Imperial College Business School: Digital Economics Report
Strategy & Digital Perspectives

A Strategic Analysis of Amazon Prime ‘Buy with Prime’ Integration into Shopify using Economic Methods

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1. Introduction

In August 2023, Amazon announced the integration of the Buy with Prime (BWP) services program into Shopify's ecosystem. This integration empowers Shopify merchants to offer Amazon Prime members BWP functionalities, promising swift delivery and hassle-free returns. By leveraging Amazon's Fulfilment by Amazon (FBA) logistics network, this integration improves the shopping experience for existing Prime members on Shopify and opens new avenues for Shopify merchants using FBA to access Amazon customers through Prime membership. Simultaneously, it incentivizes more Shopify merchants to utilize Amazon's FBA services and encourages Shopify customers to join Prime.

This strategic move aligns the interests of both Amazon and Shopify. FBA provides support for storing, packing, and delivering products efficiently, enhancing overall customer experience, while the reciprocal network effect between BWP and FBA further legitimises Shopify merchants' online reputations, encouraging vendor participation. Users inherently value platforms with larger user bases[1], and Amazon's reported 25% increased conversion[2] from BWP usage underscores the potential benefits for vendors. In this report, we delve into this collaboration between Amazon and Shopify, exploring strategic implications for both firms and their users using economic models, focusing mostly on the perspective of Amazon.

[1] Cennamo, C., & Santalo, J. (2013). Platform competition: Strategic trade-offs in platform markets. Strategic Management Journal, 34, 1331–1350

[2] "Pricing." Buywithprime.amazon.com, buywithprime.amazon.com/pricing.

2. Economic Analysis of BWP Integration Incentives

We begin by modelling the situation as a simplified two-sided market with network effects from the perspective of Amazon and applying divide-and-conquer scenarios to better understand Amazon’s decision making in where to focus price intervention.

i. Chicken – Egg Two-Sided Market Subsidy Decision

M = Amazon
i = Shopify Vendors — N_i = Numbers of Shopify Vendors
j = New Prime Members — N_j = Numbers of Prime Members

r_i = Vendor Fees for BWP — b_i = Benefit to Shopify Vendors
r_j = Prime Subscription Fee — b_j = Benefit to Prime Members

Payoff of Shopify Vendors:

$$U_i = b_i N_j - r_i$$
$$\Rightarrow b_i N_j \geq r_i$$

Payoff of Prime Members:

$$U_j = b_i N_i - r_j$$
$$\Rightarrow b_j N_i \geq r_j$$

If $b_j > b_i$,

- Divide Shopify Vendors
  $$r_i \approx -\varepsilon \leq 0 \rightarrow \text{Subsidise Vendor Fees}$$
- Conquer Prime Members
  $$r_j = b_j > 0 \rightarrow \text{Capture Surplus of New Prime Members with Subscription Fee}$$

If $b_i > b_j$,

- Divide Prime Members
  $$r_j \approx -\varepsilon \leq 0 \rightarrow \text{Subsidise Prime Membership}$$
- Conquer Shopify Vendors
  $$r_i = b_i > 0 \rightarrow \text{Capture Surplus of Shopify Vendors from Increased Traffic}$$

If $b_j > b_i$, $r_j = b_j > 0$, and $r_i \approx 0$:

ω_H : “Divide” Shopify Vendors: $r_i \approx - \varepsilon$, “Conquer” Prime Members: $r_j = b_j > 0$

This scenario amounts to Amazon ‘subsidizing’ the fees associated with use of BWP by Shopify Vendors to maximally proliferate the BWP feature on Shopify and reach the most Shopify users; some of these Shopify users may decide to get a Prime subscription if they do not already have one. Amazon will seek to capture the surplus from the additional new Prime subscriptions that increased use of BWP on the Shopify platform will encourage. Additionally, Amazon will also gain from its new and existing Prime users making use of the

BWP feature as this increased Shopify traffic will feed back into more business for Amazon's fulfilment service, FBA.

Intuitively, this strategy makes sense and is similar to the loss-leading, market share oriented strategies employed by tech companies such as Uber and even Amazon itself in its early days to gain maximum market share first[3]. We deem this to be the likely motivating strategy behind Amazon's decision making, and denote this as the likely state of the world ω_H . Currently BWP integration into Shopify incurs no payment processing fees to Shopify Vendors[4], an obvious incentive, and as such supports our assumption of ω_H. Furthermore, with this strategy it would make sense in the future, once Buy with Prime achieves some form of lock-in effect, to then increase vendor pricing for BWP, taking advantage of an established captive market.

