

The Cost of Coming Out^{*}

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Abstract

Despite significant progress in advancing lesbian, gay, and bisexual (LGB) rights, discrimination based on sexual orientation remains a prevalent issue in many countries. The concealable nature of sexual orientation presents LGB individuals with a trade-off: to avoid discrimination, they may choose to hide their identity, but this decision often results in negative mental health outcomes. Consequently, understanding people's reactions to the disclosure of sexual minority status is crucial. In this paper, we use an innovative source of data from a famous online video game to credibly identify the effects of coming out. At the beginning of the 2022 LGBT Pride Month, the developers of the game announced that one of their playable characters is gay. We use detailed daily data to track players' revealed preferences for the character over time and employ synthetic control methods to isolate the effect of the disclosure. Our findings suggest a substantial and persistent negative effect of coming out.

Keywords: LGB economics, concealable stigma, taste-based discrimination, natural experiment.

JEL Codes: J15, J71

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1 Introduction

Despite significant progress in advancing lesbian, gay, and bisexual (LGB) rights, discrimination based on sexual orientation remains a prevalent issue in many countries. Limited employment opportunities (Bertrand & Duflo, 2017; Neumark, 2018), wage disparities (Badgett, 1995; Klawitter, 2015), and barriers to financial resources (Badgett et al., 2013) are just a few of the challenges that disproportionately affect LGB individuals compared to their heterosexual counterparts. To further emphasize the importance of studying the economic implications of sexual orientation, one must also consider the substantial size of the LGB community, estimated to be over 18,000,000 individuals in the United States during the period from 2014 to 2018 (Badgett et al., 2021).

Discrimination against LGB individuals differs from discrimination based on race, sex, and disability due to the concealable nature of sexual orientation. This means that individuals can anticipate discrimination and strategically choose to hide their identity (Kudashvili & Lergetporer, 2022). However, extensive research has consistently shown that concealing one's sexual orientation has detrimental effects on mental health (Meyer, 2003; Pachankis, 2007; Pachankis et al., 2020). Thus, despite the benefits of being open about our identity (Akerlof & Kranton, 2000), it is important to acknowledge that the act of coming out is often accompanied by feelings of uncertainty, anxiety, and fear of negative consequences. The question then arises of how people react to the disclosure of one's sexual orientation.

Measuring responses to sexual minority status disclosure presents significant challenges. An ideal experiment would involve randomly requesting individuals to disclose their sexual orientation and observing the reactions of their peer group over a meaningful period. However, such an approach raises significant ethical concerns. In this paper, we propose an innovative solution by utilizing data from the online video game *League of Legends*. This enables us to leverage a natural experiment that closely approximates the ideal scenario, allowing for a credible identification of the effects of coming out.

At the beginning of the 2022 LGBT Pride Month, the developers of *League of Legends* announced that one of their playable characters is gay. We show that the announcement

was not anticipated and use detailed daily data to track players’ revealed preferences for the character over time. By employing synthetic control methods (e.g., Abadie, 2021; Abadie & Vives-i-Bastida, 2022) to isolate the effect of the disclosure, we find a substantial and persistent negative effect of coming out.

Our paper makes a significant contribution to the existing literature by being the first study to investigate the immediate reactions to coming out. The current body of research primarily focuses on measuring discrimination against LGB individuals either through correspondence designs, where sexual orientation is manipulated in job applications (e.g., Weichselbaumer, 2003; Drydakis, 2009; Tilcsik, 2011; Ahmed et al., 2013; Drydakis, 2014), or by comparing the labor market outcomes of sexual minority individuals with those of non-minority individuals with similar observable characteristics (e.g., Badgett, 1995; Plug et al., 2014; Carpenter & Eppink, 2017; Martell, 2021). These studies consistently reveal that LGB job candidates are less likely to be invited for interviews or offered job opportunities. Additionally, they consistently find a wage penalty for gay and bisexual men and a wage premium for lesbian women, although the latter can be explained by lesbian women working more than their heterosexual counterpart (see e.g., Antecol & Steinberger, 2013).¹ Despite these valuable insights, these approaches have limitations that hinder the ability to draw causal inferences from their findings. Moreover, they do not allow for the investigation of the immediate reactions individuals face upon coming out. Our study addresses these gaps and provides an understanding of the impact of coming out on individuals’ experiences.

