.140) becomes crucial when examining AI-to-AI interactions, where economic substance may exist without traditional human oversight.

B. The OECD should revise its guidelines, and this is necessary because machine-to-machine (M2M) transactions in AI are significant:

1) *Treat M2M Transactions as Controlled:* Inference calls, feedback loops, decision signals and API calls among group companies should be considered controlled transactions, so they generate significant value and should be treated on par with human transactions.
2) *Specify Rules for Characterization:* The OECD should specify rules to determine whether such transactions are a service, a license or a cost sharing arrangement, therefore this will help to characterize the transactions and allocate the value. For instance, if an Indian company is making repeated requests to a language model in the UAE to serve its customers in multiple

languages, how should this be characterized, because the answer depends on who owns what, who takes the risk, and what's actually happening,

3) *Expanded Guidance on Economic Ownership of AI Assets:* The OECD Guidelines currently adopts the notion of economic over legal ownership, and AI development makes attribution more complex and therefore it is necessary to provide additional guidance.

- First, the entire lifecycle of AI development should be considered, and this includes the initial creation, data collection, labelling, enhancement, governance and regional customization. All these steps contribute to the value of the model; thus, affiliates that have contributed to these steps should be considered for attribution.
- Second, intra-group profit attribution should be aligned with actual functional contributions, because affiliates that have contributed non-legal inputs which have added value to the model should be considered, so for example, if a Colombian affiliate has customized a voice AI to recognize local dialects, it should be entitled to a share of the returns from that market.

AI-to-AI transactions often exhibit characteristics of 'highly integrated business operations' where 'the way in which one party to the transaction performs functions, uses assets and assumes risks is interlinked with, and cannot reliably be evaluated in isolation from, the way in which another party to the transaction performs functions, uses assets and assumes risks' (OECD ¶2.133). This integration supports the application of profit split methods for AI ecosystems

4) *Development of a Comparability Framework Tailored to AI Ecosystems:* AI transactions require a different approach to comparability and the traditional approach to comparability is not suitable for the unique technology and business requirements of AI. The OECD comparability analysis framework must be adjusted for AI; therefore, the following adjustments are proposed:
   - *Processing Speed and Computing Time:* Processing speed and computing time are relevant, as they affect the performance and costs of AI, thus, they are important factors to consider.
   - *Training Data:* High quality and scarce training data improve the quality of AI, so, they are crucial for its development.
   - *Transparency and Legality of AI:* Transparency and legality are beneficial, because they increase trust in AI systems.
   - *Increased Security and Legal Controls:* Security and compliance are important for AI, particularly in cross-border applications, and, therefore, they should be prioritized.

For intercompany AI transactions, there is a lack of comparable third-party transactions, so, the OECD should encourage the application of profit splits or cost contributions for jointly developed or jointly exploited AI. The OECD should also promote the application of artificial comparables, such as risk-, size- and innovation-adjusted cost-plus, because this facilitates the estimation of arm's length prices where comparable market transactions are unavailable, thus, it provides a solution to this problem.

5) *Revised Interpretation of Control over Risk (CoR) in AI Context:* The OECD clarifies that 'control over risk should be understood as the capability and authority to decide to take on the risk, and to decide whether and how to respond to the risk, for example through the timing of investments, the nature of development programs, the design of marketing strategies, or the setting of production levels' (OECD ¶1.67). For AI systems, this translates to oversight of algorithmic decision-making parameters, model governance protocols, and risk mitigation strategies.
   The OECD's control-over-risk standard should be adapted for the AI context, and the concept of control is not direct human control. Rather, control over risk is the oversight and governance of autonomous processes, because control over AI risk is evidenced by model oversight, setting operational boundaries, algorithm auditing, and governance policies.
   To address this, the OECD should:
   - *Expand the Meaning of Control Over AI Risk:* The OECD should expand the meaning of control over AI risk to include validation testing of model outputs to ensure accuracy, bias detection and correction to prevent discrimination, and ethical guidelines with override mechanisms to ensure the appropriate use of AI, thus these demonstrate active risk management.
   - *Strengthen the Requirement for Internal Decision Making:* Even if AI control is outsourced, the entity claiming risk based returns must still make decisions, so this includes setting policies, monitoring outsourced activities and being accountable for AI outcomes and risks, therefore this should ensure that entities claiming AI risk based returns demonstrate active involvement in AI safety, governance and accountability, thus this will support the arm's length principle and economic substance.

