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Technology Adoption and Regulations: The Ideal Level of Discretion

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New technologies, although beneficial, pose significant regulatory challenges. This article emphasizes that while standardization is essential to prevent inconsistency and unpredictability, maintaining a certain degree of discretion is also necessary. Using insights from microeconomic theory and international best practices, the article categorizes regulatory challenges such as competition, conflicts of interest, job displacement, rent-seeking, security and privacy concerns, fraud, tax evasion, corruption, money laundering, and compliance with anti-terrorism measures. Several regulatory tools are identified to effectively manage these challenges. These include transparency and disclosure, collaboration and information sharing, financial incentives (grants, subsidies, and tax incentives), reducing barriers to market entry and exit, open standards and interoperability, and whistleblower protection. A survey was conducted to assess expert opinions on the gap between current regulatory practices and optimal standards for each tool. The results revealed notable discrepancies, particularly regarding barriers to market entry and exit. The results indicated that current regulations for market entry are overly restrictive compared to the optimal levels recommended. Additionally, the survey highlighted that reducing barriers to exit for large financial institutions requires greater discretionary flexibility compared to smaller firms. The results show a need for targeted regulatory adjustments based on institutional differences and systemic importance.

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1 Introduction

Law and regulations, as a system of rules, are discussed in economics literature with the aim of making it more efficient (Listokin, 2019). Microeconomics theory improves legal efficiency by studying incentives, evaluating the social welfare impact of rules, correcting market failures, and considering psychological factors. This can help establish a framework of

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standardization and rules that ensure consistency, fairness, and order within society, protect individual rights, promote justice, and maintain social order.

In this paper, I focus on the financial system and discuss how adopting new technologies, while beneficial, can be disruptive and present significant challenges, necessitating regulation. I categorize the main challenges as competition, conflicts of interest, job displacement, rent-seeking, security and privacy concerns, fraud, tax evasion, corruption, money laundering, and anti-terrorism policies. This categorization is used to discuss the ideal level of discretion in law and regulations.

While standardization is crucial for avoiding inconsistency and unpredictability of the law, some degree of discretion is also necessary (Shavell, 2007). Flexibility and adaptability allow regulators to consider unique circumstances and make context-specific decisions. It is important to note that certain variables are not included in rules but are observed by adjudicators (Shavell, 2007). On the other hand, a high level of discretion can be disruptive, since the objective function of policymaker can be different from the social welfare function.

Balancing standardization with discretion is key to achieving a just and functional legal system. Shavell (2007) discusses limiting the scope of discretion to constrain the set of decisions that adjudicators are permitted to make and decision-based incentive approach.

Standardization is essential for ensuring consistency and predictability in the law. However, a certain degree of discretion is also necessary to allow regulators to consider unique circumstances and make context-specific decisions (Shavell, 2007). It is important to recognize that some variables are not included in rules but are observed by adjudicators (Shavell, 2007). Nevertheless, excessive discretion can be disruptive, as the objectives of policymakers may differ from the social welfare function. Balancing standardization with discretion is crucial for achieving a just and functional legal system. Shavell (2007) discusses limiting the scope of discretion to constrain the range of decisions that adjudicators are permitted to make and suggests a decision-based incentive approach.

To further enrich this analysis, this study includes a survey designed to assess the optimal and current levels of discretion within the Iran’s Central Bank's laws and regulations governing financial technology adoption in supervised institutions, including banks, deposit-taking institutions, leasing companies, currency exchanges, credit rating agencies, and fintech firms. By comparing expert evaluations of the ideal and actual discretion levels, the survey provides a gap analysis of regulatory effectiveness. Experts are also

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asked whether discretion varies across these entities, offering either differentiated assessments or a general approach. The insights gained will complement the theoretical discussion with empirical data on how Central Bank regulations address key challenges such as competition, conflicts of interest, job displacement, rent-seeking, security, fraud, tax evasion, corruption, money laundering, and anti-terrorism.

Section 2 provides an in-depth analysis of the regulatory environment's influence on technology adoption from a microeconomic perspective. Section 3 extends the discussion by examining global practices pertinent to the regulatory considerations outlined in Section 2. Section 4 synthesizes the findings from Sections 2 and 3 to evaluate the strategic approaches employed by lawmakers. Section 5 discusses the gap analysis between current practices and optimal regulatory standards regarding the Central Bank's laws. Finally, Section 6 offers concluding remarks.