Our paper also emphasizes the relevance of video game data and the unique advantages they offer to economists. First, video games provide a controlled research environment, enabling the observation of behaviors that may be challenging to capture through traditional survey methods. Second, online gaming platforms offer the benefit of anonymity, which reduces social desirability bias and facilitates the disclosure of sensitive information. The majority of existing research on LGB individuals relies on survey data where

¹The only study finding a wage premium for gay men is that of Carpenter and Eppink (2017). However, they are not able to control for living in an urban area, which is crucial as those areas typically have higher wages and more gay men than rural areas (Badgett, 2020).

respondents can report their sexual orientation (see e.g. Badgett et al., 2021). However, Coffman et al. (2017) show that a substantial share of LGB respondents is reluctant to answer honestly, which complicates the interpretation of existing results and makes understanding incentives to identity disclosure even more important. Our use of video game data provides an objective measure of behavior and identity, circumventing the limitations of self-reported identity in surveys and increasing the incentives for individuals to reveal their true attitudes towards the LGB community.

Finally, our paper also advances the understanding of consumer behavior in the video game industry. In the context of the contemporary digital era, video games have established themselves as virtual meeting environments where individuals converge and engage with one another. This trend is further amplified by the advent of the Metaverse, a virtual universe where users can engage in various activities and experiences. Given the growing significance of video games as social platforms, it is increasingly crucial for economists to comprehend and analyze these new and evolving markets.²

The rest of the paper unfolds as follows. Section 2 describes the key elements of League of Legends that are relevant to our study and outlines the natural experiment we leverage to identify the effects of coming out. Section 3 introduces the data. Section 4 explains the methodology we use to isolate the effects of coming out and presents the main results. Section 5 examines the underlying mechanisms driving these effects. Section 6 discusses the policy relevance of our findings.

2 Context

In this section, we explore the contextual framework that enables us to credibly identify the causal effects of coming out. Specifically, we turn our attention to the online video game *League of Legends* as our source of data and the natural experiment we leverage.

The next subsection describes the key elements of League of Legends that are relevant

²To date, very little is known about consumer behavior in the video game industry. To the best of our knowledge, Parshakov et al. (2022) is the only study focusing on this topic. They examine the impact of marking products with a gay label on consumer demand, finding a significant, albeit short-lived, decrease in consumers' demand following the introduction of the gay label.

to our study. Our analysis does not rely on in-game information but instead focuses on the pre-match phase. Therefore, we do not provide an exhaustive account of how matches unfold but rather emphasize the details that inform our research. Then, we discuss the coming-out event we exploit and its implications for identification purposes.

2.1 League of Legends

League of Legends is a prominent multiplayer online game developed and published by Riot Games. In 2022, the game attracted an impressive player base, with an average of over 32 million players joining the game daily and 180 million players overall. League of Legends has also achieved significant financial success, with its microtransaction system generating an average daily revenue of \$2.64 million.

In League of Legends, players are divided into two teams of five players each to compete in matches with the aim of destroying the opposing team’s base. Players in each team sort themselves into one of five roles, each requiring specific playstyles and contributing differently to the team’s final objective.

Players have the option to participate in either *draft* or *ranked* matches. In both game modes, the objective remains the same: destroy the opposing team’s base. However, while draft matches are more casual and do not have consequences for players’ rankings or ratings, in ranked matches players earn or lose points based on the outcome of the match to determine their position within the ranked system. To ensure balanced matches, the matchmaking process in ranked games groups players with similar skill levels.

Before a match begins, players must select a playable character to control during the match from a pool of 162 available characters. In our analysis, we measure players’ revealed preferences for a specific character by quantifying how frequently they select that character for their matches. Our objective is to investigate whether these preferences undergo any shifts following the disclosure of the character’s sexual orientation. Thus, we devote the rest of this section to exploring the design of characters in League of Legends and the process through which players select their characters for matches.

