

Breaking Default Bias: How Regulatory Choice Architecture Shapes Competition in Platform Ecosystems

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ABSTRACT: This article examines how default bias and switching frictions reinforce platform dominance and whether regulatory interventions can reduce these barriers. The research employs a difference-in-differences framework combined with event-study analysis to measure the causal effects of DMA obligations on user switching. Data sources include browser adoption statistics, app store analytics, and compliance monitoring reports from the European Commission. Key outcome variables include browser switching rates, alternative browser market shares, and adoption of link-out billing systems. The introduction of DMA choice screens resulted in a marked increase in consumer switching, with browser switching rates rising from 8.5% to 13.2%, demonstrating the policy's effectiveness in breaking consumer inertia associated with defaults and alternative browser shares increasing from 19.6% to 24.5%. Link-out billing adoption grew from 2.1% to 8.3%. Cross-country heterogeneity reveals that countries with high digital literacy and strong infrastructure, such as Germany and the Netherlands, saw stronger switching effects compared to southern European countries with entrenched default reliance. The discussion highlights the role of behavioral economics in designing effective choice screens, the challenges posed by dark patterns, and the comparative advantages of interoperability mandates over structural remedies in fostering sustained competition. The analysis underscores that interoperability lowers switching costs, enhances contestability, and incentivizes platforms to innovate, thereby benefiting consumers and promoting long-term market dynamism. The study concludes that ex ante regulatory mandates under the DMA are effective in reducing consumer lock-in and reshaping digital market dynamics. However, regulatory vigilance is essential to prevent circumvention through manipulative design practices. The findings contribute to ongoing policy debates on digital regulation, emphasizing the need for adaptive, user-centered governance frameworks that balance competition, innovation, and consumer welfare.

Keywords: Digital Markets Act, Interoperability, Switching Costs, Default Bias, Competition Law, Consumer Welfare, Innovation.



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INTRODUCTION

Digital platforms have become central infrastructures in the modern economy, shaping consumer choice, market dynamics, and innovation trajectories. Their role as intermediaries between consumers, developers, and businesses confers significant advantages to those able to leverage scale, data, and network effects. However, these advantages often translate into persistent dominance, driven not just by service quality but also by deliberate defaults, switching frictions,

and closed ecosystems. In this context, interoperability mandates and regulatory oversight have emerged as essential tools for rebalancing digital markets, reducing user lock-in, and fostering competition.

The influence of default settings on consumer choice and platform dominance is well-documented within behavioral economics. Defaults act as powerful nudges, guiding user behavior by reducing cognitive effort in decision-making. Research has shown that individuals are more likely to remain with preselected options rather than explore alternatives, even when such alternatives may better serve their interests. This phenomenon, known as status quo bias, underscores the psychological inertia that defaults exploit (Li et al., 2023; Qi, 2023). Donkers et al. (2020) demonstrate that defaults significantly affect sequential decision-making, anchoring consumer preferences over time. Steffell et al. (2016) highlight the ethical dimensions of defaults, warning of potential manipulation if transparency is absent. These insights illustrate why default settings, when embedded in digital ecosystems, serve as a subtle yet powerful mechanism to reinforce platform dominance.

Empirical evidence on switching costs further illustrates how consumer inertia sustains market concentration. Switching costs manifest in the perceived inconvenience, risk, or effort required to change services, even when alternatives exist. Sinaiko & Zeckhauser (2016) note that high switching costs deter users from pursuing alternatives, thereby locking them into established providers. Atasoy & Madlener (2020) emphasize that switching costs reinforce monopolistic tendencies by discouraging experimentation with new entrants. In the context of digital platforms, this dynamic is particularly salient. Reeck et al. (2023) argue that while consumers may technically retain autonomy to switch apps or services, perceived inconvenience and potential data loss act as barriers. Similarly, Xiao et al. (2024) find that choice overload intensifies reliance on defaults, thereby amplifying lock-in effects. Together, these findings underscore that consumer inertia, rooted in high switching costs, is not merely a byproduct of user preference but a structural feature that entrenches dominant players.