6) *Flexibility in Tested Party Determination*

The selection of tested party becomes complex in AI ecosystems where 'the contribution of at least one party to the transaction can in fact be reliably evaluated by reference to comparable uncontrolled transactions' may not apply (OECD ¶2.133). This requires careful consideration of which entity performs the most routine functions versus those controlling unique and valuable AI capabilities.

The OECD's tested party selection criteria are not well suited to AI ecosystems, where roles are difficult to define, and value is created and shared across a range of different parties, and the OECD should therefore expand tested party roles. The OECD should broaden the definition of tested party roles to include parties that contribute to or are involved in the creation, use or enhancement of AI, because this will allow for a more comprehensive understanding of the AI ecosystem. The OECD should consider the AI platform and its co-developers as a single tested party, thus adopting an ecosystem approach. The OECD should test modules, and decompose the AI value chain by function, so that each piece can be tested independently, and therefore provide a more accurate assessment of the AI ecosystem.

XV. CONCLUSION

Artificial Intelligence (AI) presents new challenges to the traditional thinking of transfer pricing, and this paper examines the implications of AI on transfer pricing and proposes amendments to the OECD Transfer Pricing Guidelines. The guidelines should be amended to reflect value creation from AI, such as value creation from autonomous decision-making, machine-to-machine sales, joint DEMPE activities, and algorithmic risk management, because AI agents are digital workers who can perform highly valuable functions without human input. The paper illustrates how value creation from AI differs from the traditional conception of value creation, and it does not require significant human control, geographic location, or the ownership of traditional assets. AI agents are digital workers who can perform highly valuable functions without human input, thus shattering old concepts of functional analysis, risk and economic reality.

This shatters old concepts of functional analysis, risk and economic reality, and therefore, the report concludes that profit splits, particularly contribution-based profit splits, are the most suitable approaches for AI. Traditional unilateral approaches such as CUP, Cost Plus, and TNMM are inadequate for AI, because they do not account for the existing practice of AI development and application within MNE groups, so the report illustrates the role of synthetic benchmarking and weighted profit splits when comparables are not available.

1) Best Approach: The report concludes that profit splits, particularly contribution-based profit splits, are the most suitable approaches for AI, and traditional unilateral approaches such as CUP, Cost Plus, and TNMM are inadequate for AI.
2) Comparability Analysis: AI is difficult to compare with other products, services or assets, because AI is constantly learning, utilising large quantities of data, and is often bespoke through algorithms, and the report illustrates the role of synthetic benchmarking and weighted profit splits when comparables are not available.

Risk control, which is not people making decisions, but rather algorithms, model validation and risk mitigation, requires more documentation, such as documentation on how the software was programmed, how to turn it off, and testing, because new ownership concepts are necessary. AI creates intangibles that are difficult to own, and for example, it may be necessary to consider how data, software modifications, and value creation across borders contribute, thus the paper puts forth approaches to allocate ownership of value based on contributions at each stage of AI, rather than ownership of rights. Transfer pricing has to evolve for AI, according to the paper, so that taxation and MNEs are aligned, and also can adapt to AI in an increasingly digital and interconnected world, therefore, the paper examines the implications of AI on transfer pricing and proposes amendments to the OECD Transfer Pricing Guidelines.

A. *Practical Implications for MNEs:*

1) *Transfer Pricing Policy Development:* MNEs should prioritize comprehensive AI transfer pricing policies that document the entire AI value chain, from initial development through ongoing enhancement and exploitation. This includes establishing clear protocols for valuing data contributions, algorithmic improvements, and cross-border AI services.
2) *Documentation Enhancement:* The research underscores the critical importance of robust documentation covering AI governance structures, risk management protocols, and functional contributions across jurisdictions. MNEs should implement enhanced record-keeping for AI decision-making processes, override mechanisms, and performance validation activities.
3) *Advance Pricing Agreement Strategies:* Given the uncertainty surrounding AI valuations and the limited availability of traditional comparables, MNEs should proactively engage tax authorities through bilateral or multilateral APA frameworks to establish acceptable methodologies for AI-related transactions.