Each character has a unique set of skills and abilities and is specifically designed to

excel in one or two of the distinct roles that players can assume within the team. Additionally, characters are crafted with a rich background that adds a narrative dimension to the game but does not have any impact on the game's mechanics. This is achieved through the creation of detailed biographies and short stories that provide players with a deeper understanding of the character's history and motivations, thus offering players the opportunity to connect with their chosen characters on a more personal level.

The character selection process occurs in a virtual lobby where players can communicate with their teammates through a chat function. In a random order that alternates between teams, players take turns selecting their characters for the match. Once a player chooses a character, their selection becomes visible to all players participating in the match, including the opposing team. Once all players have selected their characters, the match begins.

When making their character selection, players consider various factors. First, they consider the role they are assigned to fulfill in the game. Each role has its own set of responsibilities and playstyle requirements, and players aim to choose a character that aligns with their designated role. Second, players take into account their personal mastery of specific characters, opting for those they are most skilled and comfortable with. Third, players may also consider their personal preferences, such as the playstyle and background story of the character, adding a subjective element to the selection process.

2.2 Identification

Every year in June, *LGBT Pride Month* takes place, a dedicated time to honor and celebrate the LGBT community. Originally born out of a series of protests for gay liberation in the United States in 1969, this month-long celebration has gained widespread recognition and evolved into a global movement. Today, LGBT Pride Month stands as an emblem of empowerment, visibility, and equality, fostering inclusivity for individuals of all sexual orientations and gender identities.

Since 2018, Riot Games has actively participated in LGBT Pride Month by integrating new content into League of Legends during the month of June. This includes the

introduction of in-game cosmetics, such as character skins, as well as emotes that allow players to express themselves in the game. It is important to note that while these additions enhance the visual and expressive elements of the game, they do not alter the game’s mechanics or the characteristics and abilities of the League of Legends characters.³

At the beginning of the 2022 LGBT Pride Month, Riot Games released a short story featuring two of the League of Legends characters, *Graves* and *Twisted Fate*. The story officially discloses Graves’ sexual orientation, revealing him to be a gay character. The following quotes provide two pivotal passages of the narrative:⁴

I do not have terrible taste in men. I have good taste in terrible men. (Graves)

[...] asked Fate with a tinge of poorly concealed jealousy, despite Graves having been gay for the better part of four decades. (Storyteller)

This coming-out event closely approximates an ideal experiment where individuals randomly disclose their sexual minority status, thus providing a unique setting to investigate the effects of coming out on the players’ preferences for Graves.

To ensure the credibility of our identification, it is crucial that the disclosure was not anticipated by players. The top panel of Figure 2.1 displays the Google search interest for the query “*Graves gay*.” We observe minimal interest in this search term throughout the year 2022, with a remarkable spike occurring during the week of the coming-out event. This pattern supports our assumption of no anticipation and strengthens the credibility of our identification strategy.

Furthermore, the lower panel of Figure 2.1 displays the Google search interest for the query “*lol Graves*.” Similarly to the previous search term, we observe a remarkable spike in interest during the week of the treatment. What is particularly interesting is that this surge in interest surpasses the level observed during the 2022 League of Legends World Championship (held from September 29th to November 5th), despite Graves being among

³We check this in Figure A.1 in Appendix A, where we present several performance measures for the character we focus our analysis on. The figure demonstrates that the performance of this character remained consistent after the coming-out event, indicating that there was no notable change in performance associated with the event.

⁴The whole story is available at https://universe.leagueoflegends.com/en_SG/story/the-boys-and-bombolini/.