2 A Microeconomic Perspectives

The adoption of advanced technologies by firms is a transformative trend that significantly impacts their operations and competitive positioning. From a microeconomic perspective, these innovations can enhance productivity, create competitive advantages, reduce costs, and expand market reach. While the specific details of each technology can be important, the adoption of new technologies by firms is generally affected by several factors (see e.g. Cirera et al., 2022):

- **Market competitiveness:** It can significantly influence firms' adoption of new technology. The main channel can be identified as creating competitive advantages, which help firms differentiate their products and services, attract more consumers, and stay ahead of rivals. In other words, competitive pressure from other firms in the industry can also drive the adoption of new technologies. Firms must continuously innovate to maintain their competitive edge and avoid being left behind.
- **Skilled Workforce:** The existence of trained and skilled employees is crucial for the successful implementation of new technologies. Firms need to invest in training and development to ensure their workforce can effectively utilize advanced technologies.
- **Infrastructure:** Adequate infrastructure is essential to support new technologies. This includes both physical infrastructure, such as hardware and facilities, and digital infrastructure, such as software and network capabilities.

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- **Integration:** New technologies must be integrable, meaning they should be compatible with the current existing systems and workflows of the firm. Seamless integration minimizes disruptions and maximizes the benefits of new technologies.
- **Risk Aversion:** Firms' risk-averse attitudes can slow the adoption of new technologies. Firms may be hesitant to invest in new technologies due to uncertainties about their effectiveness, potential disruptions, and the costs involved.
- **Consumer Demand:** Consumer demand for innovative and convenient banking services can drive firms to adopt new technologies. Firms that fail to meet consumer expectations risk losing market share to more technologically advanced competitors.

Despite the increasing discussion in the press about advanced technologies such as machine learning, robotics, automated vehicles, natural language processing, machine vision, and voice recognition, their adoption rates remain relatively low. Zolas et al. (2020) highlights that the adoption of these technologies is heavily skewed, with the highest concentration among a small subset of older and larger firms. Moreover, technology adoption exhibits a hierarchical pattern, where the most sophisticated technologies are typically present only when more basic applications are already in place.

Our focus is on the Regulatory Environment. This is another factor and due to the objective of this report, is discussed more extensively. The regulatory environment plays a crucial role in shaping the adoption of new technologies by firms. Directly, regulations can mandate compliance with industry standards, safety protocols, and data protection laws, compelling firms to adopt advanced technologies to meet these requirements. Additionally, governments may offer financial incentives, such as tax breaks or subsidies, to encourage technological innovation, making it more attractive for firms to invest in new technologies. Conversely, regulations may also restrict or ban the use of outdated or harmful technologies, pushing firms towards more efficient and sustainable alternatives. These direct regulatory measures create a framework within which firms operate, significantly influencing their technological adoption decisions.

Indirectly, the regulatory environment affects various factors that drive technology adoption. For instance, regulations that shape market competitiveness by setting industry standards can drive firms to adopt new technologies to gain a competitive edge. Policies supporting education and training programs help create a skilled workforce, essential for the successful implementation of advanced technologies. Government investments in

[DOI: 10.61882/jme.19.4.565]

infrastructure, such as high-speed internet and communication networks, provide the necessary support for technological adoption. Furthermore, clear regulatory guidelines and support for innovation can reduce firms' perceived risks associated with new technologies, encouraging investment. Lastly, regulations promoting consumer rights and transparency can increase consumer trust in new technologies, driving firms to adopt innovations to meet growing consumer demand. Together, these indirect effects create a conducive environment for technological advancement and adoption.

In other words, the adoption of new technologies, while beneficial, can be disruptive and present significant challenges that may lead to market failures, necessitating government intervention and regulation. By addressing these challenges, regulation helps to balance the benefits of technological advancement with the need to protect public interests and maintain social stability. We categorize the main challenges as follows (most cases are discussed in Comunale and Manera (2024)):

- **Competition:** Technological advancements can create high barriers to entry. Promoting competition is crucial to prevent monopolistic practices and foster a dynamic market environment. Policymakers must implement regulations that encourage fair competition, support new entrants, and prevent anti-competitive behaviors. This helps to drive economic growth, foster innovation, and ensure that the benefits of technological progress are widely distributed across society.
- **Conflict of interest:** The adoption of new technology often results in significant conflicts of interest across various domains. These conflicts can arise between the traditional workforce and more skilled employees, as advanced technologies demand specialized skills, potentially leading to job displacement and the need for retraining. Additionally, new technologies can disrupt traditional industries, creating tension between established businesses and new entrants offering innovative solutions. Policymakers may also face conflicts when crafting regulations that favor technological advancements, as traditional industries may resist changes that disrupt established practices. Furthermore, the allocation of resources, such as a highly educated workforce, can become contentious, with traditional industries struggling to compete for talent. Ethical concerns add another layer of complexity, as differing standards and practices can lead to disagreements over the responsible use of technology.

