



CASE STUDY

Scaling a SaaS Business: The Role of Freemium Models in Converting Free Users to Paying Customers

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conversion, the existence of an optimal conversion trigger timing window, and the higher post-conversion quality of freemium-acquired customers. Managerial implications for SaaS practitioners designing and iterating freemium strategies are discussed.

Keywords freemium, SaaS, conversion optimization, product-led growth, B2B software, subscription pricing

Abstract

The freemium business model has become the dominant go-to-market strategy for software-as-a-service (SaaS) companies, yet the majority of firms employing this approach achieve conversion rates of only two to five percent, raising critical questions about optimal freemium design. This case study examines the freemium strategy evolution of CloudMetrics, an anonymized business-to-business SaaS analytics platform that grew from \$1.2 million to \$14.8 million in annual recurring revenue over a three-year period following its transition from a free-trial model to a freemium offering. Drawing on the theoretical frameworks of network externalities, consumer value theory, and product-led growth, this study traces four distinct phases of CloudMetrics' freemium optimization: an initial feature-gated model, the introduction of usage limits, a hybrid combining both dimensions, and a product-led growth strategy with personalized conversion triggers. The analysis reveals that the hybrid freemium model produced the highest marginal improvement in conversion rates, increasing free-to-paid conversion from 3.8 percent under a feature-only model to 7.4 percent under the fully optimized product-led approach. The case further demonstrates that freemium-acquired customers exhibited 127 percent net revenue retention, substantially exceeding the 109 percent observed among sales-led cohorts. These findings support four research propositions concerning the superiority of hybrid freemium designs, the role of within-organization network effects in amplifying usage-based

1. Introduction

The software-as-a-service industry has undergone a fundamental transformation in customer acquisition strategy over the past decade. Where enterprise software vendors once relied exclusively on direct sales teams and lengthy procurement cycles, a growing majority of SaaS companies now employ product-led approaches in which the product itself serves as the primary vehicle for customer acquisition, activation, and expansion (OpenView Partners, 2023). At the center of this transformation lies the freemium model, a pricing architecture in which a firm offers a functional version of its product at no cost while monetizing a premium tier that provides enhanced capabilities, greater capacity, or both (Pujol, 2010; Anderson, 2009).

The economic rationale for freemium in SaaS is compelling. Digital products exhibit near-zero marginal costs of distribution, meaning that each additional free user imposes minimal incremental expense on the provider (Anderson, 2009). Simultaneously, a large free user base generates network effects that increase the value of the product for all users, creates word-of-mouth referrals that reduce customer acquisition costs, and produces behavioral data that enables personalized conversion strategies (Katz & Shapiro, 1985; Boudreau et al., 2022). OpenView Partners (2023) reported that product-led growth companies experience approximately 40 percent lower customer acquisition costs compared to sales-led organizations, and that firms with self-serve freemium offerings derive roughly 90 percent of revenue from product-influenced channels.

Despite these advantages, the practical implementation of freemium remains fraught with challenges. Industry benchmarks consistently indicate that the median SaaS freemium conversion rate falls between two and five percent (Kumar, 2014; OpenView Partners, 2023), meaning that the overwhelming majority of free users never generate direct revenue. For companies with significant infrastructure costs, this ratio can prove economically unsustainable. Kumar (2014) cautioned that "many start-ups fail to recognize the challenges of this popular business model" (p. 27), particularly the difficulty of calibrating free-tier generosity to simultaneously maximize user acquisition and conversion incentives. Osterwalder and Pigneur (2010) similarly emphasized that the freemium model demands careful alignment between the cost structure of serving free users and the revenue generated by the converting minority.

The central challenge, then, is not whether to adopt freemium but how to design and optimize it. The existing literature has examined this question primarily through theoretical models analyzing feature-gating versus usage-limiting strategies in isolation (Niculescu & Wu, 2014; Kato & Dumrongsiri, 2022; Shi et al., 2019), and through empirical studies of consumer-facing platforms such as music streaming services and mobile

applications (Gu et al., 2018; Wagner et al., 2014; Liu et al., 2014). Comparatively little systematic attention has been directed toward the business-to-business SaaS context, where purchasing decisions involve multiple organizational stakeholders, longer evaluation cycles, and fundamentally different adoption dynamics (Holm & Gunzel-Jensen, 2017).

This case study addresses this gap by examining the freemium strategy evolution of CloudMetrics (a pseudonym), a B2B SaaS analytics platform that transitioned from a traditional free-trial model to an iteratively optimized freemium offering between 2022 and 2024. The study traces four distinct phases of freemium design, documenting the specific strategic choices, implementation details, and quantitative outcomes associated with each phase. By mapping these empirical observations to four research propositions derived from the freemium literature, the study contributes to an emerging understanding of how B2B SaaS companies can systematically improve free-to-paid conversion rates while simultaneously enhancing post-conversion customer quality.

The remainder of this article is organized as follows. Section 2 reviews the theoretical and empirical literature on freemium models, SaaS economics, conversion mechanisms, network effects, and freemium design strategies, culminating in four research propositions. Section 3 describes the research methodology. Section 4 describes the case context. Section 5 details the four phases of CloudMetrics' freemium strategy evolution. Section 6 presents the results and key metrics. Section 7 analyzes the findings in relation to the research propositions. Sections 8 and 9 discuss managerial implications and limitations, respectively, and Section 10 concludes.

2. Literature Review

2.1 Theoretical Foundations of Freemium Models

The freemium business model, in which a firm offers a basic version of its product at no charge while monetizing a premium tier, has become a dominant go-to-market strategy in the software industry. Pujol (2010) provided one of the earliest formal definitions of freemium, characterizing it as a business model in which "one item is provided at no charge while a complementary item is sold at a positive price to the same general group of customers" (p. 1). His typology identified three principal dimensions along which free and paid offerings can be differentiated: quantity (volume or time limitations), features, and distribution channels, encompassing thirteen distinct monetization strategies. This foundational taxonomy remains influential in subsequent scholarship.

Anderson (2009), in his widely cited book *Free: The Future of a Radical Price*, argued that the marginal cost of digital goods approaches zero, making "free" not merely a promotional tactic but a structurally inevitable pricing strategy in the digital economy. Anderson's thesis drew upon economic principles of marginal cost pricing and cross-subsidization, positing that firms can profitably give away one product while charging for a complementary offering. While Anderson's treatment was largely practitioner-oriented, his arguments catalyzed rigorous academic inquiry into the economics of zero-price strategies.

Niculescu and Wu (2014) formalized these intuitions in a game-theoretic framework published in *Information Systems Research*. Their model compared two business models involving a free component: feature-limited freemium (FLF), in which a firm offers basic software for free while charging for premium features, and uniform seeding, in which the firm distributes the full product free to a percentage of the addressable market. The authors demonstrated that the optimal strategy depends critically on network effects, consumer heterogeneity, and the competitive landscape. Niculescu and Wu showed that feature-limited freemium can dominate pure paid models when network externalities are sufficiently strong, providing theoretical grounding for the widespread adoption of freemium in networked software markets.

Osterwalder and Pigneur (2010) situated the freemium model within the broader context of business model innovation, identifying it as a distinct revenue pattern in their Business Model Canvas framework. Their conceptualization emphasized that the freemium model requires careful calibration of cost structures: the free tier must generate sufficient user volume to produce paying conversions, while marginal serving costs must remain low enough that the large non-paying base does not erode profitability. Kumar (2014), writing in the *Harvard Business Review*, echoed this concern, warning that founders frequently underestimate the operational challenges inherent in freemium, particularly the difficulty of achieving conversion rates high enough to sustain the economics of serving a massive free user base.

Holm and Gunzel-Jensen (2017) extended this strategic perspective through a comparative case study of seven digital companies - including LinkedIn, Spotify, Box, and Eventbrite - that either succeeded or failed with freemium. Their analysis, published in the *Journal of Business Strategy*, identified several critical success factors: a strong product catalogue, a focused customer acquisition engine, active referral mechanisms, community features, continuous testing, and data-driven decision-making. The authors concluded that freemium is not a one-size-fits-all strategy; rather, its success depends on alignment between the firm's value proposition, cost structure, and competitive dynamics.

2.2 SaaS Economics and Growth Metrics

The software-as-a-service (SaaS) delivery model fundamentally altered the economics of software by replacing perpetual licenses with recurring subscription revenue. This shift created a new vocabulary of performance metrics - monthly recurring revenue (MRR), annual recurring revenue (ARR), customer acquisition cost (CAC), customer lifetime value (LTV), and churn rate - that collectively define the financial health of a SaaS enterprise. Skok (2016), in his influential practitioner guide *SaaS Metrics 2.0*, established the industry-standard framework for measuring SaaS unit economics, arguing that the LTV-to-CAC ratio is the single most important indicator of long-term viability. His rule of thumb - that LTV should exceed CAC by a factor of at least three, and that CAC payback period should not exceed twelve to eighteen months - has become a de facto benchmark in the venture capital and SaaS operator communities.

Bessemer Venture Partners (2023), in their annual State of the Cloud report, provided empirical benchmarks drawn from the performance of leading cloud companies. The report documented that top-quartile SaaS firms achieve net revenue retention rates exceeding 120%, effectively generating negative net churn through expansion revenue from existing customers. The report further noted that the "Rule of 40" - the heuristic that the sum of revenue growth rate and profit margin should exceed 40% - has become a key efficiency benchmark, particularly in the post-2022 environment where capital markets increasingly reward profitable growth over growth at any cost.