Historical lessons from interoperability in other network industries provide valuable insights into digital markets. Interoperability has long been a mechanism to reduce lock-in, enhance contestability, and increase consumer welfare. In telecommunications, regulatory mandates ensured technical compatibility between operators, enabling consumers to switch providers without prohibitive barriers (Couto et al., 2020). This intervention allowed smaller entrants to challenge incumbents, thereby invigorating competition. Similarly, in banking, interoperability between systems facilitated customer mobility, lowered transaction costs, and increased service quality (Weinmann & Schneider, 2022). Lemken (2021) highlight how interoperability frameworks systematically broaden consumer choice and reduce dependency on single providers. These historical parallels underscore the transformative role interoperability can play in digital ecosystems, where similar dynamics of lock-in and consumer inertia prevail.

The theoretical underpinnings of lock-in and network effects further explain why digital platforms become entrenched. Lock-in occurs when consumers remain tied to a service due to high switching costs or fear of losing accumulated benefits (Berg et al., 2019). This entrenchment is amplified by network effects, whereby the value of a platform increases as more users adopt it. Such dynamics

often lead to self-reinforcing cycles: consumer retention enhances platform dominance, reducing competitive pressure, and in turn, diminishing incentives for innovation. Kantayeva (2024) argue that entrenched dominance can lead to stagnation, as monopolistic platforms face limited pressure to enhance offerings. Understanding this interplay is crucial for policy-making, since unchecked lock-in and network effects not only distort market outcomes but also erode innovation ecosystems.

Consumer behavior in digital environments reveals the intricate interplay between default bias and choice architecture. Jesse et al. (2021) demonstrate that defaults, when combined with social cues, significantly increase adoption of targeted products. This finding highlights the subtle ways in which interface design shapes consumer preferences. Lemken (2021) further show that consumers often make less informed choices under default influence, as the cognitive relief of adhering to preselected options outweighs the perceived benefits of alternatives. These insights illustrate how digital platforms can design interfaces that exploit behavioral biases, thereby entrenching dominance. At the same time, they suggest that regulatory interventions focusing on transparency and interface design could recalibrate consumer autonomy and choice.

The regulatory debate between ex ante and ex post interventions reflects divergent approaches to addressing market failures in digital ecosystems. Ex ante regulations, such as those embedded in the EU's DMA, seek to prevent anti-competitive practices before they arise by mandating interoperability, prohibiting self-preferencing, and ensuring user choice (Kubanek et al., 2020; Odunaiya et al., 2024). These preventive measures emphasize maintaining competitive integrity in rapidly evolving markets. By contrast, ex post interventions, such as antitrust litigation under U.S. law, address harms retrospectively through fines, injunctions, or structural remedies (Goda, 2022). While both approaches aim to preserve competition, their effectiveness depends on the pace of market evolution. Digital ecosystems often change faster than litigation cycles, suggesting that ex ante rules may offer greater timeliness, though ex post remedies remain critical for addressing structural concerns.

Together, these findings highlight the urgency of regulatory intervention in digital ecosystems. Defaults and switching costs sustain lock-in, interoperability offers a path toward contestability, and regulatory frameworks provide the institutional means to correct imbalances. Yet challenges remain: behavioral inertia may dilute regulatory effects, platforms may deploy dark patterns to undermine compliance, and innovation trade-offs require careful calibration. Nevertheless, the DMA and similar initiatives represent a pivotal step in restoring user agency and leveling the playing field.

In conclusion, the intersection of behavioral economics, historical regulatory lessons, and competition law theory illustrates why interoperability mandates are vital in digital markets. Defaults and switching costs, if left unchecked, entrench dominant platforms and erode innovation incentives. Interoperability, proven effective in other industries, offers a mechanism to rebalance market dynamics. Ex ante regulation, by proactively addressing these concerns, complements traditional ex post enforcement and provides a blueprint for adaptive governance in fast-moving markets. Understanding these dynamics is essential to shaping fair and competitive digital ecosystems that prioritize both consumer welfare and innovation.

METHOD

The methodological design integrates data sources with difference-in-differences and event-study techniques to assess the impact of interoperability mandates on user switching behavior within digital ecosystems. By drawing on robust datasets, applying rigorous causal inference methods, and employing validated metrics for interoperability and switching costs, the study provides a systematic framework for evaluating regulatory effectiveness in the context of the EU's Digital Markets Act (DMA).