If $b_i > b_j$, $r_i = b_i$ and $r_j \approx 0$:

ω_L : **"Divide" Prime Members: $r_j \approx -\varepsilon$, "Conquer" Shopify Vendors: $r_i = b_i > 0$**

This scenario illustrates a case where Amazon effectively 'subsidizes' Prime memberships to maximally spread would-be customer access to its Buy with Prime feature and increase traffic on Shopify in order to then capture the Shopify merchants' surplus through fees incurred from the vendors' use of the BWP feature. Amazon will also gain from the increased business of new and existing Prime members transacting using BWP on Shopify by kicking back business to its fulfilment service FBA.

Many are familiar with the high frequency with which Amazon offers deals, free month incentives, and bundles for Prime membership. While there is a plausible mechanism through which such a strategy may pay off, we find this to be less plausible than the state ω_H when supported by evidence of no added payment processing fees for Shopify Vendors, and as such denote this as the less likely state of the world ω_L . Importantly, in both states ω_H and ω_L Amazon has a mechanism by which it increases business directed to FBA, effectively guaranteeing business regardless of which side of the market any subsidy is applied to.

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[3] Brynjolfsson, E., & Kemerer, C. (1996). Network externalities in microcomputer software: An econometric analysis of the spreadsheet market. Management Science, 42, 1627–2647.
[4]Amazon, "Pricing." Buywithprime.amazon.com, buywithprime.amazon.com/pricing.

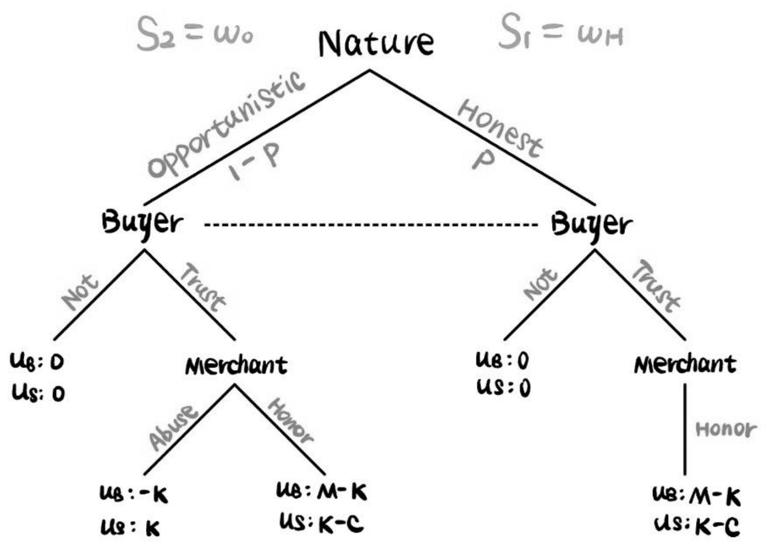
Amazon Prime members have a 93% retention rate after one year and a 98% retention rate after two years[1], and by leveraging existing public trust in Amazon merchants on Shopify can attract otherwise wary customers and increase both first-time and repeated interactions of consumers who are unsure about the reputation of sellers on Shopify. Using the game tree below, we explain how using BWP positively alters the reputation model in the most likely scenario for a dishonest interaction: a one-instance finite game.

ii. Reputation Game in Extensive Form

Buyer's Willingness to Pay (WTP) = ***M*** *Seller's Cost =* ***C***

Buyer Surplus = ***M – K*** *Seller Surplus =* ***K – C***

Where, ***K*** *= price of the good, and* ***P*** *= probability of dealing with an 'Honest' Merchant*



Here, the models depict the probability of consumers dealing with an honest or dishonest seller. The probability of the seller being honest is ***P*** corresponding to state ω_H, and opportunistic (i.e. cheating the buyer) is ***(1- P)*** corresponding to state ω_O. We see ω_H and ω_O are separated by an information set. Users who trust Amazon are likely to assume that Shopify Vendors using BWP are the honest type of seller, increasing users'

[5] Yakub, Mohammad (2023), Amazon Customer Loyalty Statistics: The Key Data (Latest). www.onlinedasher.com/amazon-customer-loyalty-statistics/.