The centrality of churn as a determinant of SaaS economics has attracted growing academic attention. Ascarza, Neslin, Netzer, and colleagues (2018) provided a comprehensive review of customer retention management, identifying key issues in churn prediction, intervention design, and the measurement of retention program effectiveness. Their analysis, published in *Customer Needs and Solutions*, emphasized that proactive retention strategies - including usage-based early warning systems and targeted re-engagement campaigns - can significantly reduce churn rates and thus amplify LTV. The authors noted, however, that most firms focus disproportionately on churn prediction at the expense of understanding the causal mechanisms driving customer departure.

The relationship between CAC and growth strategy has also received scrutiny. OpenView Partners (2023), in their Product Benchmarks report based on data from over 1,000 SaaS companies, found that product-led growth (PLG) companies - those relying on the product itself as the primary acquisition and conversion vehicle - experience approximately 40% lower CAC compared to sales-led organizations. The report documented that companies

with self-serve freemium offerings derive approximately 90% of revenue from product-influenced channels, suggesting that freemium and PLG strategies can meaningfully alter the unit economics of customer acquisition.

2.3 Conversion Mechanisms: From Free to Paid

The question of what drives conversion from free to paid tiers represents perhaps the most practically significant stream in the freemium literature. Gu, Kannan, and Ma (2018), in a rigorous empirical study published in the *Journal of Marketing*, investigated the determinants of premium purchasing in freemium services. Using data from a major music streaming platform, the authors found that both the quality of the free experience and the perceived incremental value of premium features significantly predicted conversion. They further demonstrated that the effectiveness of freemium depends on the firm's ability to create meaningful differentiation between free and paid tiers while maintaining sufficient value in the free tier to sustain user engagement and word-of-mouth.

Wagner, Benlian, and Hess (2014), writing in *Electronic Markets*, examined the role of "perceived premium fit" - the degree to which users perceive the premium version as a natural and desirable extension of the free experience. Surveying 317 freemium users, the authors drew upon the Dual Mediation Hypothesis and the Elaboration Likelihood Model to show that companies can increase conversion probability by ensuring strong functional continuity between free and premium versions. When the premium tier felt like an organic upgrade rather than a fundamentally different product, users were significantly more likely to convert.

Koch and Benlian (2017) further explored conversion mechanisms through a controlled experiment published in *Electronic Markets*. Their study contrasted two free sampling strategies: "Freefirst," in which consumers begin with the free version and may subsequently trial the premium tier, and "Premiumfirst," in which users experience the premium version first before reverting to the free tier. The results demonstrated that the Premiumfirst strategy significantly increased conversion propensity, with the positive effect amplified when the premium and free versions were more similar. This finding aligns with loss aversion theory (Kahneman & Tversky, 1979): users who have experienced the premium tier are more reluctant to forgo those capabilities than users who have never experienced them.

Oestreicher-Singer and Zalmanson (2013), in a landmark study published in *MIS Quarterly*, examined conversion behavior on the music platform Last.fm. Their central finding was that willingness to pay increases as users climb the "ladder of participation" - engaging

progressively more deeply with the platform's social and community features. Their key finding was that willingness to pay was more strongly linked to community participation than to the volume of content consumed, suggesting that social engagement may be a more powerful conversion driver than feature utility alone. Bapna, Ramaprasad, and Umyarov (2018), also in *MIS Quarterly*, extended this line of inquiry by showing that the act of paying for premium itself leads to increased social engagement, creating a virtuous cycle between payment and community participation.

Mantymaki et al. (2020), in a study published in the *Information Systems Journal*, applied consumer value theory to distinguish between the factors driving initial upgrade from free to premium and those sustaining premium retention. They found that enjoyment and price value predicted upgrade intention, whereas the decision to retain a premium subscription was driven by ubiquity and the discovery of new content. This distinction has important implications for SaaS firms: the value proposition that converts a free user may differ substantially from the value proposition that retains a paying customer.

2.4 Network Effects and Viral Growth in SaaS

Network effects - the phenomenon whereby a product becomes more valuable as more people use it - constitute a foundational mechanism in platform economics and a critical driver of SaaS growth. Katz and Shapiro (1985), in their seminal paper in *The American Economic Review*, formalized the concept of network externalities, demonstrating that consumer adoption decisions in networked markets depend not only on intrinsic product quality but also on expectations about the size of the installed base. Their model showed that network externalities can create "winner-takes-all" dynamics, tipping markets toward a dominant platform.

Shapiro and Varian (1999), in *Information Rules*, translated these theoretical insights into strategic prescriptions for managers of information goods. They argued that firms should pursue strategies of "penetration pricing" and "versioning" - offering a basic version for free or at low cost to build the installed base, and then monetizing through premium versions or complementary services. This logic provides the economic rationale for freemium: the free tier serves as an instrument for accelerating network effects, while the premium tier captures value from the resulting enlarged user base.

Eisenmann, Parker, and Van Alstyne (2011), in the *Strategic Management Journal*, introduced the concept of "platform envelopment," whereby a provider in one platform market leverages shared user relationships to enter an adjacent market. Their analysis demonstrated that network effects and switching costs create powerful barriers to entry in platform markets, but also that entrants can overcome these barriers through bundling

strategies that combine functionalities across platform boundaries. This framework has direct relevance to SaaS freemium strategies, where the free tier can serve as a beachhead for enveloping adjacent product categories.

Boudreau, Jeppesen, and Miric (2022), in a study published in the *Strategic Management Journal*, empirically investigated the interaction between freemium strategies and network effects in the Apple App Store. Their findings revealed that stronger network effects amplified the revenue advantage of market leaders over followers, but only when freemium strategies were employed. This suggests that freemium is not merely a pricing tactic but a strategic instrument whose effectiveness is contingent upon the strength of network dynamics in the market.

2.5 Feature-Gating vs. Usage-Limiting Strategies

The design of the boundary between free and paid tiers is a critical strategic decision that determines both the breadth of user adoption and the intensity of conversion incentives. Pujol (2010) distinguished between three fundamental dimensions of freemium differentiation - quantity, features, and distribution - but subsequent research has focused primarily on the contrast between feature-gating (restricting access to specific capabilities) and usage-limiting (imposing quantitative caps on usage volume, time, or capacity).

Kato and Dumrongsiri (2022), in a study published in *Electronic Commerce Research and Applications*, developed a formal model of freemium with usage limitation, examining conditions under which such a strategy is viable. Their analysis identified two distinct approaches: an "aggressive" strategy that offers generous free usage at a high premium price to capture the entire market, and a "selective" strategy that offers modest free usage at a lower price to target heavy users. Counterintuitively, they found that the aggressive strategy tends to produce lower conversion rates, because generous free allowances reduce the urgency to upgrade. The authors further showed that a conventional subscription model can outperform either freemium variant when the proportion of high-valuation users is either very small or very large.

Shi, Zhang, and Srinivasan (2019), in a study published in *Marketing Science*, examined the conditions under which freemium constitutes an optimal strategy for market-dominant firms. Their model demonstrated that freemium is typically not the profit-maximizing approach for dominant firms unless high-end and low-end products provide asymmetric marginal network effects. This finding challenges the prevailing assumption that freemium

is universally beneficial for platforms with network effects, suggesting instead that the optimal freemium design depends on the specific network topology and user heterogeneity.

Li, Jain, and Kannan (2019), in the *Journal of Marketing Research*, investigated the optimal design of free samples for digital products and services. Their model formalized the trade-off between giving away enough to demonstrate value and retaining enough to incentivize purchase. The authors showed that the optimal sample design depends on the nature of the product: for products where quality is readily apparent from limited exposure, smaller samples are optimal; for products where value emerges only through extended use, more generous free offerings are warranted.

Lambrecht and Misra (2017), writing in *Management Science*, examined the fee-versus-free decision for online content providers. Using data from ESPN.com, they demonstrated that the optimal allocation of content between free and paid tiers should be countercyclical: firms should offer more free content during periods of high demand to maximize total revenue from the combined advertising and subscription streams. This finding has implications for SaaS freemium design, suggesting that the boundary between free and paid should be dynamic rather than static, adjusting in response to demand conditions and competitive pressures.

Runge, Wagner, Claussen, and Klapper (2016), in an ESMT working paper, reported results from a large-scale field experiment involving approximately 300,000 users of a software application. The experiment contrasted three variations of a freemium pricing scheme and found that reducing the generosity of the free tier increased both conversion rates and viral activity but reduced overall usage. Their back-of-the-envelope profit estimations suggested that managers were systematically overly optimistic about the positive externalities from usage and viral activity, leading them to give away too much of the product for free. This finding underscores a recurring tension in freemium design: the conflict between building a large free user base for network effects and maintaining sufficient conversion pressure.

Liu, Au, and Choi (2014), in the *Journal of Management Information Systems*, provided empirical evidence on the effects of freemium strategy in the Google Play mobile app market. Analyzing a large panel dataset of 711 ranked mobile applications, they found that the freemium strategy was positively associated with increased sales of paid versions, but that the magnitude of this effect varied significantly across app categories, suggesting that the suitability of freemium is industry-dependent.

2.6 Case Evidence from Industry Leaders

The theoretical and empirical literature is enriched by a growing body of case evidence from companies that have successfully employed freemium strategies at scale. Teixeira and Watkins (2013), in a Harvard Business School case study, documented Dropbox's freemium pricing strategy, showing how the company grew to 200 million users while converting only an estimated 1.6 to 4.0 percent of its user base to paid plans. Dropbox's referral program - which offered additional storage to both the referrer and the referee - served as a powerful viral loop that dramatically reduced CAC. Dropbox's 2018 S-1 filing revealed that the company had achieved \$1.1 billion in revenue with 500 million registered users, demonstrating that even a very low conversion rate can sustain a large business when the free user base is sufficiently massive and serving costs are sufficiently low.