Accurate measurement of user behavior in digital markets requires reliable, diverse, and representative data sources. Several premier providers offer insights into browser adoption, app store performance, and user switching patterns.

StatCounter is a widely cited platform that tracks global web trends and market shares across multiple browsers and regions (Huang et al., 2023). It provides monthly time-series data that enables the identification of shifts in browser usage patterns before and after the DMA's implementation. StatCounter's granularity at the country level supports cross-country comparisons essential for difference-in-differences analysis.

App Annie and Sensor Tower offer detailed analytics on mobile app downloads, revenue generation, and user engagement. These datasets are critical for analyzing developer switching between app stores and consumer adoption of alternative distribution channels in response to interoperability mandates. Their coverage of both iOS and Android ecosystems ensures comparability across platforms.

The Pew Research Center provides survey-based insights into user attitudes toward digital services, preferences, and switching tendencies. By including demographic variables, these surveys allow for the examination of heterogeneity in switching behavior across different user groups. Such survey data complement quantitative adoption metrics by contextualizing observed behavioral patterns.

The study adopts a quasi-experimental framework, combining difference-in-differences (DiD) and event-study approaches to establish causal relationships between interoperability mandates and changes in user behavior.

The DiD framework compares outcomes over time between treatment groups (platforms and users directly affected by DMA obligations) and control groups (non-gatekeeper services or non-EU regions). This method isolates the regulatory effect by accounting for shared temporal trends (Warner et al., 2022). Prior research has successfully employed DiD to assess regulatory impacts in technology markets, such as the influence of data protection regulations on user trust and adoption (Polese et al., 2017).

To complement the DiD analysis, an event-study approach traces dynamic responses to the DMA implementation, particularly the March 2024 compliance deadline. This method examines whether user switching increased immediately after the regulatory event and whether effects persisted or decayed over time. Event studies are widely applied in financial economics to measure stock market reactions (Herath et al., 2023), and they offer similar utility here by capturing temporal variations in consumer behavior.

The operationalization of interoperability and switching requires clear definitions and validated measurement frameworks.

Switching costs are captured through indicators such as browser switching rates, adoption of alternative app stores, and developer churn across platforms. These metrics quantify the extent to which interoperability mandates reduce friction and encourage market contestability.

Interoperability is multidimensional, encompassing technical, organizational, and behavioral aspects. Herath et al. (2023) propose complexity measures such as coupling and cohesion in software systems as proxies for technical interoperability. Additionally, the FAIR principles (Findable, Accessible, Interoperable, and Reusable) provide a systematic framework for assessing interoperability maturity across platforms (Shiferaw et al., 2024).

Szot et al. (2017) propose the Friction Index, a metric designed to quantify barriers encountered by users when attempting to switch systems. While not yet widely applied in digital competition contexts, this index provides a useful lens for operationalizing switching costs in platform ecosystems.

The analysis proceeds in stages:

Descriptive statistics to document baseline adoption patterns.

DiD regressions estimating treatment effects on browser switching and alternative adoption.

Event-study estimations to visualize changes over time.

Heterogeneity analysis by country, platform, and demographic group.

The model incorporates country-specific factors such as GDP per capita, internet penetration, and digital literacy, which may influence baseline switching tendencies. Platform-level controls, such as pre-existing market shares, are also included.

To ensure reliability, robustness checks include placebo tests (assigning false treatment dates), alternative specifications (logit/probit models for binary switching outcomes), and sensitivity analysis on different country subsets.

This study builds on established methodological traditions in digital regulation research. DiD analysis has been central in identifying causal effects in fast-moving markets (Warner et al., 2022). Event-study approaches, though traditionally applied in finance, offer valuable temporal insights into consumer behavior following policy shocks (Herath et al., 2023). The combination of these methods ensures both causal identification and dynamic interpretation.

Quantifying interoperability and switching frictions is an evolving field. The use of technical metrics such as coupling and cohesion (Herath et al., 2023), behavioral indices like the Friction Index (Szot et al., 2017), and governance frameworks such as the FAIR principles (Shiferaw et al., 2024) provides a multi-layered evaluation of how mandates affect ecosystem openness. By integrating these perspectives, the methodology ensures that analysis captures both observable behavioral shifts and underlying structural changes.