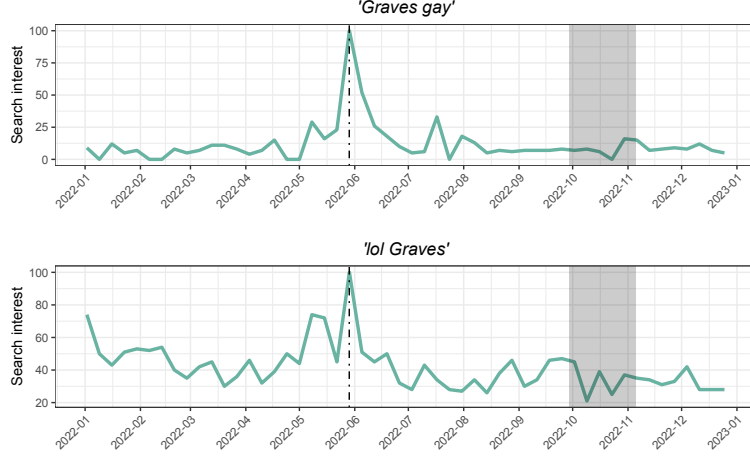


Figure 2.1: Google search interest over time for the queries “*Graves gay*” (top panel) and “*lol Graves*” (bottom panel). The dashed vertical line denotes the week of disclosure, and the shaded area highlights the League of Legends World Championship.

the top-eight most played characters during the tournament. This finding emphasizes the substantial impact and attention that the coming-out event received from players.

3 Data

We obtain our data by accessing the Riot Games API, which provides us with valuable information about League of Legends matches.

The game operates on multiple servers located worldwide, and we focus on specific servers for our analysis. These servers include Brasil, North and East Europe, West Europe, Korea, North Latin America, South Latin America, and North America.

Within these servers, we specifically target the top tier of the League of Legends ranked system, which comprises the top 200 or 300 players (approximately the top 0.01% of players) on each server. By targeting this specific group of players, we aim to minimize the noise that may arise from players who are not fully engaged in the game, thus reducing the risk of attenuation bias.

For each of these players, we collect all the matches they played during the period January-July 2022. After some cleaning, we have 101,879 players and 129,880 matches. From these data, we construct two balanced daily panel data sets, one that tracks the behavior of each character over time and another that tracks the behavior of each player

over time. We further filter the character data set by removing three League of Legends characters (*K'Sante*, *Nilah*, and *Bel'Veth*), as they were released after the coming-out event. Additionally, we exclude from the player data set players who appeared in less than 100 matches before the coming-out event and less than 50 matches after the event, resulting in a final data set of 725 players.

To gauge players' revealed preferences for characters, we use the character data set to construct a metric called *pick level*, which counts the number of times players choose a specific character in their games each day. Our primary objective is to investigate whether the disclosure of Graves' sexual orientation influences the pick level of this character.

4 Effects of Coming Out

The red line in Figure 4.1 depicts Graves' pick level series, which exhibits some upward trend despite daily variations. However, we observe a sharp drop in the series on the day of disclosure (indicated by a dashed vertical line) which persists over time.

A simple comparison of Graves' pick levels before and after the coming-out event may not accurately reflect the impact of the disclosure, as other unobserved factors could have changed during that period. To address this issue, we construct a synthetic control unit (see e.g., Abadie & Gardeazabal, 2003; Abadie et al., 2010; Abadie, 2021; Abadie & Vives-i-Bastida, 2022) by weighting other characters to approximate the pick levels of Graves before the disclosure. This method allows us to isolate the effect of the coming out on the players' revealed preferences for Graves and gain insight into what would have happened to Graves without the disclosure.

Formally, the character data set comprises $n = 159$ characters ($i = 1, \dots, n$) observed over $T = 193$ days ($t = 1, \dots, T$), with $T^{pre} = 150$ days prior to the coming-out event. For each unit i and time t , we denote the observed pick level as $Y_{i,t}$. We also define the potential pick level in the absence of disclosure as $Y_{i,t}^0$ and the potential pick level in the presence of disclosure as $Y_{i,t}^1$.⁵

Without loss of generality, we let the first unit $i = 1$ be Graves. Our estimands of

⁵These potential outcomes are based on Rubin's model for causal inference (Rubin, 1974).

interest are the effects of the disclosure for Graves in each period $t > T^{pre}$:⁶

$$\tau_t := Y_{1,t}^1 - Y_{1,t}^0 \quad (4.1)$$

Since Graves' sexual orientation has been disclosed after period T^{pre} , under a standard SUTVA assumption (e.g., Imbens & Rubin, 2015) we observe $Y_{1,t} = Y_{1,t}^1$ for all $t > T^{pre}$. Thus, as shown in Equation (4.1), the challenge in estimating our causal effects of interest is to estimate $Y_{1,t}^0$ for $t > T^{pre}$, i.e., how Graves' pick levels would have evolved in the absence of the disclosure. To this end, we can construct a synthetic control unit that approximates the pick levels of Graves before the coming out. The idea is that if the synthetic control and Graves behave similarly before the disclosure, then the synthetic control can serve as a valid counterfactual.