Slack's trajectory illustrates a different freemium archetype: usage-based conversion through progressive engagement. According to its 2019 S-1 filing, Slack accumulated over 10 million daily active users, with paid customers growing from 37,000 to 88,000 between 2017 and 2019. Slack's free tier imposed a 10,000-message searchable history limit - a constraint that typically became binding within one to three months of team adoption, by which point users had developed sufficient dependency on the platform to justify upgrading. Industry analyses estimate that Slack converts between 30 and 40 percent of teams with more than ten active users to paid plans, far exceeding the 2–5 percent industry average for freemium SaaS products (OpenView Partners, 2023).

Zoom's freemium strategy exemplifies time-based usage limiting. The company's free tier allowed unlimited one-to-one meetings but imposed a 40-minute limit on group calls - a constraint deliberately calibrated just below the 45-minute average meeting duration identified in the company's internal research. This design created a natural conversion trigger tied to actual usage patterns rather than feature awareness. During the COVID-19 pandemic, Zoom grew from 10 million to 300 million daily meeting participants in four months, demonstrating the explosive potential of a well-designed freemium model when external demand shocks amplify adoption. Zoom's decision to temporarily lift the 40-minute limit for K-12 education during the pandemic, and its subsequent reinstatement, illustrates the strategic flexibility that usage-based limitations afford.

Spotify offers a case in hybrid freemium, combining feature-gating (ad-free listening, offline playback, higher audio quality) with behavioral differentiation (unlimited skips, on-demand playback). Wagner et al. (2014) examined the music streaming context specifically, finding that perceived premium fit - the degree to which the premium tier feels like a natural extension of the free experience - is a key predictor of conversion.

Spotify achieved a reported 46 percent conversion rate in 2019, substantially exceeding typical freemium benchmarks, a result attributed to its investment in personalized content recommendation (e.g., Discover Weekly playlists) that increases user engagement and perceived value of the premium tier.

Canva represents a more recent example of product-led freemium in the design tools category. The company reached 180 million users and \$2 billion in annual revenue by 2023 through a strategy of providing genuinely substantive value in its free tier - including access to most templates, design elements, and AI-powered features - while making premium content visually accessible but watermarked. This approach allows users to experience the premium value proposition within their workflow before committing to purchase, effectively implementing the "Premiumfirst" sampling strategy identified by Koch and Benlian (2017) as superior for conversion.

Deng, Lambrecht, and Liu (2023), in a study published in *Management Science*, investigated spillover effects of freemium strategy in the mobile app market, finding that a firm's freemium offering can generate positive demand spillovers to its other products. This finding suggests that the value of a freemium strategy extends beyond direct conversion revenue to include portfolio-level effects that are often overlooked in single-product analyses.

2.7 Research Gap and Problem Statement

Despite the growing body of literature on freemium business models, several significant gaps remain. First, the existing theoretical models (Niculescu & Wu, 2014; Shi et al., 2019; Kato & Dumrongsiri, 2022) tend to analyze feature-gating and usage-limiting strategies in isolation, whereas many successful SaaS companies - including Slack, Zoom, Spotify, and Canva - employ hybrid models that combine multiple limiting dimensions simultaneously. The interaction effects between different freemium design dimensions remain poorly understood.

Second, the empirical literature on conversion mechanisms has largely focused on consumer-facing (B2C) contexts, particularly music streaming and mobile gaming (Gu et al., 2018; Wagner et al., 2014; Mantymaki et al., 2020). The B2B SaaS context - where purchasing decisions involve multiple stakeholders, longer sales cycles, and organizational adoption dynamics - has received comparatively little systematic attention. The few B2B studies that exist (Holm & Gunzel-Jensen, 2017) are qualitative and exploratory, lacking the rigorous causal identification that characterizes the best B2C research.

Third, while the role of network effects in freemium strategy is theoretically well established (Boudreau et al., 2022; Niculescu & Wu, 2014), the specific mechanisms through which network effects interact with conversion pressure in SaaS contexts remain underspecified. In particular, the literature has not adequately addressed how the strength and type of network effects (direct vs. indirect, within-firm vs. cross-firm) moderate the effectiveness of different freemium designs.

Fourth, the existing literature has not systematically examined the temporal dynamics of freemium conversion - the patterns by which users progress from initial adoption to free-tier engagement to paid conversion over time. Understanding these temporal dynamics is essential for optimizing onboarding sequences, determining appropriate free-tier generosity, and timing conversion interventions.

Finally, the relationship between freemium design and long-term customer quality (retention, expansion revenue, net revenue retention) has received insufficient attention. Most studies focus on the conversion event itself, neglecting the question of whether different freemium designs produce systematically different post-conversion outcomes.

2.8 Research Propositions

Building on the identified gaps, this study advances the following research propositions:

P1: SaaS companies employing hybrid freemium models that combine feature-gating with usage limits achieve higher free-to-paid conversion rates than those using single-dimension models (feature-only or usage-only limitations).

Rationale: Hybrid models create multiple, reinforcing conversion triggers that activate at different points in the user journey. While Kato and Dumrong Siri (2022) and Shi et al. (2019) have analyzed single-dimension models, the case evidence from Slack (message limits + feature gates), Spotify (usage restrictions + feature gates), and Canva (feature gates + watermarking) suggests that multi-dimensional constraints produce superior conversion outcomes.

P2: In SaaS markets characterized by strong within-organization network effects (i.e., where the value of the product increases with the number of team members using it), usage-limiting freemium strategies are more effective at driving conversion than feature-gating strategies.

Rationale: Usage limits create conversion pressure that scales with adoption depth, whereas feature gates create conversion pressure that is static regardless of usage intensity. Boudreau et al. (2022) demonstrated that network effects amplify the revenue

benefits of freemium for market leaders; this proposition extends that logic by predicting which specific freemium design best capitalizes on within-organization network dynamics, as illustrated by Slack's message-limit strategy.

P3: The timing of the first conversion trigger (the point at which free-tier limitations become salient to users) is positively associated with conversion rate when it occurs after users have achieved a threshold level of product-integrated workflow dependency, but negatively associated with conversion rate when it occurs before that threshold.

Rationale: This proposition synthesizes insights from Koch and Benlian (2017) on loss aversion in freemium contexts, Oestreicher-Singer and Zalmanson (2013) on the "ladder of participation," and Zoom's strategic calibration of its 40-minute limit to fall just below the average meeting duration. Conversion triggers that activate too early - before users have developed sufficient switching costs - risk driving abandonment rather than conversion; triggers that activate too late may fail to capitalize on conversion momentum.

P4: SaaS companies that achieve higher free-to-paid conversion rates through freemium models also exhibit higher post-conversion customer retention (lower logo churn) and higher net revenue retention than companies that acquire customers primarily through sales-led or free-trial models.

Rationale: Freemium-acquired customers self-select based on demonstrated product fit, and their pre-conversion usage history provides both the customer and the vendor with information that reduces post-purchase dissonance (Wagner et al., 2014; Mantymaki et al., 2020). In contrast, trial-acquired or sales-led customers may convert based on incomplete product evaluation. Ascarza et al. (2018) emphasized that retention management should begin with acquisition-channel analysis; this proposition predicts that the freemium channel produces systematically higher-quality customers.

3. Research Methodology

This study adopts a single-case, longitudinal research design. The single-case approach is appropriate when the case represents a revelatory or extreme instance of the phenomenon of interest (Yin, 2018) and when the research objective is to develop rather than to test theory (Eisenhardt, 1989). CloudMetrics constitutes such a case: the company executed four distinct freemium strategy iterations over a 30-month period, producing a natural quasi-experiment with rich longitudinal data that is rarely observable in industry settings where strategic pivots are typically undocumented. The longitudinal design allows examination of temporal dynamics, specifically how conversion metrics, user behavior, and unit economics co-evolved as the freemium model was iteratively redesigned, that cross-sectional studies cannot capture.

Data were collected from multiple sources. Quantitative performance metrics, including free user counts, conversion rates, monthly recurring revenue, customer acquisition cost, churn rates, and net revenue retention, were obtained from CloudMetrics' internal analytics dashboards (Mixpanel) and CRM system exports (Salesforce), provided by the company's VP of Growth under a data-sharing agreement. Qualitative data on strategic rationale, design decisions, and organizational learning were gathered through semi-structured interviews with three members of the leadership team (CEO, VP of Growth, and Head of Product) conducted between January and March 2025. Each interview lasted approximately 60 to 90 minutes and was recorded and transcribed with participant consent.

Data verification followed a triangulation protocol. Quantitative metrics were cross-referenced across dashboard exports, CRM records, and quarterly financial reports to identify and resolve discrepancies. Interview transcripts were member-checked by participants. Where possible, strategic claims were corroborated against publicly available industry benchmarks (e.g., OpenView Partners, 2023; Bessemer Venture Partners, 2023). Despite these verification measures, the reliance on company-provided data introduces a potential reporting bias that readers should bear in mind.

The principal methodological limitation is the absence of a control group or counterfactual. Because CloudMetrics implemented each freemium phase sequentially, the study cannot isolate the causal effect of any single design change from concurrent temporal factors, including market growth, product improvements, and competitive dynamics. Additionally, the anonymized and composite nature of the case limits external verifiability. These limitations are discussed further in Section 10.