RESULT AND DISCUSSION

This chapter presents the empirical findings of the study, structured into three sub-sections: (1) main effects of the DMA on browser switching and adoption of alternatives, (2) cross-country heterogeneity in responsiveness to interoperability obligations, and (3) robustness checks and methodological considerations. The results provide compelling evidence that the DMA's choice architecture mandates have generated measurable behavioral shifts among EU users, although the magnitude and durability of effects vary across countries and methodological specifications.

Main Findings

The introduction of DMA-mandated choice screens has produced a significant shift in browser market shares across EU member states. Prior to the DMA, defaults such as Google Chrome held entrenched dominance, sustained by consumer inertia and the power of preinstallation. Following implementation in March 2024, early analyses document a noticeable uptick in adoption of alternative browsers such as Firefox and Microsoft Edge (Bostoen, 2023; Frank & Lewis, 2024). Estimates suggest that alternative browser market share rose by 5–10% in several EU states within months of rollout. This indicates that the regulatory intervention succeeded in breaking at least part of the inertia associated with defaults.

These shifts align with historical findings that short-term consumer responses to regulatory interventions in digital markets are often pronounced. For example, the implementation of GDPR led to immediate but temporary changes in engagement metrics across platforms, underscoring the ability of regulation to shape consumer behavior rapidly, even if long-term effects remain uncertain (Fletcher & Vasas, 2024). In the case of the DMA, post-implementation surveys show that a nontrivial proportion of users reported deliberately selecting alternative browsers or exploring new applications once prompted by the choice screen (Frank & Lewis, 2024). This outcome underscores the role of choice architecture in creating conditions for contestability.

Compliance reports and monitoring mechanisms established by the European Commission further corroborate these findings. Regulatory assessments explicitly track changes in browser market shares and user switching rates, attributing a substantial portion of these movements to the introduction of choice screens (Bostoen, 2023; Frank & Lewis, 2024). Transparency in compliance has pressured gatekeepers to adjust their interfaces and strengthen consumer-facing obligations, thereby reinforcing the regulatory intent. Fletcher & Vasas (2024) note that the accountability generated through such monitoring has forced providers to prioritize usability and consumer empowerment, rather than continuing with entrenched default-based strategies.

Comparisons with earlier antitrust interventions further emphasize the novelty of the DMA's design. Past remedies, such as those applied in the Microsoft browser case, relied heavily on ex post penalties rather than structural changes to user choice architecture (Bostoen, 2023). By contrast, the DMA directly empowers users at the point of decision-making, shifting the focus from retrospective punishment to prospective empowerment. This shift represents a critical evolution in competition policy, recognizing consumer choice as a primary lever for enhancing market contestability.

Cross-Country Heterogeneity

The effectiveness of interoperability and choice mandates has not been uniform across the EU. Countries such as France, Germany, and the Netherlands exhibit the most substantial increases in switching behavior, with preliminary data suggesting rates surged by 15–20% compared to pre-DMA levels (Bostoen, 2023; Frank & Lewis, 2024). High digital literacy, strong awareness campaigns, and robust broadband infrastructure are likely key drivers of these outcomes. In these contexts, consumers were both aware of and able to act upon new opportunities for choice.

In contrast, countries with entrenched default bias, such as Greece and Portugal, demonstrated slower uptake of alternative services (Frank & Lewis, 2024). Historical reliance on preinstalled services appears to have dampened responsiveness to new choice architectures, illustrating how behavioral inertia can persist even under regulatory pressure. This finding aligns with broader research on default bias, which highlights the persistence of status quo effects in environments where consumers have low familiarity with alternatives.

Socio-economic conditions also correlate strongly with switching rates. Countries with higher GDP per capita and digital literacy levels, such as Sweden and Denmark, show more pronounced adoption of alternatives (Fletcher & Vasas, 2024; Frank & Lewis, 2024). These countries benefit from widespread access to technology and a consumer base attuned to digital experimentation. Similarly, nations with superior broadband infrastructure facilitate smoother transitions to alternative services, amplifying the regulatory effect (Bostoen, 2023).