The synthetic control unit is characterized by a set of weights, denoted as $\omega_2, \dots, \omega_{159}$, chosen to align the pre-treatment pick levels of the synthetic unit with those of Graves. This is achieved by solving the following optimization problem (Arkhangelsky et al., 2021):

$$\begin{aligned} \hat{\omega} &= \arg \min_{\omega \in \Omega} \ell(\omega) \\ \ell(\omega) &= \sum_{t=1}^{T_{pre}} \left(\sum_{i=2}^n \omega_i Y_{i,t} - Y_{1,t} \right)^2, \quad \Omega = \left\{ \omega \in \mathbb{R}_+^{n-1} : \sum_{i=2}^n \omega_i = 1 \right\} \end{aligned} \quad (4.2)$$

where the weights are restricted to be non-negative and to sum up to one to avoid extrapolation. Then, we estimate the counterfactual outcome of Graves as a weighted average of the outcome of the control units:

$$\hat{Y}_{1,t}^0 = \sum_{i=2}^n \hat{\omega}_i Y_{i,t} \quad (4.3)$$

Finally, to estimate the causal effects of interest, we compute the differences between Graves' observed pick levels and the synthetic counterfactual for all $t > T^{pre}$:

$$\hat{\tau}_t = Y_{1,t}^1 - \hat{Y}_{1,t}^0 \quad (4.4)$$

⁶Note that we allow the effect to change over time.

Results are presented in the left panel of Figure 4.1.⁷ Overall, our analysis suggests a substantial negative impact of coming out. Before the disclosure, the synthetic control estimator closely approximates the trajectory of Graves’ pick levels, providing support for the estimator’s ability to predict the counterfactual series. However, starting from June 1st, 2022, the two series diverge substantially, with Graves’ pick levels consistently dropping to values up to 66% lower than those of the synthetic control. This gap persists over time, extending even beyond the conclusion of LGBT Pride Month (highlighted by the rainbow area).

To assess the credibility of the synthetic control estimator, we conduct a robustness check by artificially shifting the coming-out event ten days earlier. This backdating exercise allows us to evaluate the estimator’s predictive accuracy during a ten-day hold-out period (see e.g., Abadie & Vives-i-Bastida, 2022). Figure A.3 in Appendix A presents the results of this analysis. We observe three key findings. First, the estimated effects remain qualitatively and quantitatively consistent, confirming a negative and persistent impact of coming out on players’ revealed preferences for Graves. Second, the synthetic control estimator demonstrates a good fit during the hold-out period, indicating its ability

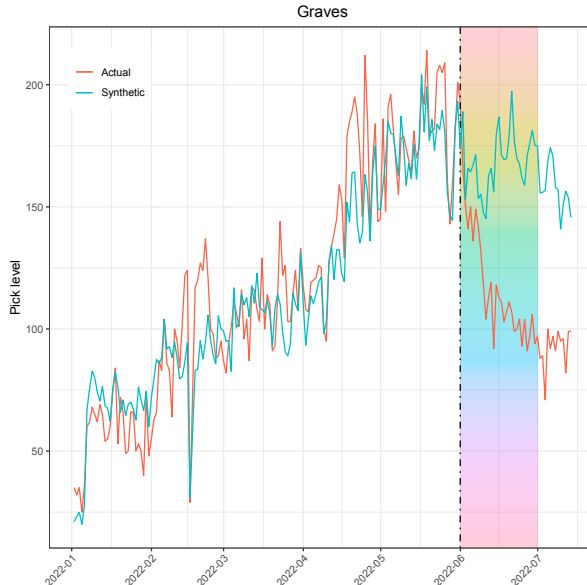


Figure 4.1: Graves’ daily pick levels and synthetic control estimation results. The dashed vertical line denotes the day of disclosure, and the rainbow area highlights LGBT Pride Month.