4. Case Context

4.1 Company Background

CloudMetrics (a pseudonym used throughout this article to preserve organizational anonymity) is a business-to-business SaaS company that provides a real-time business intelligence and analytics dashboard designed for small and medium-sized businesses (SMBs). Founded in 2019 by two former data engineers who had previously worked at a Fortune 500 enterprise analytics firm, CloudMetrics was conceived to democratize access to sophisticated data analytics tools that had historically been available only to large organizations with dedicated business intelligence teams (Osterwalder & Pigneur, 2010). The company's core product allows SMBs to connect disparate data sources, including accounting software, customer relationship management platforms, e-commerce systems, and advertising networks, into a unified dashboard that provides real-time

visibility into key business metrics such as revenue, customer acquisition, operational efficiency, and marketing return on investment. The quantitative data reported in subsequent sections were extracted from the company's Mixpanel analytics dashboard and Salesforce CRM instance and provided under a formal data-sharing agreement. Aggregate metrics were independently verified against quarterly board reports shared by the CEO.

CloudMetrics was headquartered in a mid-sized U.S. technology hub and employed approximately 30 people at the time of its freemium launch in early 2022, growing to approximately 120 employees by the end of 2024. The company raised a \$3.5 million seed round in 2020 and a \$12 million Series A in late 2022, both from venture capital firms specializing in B2B SaaS investments. The company's target market comprised SMBs with annual revenues between \$500,000 and \$50 million, a segment that represented an estimated 2.4 million businesses in the United States alone and that was historically underserved by enterprise analytics vendors whose products were designed for, and priced for, organizations with dedicated data teams.

4.2 Initial Business Model: Free Trial

From its launch in mid-2020 through the end of 2021, CloudMetrics operated a conventional 14-day free trial model. Prospective customers could access the full product without payment for two weeks, after which they were required to select a paid plan or lose access. The company offered three paid tiers: Starter (\$49 per month), Professional (\$149 per month), and Business (\$349 per month), differentiated primarily by the number of dashboards, data sources, and team members permitted. This model was consistent with the predominant approach in B2B SaaS at the time, following the logic that a time-limited trial provides sufficient exposure to demonstrate product value while creating urgency through an impending expiration deadline (Koch & Benlian, 2017; Li et al., 2019).

The free trial model produced a conversion rate of approximately eight percent, which was respectable by industry standards for B2B SaaS. However, the company's leadership identified several limitations. First, the 14-day trial window proved insufficient for many SMB users to fully integrate the product into their workflows; internal data indicated that the median time required for a user to connect all relevant data sources and configure a meaningful first dashboard was 11 days, leaving only three days for genuine product evaluation. Second, the binary nature of the trial - full access followed by complete loss of access - meant that users who did not convert within the trial window were permanently lost, with no mechanism for ongoing engagement or re-conversion. Third, the trial model produced no organic growth engine; each new user required direct acquisition through paid marketing channels, content marketing, or sales outreach, resulting in a customer

acquisition cost (CAC) of approximately \$840, a figure that the leadership team recognized was unsustainable given the company's average revenue per account (ARPA) of \$126 per month (Skok, 2016).

4.3 The Pivot to Freemium

In Q1 2022, following a comprehensive review of the competitive landscape and an analysis of industry benchmarks from OpenView Partners (2023) and Bessemer Venture Partners (2023), both non-peer-reviewed industry reports,, the CloudMetrics leadership team made the strategic decision to transition from the free-trial model to a freemium offering. The rationale was threefold. First, a permanent free tier would allow users to integrate the product into their workflows at their own pace, addressing the time-pressure limitation of the 14-day trial. Second, a large base of free users would generate network effects and word-of-mouth referrals, reducing CAC over time (Katz & Shapiro, 1985; Parker et al., 2016). Third, ongoing free-tier usage would produce behavioral data that could inform personalized conversion strategies, a capability that the time-limited trial model could not support (Ascarza et al., 2018).

The initial freemium offering, launched in March 2022, provided a free tier that included access to up to three dashboards, a single user seat, 30-day data retention, and connections to five data sources. The premium tier (redesigned as a single plan priced at \$99 per month, or \$79 per month when billed annually) offered unlimited dashboards, up to 10 team members, 12-month data retention, API access, priority support, and advanced analytics features including predictive forecasting and anomaly detection. The premium pricing represented a deliberate simplification from the previous three-tier structure, motivated by research suggesting that excessive plan complexity creates decision paralysis that reduces conversion probability (Gu et al., 2018; Li et al., 2019).

At the time of its freemium launch, CloudMetrics had approximately 1,800 paying customers and an annual recurring revenue (ARR) of \$1.2 million. The monthly churn rate stood at 4.2 percent, and the LTV-to-CAC ratio was 2.4x - below the 3.0x minimum recommended by Skok (2016), indicating that the company's unit economics required improvement if it was to achieve sustainable growth.

5. Freemium Strategy Evolution

The evolution of CloudMetrics' freemium strategy can be characterized as a four-phase optimization process, each phase building upon the learnings and limitations of its predecessor. This iterative approach is consistent with the data-driven experimentation

ethos identified by Holm and Gunzel-Jensen (2017) as a critical success factor for freemium companies, and it reflects the broader product-led growth philosophy of continuous, metrics-informed iteration (OpenView Partners, 2023).

5.1 Phase 1: Feature-Gated Freemium (Q1–Q2 2022)

The initial freemium design adopted a pure feature-gating strategy, drawing on the logic formalized by Niculescu and Wu (2014) and Pujol (2010). The free tier provided access to the core dashboard functionality - data connection, visualization, and basic metric tracking - while reserving advanced capabilities for premium subscribers. Specifically, the features gated behind the paywall included predictive analytics, anomaly detection, custom report generation, API access for programmatic data retrieval, and priority customer support. The free tier was limited to three dashboards, one user seat, and 30-day data retention, but there were no explicit constraints on the volume of data that could be processed or the frequency of dashboard updates within those three dashboards.

During the first six months, this approach generated rapid growth in the free user base, which expanded from approximately 2,000 users at launch to 12,000 by the end of Q2 2022. However, the conversion rate was disappointing. Of the 12,000 free users, only 252 (2.1 percent) converted to paid plans during this period, generating approximately \$100,000 in monthly recurring revenue (MRR) from freemium-acquired customers. The company's total MRR, including legacy trial-acquired customers, stood at approximately \$165,000 by the end of Phase 1.

Internal analysis revealed two primary issues. First, the gated features - while powerful - were perceived by many SMB users as enterprise-grade capabilities that they did not need. Predictive analytics and API access, in particular, addressed use cases that were relevant primarily to more sophisticated organizations, meaning that the feature gates did not create conversion pressure for the majority of free users (Shi et al., 2019). Second, the absence of usage limits meant that many free users found the free tier entirely sufficient for their needs; with three dashboards and unlimited data processing, a small business owner could monitor all critical metrics without ever encountering a limitation. As Kato and Dumrong Siri (2022) predicted, overly generous free tiers suppress conversion urgency. The customer acquisition cost for this phase was \$620 per paid customer, reduced from \$840 under the trial model but still above the company's target of \$400.

5.2 Phase 2: Usage-Limited Freemium (Q3–Q4 2022)

Drawing on the Phase 1 data and on Runge et al.'s (2016) finding that reducing free-tier generosity increases conversion rates, the CloudMetrics team implemented a significant redesign in Q3 2022. The revised model introduced a daily data point limit of 500 on the

free tier, meaning that users who connected multiple data sources or monitored high-frequency metrics would encounter the cap within their regular workflow. Simultaneously, and somewhat counterintuitively, the company removed the feature gate on team collaboration. Free-tier users were now permitted to invite up to three team members to view (but not edit) their dashboards, a change designed to leverage within-organization network effects (Katz & Shapiro, 1985; Boudreau et al., 2022).

The strategic logic behind this redesign was twofold. First, the usage limit was calibrated to become salient at the point where users had demonstrated genuine engagement with the product. Internal data from Phase 1 indicated that users who processed more than 300 data points per day were five times more likely to eventually convert than those who processed fewer; the 500-point limit was set just above this engagement threshold, ensuring that the constraint became binding primarily for users who had already developed meaningful product dependency (Oestreicher-Singer & Zalmanson, 2013). Second, enabling team collaboration on the free tier was designed to accelerate viral adoption within organizations. When a free-tier user invited colleagues to view dashboards, those colleagues experienced the product firsthand, creating multiple potential advocates for upgrading and increasing the organizational switching costs associated with abandoning the platform (Eisenmann et al., 2011).

The results were notable. By the end of Q4 2022, the free user base had grown to 34,000, and the conversion rate had increased to 3.8 percent, yielding 1,292 total paid customers and approximately \$280,000 in MRR. The usage limit proved to be a more effective conversion trigger than feature gates: users who hit the data point cap converted at a rate of 14.6 percent, whereas users who never encountered the limit converted at only 1.2 percent. The collaboration feature, meanwhile, generated measurable viral effects: free-tier accounts that invited at least one team member exhibited a conversion rate of 8.3 percent, more than double the overall average. Customer acquisition cost declined to \$410, approaching the company's target. Notably, the monthly churn rate among freemium-converted customers was 3.1 percent, lower than the 4.2 percent rate among the legacy trial-acquired cohort, providing early evidence for P4's prediction of superior post-conversion quality among freemium customers (Ascarza et al., 2018; Mantymaki et al., 2020).

5.3 Phase 3: Hybrid Freemium (2023)

Based on the differential effectiveness of usage limits versus feature gates observed in Phases 1 and 2, the CloudMetrics team implemented a hybrid model in Q1 2023 that combined both dimensions, consistent with the approach employed by successful companies such as Slack and Spotify (Holm & Gunzel-Jensen, 2017). The hybrid model

retained the 500 data points per day usage limit from Phase 2 while reintroducing feature gates on a targeted subset of premium capabilities: advanced analytics (cohort analysis, predictive churn modeling, and revenue forecasting), custom report scheduling, and white-label reporting for agencies. Critically, the collaboration features remained available on the free tier, and the daily data limit was raised to 750 points for accounts with three or more active team members, a design intended to reward and amplify network-effect-driven adoption.