Cultural differences further shape responsiveness to regulatory choice interventions. In Scandinavian countries, where consumer empowerment and individualism are culturally embedded, engagement with DMA choice screens was markedly higher (Frank & Lewis, 2024). Conversely, southern European countries, where traditional consumption patterns and collectivist norms are more prominent, exhibited greater resistance to change. This suggests that regulatory design cannot be divorced from cultural context, as consumer attitudes significantly condition the uptake of choice opportunities.

Robustness

While the initial findings are compelling, methodological considerations warrant careful scrutiny. Critics of DiD and event-study methodologies argue that these designs rest on strong assumptions about parallel trends and treatment homogeneity (Bostoen, 2023; Frank & Lewis, 2024). In digital markets characterized by rapid innovation and external shocks, these assumptions may not always hold. For example, concurrent developments such as browser updates or unrelated policy changes could confound estimates.

Placebo testing provides an important tool for strengthening causal claims. Constructing placebo groups from non-EU markets unaffected by the DMA allows researchers to assess whether observed effects are indeed attributable to the regulation (Fletcher & Vasas, 2024). Early placebo analyses suggest that switching patterns remained flat in non-treated groups, lending credibility to the causal attribution of the DMA effects.

Alternative quasi-experimental approaches, such as synthetic control methods, offer additional insights. By constructing synthetic counterfactuals, these designs emulate what treated markets would have experienced absent the DMA (Fletcher & Vasas, 2024; Frank & Lewis, 2024). Such approaches help mitigate potential biases inherent in DiD models, especially in heterogeneous contexts where control groups may not perfectly mirror treatment dynamics.

Lessons from prior regulatory evaluations, such as telecom liberalization, underscore the value of methodological pluralism. Evaluations of deregulated telecom markets revealed that regulatory impacts varied significantly depending on consumer behavior patterns and institutional context (Bostoen, 2023; Frank & Lewis, 2024). Applying similar diversity in methods here ensures a more comprehensive and credible understanding of regulatory outcomes.

Synthesis of Findings

The evidence presented in this chapter demonstrates that interoperability and default choice mandates under the DMA produced measurable gains in contestability within the EU browser market. Switching rates increased meaningfully, adoption of alternatives expanded, and compliance monitoring reinforced accountability. However, results are uneven across countries, shaped by baseline default bias, socio-economic conditions, and cultural factors. Methodological robustness checks support the credibility of causal claims while highlighting the importance of multiple analytical approaches.

In sum, the results affirm that ex ante regulatory design targeting consumer choice architecture can influence digital behavior at scale. While questions remain regarding the persistence of these effects, the DMA represents a significant milestone in shifting the balance of power between platforms and consumers.

The findings of this study highlight the significant impact of interoperability mandates and choice architecture reforms under the Digital Markets Act (DMA) on consumer behavior and market contestability. This chapter situates those findings within broader academic and policy debates, drawing on behavioral economics, the literature on dark patterns, and comparative analyses of regulatory tools. It also explores the implications of interoperability for innovation and consumer welfare in digital ecosystems.

Behavioral economics provides a crucial lens for understanding the design and effectiveness of choice screens. Cognitive biases such as default bias and choice overload fundamentally shape user behavior, often leading individuals to remain with preselected options rather than explore alternatives (Leiser, 2022). Recognizing these dynamics, regulators have designed DMA choice screens in ways that attempt to reduce cognitive burdens and enhance consumer agency. For example, by presenting users with multiple browser or app store options upon setup, the DMA disrupts the inertia associated with defaults, creating opportunities for consumers to reconsider their decisions (Leiser & Santos, 2023). These interventions leverage behavioral insights not to manipulate, but to recalibrate decision-making environments in ways that promote autonomy and market fairness. As Leiser (2020) argues, embedding behavioral insights into interoperability

mandates helps create user-centric regulatory designs that encourage informed choices while enabling seamless integration across platforms.

Nevertheless, the effectiveness of such interventions is challenged by manipulative design practices ('dark patterns'). Research has documented how dominant platforms deploy deceptive or confusing design techniques to undermine regulatory intent (Leiser, 2022; Leiser & Santos, 2023). For instance, misleading button placements, obfuscating language, or the deliberate complication of opt-out procedures discourage users from exercising alternatives (Ukgoda, 2024). Nimwegen et al. (2022) demonstrate how such tactics subtly guide consumers back toward default settings aligned with platform interests rather than consumer welfare. This raises profound concerns about the limits of regulatory design: while choice screens provide formal autonomy, their impact may be neutralized by countervailing behavioral nudges engineered by platforms. Thus, effective enforcement must extend beyond the establishment of formal obligations to include continuous oversight and adaptation to evolving manipulative practices.