⁷Figure A.2 in Appendix A displays the identities and the contributions of the characters in the donor pool with non-zero estimated weights.

to accurately capture Graves’ behavior prior to the disclosure. Third, the actual and the synthetic series begin to diverge on the true day of disclosure, even when the estimator has no knowledge of the actual disclosure date. The absence of estimated effects before the coming-out event also lends support to the plausibility of a no-anticipation assumption (see e.g., Abadie, 2021).

To explore potential regional differences in players’ attitudes towards the LGB community, we divide the matches based on the server on which they were hosted. The matches are classified into four regional categories: European matches (North and East Europe and West Europe servers), Korean matches, Latin American matches (Brasil, North Latin America, and South Latin America servers), and North American matches. We then apply the synthetic control estimator to each of these series separately.

Figure 4.2 displays the results. The synthetic control estimator closely approximates the trajectory of Graves’ pick levels for matches in Europe, Latin America, and Korea before the disclosure. However, it deviates from the actual series for North American matches, limiting our ability to draw conclusions for that region.

In Europe, Korea, and Latin America, we consistently observe a negative and persistent effect of coming out on players’ preferences for Graves. The magnitude of this effect varies across regions, with the largest impact observed in Europe and the smallest impact observed in Korea.

However, this regional variation may be influenced by factors other than players’ attitudes toward the LGB community. One such factor could be the differential levels of competitiveness on different servers, which may affect the character selection process by introducing different levels of subjectivity. In regions with higher levels of competitiveness, players are more likely to prioritize performance-based choices over personal preferences, potentially attenuating the impact of coming out on players’ preferences for Graves. This is consistent with the smallest estimated effect being observed on the Korean server, known for its high competitiveness. Therefore, the regional differences in the estimated effects may reflect a combination of both players’ attitudes toward the LGB community and the competitive dynamics specific to each server.

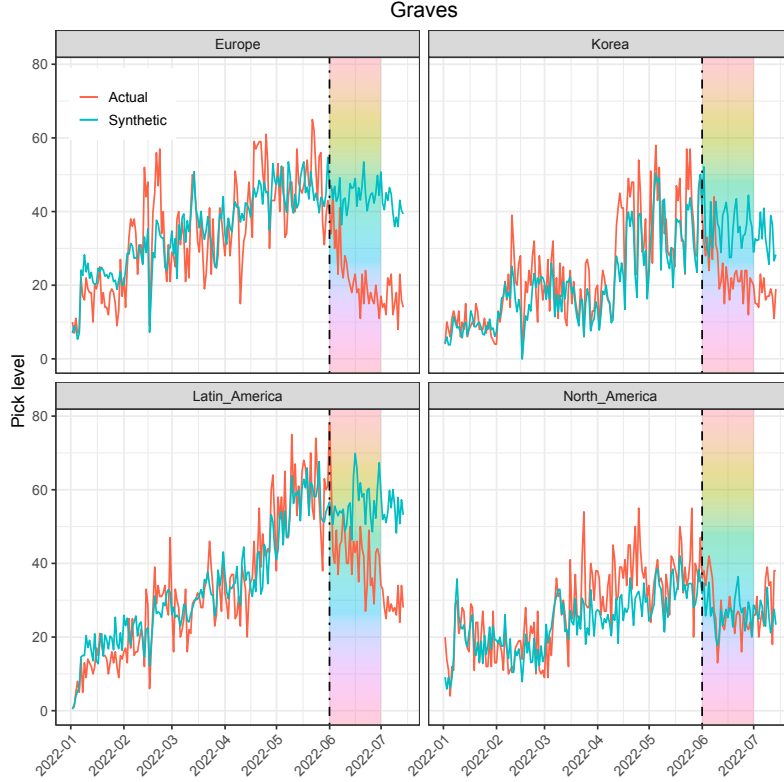


Figure 4.2: Graves’ daily pick levels and synthetic control estimation results by region. The dashed vertical line denotes the day of disclosure, and the rainbow area highlights LGBT Pride Month.

5 Mechanisms

In Section 4, we established evidence of a significant negative impact of the coming-out event on players’ preferences for Graves. Building on these findings, this section aims to investigate the underlying mechanisms driving this effect.