XVI. RECOMMENDATIONS

A. For Tax Authorities and Policy Makers:

1) OECD Guidelines Enhancement: The OECD should expeditiously develop dedicated guidance for AI transactions, including:
   - Formal recognition of machine-to-machine transactions as controlled transactions subject to transfer pricing rules
   - Enhanced DEMPE analysis specifically addressing continuous learning and algorithmic enhancement
   - Clarified control over risk standards for autonomous systems
   - Expanded profit split method guidance for integrated AI ecosystems
2) Safe Harbor Development Tax authorities should consider developing bilateral or multilateral safe harbors for routine AI applications (e.g., standardized APIs, basic automation tools) to reduce compliance burdens while focusing examination resources on unique and valuable AI systems.
3) Advance Pricing Agreement Prioritization Revenue authorities should establish specialized teams with technical AI expertise to facilitate APA negotiations for complex AI arrangements, ensuring consistent application of principles across jurisdictions.

B. For Multinational Enterprises

1) Proactive Transfer Pricing Strategy:

- Conduct comprehensive AI value chain analysis to identify all intercompany transactions involving AI systems
- Develop robust economic models for AI valuation incorporating uncertainty analysis and scenario planning
- Implement regular benchmarking studies focusing on functional comparability rather than product similarity

2) Enhanced Documentation Protocols:

- Establish detailed AI governance documentation covering decision-making authorities, risk management protocols, and performance validation processes
- Maintain comprehensive records of data contributions, algorithmic enhancements, and local customizations across jurisdictions
- Implement real-time tracking of AI-generated value creation and cost savings

3) Risk Management Framework:

- Develop specific risk management protocols for AI transfer pricing, including obsolescence risk, bias risk, and regulatory compliance risk
- Establish clear escalation procedures for AI-related transfer pricing disputes
- Consider insurance or indemnification arrangements for AI-related transfer pricing exposures

C. For Tax and Transfer Pricing Professionals:

1) Capability Development Transfer pricing professionals must develop technical AI literacy to effectively analyze AI value creation, understand algorithmic decision-making, and assess AI-related risks. This includes understanding machine learning architecture, data processing workflows, and AI performance metrics.
2) Interdisciplinary Collaboration Effective AI transfer pricing requires close collaboration between tax professionals, data scientists, AI engineers, and business stakeholders to ensure accurate functional analysis and risk assessment.
3) Continuous Learning Framework Given the rapid pace of AI technological development, transfer pricing professionals should establish systematic approaches for monitoring AI advancement and their implications for transfer pricing policy and compliance.

D. Future Research Directions:

This paper opens several avenues for future research:

1) *Quantitative Modeling:* Development of sophisticated economic models for AI valuation incorporating uncertainty analysis, competitive dynamics, and technological obsolescence patterns.
2) *Cross-Border Data Flows:* Analysis of transfer pricing implications for data localization requirements, privacy regulations, and cross-border data sharing in AI contexts.
3) *Industry-Specific Applications:* Deep-dive studies into AI transfer pricing challenges in specific sectors (pharmaceuticals, financial services, manufacturing) with detailed case study analysis.

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4) *Developing Country Perspectives*: Research into AI transfer pricing implications for developing countries, including capacity building needs and revenue protection strategies.

XVII. FINAL OBSERVATIONS

Artificial intelligence (AI) is a massive issue for international taxation, and AI is transforming business models and the creation of profits. Traditional tax rules are ill-equipped to deal with the new challenges, because this paper argues that AI must not be treated as a traditional intangible asset. Taxation and multinational enterprises must consider how AI alters the location of profit, risk and substance; thus, AI is not just another tool, but a disruptive innovation that renders traditional approaches to profit and risk allocation obsolete. The arm's length principle must continue to be applied, and each state must receive a fair share of the profits, therefore there is a need for significant assistance from tax practitioners, technology firms and others.

We need policies that are intelligent and workable, so we should act before the AI express leaves the station and transfer pricing rules are left behind. As AI becomes more sophisticated and ubiquitous, it will complicate transfer pricing, and international taxation should adapt to AI, but must remain mindful of maintaining fairness, transparency, and substance in the international tax system.