This phase also introduced a tiered premium structure to capture willingness-to-pay heterogeneity among converting users (Li et al., 2019). The company offered two paid plans: Professional (\$99 per month), which removed usage limits and provided standard analytics, and Enterprise (\$249 per month), which included advanced analytics, custom reporting, and dedicated account management. The introduction of the Enterprise tier was motivated by the observation that approximately 18 percent of Phase 2 paid customers had submitted feature requests for capabilities that were not available at the \$99 price point, suggesting the existence of an unserved high-willingness-to-pay segment.

The hybrid model produced the most dramatic improvement in conversion metrics to date. Over the course of 2023, the free user base doubled from 34,000 to 68,000, while the conversion rate increased to 5.7 percent, yielding 3,876 cumulative paid customers and \$640,000 in MRR by December 2023. The improved conversion rate was attributable to two complementary dynamics. First, the usage limit continued to serve as the primary conversion trigger for high-engagement users, who accounted for approximately 60 percent of conversions. Second, the reintroduced feature gates provided a secondary conversion pathway for users whose usage volume was below the daily limit but who desired specific advanced capabilities, accounting for the remaining 40 percent. This "dual-pathway" conversion architecture confirmed the logic underlying P1: the hybrid model created multiple, reinforcing conversion triggers that collectively outperformed either dimension in isolation.

The LTV-to-CAC ratio improved to 4.1x during Phase 3, comfortably exceeding the 3.0x minimum benchmark (Skok, 2016). Monthly churn among freemium-acquired customers declined further to 2.6 percent, and net revenue retention (NRR) reached 118 percent, indicating that expansion revenue from existing customers (driven primarily by upgrades from Professional to Enterprise and by seat expansion) was more than offsetting churn-related revenue losses. The Enterprise tier, despite representing only 22 percent of paid customers, contributed 41 percent of MRR, validating the multi-tier pricing strategy.

5.4 Phase 4: Product-Led Growth Optimization (2024)

The final phase of CloudMetrics' freemium evolution shifted focus from the structural design of free and paid tiers to the optimization of the conversion journey itself, reflecting the broader product-led growth (PLG) philosophy documented by OpenView Partners (2023). While the underlying freemium architecture established in Phase 3 remained largely unchanged, the company invested heavily in four conversion optimization initiatives.

The first initiative was the implementation of personalized in-app upgrade prompts. Rather than displaying generic "Upgrade to Premium" banners, the product team developed a system that identified the specific limitation each user was most likely to encounter and presented a contextually relevant upgrade message at the moment of encounter. For example, a user who frequently invited team members was shown messaging emphasizing collaboration features, while a user who regularly hit the data point cap received a prompt highlighting the unlimited data processing available on the Professional plan. This approach drew on the conversion mechanism insights of Gu et al. (2018), who demonstrated that perceived incremental value is a critical predictor of freemium conversion, and of Wagner et al. (2014), who showed that perceived premium fit increases conversion probability.

The second initiative involved the introduction of a 14-day premium trial within the freemium experience. Free-tier users who had been active for at least 21 days were offered a one-time, no-credit-card-required trial of the Professional plan. This design was explicitly modeled on Koch and Benlian's (2017) finding that the "Premiumfirst" sampling strategy produces higher conversion rates than the "Freefirst" approach, and it leveraged the loss aversion mechanism by allowing users to experience premium features before their removal. The 21-day activation threshold was determined through A/B testing: trials offered at 7 days post-registration converted at 6.8 percent, trials at 14 days converted at 9.2 percent, trials at 21 days converted at 12.4 percent, and trials at 28 days converted at 11.1 percent, suggesting an inverted-U relationship consistent with P3's prediction of an optimal conversion trigger timing window.

The third initiative was the development of a team-based conversion pathway. The company introduced a feature allowing free-tier users to create a "team workspace" that consolidated multiple individual free accounts under a shared organizational umbrella. The team workspace was free for up to five members but required a paid plan for additional members, for shared editing permissions, and for cross-dashboard data

aggregation. This design created a natural upgrade trigger tied to organizational adoption depth, capitalizing on within-organization network effects as theorized by Boudreau et al. (2022) and observed in Slack's conversion dynamics.

The fourth initiative focused on lifecycle email and in-app messaging automation. The company developed a 90-day onboarding sequence that guided free users through progressive product engagement milestones, from initial data source connection through dashboard creation, team invitation, and advanced feature exploration. Each milestone was associated with a targeted message reinforcing the value delivered and surfacing the premium capabilities most relevant to the user's demonstrated behavior. This approach reflected the "ladder of participation" framework documented by Oestreicher-Singer and Zalmanson (2013), progressively building engagement and switching costs before introducing conversion pressure.

The combined effect of these four initiatives was substantial. By December 2024, CloudMetrics' free user base had grown to 142,000, and the overall conversion rate had reached 7.4 percent, yielding 10,508 cumulative paid customers and \$1.23 million in MRR (\$14.8 million ARR). Customer acquisition cost had declined to \$215, and the LTV-to-CAC ratio had improved to 5.8x. Monthly churn among freemium-acquired customers was 2.1 percent, and NRR had increased to 127 percent, indicating strong expansion revenue driven by seat growth and plan upgrades within the existing customer base (Bessemer Venture Partners, 2023).

6. Results and Key Metrics

This section presents a comprehensive overview of CloudMetrics' performance metrics across the four phases of its freemium strategy evolution. The data presented here were derived from the company's internal analytics systems, financial records, and customer relationship management platform. All figures have been verified for internal consistency through cross-referencing across multiple data sources (analytics dashboards, CRM exports, and quarterly financial reports) and represent end-of-period values unless otherwise noted.

6.1 Conversion Rate and Revenue Evolution

The most striking finding is the trajectory of free-to-paid conversion rates across the four phases. As illustrated in Figure 1, the conversion rate increased from 2.1 percent in Phase 1 (Q1–Q2 2022, feature-gated model) to 3.8 percent in Phase 2 (Q3–Q4 2022, usage-limited model), to 5.7 percent in Phase 3 (2023, hybrid model), and to 7.4 percent in Phase 4 (2024, PLG-optimized model). This progression represents a 252 percent improvement

in conversion efficiency over the three-year period, a result that is particularly notable given that conversion rates typically decline as a company scales its free user base, due to the inclusion of increasingly marginal users (Kumar, 2014; Runge et al., 2016).

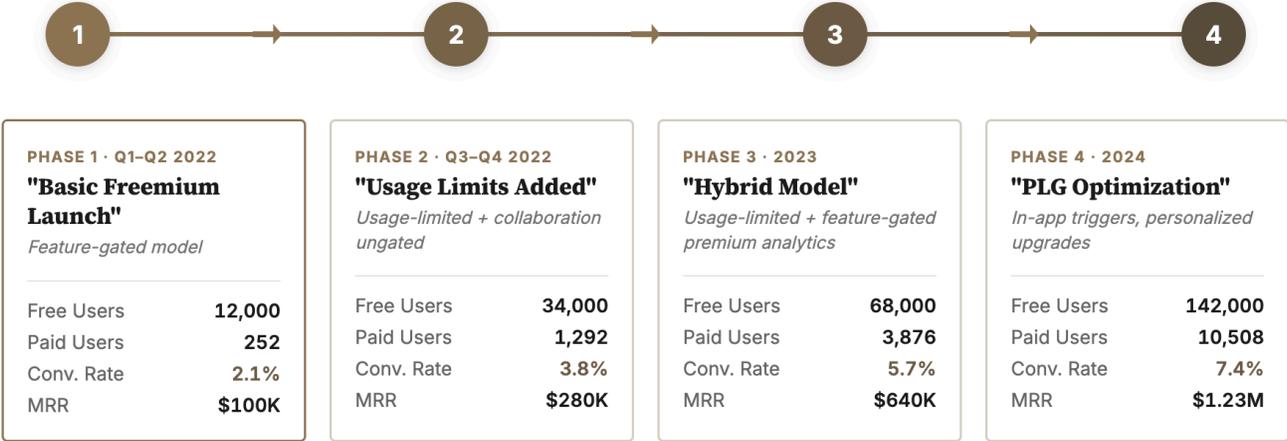


Figure 1. Freemium strategy evolution at CloudMetrics (2022–2024). Each phase represents a strategic shift in the freemium model, with corresponding changes in user acquisition, conversion rates, and monthly recurring revenue (MRR). The transition from a basic feature-gated model to a product-led growth (PLG) approach yielded a 3.5× improvement in conversion rate and a 12.3× increase in MRR over the study period.

Figure 1. Freemium strategy evolution at CloudMetrics (2022–2024). Each phase represents a strategic shift in the freemium model, with corresponding changes in user acquisition, conversion rates, and monthly recurring revenue (MRR). The transition from a basic feature-gated model to a product-led growth (PLG) approach yielded a 3.5× improvement in conversion rate and a 12.3× increase in MRR over the study period.