  Furthermore, a conflict of interest might exist between policymakers and the private sector, such as when a central bank manages national payment systems (Klein, 2023). Addressing these conflicts is essential to ensure a

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balanced and equitable technological transition that benefits all stakeholders while minimizing disruptions and inequalities.

- **Job Displacement:** Job displacement due to technological progress can lead to significant social unrest and increased inequality. When automation and AI replace human workers, especially in industries with a high concentration of routine tasks, it can result in widespread job losses. This displacement often disproportionately affects low-skilled workers who may lack the resources or opportunities to retrain for new roles, exacerbating income inequality. The loss of stable employment can lead to financial insecurity, reduced consumer spending, and a decline in mental health, contributing to social instability. Additionally, the concentration of wealth and power in tech-driven industries can create economic disparities, where a small segment of the population benefits disproportionately from technological advancements. This can lead to feelings of disenfranchisement and resentment among those left behind, potentially fueling social tensions and unrest. Furthermore, the rapid pace of technological change can outstrip the ability of educational and social systems to adapt, leaving many workers unprepared for the new job market realities.
- **Rent seeking:** Technological progress can lead to increased rent-seeking behavior, where resources are diverted from productive activities to efforts aimed at capturing a larger share of existing economic wealth. This can manifest through regulatory capture, where the need for updating or creating new regulations is posed and firms invest in lobbying to secure favorable regulations, or through patent trolling, where patents are acquired to sue for infringement rather than to innovate. Market manipulation, such as high-frequency trading, and the creation of data monopolies can also enable firms to extract rents without contributing to economic growth. Additionally, technological advancements can create high barriers to entry, allowing established companies to maintain market dominance and extract rents.
- **Security and Privacy Concerns:** Technological progress, while offering numerous benefits, can also pose significant challenges to security and privacy for governments. The proliferation of digital technologies and the internet has increased the vulnerability of government systems to cyberattacks. Hackers and malicious actors can exploit weaknesses in cybersecurity infrastructure, leading to data breaches, theft of sensitive information, and disruption of critical services. Additionally, the widespread use of surveillance technologies, such as facial recognition

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and data analytics, raises concerns about the erosion of privacy rights. Governments may collect vast amounts of data on citizens, often without adequate safeguards, leading to potential misuse or abuse of this information. The integration of Internet of Things (IoT) devices in public infrastructure also introduces new security risks, as these devices can be targeted to disrupt essential services like power grids and transportation systems. Furthermore, the rapid pace of technological change can outstrip the ability of regulatory frameworks to keep up, resulting in gaps in oversight and accountability. These challenges necessitate a careful balance between leveraging technological advancements and ensuring robust security and privacy protections.

- **Fraud, Tax Evasion, Corruption, Money Laundering and Anti-Terrorism:** When new technology is innovated or adopted, governments must address concerns related to fraud, tax evasion, corruption, money laundering, and anti-terrorism. These technologies can create opportunities for fraudulent activities and tax evasion by obscuring financial transactions, necessitating sophisticated monitoring and regulatory measures. Additionally, while technologies like blockchain can enhance transparency, they can also be manipulated for corrupt practices without proper oversight. The anonymity provided by digital banking and cryptocurrencies can facilitate money laundering, requiring stringent anti-money laundering regulations. Furthermore, the internet and social media can be exploited by terrorist organizations for recruitment and propaganda, highlighting the need for advanced surveillance and intelligence-gathering technologies. Governments must balance innovation with robust regulatory frameworks, international collaboration, and investment in monitoring tools to mitigate these risks effectively.

When focusing on the financial and banking system, policymakers' concerns regarding the adoption of new technologies *by banks* have some unique aspects compared to general firms. Policymakers are concerned about the impact of new technologies on the stability of the financial system. In fact, the interconnected nature of the banking system means that technology-driven risks can have systemic implications. Banks are prime targets for cyberattacks, and the adoption of new technologies can increase vulnerabilities. With the increasing use of digital banking, protecting customer data and ensuring compliance with data privacy regulations is a top priority. Banks must comply with stringent regulations, and new technologies can complicate compliance efforts. In the financial sector, high-frequency trading (HFT) can be seen as a

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form of rent-seeking, where firms use advanced algorithms to gain an unfair advantage in the market. New technologies can disrupt traditional industries, leading to conflicts between established firms and new entrants. For example, fintech companies may compete with traditional banks, creating tension in the financial sector.