users’ perception of the value of P. In a large market with many sellers this effect is equivalent to having a more honest market or larger proportion of honest sellers, increasing overall likelihood of state $\boldsymbol{\omega_H}$. This would increase the number of first time and repeated interactions in this model and push sales up for sellers if they were to adopt BWP as a signal of being an honest type.

conceptualised as arising from increased good reputation. First, the BWP option attracts more wary consumers to buy the products from Shopify merchants, as Amazon has a trusted delivery system. More vendors will use BWP and Shopify to prove their legitimacy in order to attract wary customers; reputation and feedback systems which aim to legitimize honest sellers up-front and over time operate based on alleviating moral hazard to attract otherwise cautious customers [6]. Wary consumers who are not Prime members may join if they want to use BWP for peace of mind when they use Shopify stores. Therefore, Amazon and Shopify will both benefit directly from the network effects of better vendor reputations resulting from BWP integration in Shopify.

[6] Tadelis, Steven (2016). “Reputation and Feedback Systems in Online Platform Markets.” Annual Review of Economics, vol. 8, no. 1, 2016, pp. 321–340

iii. Network Effects in an Expanded Two-Sided Market Model

Expanding the network size enhances the value for every user within the network[1]. For the purposes of our analysis of Amazon's strategic decision making, this additional augmented model of a two-sided market further illustrates the importance of such network

$Side^A$: Shopify Vendor Market

$Side^B$: Prime Members Market

v_i: Willingness to Pay

v^A = WTP of Vendors [for BWP fees] v^B = WTP of Customers [for Prime]

p: Price

p^A = Price of BWP fees to Vendors p^B = Price of Prime Subscription

Q: Demand = $D(p)$

Q^A = Shopify Demand Q^B = Prime Demand

Assuming a linear demand $Q = D(p) = T - \alpha p$

Therefore: $D'(p) = -\alpha$

β: Network Effect

β^A = Network Effect of Shopify + BWP β^B = Network Effect of Prime

MC: Marginal Cost = c

c^A = MC of providing BWP c^B = MC of providing Prime Subscription

Utility from $Side^A$:

$$u_i^A = v_i^A + \beta^A Q^B - p^A$$

Utility from $Side^B$:

$$u_i^B = v_i^B + \beta^B Q^A - p^B$$

Generally: $\pi = D(p)(p - c)$, where $\frac{\partial \pi}{\partial p} = \frac{dQ}{dp}(\mathrm{p} - \mathrm{c}) + \mathrm{Q}$

[7] Katz, M. L., & Shapiro, C. (1985). Network externalities, competition, and compatibility. The American economic review, 75(3), 424–440.

$$\text{If } \frac{\partial \pi}{\partial p} > 0, \text{ increase p}$$

$$\text{If } \frac{\partial \pi}{\partial p} < 0, \text{ decrease p}$$

Amazon 2SM Profit: $\pi = Q^A(p^A - c^A) + Q^B(P^B - c^B)$

where $Q^A = D^A(p^A - \beta^A Q^B),\ Q^B = D^B(p^B - \beta^B Q^A)$

$$\frac{dQ^A}{dp^A} = \frac{-\alpha^A}{1 - \alpha^A\beta^A\alpha^B\beta^B}$$

$$\frac{dQ^B}{dp^B} = \frac{-\alpha^B}{1 - \alpha^B\beta^B\alpha^A\beta^A}$$

$\frac{\partial}{\partial p}$

$$\frac{\partial \pi}{\partial p^A} = \frac{dQ^A}{dp^A}\,(p^A - c^A) + Q^A \Longrightarrow \frac{\partial \pi}{\partial p^A} = \frac{-\alpha^A}{1 - \alpha^A\beta^A\alpha^B\beta^B}(p^A - c^A) + Q^A$$

If $\frac{\partial \pi}{\partial p^A} > 0$, Amazon should increase BWP fees for Vendors

If $\frac{\partial \pi}{\partial p^A} < 0$, Amazon should decrease BWP fees for Vendors

$\frac{\partial}{\partial p}$

$$\frac{\partial \pi}{\partial p^B} = \frac{dQ^B}{dp^B}\,(p^B - c^B) + Q^B \Longrightarrow \frac{\partial \pi}{\partial p^B} = \frac{-\alpha^B}{1 - \alpha^B\beta^B\alpha^A\beta^A}(p^B - c^B) + Q^B$$