First, we address the possibility that the estimated effects are driven by LGBT Pride Month. It is plausible that the inclusion of visual and expressive elements supporting the LGBT community in League of Legends could elicit negative reactions from some players, leading them to shift their preferences away from Graves. We exclude this potential channel by leveraging the presence of other LGB League of Legends characters.

Second, we explore whether players’ character preferences for Graves are associated with differences in performance compared to other players. Additionally, we assess whether there is a performance cost when players no longer select Graves as their character choice. By analyzing players’ win rates and kill-to-death ratios, we find that players’

performance is not influenced by their preference for Graves and that there is no performance cost associated with players transitioning away from Graves as their character choice.

5.1 Coming Out versus LGBT Pride Month

As described in Section 2.2, the disclosure of Graves' sexual orientation coincided with the start of LGBT Pride Month. This means that our treatment consists of a combination of the coming-out event and the introduction of visual and expressive elements in League of Legends that support the LGBT community. It is therefore plausible that the findings presented in Section 4 may, to some extent, be influenced by the presence of LGBT Pride Month, which might elicit negative reactions from certain players, leading them to shift their preferences away from Graves. While this alternative perspective does not undermine the validity of our identification strategy, it does raise questions about our interpretation of the estimated effects as the cost of coming out.

To rule out this possibility, we leverage the existence of other LGB League of Legends characters who were already established as part of the community prior to the coming-out event.⁸ These characters are subject only to a part of our treatment, specifically the presence of LGBT Pride Month, while Graves experiences both the disclosure of their sexual orientation and LGBT Pride Month. Thus, we can evaluate the impact of LGBT Pride Month on these characters and compare the results with those obtained for Graves to assess the role of LGBT Pride Month in driving our main findings. This analysis helps us to determine whether the estimated effects on Graves' pick levels are primarily attributable to his coming out or if they can be attributed to the broader influence of LGBT Pride Month.

To evaluate the impact of LGBT Pride Month on the LGB League of Legends characters other than Graves, we construct four new pick level series by averaging the pick levels of these characters separately for each region. We then apply the synthetic control estimator to each of these series.

⁸These characters are *Diana*, *Leona*, *Nami*, and *Neeko*.



Figure 5.1: LGB aggregate's daily pick levels and synthetic control estimation results by region. The dashed vertical line denotes the day of disclosure, and the rainbow area highlights LGBT Pride Month.

The results are shown in Figure 5.1. Across all regions, we consistently observe minimal differences between the actual pick level series and the synthetic series, indicating that LGBT Pride Month has no substantial effect on the players' preferences for these characters. This suggests that the estimated effects for Graves primarily stem from his coming out rather than the influence of LGBT Pride Month.

5.2 Preferences for Graves and Performance

TO BE DONE.

6 Public Policy Relevance

Discrimination based on sexual orientation is first and foremost a human rights issue. However, when LGB individuals are unfairly targeted in education, health, social, and

political settings, there is a loss of human capital that can have detrimental effects on the economy as a whole (Badgett, 2020). For example, bullying and discrimination act as barriers to LGB students' acquisition of skills and knowledge. Furthermore, even short experiences of bullying can have severe long-term health consequences (e.g., Boden et al., 2016). Our findings suggest that revealing sexual minority status can lead to negative outcomes. This is a crucial insight for policymakers who seek to develop interventions to address discrimination and improve the well-being of LGB people.

One potential policy strategy would be to create inclusive social environments that reduce stigma and promote acceptance of sexual minority individuals. Raising awareness about the reaction to stigma disclosure could be an important step to develop such a society. Additionally, policymakers can consider providing resources and support to individuals who have recently come out, such as access to counseling and mental health services. By doing so, they can mitigate some of the negative outcomes that may arise from coming out.