3 Some Global Practices[1]

3.1 EU: Artificial Intelligence Act

The proposed AI regulatory framework by European Parliament (2024) aims to establish a comprehensive, risk-based approach to the development and deployment of artificial intelligence systems (Comunale and Manera, 2024). Under this law, AI practices are distinguished based on their potential impact on individuals and society. High-risk AI systems are those that pose significant risks to health, safety, or fundamental rights, such as those used in critical infrastructure, law enforcement, and employment. These systems are subject to stringent requirements, including rigorous testing, transparency, and human oversight. Moderate-risk AI systems may have some impact but are less likely to cause significant harm. They are required to adhere to specific standards and guidelines to ensure fairness and transparency. Low-risk AI systems pose minimal risk and are subject to basic principles of ethical use and transparency, with fewer regulatory requirements. This tiered approach ensures that regulatory efforts are proportionate to the potential risks associated with different AI applications.

Prohibited AI practices in the Artificial Intelligence Act include:

- **Manipulative Techniques:** AI systems that manipulate human behavior in ways that cause significant harm are prohibited. This includes techniques that exploit psychological or emotional vulnerabilities to influence decisions or actions. For example, an AI-driven app that uses subliminal messaging to manipulate users into making purchases they wouldn't otherwise make, leading to financial harm.
- **Exploitation of Vulnerabilities:** AI systems that exploit vulnerabilities of specific groups (e.g., children, persons with disabilities) to cause harm are banned. For example, a toy with AI capabilities that collects data from children and uses it to target them with inappropriate advertisements or content.

[1] I utilized generative AI to summarize the regulations outlined in this section.

[DOI: 10.61882/jme.19.4.565]

- **Social Scoring:** AI systems used for social scoring by public authorities that lead to unfair or discriminatory outcomes are forbidden. For example, a government system that assigns scores to citizens based on their social media activity, which then affects their access to services or opportunities, leading to discrimination.
- **Remote Biometric Identification:** The use of real-time remote biometric identification systems in publicly accessible spaces for law enforcement is generally prohibited, with some exceptions for serious crimes and threats. For example, a facial recognition system used in public places to continuously monitor and identify individuals without their consent, except in cases of serious criminal investigations.

3.2 US: Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence

The executive order White House (2023) is founded on a comprehensive set of guidelines, principles, and priorities, emphasizing a decentralized approach that involves various stakeholders, including government agencies, the private sector, academia, civil society, labor unions, international allies, and partners (Comunale and Manera, 2024). Key principles outlined in the order include ensuring the safety and security of AI systems through robust evaluations and risk mitigation measures, protecting privacy and civil liberties, preventing discrimination and bias in critical areas such as hiring, housing, and healthcare, promoting innovation while ensuring fair competition, safeguarding worker rights, and addressing AI-related national security risks. This approach aims to harness the benefits of AI while mitigating its risks, ensuring alignment with societal values and priorities.

The executive order outlines several key prohibitions to ensure the ethical and responsible use of AI. These include:

- **Discrimination and Bias:** AI must not exacerbate discrimination or bias, especially in critical areas like hiring, housing, and healthcare. For example, an AI system used in hiring should not favor candidates based on race, gender, or other protected characteristics.
- **Worker Rights:** AI should not undermine worker rights, worsen job quality, or introduce new health and safety risks. For instance, an AI system used to monitor employee productivity should not lead to excessive surveillance that invades privacy or creates a stressful work environment. Additionally, AI should not replace human workers in a way that leads to unsafe working conditions.

[DOI: 10.61882/jme.19.4.565]

- Privacy Violations: AI must not improperly collect, use, or disclose personal information, ensuring privacy and civil liberties are protected. For example, an AI-powered app that tracks user location data should not share this information without user consent.
- **National Security Risks:** AI systems must be secure and not pose risks to national security, including misuse in biotechnology, cybersecurity, and critical infrastructure. For instance, AI used in critical infrastructure, such as power grids or water supply systems, must be protected against cyberattacks that could disrupt services or cause harm.
- **Disinformation:** AI must not spread false information or disinformation that could harm public trust or safety. For example, an AI system that generates news articles should not create fake news stories that mislead the public.
- **Fraud:** AI should not be used to commit fraud or other deceptive practices. For instance, an AI system that generates deepfake videos should not be used to impersonate individuals for fraudulent purposes, such as scamming people out of money.
- **Stifling Competition:** AI must not stifle competition or create unfair market advantages. For example, a company should not use AI to manipulate market prices or engage in anti-competitive practices that harm other businesses.
- **Child Exploitation:** AI must not produce or distribute child sexual abuse material or non-consensual intimate imagery.
- **Synthetic Content:** AI must not create synthetic content that is misleading or harmful without proper authentication and labeling. For example, AI-generated images or videos should be clearly labeled as synthetic to prevent confusion or misuse.