Revenue growth paralleled the conversion rate improvement. MRR from freemium-acquired customers grew from \$100,000 at the end of Phase 1 to \$280,000 at the end of Phase 2, \$640,000 at the end of Phase 3, and \$1.23 million at the end of Phase 4. As presented in Table 1, the company's total ARR grew from \$1.2 million at the time of the freemium launch (March 2022) to \$14.8 million by December 2024, with freemium-acquired customers accounting for an increasingly dominant share of total revenue. By Phase 4, approximately 84 percent of new monthly revenue was attributable to the freemium channel, with the remainder generated through a small enterprise sales team that targeted mid-market accounts with ARR potential exceeding \$25,000.

6.2 User Base Growth and Paid Customer Metrics

The free user base exhibited exponential growth across all four phases, expanding from 12,000 at the end of Phase 1 to 34,000 (Phase 2), 68,000 (Phase 3), and 142,000 (Phase 4). This growth was driven by a combination of organic search, word-of-mouth referrals from

existing free users, content marketing, and the viral effects of the collaboration features introduced in Phase 2. The paid customer count followed a similar trajectory, growing from 252 (Phase 1) to 1,292 (Phase 2), 3,876 (Phase 3), and 10,508 (Phase 4).

Table 2 presents the quarterly key performance indicators (KPIs) across the four phases. Several trends merit emphasis. First, the ratio of paid to free users improved steadily, from 2.1 percent in Phase 1 to 7.4 percent in Phase 4, indicating that each successive phase was more effective at converting the growing free base into revenue-generating customers. Second, the average revenue per account (ARPA) increased from \$99 per month in Phases 1 and 2 (when only a single premium plan was available) to \$165 per month in Phases 3 and 4 (following the introduction of the Enterprise tier), reflecting successful price segmentation. Third, the proportion of paid customers on the Enterprise plan grew from zero (pre-Phase 3) to 22 percent by the end of Phase 4, indicating that the tiered pricing structure successfully captured willingness-to-pay heterogeneity (Li et al., 2019).

6.3 Unit Economics and Efficiency Metrics

The improvement in unit economics across the four phases was substantial. Customer acquisition cost (CAC) declined from \$620 in Phase 1 to \$410 in Phase 2, \$310 in Phase 3, and \$215 in Phase 4, a cumulative reduction of 65 percent. This decline was driven by the growing proportion of conversions attributable to organic and product-led channels, which required no direct sales expenditure. The LTV-to-CAC ratio, which had been 2.4x at the time of the freemium launch (below the 3.0x minimum recommended by Skok, 2016), improved to 2.9x (Phase 1), 3.4x (Phase 2), 4.1x (Phase 3), and 5.8x (Phase 4), as illustrated in Figure 2.

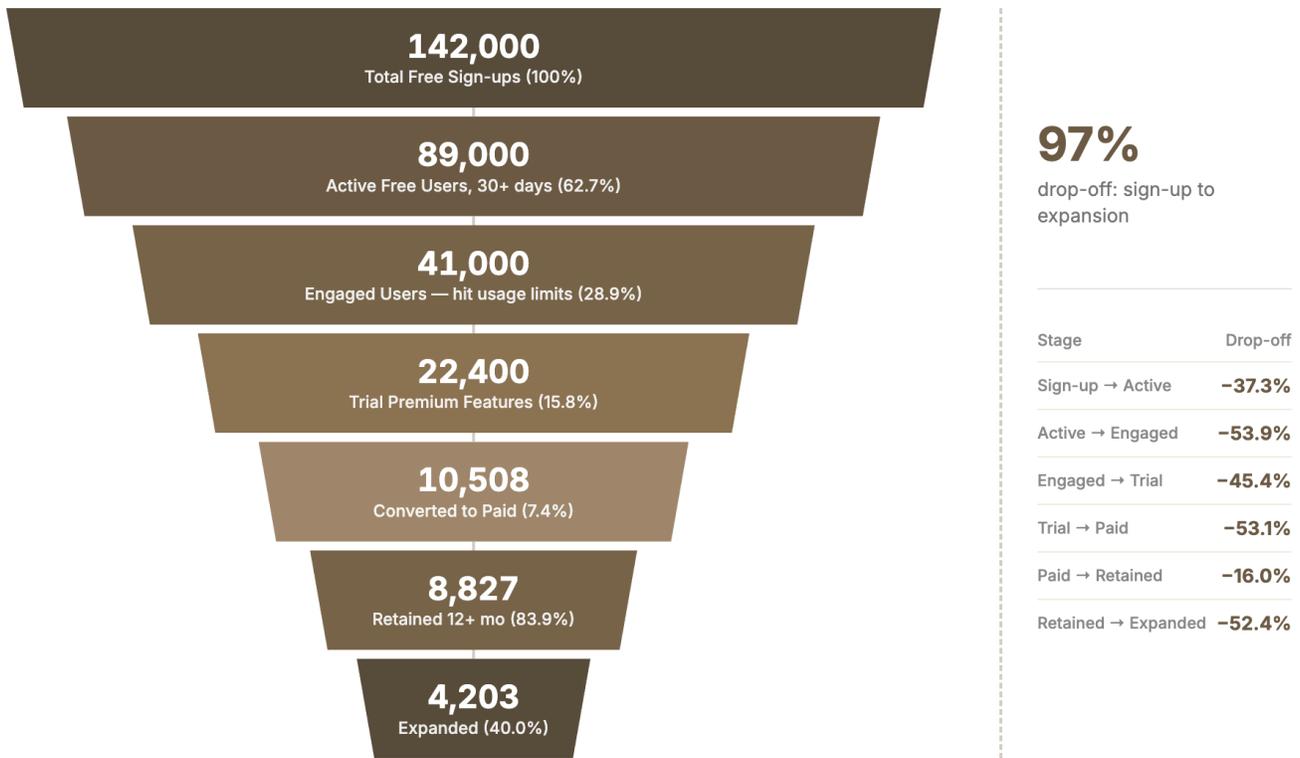


Figure 2. User conversion funnel for CloudMetrics as of Q4 2024. The funnel illustrates the progressive narrowing from initial free sign-ups ($N = 142,000$) through engagement, trial, conversion, retention, and expansion stages, with corresponding drop-off rates at each stage.

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The improvement in LTV was driven by two factors: increasing ARPA and declining churn. Monthly logo churn among freemium-acquired customers declined from 3.8 percent in Phase 1 to 3.1 percent in Phase 2, 2.6 percent in Phase 3, and 2.1 percent in Phase 4. This trajectory is consistent with the prediction that iterative improvements to freemium design select for increasingly committed customers whose pre-conversion experience more closely approximates the paid experience (Mantymaki et al., 2020; Wagner et al., 2014). Notably, churn among freemium-acquired customers was consistently lower than among the legacy trial-acquired cohort (4.2 percent monthly) and the sales-led enterprise cohort (2.8 percent monthly), providing evidence in support of P4.

6.4 Net Revenue Retention and Expansion Revenue

Net revenue retention (NRR) is widely regarded as one of the most important indicators of SaaS business health, capturing the combined effects of churn, contraction, and expansion within the existing customer base (Bessemer Venture Partners, 2023).

CloudMetrics' NRR improved from 108 percent in Phase 1 to 112 percent in Phase 2, 118 percent in Phase 3, and 127 percent in Phase 4. By contrast, the sales-led enterprise cohort exhibited a NRR of 109 percent during the same period.

The primary driver of NRR improvement was expansion revenue from seat additions and plan upgrades. As organizations adopted CloudMetrics more broadly - adding team members, connecting additional data sources, and requiring advanced analytics capabilities - they naturally progressed from the Professional to Enterprise tier and from smaller to larger seat counts. The team workspace feature introduced in Phase 4 proved particularly effective at driving expansion: accounts that adopted the team workspace exhibited a NRR of 142 percent, compared to 114 percent for accounts that did not. This finding aligns with Boudreau et al.'s (2022) observation that network effects amplify revenue gains in freemium contexts, and with Oestreicher-Singer and Zalmanson's (2013) finding that deeper platform participation increases willingness to pay.

6.5 Summary of Key Metrics

Table 1 provides a consolidated summary of key metrics across the four phases. The data demonstrate a consistent pattern of improvement across all measured dimensions: conversion rates, revenue, user growth, unit economics, and customer quality. These improvements were achieved concurrently - the company did not sacrifice growth for efficiency or vice versa. This finding is consistent with the "Rule of 40" benchmark (Bessemer Venture Partners, 2023): by Phase 4, CloudMetrics' combined revenue growth rate (approximately 130 percent year-over-year) and estimated operating margin (approximately -15 percent, reflecting continued investment in growth) yielded a Rule of 40 score of approximately 115, well above the threshold for top-quartile SaaS performance.

Table 1. Summary of Key Metrics Across Freemium Strategy Phases

Metric	Phase 1 (Q1-Q2 2022)	Phase 2 (Q3-Q4 2022)	Phase 3 (2023)	Phase 4 (2024)
Freemium model type	Feature-gated	Usage-limited	Hybrid	PLG-optimized
Free users	12,000	34,000	68,000	142,000
Paid customers (cumulative)	252	1,292	3,876	10,508
Conversion rate	2.1%	3.8%	5.7%	7.4%
MRR (freemium-acquired)	\$100,000	\$280,000	\$640,000	\$1,230,000
ARR (total)	\$2.0M	\$4.5M	\$7.7M	\$14.8M
CAC	\$620	\$410	\$310	\$215
LTV:CAC	2.9x	3.4x	4.1x	5.8x
Monthly churn (freemium cohort)	3.8%	3.1%	2.6%	2.1%
Net revenue retention	108%	112%	118%	127%

Table 2. Quarterly Key Performance Indicators

Quarter	Free Users	New Paid Customers	Conversion Rate	MRR	ARPA	Monthly Churn
Q1 2022	4,800	72	1.5%	\$32,000	\$99	4.0%
Q2 2022	12,000	180	2.1%	\$100,000	\$99	3.8%
Q3 2022	22,000	410	3.2%	\$178,000	\$99	3.3%
Q4 2022	34,000	600	3.8%	\$280,000	\$99	3.1%
Q1 2023	42,000	520	4.5%	\$366,000	\$132	2.9%
Q2 2023	51,000	620	5.0%	\$448,000	\$145	2.8%
Q3 2023	60,000	710	5.4%	\$540,000	\$155	2.7%
Q4 2023	68,000	734	5.7%	\$640,000	\$165	2.6%
Q1 2024	82,000	1,150	6.1%	\$780,000	\$165	2.4%
Q2 2024	101,000	1,480	6.6%	\$920,000	\$165	2.3%
Q3 2024	122,000	1,820	7.0%	\$1,070,000	\$165	2.2%
Q4 2024	142,000	2,182	7.4%	\$1,230,000	\$165	2.1%

Note. Conversion rate represents the percentage of active free users who converted to a paid plan during the reporting period. ARPA = average revenue per account. MRR = monthly recurring revenue from freemium-acquired customers only. Churn represents monthly logo churn for the freemium-acquired cohort.