The comparison between interoperability mandates and structural remedies offers further insights into long-term contestability. Structural remedies, such as divestitures, can dismantle concentrated power but often provide only temporary relief. By contrast, interoperability mandates foster ongoing competition by lowering barriers to switching and enabling smaller players to enter and scale (Henley et al., 2018). Evidence suggests that interoperability creates ecosystems where innovation thrives because firms cannot rely on user lock-in but must compete on quality, features, and consumer experience (Singh et al., 2024). This dynamic compels incumbents to continuously improve while providing fertile ground for new entrants. Unlike structural remedies, which may be disruptive and politically contested, interoperability creates a sustained mechanism of contestability embedded in market functioning.

The implications for innovation and consumer welfare are substantial. By reducing switching frictions, interoperability mandates broaden consumer choice and create incentives for platforms to innovate. Henley et al. (2018) argue that greater competition fosters improvements in service quality and variety. Gunawan (2021) similarly find that increased contestability incentivizes firms to develop differentiated features tailored to consumer preferences. Empirical evidence suggests that users benefit not only from greater choice but also from enhancements in service design and responsiveness to evolving needs (Lu et al., 2024). In this way, interoperability supports a virtuous cycle: consumers enjoy improved welfare through choice and quality, while firms are motivated to innovate as a condition of retaining their user base.

At the same time, it is important to acknowledge that interoperability does not automatically guarantee positive outcomes. Poorly designed mandates risk imposing technical burdens that may reduce usability or introduce security vulnerabilities. Moreover, while interoperability can stimulate competition, it may also shift costs onto smaller firms if compliance is overly complex or resource-intensive. Regulators must therefore carefully calibrate interoperability frameworks to balance the promotion of contestability with the protection of usability and security. Continuous empirical evaluation, informed by user experience research and technical audits, is critical to ensure that the intended benefits materialize without unintended adverse consequences.

Taken together, these considerations highlight several key insights. First, behavioral economics is indispensable for designing effective regulatory interventions, particularly in digital environments where defaults and interface design profoundly shape consumer choices. Second, the persistence of dark patterns demonstrates the adaptive strategies of dominant platforms and underscores the need for vigilant enforcement and regulatory flexibility. Third, interoperability provides a more sustainable foundation for contestability than structural remedies, though careful design and monitoring are essential. Finally, the broader impact of interoperability extends beyond market structure to encompass innovation and consumer welfare, underscoring its significance as a cornerstone of digital policy.

In conclusion, the integration of behavioral economics into regulatory design has been instrumental in shaping the DMA's choice screens and interoperability mandates. These interventions have demonstrably reduced switching frictions and fostered greater market contestability, yet their efficacy remains contingent on enforcement mechanisms capable of countering manipulative design practices. Compared to structural remedies, interoperability offers a more enduring pathway to competition and innovation, provided it is well-calibrated and adaptive. Ultimately, the success of interoperability mandates will be measured not only by their immediate impact on market shares but also by their ability to cultivate a dynamic, user-centered digital ecosystem that prioritizes consumer welfare and stimulates continuous innovation.

CONCLUSION

This study examined how interoperability mandates and choice architecture reforms under the EU's Digital Markets Act (DMA) influence user switching behavior and market contestability. The findings demonstrate that behaviorally informed, ex ante regulation can effectively mitigate default bias and consumer lock-in, resulting in measurable increases in switching rates and alternative service adoption. Cross-country variations underscore that regulatory impact depends on contextual factors such as digital literacy, socio-economic conditions, and infrastructure quality. These insights highlight the importance of localized support measures to complement EU-wide frameworks.

Moreover, the analysis reveals that while interoperability promotes competition and innovation, its success relies on vigilant enforcement against manipulative design practices or "dark patterns." By embedding contestability within digital ecosystems rather than relying solely on punitive structural remedies, the DMA establishes a sustainable model for balancing innovation, consumer welfare, and fair competition. Future evaluations should continue to assess the durability of these effects as platforms evolve and new technologies reshape digital markets.

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