3.3 US: Financial Innovation and Technology for the 21st Century Act

Congress (2023) establishes a comprehensive regulatory framework for digital assets, aiming to balance innovation with robust consumer protection. It delineates the roles of the Commodity Futures Trading Commission (CFTC) and the Securities and Exchange Commission (SEC) in overseeing digital assets, based on their level of decentralization. By providing clear guidelines and enhanced disclosure requirements, it seeks to create a secure and dynamic environment for digital asset transactions, ensuring investor protection and market efficiency.

[DOI: 10.61882/jme.19.4.565]

The executive order outlines several key prohibitions. These include:

- **Fraud and Manipulation:** Engaging in any act, practice, or course of business that operates or would operate as a fraud or deceit upon any person in connection with the purchase or sale of any digital asset.
- **Unregistered Offerings:** Issuing or selling digital assets without proper registration or exemption, including knowingly evading classification as a digital asset issuer.
- **Conflict of Interest:** Engaging in activities that create conflicts of interest without proper disclosure and mitigation.
- **Non-compliance with Disclosure Requirements:** Failing to meet enhanced disclosure requirements for digital assets, including providing accurate and complete information to investors.
- **Unauthorized Custody:** Providing custodial or safekeeping services for digital assets without proper registration and compliance with regulatory standards.

4 Policymaker Strategies

As technology continues to advance and become more integrated into various sectors, policymakers face a range of concerns, including rent-seeking, fraud, conflicts of interest, job displacement, and security and privacy issues. Addressing these challenges is crucial to ensuring that technological growth and adoption contribute positively to societal welfare. This section aims to explore the various strategies and measures that can be employed to tackle these pressing concerns, supporting a balanced approach to technological progress that safeguards public interests and promotes sustainable development.

4.1 Promoting Competition

To effectively promote competition in the adoption and application of new technologies, policymakers should implement clear and transparent regulatory frameworks that prevent monopolistic practices and ensure a level playing field for all market participants. This includes enforcing antitrust laws to prevent mergers and acquisitions that could lead to market dominance and stifle competition. Encouraging innovation and supporting new entrants through grants, subsidies, and tax incentives can help smaller firms compete with established players.

Additionally, policymakers should also promote open standards and interoperability to prevent lock-in effects and ensure that consumers have

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access to a wide range of products and services. Collaboration with international regulatory bodies can help harmonize competition policies and prevent cross-border anti-competitive practices. Finally, public awareness campaigns can educate consumers about their rights and the benefits of competition, empowering them to make informed choices and drive demand for competitive markets.

Reducing barriers to entry and exit by simplifying licensing, regulatory requirements, and liquidation processes can foster a more dynamic market environment. Reducing barriers for exit in the case of "too big to fail" companies presents a significant challenge for policymakers. These firms often have extensive networks and systemic importance, making their liquidation complex and potentially disruptive to the broader economy.

Consequently, policymakers must exercise discretion in applying regulations, tailoring them to the size and impact of different firms. Enhanced regulation, such as stricter oversight and increased capital requirements, can help mitigate risks associated with large firms. Additionally, requiring "living wills" or contingency plans ensures that these companies can be dismantled safely in times of financial distress.

4.2 Managing Conflicts of Interest

To effectively manage conflicts of interest in the adoption of new technologies, policymakers should require transparency and disclosure to ensure all stakeholders are aware of potential issues. Establishing ethical guidelines can provide a framework for responsible technology use, aligning advancements with societal values. Creating incentives for collaboration between traditional and tech-driven sectors can foster innovation and reduce tensions. Additionally, public awareness campaigns, supported by free speech and journalism, can educate the public about the benefits and challenges of new technologies, building support and reducing resistance from traditional industries.

Furthermore, conflict of interest exists when policymaker competes with the private sector. To address this, the central bank should clearly delineate its regulatory and operational roles, ensuring fair competition by applying the same rules and standards to both its own and private sector systems.