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Appendix A Additional Figures

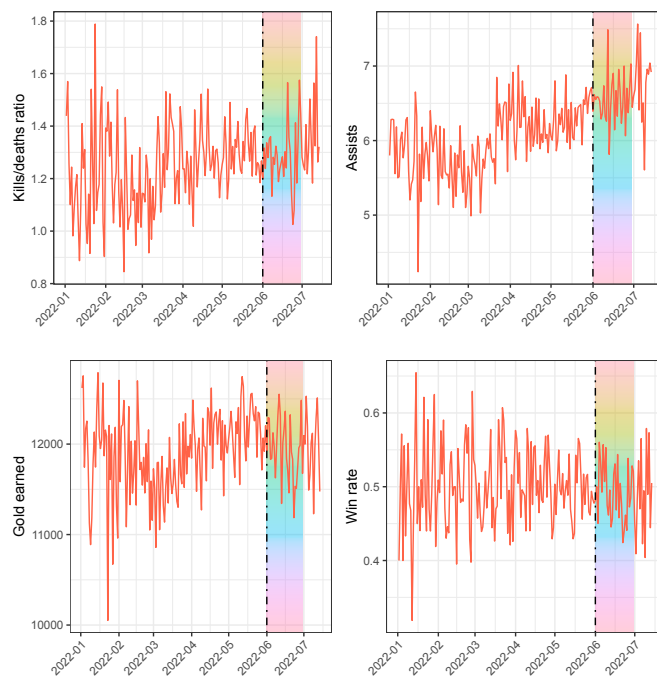


Figure A.1: Graves' performance measures over time. The four panels display Graves' kill-to-death ratio, number of assists, gold earned, and win rate. The dashed vertical line denotes the day of disclosure, and the rainbow area highlights LGBT Pride Month.

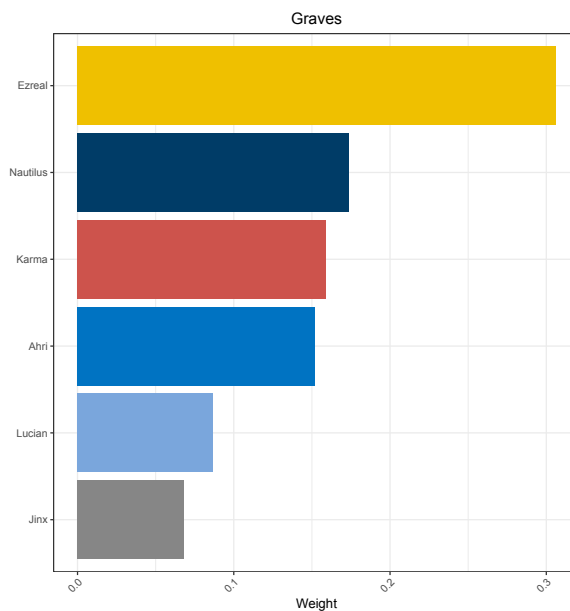


Figure A.2: Identities and contributions of characters in the donor pool for the Graves' synthetic control displayed in Figure 4.1.

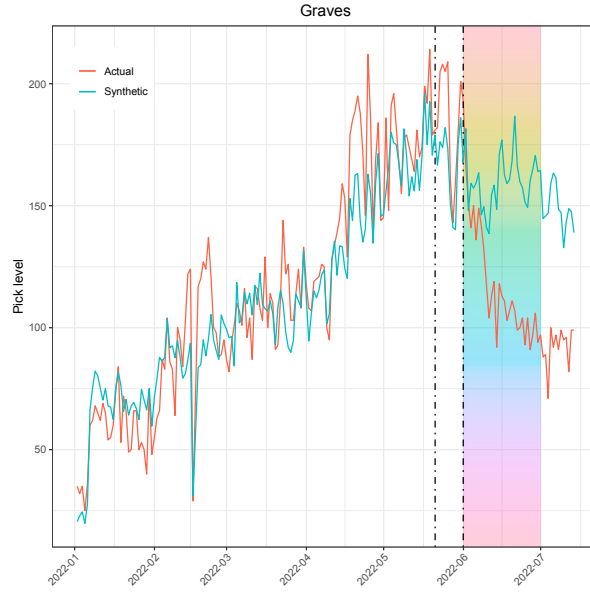


Figure A.3: Graves' daily pick levels and synthetic control estimation results. The coming-out event is artificially backdated to *21-05-2022*, denoted by the first dashed vertical line. The second dashed vertical line denotes the actual day of disclosure, and the rainbow area highlights LGBT Pride Month.