If $\frac{\partial \pi}{\partial p^B} > 0$, Amazon should increase Prime Subscription Prices

If $\frac{\partial \pi}{\partial p^B} < 0$, Amazon should decrease Prime Subscription Prices

This model shows how demand for BWP is influenced by the demand for Prime subscriptions, and vice versa. This can be interpreted from the demand equations for both sides of the market:

$$Q^A = D^A(p^A - \beta^A Q^B),\ Q^B = D^B(p^B - \beta^B Q^A)$$

We can see that the demand for each good in inherently depends on the demand of the other as both demand equations contain each other; more specifically the demand of the other good multiplied by the network effect $\boldsymbol{\beta^i}$, thus showing that the network effect also influences demand. The case for BWP demand from Shopify vendors influencing demand for Prime subscriptions is most clear when it causes Shopify users to join Prime for the first time, and the case for demand for Prime subscriptions creating demand for BWP opportunities is straightforward if Prime users avail of the full extent of their membership benefits. From the demand and profit equations, we see how Amazon's total profit depends on both demands, both price levels, and both costs:

$$\pi = Q^A(p^A - c^A) + Q^B(P^B - c^B)$$

In this case network effects can help to increase both components of Amazon's profit equation, with positive indirect network effects between more Shopify vendors using BWP and more Prime users, as well as the positive direct network effects arising from reputation and those experienced by FBA. Instead of entering into competition against an e-commerce platform superstar, Amazon was able to come to an innovative solution that allows them to effectively revenue-share in transactions facilitated by an e-commerce service that is otherwise a direct competitor. Amazon captures a two-sided market in a manner which harnesses positive network effects, which in turn create more Prime subscriptions, more BWP uptake among Shopify vendors, and more business for FBA.

3. Further Strategic Considerations

An additional supporting reason as to why Amazon pursued this collaboration was the explicit expansion of their consumer base within the FBA network itself as mentioned in their annual reports of 2022[8]. There is some agreement in economic literature that focusing on supply and logistics management is especially advantageous in network markets[9]. Through this collaboration, Amazon aimed to incentivize a greater number of Spotify merchants to join their FBA network, thereby expanding their sales channels through third-party involvement. Another intriguing point was despite cautioning merchants against Amazon's BWP service in the preceding year, Shopify entered a partnership with Amazon in August 2023. This mixed signalling by Shopify could have

[8] Amazon Annual Report 10-K (2022)
[9] Kapoor, R., & Lee, J. M. (2013). Coordinating and competing in ecosystems: How organizational forms shape new technology investments. Strategic Management Journal, 34(3), 274–296.

created trust concerns with merchants. Had Shopify used this opportunity to lead expectations, potential participants could have been pushed to have more anticipation when it was officially launched[10]**.** A consistent communication strategy could have yielded higher adoption among Shopify merchants, benefiting both Shopify and Amazon.

4. Conclusion

The strategic integration of Amazon's BWP into Shopify enhances trust in shopping experiences for Prime members and expands market access for vendors by leveraging Amazon’s good reputation and FBA services to optimize logistics. Various models were employed to study this collaboration. The application of a “chicken – egg” style two-sided model provided a framework for understanding the interactions between Shopify vendors and Prime members by allowing us to explore different strategic subsidy scenarios: whether Amazon should subsidize fees for Shopify vendors or Prime memberships. Further, the game theoretic reputation model explores the impact of BWP on the perceived credibility of Shopify vendors and perceived honesty of the Shopify platform at large. Leveraging Amazon's trusted reputation through Prime, we discussed how this collaboration positively influences consumers' willingness to engage with Shopify vendors.

This alliance showcases growth and increased user engagement. Ongoing monitoring is crucial for assessing sustained impact in the ever-evolving e-commerce landscape. This collaboration alleviates logistical and distribution burdens for Shopify, allowing them to focus on strategic objectives such as marketing and new customer acquisition. Simultaneously, Amazon stands to gain an increased user base within its Prime and FBA networks. This capture and amplification of network effects within a 2-sided market (with complementary effects on FBA business in logistics fulfilment) demonstrates excellent strategic decision making, which collaborates instead of competes, showcasing the pragmatic innovation Amazon have become known for.

[10] Bhargava, H. K. (2014). Platform technologies and network goods: insights on product launch and management. Information Technology and Management, 15, 199–209

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