4.3 Managing Job Displacement

Policymakers can address job displacement and other negative effects of technology on the labor market by implementing education and training programs to help workers acquire new skills, providing support for

[DOI: 10.61882/jme.19.4.565]

transitioning workers through benefits and career counseling, and promoting lifelong learning to keep skills relevant. Collaboration with industries to identify emerging skill needs and develop targeted training programs is essential, as is strengthening social safety nets to buffer affected workers. Encouraging innovation and entrepreneurship can create new job opportunities, while regulating the gig economy ensures fair wages and job security for non-traditional workers. By adopting these strategies, policymakers can facilitate a more equitable and inclusive transition to a technology-driven economy.

4.4 Managing Rent-seeking

To effectively manage rent-seeking in the adoption and application of new technologies, policymakers should ensure transparent regulatory processes to reduce the risk of regulatory capture and promote fair competition. Patent reform is essential to prevent patent trolling and encourage genuine innovation. Regulating high-frequency trading can create a level playing field in the financial sector. Strong whistleblower protections can encourage the reporting of unethical practices while lobbying regulations can prevent undue influence on policymakers. Finally, education and awareness programs can build a culture of integrity and ethical behavior, highlighting the negative impacts of rent-seeking.

4.5 Managing Security and Privacy Concern

Policymakers can manage security and privacy concerns in the face of technological progress by establishing clear legal frameworks for emerging technologies, ensuring that regulations keep pace with innovation. Educating and raising awareness among businesses and consumers about the importance of security and privacy can build a culture of vigilance. Supporting research and development in advanced security technologies can help address evolving threats. Enhancing transparency and accountability by requiring firms to be open about their data practices and regularly report on security incidents can further protect against misuse and breaches.

4.6 Managing Fraud, etc.

Policymakers can address fraud, tax evasion, corruption, money laundering, and terrorist financing during the transition to new technologies by implementing advanced monitoring systems to detect suspicious activities in real-time. Enhancing collaboration and information sharing between government agencies, financial institutions, and technology firms can improve

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the detection and prevention of illicit activities. Promoting transparency and accountability through strict reporting requirements and regular audits can reduce opportunities for corruption. Strengthening international cooperation by harmonizing regulations and sharing intelligence can enhance efforts to combat cross-border financial crimes. Additionally, supporting whistleblower protections can encourage individuals to report illicit activities, helping to uncover and address fraudulent practices and corruption.

4.7 Remarks

To address various policy challenges effectively, several common strategies can be employed. Transparency and disclosure are crucial in managing conflicts of interest, rent-seeking, security and privacy concerns, fraud, and promoting competition. By ensuring transparent regulatory processes and promoting accountability, policymakers can foster trust, reduce unethical practices, and create a level playing field for all market participants.

Public awareness and education play a vital role in managing conflicts of interest, security and privacy concerns, rent-seeking, and promoting competition. Educating stakeholders and the public about the benefits and challenges of new technologies can build support, mitigate resistance, and empower consumers to make informed choices.

Collaboration and information sharing are essential in managing conflicts of interest, job displacement, fraud, and promoting competition. By fostering cooperation between traditional and tech-driven sectors, industries, and government agencies, policymakers can enhance innovation, improve the detection and prevention of illicit activities, and ensure a dynamic market environment.

Grants, subsidies, and tax incentives can support new entrants and smaller firms, helping them compete with established players and drive innovation.

Reducing barriers to entry and exit can foster a more dynamic market environment, encouraging competition and innovation.

Open standards and interoperability prevent lock-in effects and ensure that consumers have access to a wide range of products and services, promoting competition.

Whistleblower protections are important in managing rent-seeking, fraud, and promoting competition. Providing strong protections encourages individuals to report unethical practices, helping to uncover and address corruption, fraudulent activities, and anti-competitive behaviors.

Note that the policymaker should avoid certain practices. Banning or excessively slowing down the adoption of new technologies can have

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significant drawbacks. While it's important to regulate new technologies to address concerns such as security, privacy, and job displacement, an outright ban or overly restrictive regulations can stifle innovation, economic growth, and global competitiveness.

Furthermore, policymakers should avoid actions that could stifle innovation and hinder the positive impacts of new technologies. Overregulation, characterized by excessive or overly complex rules, can create significant barriers to entry and exit, discouraging innovation and investment. Additionally, failing to engage with key stakeholders, including industry experts, businesses, and the public, can result in policies that are disconnected from practical realities and needs. Neglecting to invest in education and training programs can leave the workforce unprepared for technological changes, leading to higher unemployment and skill gaps. A short-term focus on immediate gains without considering long-term impacts can lead to unintended consequences and missed opportunities for sustainable development. Furthermore, ignoring the needs of small and medium enterprises (SMEs) can result in a technology adoption gap, where only large firms benefit from advancements, exacerbating economic inequality.