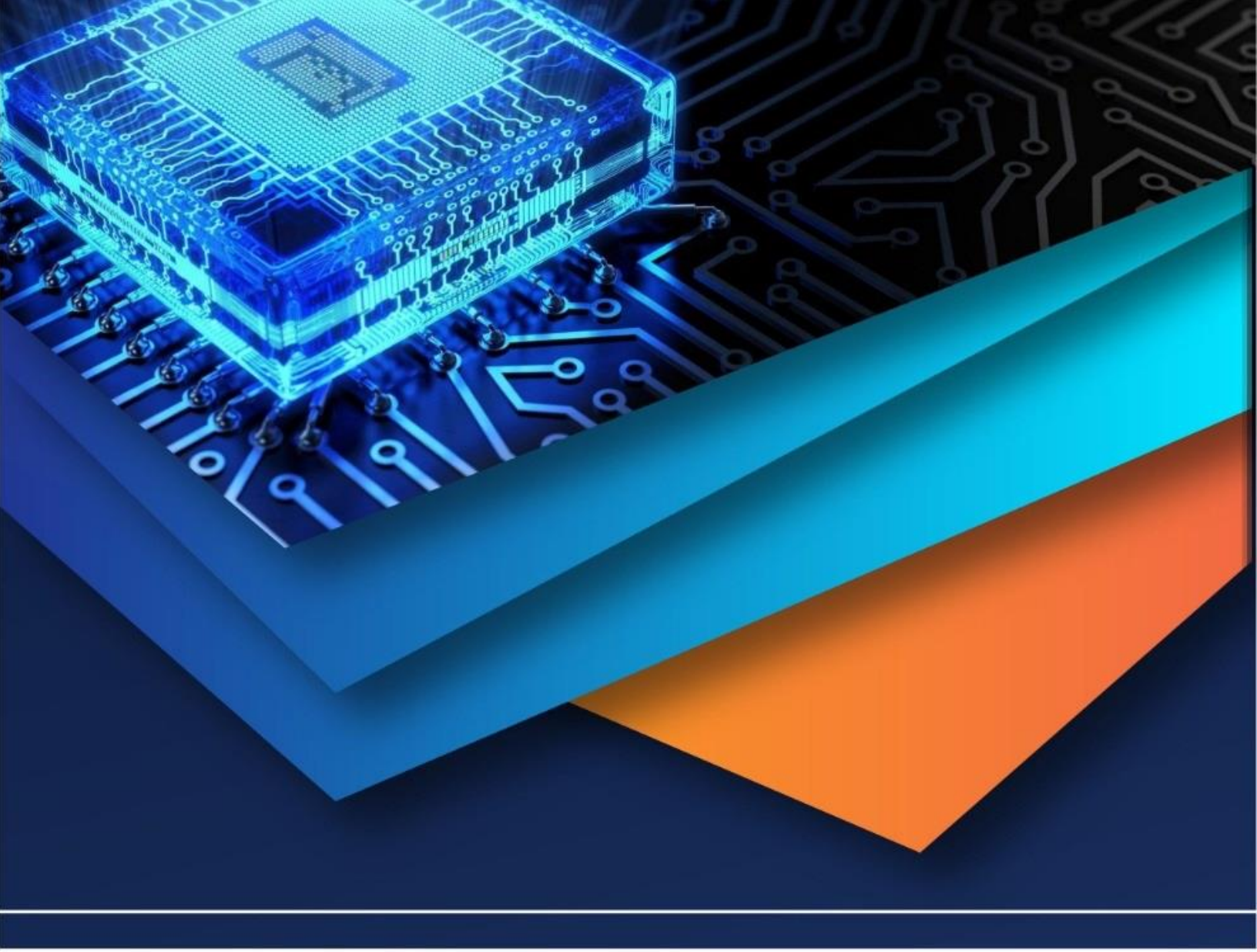
Change is inevitable, and the question is no longer whether transfer pricing will evolve in response to AI, but rather how quickly and effectively it will evolve, therefore we should ensure that such evolution supports other objectives, such as cooperation in the tax arena and fairness, in the digitalized economy. This paper contributes to the discourse on digital taxation and transfer pricing, because it provides a comprehensive analysis of the issues.

This publication analyses how AI generates revenues within MNEs, and proposes a vision for the future, thus as the first comprehensive analysis of AI and transfer pricing, it lays the foundation for the next stage of international tax reform.

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