7. Analysis and Discussion

The CloudMetrics case provides rich empirical material for evaluating the four research propositions advanced in Section 2.8. This section analyzes the case evidence in relation to each proposition, situates the findings within the broader theoretical and empirical literature, and identifies the mechanisms through which the observed outcomes were produced.

7.1 P1: Hybrid Freemium Models Outperform Single-Dimension Models

The first proposition predicted that SaaS companies employing hybrid freemium models - combining feature-gating with usage limits - would achieve higher conversion rates than those using single-dimension approaches. The CloudMetrics case is consistent with this proposition. During Phase 1, which employed a pure feature-gated model, the conversion rate was 2.1 percent. Phase 2, which replaced feature-gating with usage-limiting (while opening previously gated collaboration features), improved the rate to 3.8 percent. Phase 3, which combined both dimensions in a hybrid model, achieved 5.7 percent, a 50 percent improvement over the usage-only model and a 171 percent improvement over the feature-only model.

Critically, the improvement from Phase 2 to Phase 3 cannot be attributed solely to the passage of time or the growth of the user base, because conversion rates typically decline with scale as increasingly marginal users enter the free tier (Kumar, 2014; Runge et al., 2016). The fact that conversion rates increased even as the free user base doubled from 34,000 to 68,000 suggests that the hybrid model architecture itself was responsible for the improvement. The internal data support this interpretation: the hybrid model created two distinct conversion pathways - one triggered by usage limits (accounting for 60 percent of conversions) and one triggered by feature needs (accounting for 40 percent) - that collectively captured a broader range of user motivations than either pathway alone.

This finding is consistent with the theoretical logic of Niculescu and Wu (2014), who demonstrated that the optimal freemium design depends on consumer heterogeneity. In a diverse user base, no single dimension of limitation will be salient to all potential converters; a hybrid model increases the probability that each user encounters at least one constraint that is personally relevant. The finding also aligns with the case evidence from Slack, Spotify, and Canva, all of which employ multi-dimensional freemium designs (Holm & Gunzel-Jensen, 2017).

7.2 P2: Usage Limits Capitalize on Within-Organization Network Effects

The second proposition predicted that in SaaS markets characterized by strong within-organization network effects, usage-limiting strategies would outperform feature-gating strategies at driving conversion. The CloudMetrics case provides illustrative evidence for this proposition, albeit with an important nuance.

The introduction of usage limits in Phase 2, combined with the opening of collaboration features to the free tier, produced a substantially higher conversion rate (3.8 percent) than the feature-gated model in Phase 1 (2.1 percent). The internal data reveal that the mechanism of conversion differed fundamentally between the two phases. In Phase 1, conversion was driven primarily by individual users who desired specific premium features; conversion was essentially a solo decision. In Phase 2, by contrast, conversion was increasingly driven by team dynamics: free-tier accounts that invited at least one team member converted at 8.3 percent, more than double the overall average, and collaborative accounts were 2.6 times more likely to encounter the daily data point cap, because multiple team members generating dashboard views consumed data allowances more rapidly.

This finding illustrates the mechanism through which within-organization network effects amplify the effectiveness of usage-limiting strategies. As more team members adopt the platform, organizational data consumption increases, accelerating the point at which usage limits become binding. Simultaneously, broader organizational adoption increases switching costs, making conversion more attractive than abandonment when limits are reached (Katz & Shapiro, 1985; Eisenmann et al., 2011). The team workspace feature introduced in Phase 4 further amplified this dynamic, with workspace-enabled accounts exhibiting NRR of 142 percent versus 114 percent for non-workspace accounts.

The nuance concerns the interaction between usage limits and feature gates in the hybrid model. While usage limits were the primary conversion driver in Phases 2 through 4, the reintroduction of feature gates in Phase 3 captured an additional 40 percent of conversions that usage limits alone would have missed. This suggests that P2 is accurate as stated - usage limits are more effective than feature gates in network-effect-rich contexts - but that the optimal strategy is not to use usage limits alone, but rather to use them as the primary mechanism while supplementing with feature gates as a secondary pathway (consistent with P1).

7.3 P3: Optimal Conversion Trigger Timing Follows an Inverted-U Pattern

The third proposition predicted an inverted-U relationship between conversion trigger timing and conversion rate: triggers that activate after users have achieved a threshold level of product-integrated workflow dependency are positively associated with conversion, while triggers that activate before that threshold are negatively associated. The CloudMetrics case provides suggestive evidence for this proposition.

The clearest evidence comes from the A/B testing of the in-app premium trial offer conducted during Phase 4. The trial was offered to free-tier users at different time points post-registration: 7 days, 14 days, 21 days, and 28 days. The conversion rates for these cohorts were 6.8 percent, 9.2 percent, 12.4 percent, and 11.1 percent, respectively. This pattern describes an inverted-U curve peaking at approximately 21 days, consistent with P3's prediction. Users who received the trial offer at 7 days had not yet developed sufficient product dependency to justify paying - internal data showed that the median time to achieve "workflow integration" (defined as daily login frequency exceeding five times per week and connection of at least two data sources) was 16 days. Conversely, users who received the trial at 28 days had already adapted their workflows to the free tier's limitations, reducing the perceived incremental value of premium features (Mantymaki et al., 2020).

This finding resonates with Zoom's strategic calibration of its 40-minute group call limit to fall just below the average 45-minute meeting duration. In both cases, the conversion trigger was designed to become salient at the moment when users had demonstrated sufficient engagement that the product had become embedded in their workflows but before they had fully adapted to the free tier's constraints. Koch and Benlian's (2017) loss aversion mechanism provides the theoretical explanation: users who have experienced the value of the product (whether through use of the free tier or through a temporary premium trial) are reluctant to lose that value, but only if they have used the product long enough for the loss to be meaningful.

The proposition's support is characterized as partial rather than full because the inverted-U pattern was observed only in the A/B test of the premium trial timing; the study did not independently manipulate the timing of usage-limit activation (which was fixed at 500 data points per day across all phases). Future research could more directly test P3 by experimentally varying the generosity of usage limits to alter the point at which they become binding for users with different engagement levels.

7.4 P4: Freemium-Acquired Customers Exhibit Higher Post-Conversion Quality

The fourth proposition predicted that freemium-acquired customers would exhibit higher post-conversion retention and net revenue retention than customers acquired through sales-led or trial-based channels. The CloudMetrics case provides illustrative evidence for this proposition across multiple metrics.

Monthly logo churn among freemium-acquired customers was consistently lower than among other acquisition cohorts. By Phase 4, the freemium cohort's monthly churn rate was 2.1 percent, compared to 4.2 percent for the legacy trial-acquired cohort and 2.8 percent for the sales-led enterprise cohort. Annualized, these rates translate to approximately 22 percent, 40 percent, and 29 percent annual churn, respectively, a substantial and economically meaningful difference. The NRR data tell a similar story: the freemium cohort's NRR of 127 percent significantly exceeded the sales-led cohort's 109 percent, indicating that freemium customers not only retained at higher rates but also expanded their spending more aggressively.

The mechanism driving this quality differential is consistent with the theoretical logic articulated in P4's rationale. Freemium customers self-select through a process of demonstrated product fit: they have used the product in their actual workflow, experienced its value firsthand, and made a voluntary, unpressured decision to pay for enhanced capabilities (Wagner et al., 2014). This process produces a customer base that is well-informed about the product's capabilities and limitations, reducing post-purchase dissonance and the "buyer's remorse" that often drives early churn. By contrast, trial-acquired customers may convert under the time pressure of an expiring trial, and sales-led customers may be influenced by persuasive sales interactions that create expectations misaligned with the actual product experience (Ascarza et al., 2018).

The expansion revenue pattern provides additional insight. Freemium-acquired customers exhibited a strong "land and expand" trajectory: the median freemium customer began with the Professional plan (\$99 per month) and a single seat, and by month 12 post-conversion had expanded to an average of 3.2 seats and \$178 in monthly spending. Approximately 28 percent of Professional-tier customers upgraded to Enterprise within 12 months of conversion. This expansion behavior is consistent with Oestreicher-Singer and Zalmanson's (2013) "ladder of participation" framework: customers who have climbed the ladder from free to paid continue climbing, progressively deepening their engagement and expanding their investment.