5 Gap Analysis: Iran's Central Bank Law and Regulations

This section presents the results of a survey designed to gather expert opinions and evaluate the Central Bank's laws and regulations related to the research topic. Specifically, the survey solicits expert opinions on two key dimensions: the optimal level of discretion that should be exercised within Iran's Central Bank regulations, and the current level of discretion observed in practice. The questions correspond directly to various regulatory instruments available to policymakers—such as licensing procedures, market entry and exit protocols, measures to prevent market concentration, and initiatives to promote transparency and innovation. These instruments are critical for addressing regulatory challenges specific to Iran's financial sector, including competition, conflicts of interest, job displacement, rent-seeking, security and privacy concerns, fraud, tax evasion, corruption, money laundering, and anti-terrorism.

By comparing experts' assessments of the ideal versus the current level of discretion, the results facilitate a gap analysis highlighting discrepancies between best practices and actual regulatory implementation within Iran's Central Bank framework. Insights from this survey complement theoretical discussions from previous sections and provide empirical guidance for

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refining the balance between standardization and flexibility in Iran's financial regulations.

In designing the survey, differentiating between various institutions was essential. To achieve this, the questionnaire was divided into three sections: (a) banks and other deposit-taking institutions, (b) fintech companies, and (c) other institutions, including leasing companies, exchange bureaus, and credit-rating agencies. For each type of institution, questions were formulated to assess the current and optimal levels of discretion across the following categories:

- Reducing Barriers to Entry
- Reducing Barriers to Exit (large firms)
- Reducing Barriers to Exit (small and medium-sized firms)
- Transparency and Disclosure
- Whistleblower Protections
- Public Awareness and Education
- Collaboration and Information Sharing
- Grants, Subsidies, and Tax Incentives
- Open Standards and Interoperability

For example, regarding the first category, experts were asked about the ideal versus current ease of market entry for banks and credit institutions. Responses were provided on a scale of 1 to 5 in both cases (optimal and current), where 1 represents the lowest level of discretion (entry fully regulated), and 5 represents the highest level of discretion. This procedure was repeated for fintechs and other institutions as well in all the preceding categories.

Out of 11 questionnaires sent, 7 were received, and after a quality assessment, 2 were excluded. Quality assessment considered several factors. For instance, experts were expected to recommend a higher optimal level of discretion for larger firms ("too big to fail") and lower discretion levels for the entry and exit of smaller firms. Additionally, given the current circumstances, a positive gap in whistleblower protection was anticipated.

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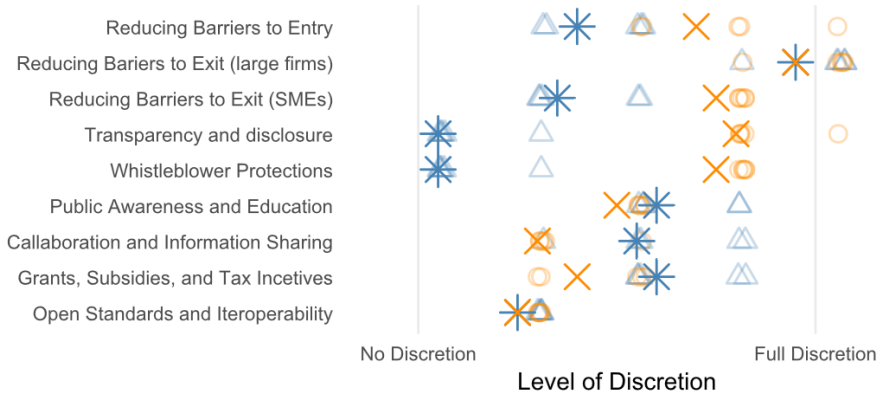

Figure 1. Results for banks and credit institutions. Source: Research calculations

Triangles represent optimal discretion levels chosen by experts, and circles represent current assessed levels (slightly shifted for clarity). The star indicates the average optimal levels, and the cross represents average current levels. The horizontal axis ranges from 1 (no discretion or fully regulated) to 5 (high discretion). If the cross sign appears to the right of the star, the current discretion exceeds the optimal level, and vice versa.

Figure 1 presents the average survey scores for banks and credit institutions. Similar results for fintechs are shown in Figure 2. Results for the third group (other institutions) closely align with fintech results, suggesting the fintech analysis largely applies to them as well. This indicates that, in this research context, expert opinions on banks and credit institutions differ significantly from other types of institutions, which is expected.