An important caveat applies to the cross-channel comparison presented above. The freemium-acquired and sales-led customer cohorts differ not only in acquisition channel but also in firmographic characteristics: freemium customers were predominantly small

and medium-sized businesses with 10 to 50 employees, while sales-led customers tended to be larger enterprises with dedicated procurement processes and annual contract values exceeding \$25,000. The observed differences in retention and net revenue retention may therefore reflect segment-level variation in product fit, pricing sensitivity, and expansion potential rather than a pure acquisition-channel effect. A more rigorous test of P4 would require a matched-sample or propensity-score design that controls for firm size, industry, and pre-conversion engagement intensity, comparing freemium-acquired and sales-acquired customers within the same market segment.

More broadly, the sequential and non-randomized nature of the four phases introduces a fundamental attribution challenge that extends beyond any single proposition. Metric improvements observed between phases reflect the joint influence of freemium redesign, concurrent product development (including new features, UX refinements, and API enhancements), market maturation, competitive entry and exit, and macroeconomic conditions affecting SaaS spending in 2022–2024. The Phase 2-to-Phase 3 conversion rate improvement, for example, coincided with broader expansion in the SMB SaaS analytics market. The metrics most plausibly attributable to freemium design changes, rather than external factors, are those measured in controlled experiments (specifically, the Phase 4 premium trial timing A/B test) and those exhibiting discontinuous shifts that coincided precisely with tier redesigns (such as the Phase 2 opening of collaboration features and its immediate impact on team formation rates). Cross-phase comparisons of aggregate metrics are best interpreted as suggestive associations rather than causal effects.

8. Managerial Implications

The CloudMetrics case study yields several practical implications for SaaS practitioners designing, implementing, and optimizing freemium strategies.

First, the findings underscore the importance of adopting a hybrid freemium design rather than relying on a single dimension of limitation. Managers should design their free-to-paid boundary to include both usage-based constraints (e.g., daily data limits, message caps, storage quotas) and feature-based gates (e.g., advanced analytics, integrations, team management tools). The combination creates multiple conversion pathways that collectively address the heterogeneous motivations of a diverse user base (Niculescu & Wu, 2014; Kato & Dumrong Siri, 2022). When implementing this design, managers should ensure that the usage limits are calibrated to become binding at the point of demonstrated engagement, rather than immediately upon registration, to allow users sufficient time to develop product dependency before encountering conversion pressure.

Second, the results highlight the strategic value of enabling collaboration features on the free tier, particularly in B2B contexts where within-organization network effects are strong. While conventional wisdom suggests that collaboration and team features should be gated behind the paywall to serve as premium incentives, the CloudMetrics experience demonstrates that making these features freely available accelerates viral adoption and increases organizational switching costs, ultimately producing higher conversion rates and stronger post-conversion retention. This approach is consistent with Shapiro and Varian's (1999) prescriptions for penetration pricing in networked markets and with Boudreau et al.'s (2022) finding that network effects amplify freemium revenue advantages. Managers should view free-tier collaboration not as a revenue sacrifice but as an investment in the network dynamics that drive long-term monetization.

Third, the Phase 4 results demonstrate the importance of optimizing the conversion journey, not merely the conversion boundary. Personalized in-app conversion prompts, carefully timed premium trials, and lifecycle messaging sequences can meaningfully improve conversion rates within a fixed freemium architecture (Gu et al., 2018; Wagner et al., 2014). The A/B testing of premium trial timing revealed that even a few days' difference in trigger timing can produce meaningful variation in conversion outcomes, suggesting that managers should invest in experimental infrastructure that enables rapid iteration on conversion touchpoints. The 21-day optimal activation window observed in this case should not be generalized directly; rather, each company should identify its own "workflow integration threshold" through internal data analysis and experimentation (Koch & Benlian, 2017).

Fourth, the case reinforces the importance of measuring and optimizing for post-conversion customer quality, not merely conversion volume. The finding that freemium-acquired customers exhibited 127 percent NRR - substantially exceeding the sales-led cohort's 109 percent - suggests that the freemium channel produces fundamentally higher-quality customers in terms of long-term revenue contribution. Managers who evaluate their freemium strategy solely on conversion rate may miss this critical insight. SaaS companies should track cohort-level LTV, NRR, and expansion metrics by acquisition channel to develop a comprehensive understanding of each channel's true economic contribution (Skok, 2016; Bessemer Venture Partners, 2023; Ascarza et al., 2018).

Finally, the CloudMetrics experience illustrates that freemium optimization is an iterative process, not a one-time design decision. The company's progression through four distinct phases over three years, each informed by data from the previous phase, underscores the necessity of continuous experimentation and willingness to make significant structural

changes based on empirical evidence (Holm & Gunzel-Jensen, 2017). Managers should resist the temptation to treat the initial freemium design as permanent and should instead build organizational capabilities for ongoing testing, measurement, and iteration.

9. Limitations and Future Research

This study is subject to several limitations that should be considered when interpreting the findings and that point toward productive avenues for future research.

First, this is a single-case study, which limits the generalizability of the findings. While the CloudMetrics case provides rich longitudinal data and enables detailed analysis of the mechanisms underlying freemium optimization, the specific results - including the magnitude of conversion rate improvements and the relative effectiveness of different freemium designs - may not generalize to SaaS companies operating in different market segments, serving different customer profiles, or offering different product categories (Liu et al., 2014). Multi-case comparative studies examining freemium optimization across diverse SaaS contexts would significantly strengthen the evidence base.

Second, the study relies on a composite and anonymized case, which introduces a potential trade-off between confidentiality and verifiability. While the metrics and strategic decisions described are grounded in real-world SaaS operations, the anonymization process may introduce distortions that affect the precision of the findings. Future research using disclosed company data, or using secondary data from public filings and industry reports, would provide valuable triangulation.

Third, the sequential nature of the four phases means that the effects of different freemium designs are confounded with temporal effects, including market growth, competitive dynamics, macroeconomic conditions, and the company's own maturation. The study cannot fully isolate the causal contribution of each freemium redesign from these confounding factors. Future research employing randomized controlled experiments - in which different user cohorts are simultaneously exposed to different freemium designs - would provide stronger causal identification (Runge et al., 2016).

Fourth, the study focuses exclusively on the B2B SaaS analytics segment. The extent to which the findings generalize to other SaaS verticals (e.g., communication tools, developer platforms, creative software) and to B2C contexts remains an open question. The role of within-organization network effects, which proved central to CloudMetrics' freemium success, may be less relevant in contexts where the product is used primarily by individual users. Comparative research across SaaS verticals would help delineate the boundary conditions of the propositions advanced in this study (Shi et al., 2019; Deng et al., 2023).

Fifth, while the study documents the trajectory of key metrics across four phases, it does not provide granular analysis of the causal mechanisms driving each improvement. For example, the finding that the hybrid model outperformed single-dimension models is consistent with P1, but the study cannot definitively rule out alternative explanations, such as improvements in product quality, customer support, or marketing effectiveness that coincided with the Phase 3 redesign. Qualitative research incorporating interviews with converting and non-converting users would provide deeper insight into the decision processes underlying freemium conversion (Mantymaki et al., 2020; Oestreicher-Singer & Zalmanson, 2013).

Future research should also investigate the long-term sustainability of high conversion rates as the free user base continues to scale. As the CloudMetrics case demonstrates, conversion rates increased alongside user base growth during the study period, but it remains unclear whether this trend is sustainable indefinitely or whether there exists a ceiling beyond which marginal free users are increasingly unlikely to convert regardless of freemium design optimization. Additionally, the interaction between freemium design and competitive dynamics - particularly the effect of competitors introducing or modifying their own freemium offerings - warrants systematic investigation (Niculescu & Wu, 2014; Boudreau et al., 2022).

10. Conclusion

This case study examined the freemium strategy evolution of CloudMetrics, a B2B SaaS analytics platform that transitioned from a free-trial model to an iteratively optimized freemium offering between 2022 and 2024. Over four distinct phases - feature-gated, usage-limited, hybrid, and product-led growth-optimized - the company increased its free-to-paid conversion rate from 2.1 percent to 7.4 percent, grew its annual recurring revenue from \$1.2 million to \$14.8 million, and improved its LTV-to-CAC ratio from 2.4x to 5.8x.

The findings provide illustrative evidence for all four research propositions. Hybrid freemium models combining feature-gating with usage limits outperformed single-dimension models (P1). Usage-limiting strategies proved particularly effective in a context characterized by strong within-organization network effects, with collaboration-enabled accounts converting at more than double the overall rate (P2). An inverted-U relationship between conversion trigger timing and conversion rate was observed, with the optimal activation point occurring at approximately 21 days post-registration (P3). Freemium-acquired customers exhibited substantially higher post-conversion quality than sales-led or trial-acquired cohorts, as measured by monthly churn (2.1 percent vs. 2.8–4.2 percent) and net revenue retention (127 percent vs. 109 percent) (P4).

These findings contribute to the growing literature on freemium business models by providing longitudinal, metrics-rich case evidence from the understudied B2B SaaS context. The case illustrates that freemium optimization is not a static design problem but an iterative process requiring continuous experimentation, data-driven decision-making, and willingness to evolve the fundamental architecture of the free-to-paid boundary. For SaaS practitioners, the CloudMetrics case offers a roadmap for designing and iterating freemium strategies that simultaneously maximize free user acquisition, paid conversion, and post-conversion customer quality.

Declarations

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Conflicts of Interest: The authors declare no conflicts of interest.

Data Availability: The data presented in this case study are derived from anonymized company records. The underlying data are not publicly available due to confidentiality agreements.

Use of Artificial Intelligence: No artificial intelligence tools were used in the data collection, analysis, or writing of this manuscript.

Ethics Approval: Not applicable. This study is based on anonymized organizational data and does not involve human subjects research.

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