The analysis of mean values for optimal and current measures across the nine key categories reveals notable differences. For instance, in "Reducing Barriers to Entry," the current mean (3.8) exceeds the optimal mean (2.6), suggesting current conditions are more restrictive than optimal. On the other hand, "Reducing Barriers to Exit for SMEs" shows higher current means (4) compared to the optimal means (2.4). This pattern is not observed among large firms, indicating closer alignment for large firms but a larger gap for SMEs. Conversely, "Transparency and Disclosure" and "Whistleblower Protections" exhibit higher current means relative to optimal counterparts, signaling overly non-regulated practices. Categories like "Public Awareness and Education" and "Collaboration and Information Sharing" display moderate discrepancies,

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suggesting room for improvement. Notably, "Grants, Subsidies, and Tax Incentives" and "Open Standards and Interoperability" also have higher optimal means, highlighting critical areas for policy enhancement. Overall, the analysis underscores the need for targeted interventions to bridge gaps between current states and optimal goals, with the urgency varying by category based on observed discrepancies.

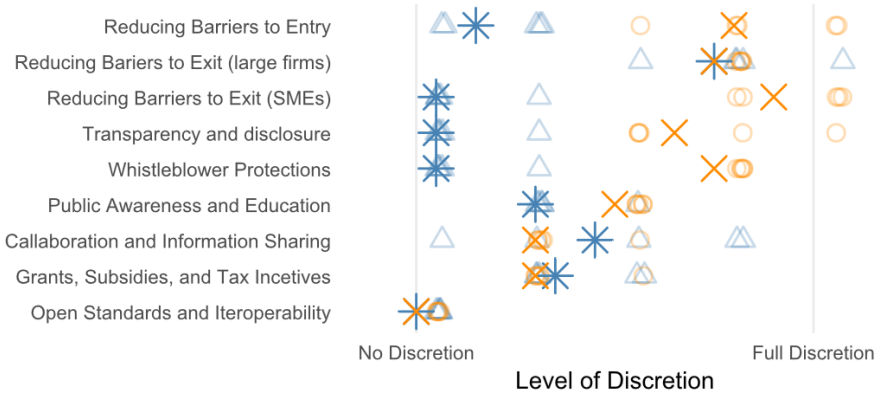

Figure 2. Results for fintech companies (see caption for Figure 1). Source: Research calculations

Figure 2 reports the results for the fintechs. Compared to banks, the primary changes relate to discretionary barriers to entry and exit. For instance, the optimal mean for "Reducing Barriers to Entry" decreased significantly (from 2.6 to 1.6), whereas the current mean increased (from 3.8 to 4.2), widening the gap and emphasizing greater misalignment. A similar trend appears for "Reducing Barriers to Exit (SMEs)," where the optimal mean fell from 2.4 to 1.2, but the current mean rose, intensifying the disparity.

Other categories showed minor changes. Given that banks are generally larger and systemically more critical, it appears the primary concern of experts in differentiating institutions was systemic importance.

6 Conclusion

Policymakers must strike a balance between setting specific rules in regulations and relying on discretionary policies to effectively manage technological advancements. A hybrid approach that combines both specific

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rules and discretionary policies can provide a balanced regulatory framework, where the risk of arbitrary decision-making is mitigated.

In this paper, I examine the financial system and explore how the adoption of new technologies, while advantageous, can also be disruptive and pose significant challenges, thereby necessitating regulation. I categorize the primary challenges as competition, conflict of interest, job displacement, rent-seeking, security and privacy concerns, fraud, tax evasion, corruption, money laundering, and anti-terrorism policies.

A survey conducted for this research assessed expert opinions on optimal versus current regulatory discretion levels within Iran's Central Bank, focusing on three categories of financial institutions: banks, fintech companies, and other financial entities. Nine regulatory areas, such as barriers to market entry/exit, transparency, whistleblower protections, and incentives were examined.

Results highlighted significant discrepancies between current practices and optimal standards, notably with barriers to entry and exit. Banks showed greater regulatory alignment than fintechs, whose current conditions notably exceeded optimal discretion levels, emphasizing a significant regulatory gap. Differences mainly stemmed from the systemic importance attributed to banks versus other entities, guiding experts' views on the required regulatory discretion levels.

It is essential to recognize law, regulation, and policy-making as distinct concepts. There is no clear distinction between them from the microeconomic perspective of this paper. Moreover, it is crucial to acknowledge that when discussing guidelines for policymakers, the selection of strategies must be informed by various limitations and considerations, including political, social, and cultural factors. Each policy option should be meticulously evaluated within the broader context of societal welfare, ensuring that the chosen measures align with the unique needs and values of the community.

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