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BREXIT: AN ANALYSIS OF THE IMPACT OF AGE AND GENDER

KAYLYN MACALUSO  
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Reviewed and approved\* by the following:

Matthew Golder  
Professor of Political Science and Co-Director of Undergraduate Studies  
Thesis Supervisor

Gretchen Casper  
Associate Professor of Political Science  
Honors Adviser

\* Signatures are on file in the Schreyer Honors College.

## ABSTRACT

Why did some individuals vote to remain in the European Union during the 2016 referendum in the United Kingdom while others did not? This research analyzes the effect of age and gender on the outcome of the 2016 EU Referendum. Much has been written about how an individual's age and gender affected their 'Brexit vote.' Studies have repeatedly shown that younger individuals were more likely to vote to stay in the European Union (EU) than older individuals (Clarke, Godwin and Whitely 2016). Although the results are not quite as consistent, research also suggests that women were less likely to vote to stay in the EU than men (Vreese and Boomgaarden 2005, Nelson and Guth 2000). In this thesis, I reexamine the impact of age and gender on the Brexit vote. While existing scholarship has examined the additive effects of age and gender on the Brexit vote, I argue, building on theories of intersectionality, that we should look at how age and gender interact to determine support for staying in the European Union. The interaction between age and gender broadens the understanding of support for the Brexit vote. My results show that age always has a negative effect on the probability of voting to remain in the EU but that this negative effect is larger for women. My results also show that young women are more likely to vote remain than young men but that older women are less likely to vote remain than older men. These results confirm my expectation that age and gender interact to determine the Brexit vote.

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## **Chapter 1**

### **Introduction**

Why did some individuals vote to remain in the European Union during the 2016 referendum in the United Kingdom while others did not? Much has been written about how an individual's age and gender affected their 'Brexit vote.' Studies have repeatedly shown that younger individuals were more likely to vote to stay in the European Union (EU) than older individuals (Clarke, Godwin and Whitely 2016). Although the results are not quite as consistent, research also suggests that women were less likely to vote to stay in the EU than men (Vreese and Boomgaarden 2005, Nelson and Guth 2000). Research also investigates what factors influence feelings towards the European Union. The cost and benefits of the European Union, community identity and political affiliation all contribute to varying support for European integration. (Franklin et al. 1994, Gabel and Palmer 1995, Gabel and Whitten 1997, Gabel 1998, Armingeon and Ceka 2014). In this thesis, I reexamine the impact of age and gender on the Brexit vote. While existing scholarship has examined the additive effects of age and gender on the Brexit vote, I argue, building on theories of intersectionality, that we should look at how age and gender interact to determine support for staying in the European Union.

I hypothesize that young voters are more supportive of remaining in the EU than old voters, and that females are less supportive of remaining in the European Union. So, age is always expected to have a negative effect. This is because old voters see less advantage in the EU market and identify less with European Union membership. I expect that this negative effect is greater for women because they had less time to benefit from European Union membership. The effect of

gender on voting to remain is more complex. I expect that older women are less likely to vote Remain than older men because the perceived differences in economic benefits, their apolitical attitudes and lack of support for female-benefitting policies. However, I expect that young women are more likely to vote Remain than younger men. This is because young females value the economic benefit of the EU more, and typically vote more left wing than males.

To test these hypotheses, I use a quantitative approach to analyze the difference between voters and their vote choice. I use data gathered by the British Election Study in the post-election survey of the 2016 EU Referendum. I conduct multiple analyses and my results show that age always has a negative effect on the probability of voting to remain in the EU but that this negative effect is larger for women. My results also show that young women are more likely to vote remain than young men but that older women are less likely to vote remain than older men. These results find age has varying effects on gender, and confirm my expectation that age and gender interact to determine the Brexit vote.

## Chapter 2

### Some Background Information on the Referendum

To understand the historic importance of the referendum and the forces potentially shaping this vote, it is important to consider some historical perspective on the UK's relationship with Europe. Britain has always had a certain reluctance towards the European Project, particularly a political union. As a result, the Brexit vote is not completely unexpected. The following history explains the events leading up to the 2016 EU Referendum.

The idea of a European Project goes back for centuries, starting with Charlemagne in the Early Middle Ages. Known as the "Father of Europe", Charlemagne united most of western and central Europe (McKitterick 2011). Centuries later, Winston Churchill spoke about creating a European Union (EU)<sup>1</sup> in 1946 when he described how Europe must create a "United States of Europe" that would allow all nations, regardless of size to "gain their honor by their contribution to the common cause" (Perisic 2010). While Britain's Prime Minister spoke about a European Project, he was not necessarily expecting the UK to be part of it. The UK still saw itself as a global power, not a regional one.

Post World War II, Europe began to finally test all the beliefs they had about possible success with European integration (McCormick 2017, 56). The beginning of the European Community started with the creation of the European Coal and Steel Community (ECSC) in 1951. The ECSC consisted of 6 countries, France, West Germany, Italy, Belgium, Netherlands and

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<sup>1</sup> The European project underwent a series of developments, starting as the European Coal and Steel Community (ECSC) from 1951-1957, becoming the European Economic Community (EEC) from 1958 – 1986, then the European Community (EC) from 1986 – 1992, and finally the European Union (EU) from 1992 – Present.

Luxembourg, and aimed to make future war impossible, constrain German economic power, integrate the coal and steel communities in western Europe. It was seen as one of the first attempts at European Economic integration (Dedman 2003). Post World War II, Britain continued to see themselves as world power. They refused to participate in many of the meetings and activities attributed to implementing the ECSC because they were not interested in integrating. The modest success of the ECSC lead to further initiatives of integration.

In June 1955, a meeting of ECSC foreign minister determined it was time to ‘relaunch’ the European idea because of the success of the ECSC. This would include development of common institutions, fusing national economies, creating the common market and harmonizing social policies. (McCormick 2017, 67). A committee was set up to look into options, and in January 1958 the Treaty of Rome was signed, the European Economic Community (EEC) and European Atomic Energy Community (Euratom) were formed. The original six countries, France, West Germany, Italy, Belgium, Netherlands and Luxembourg signed the treaty. The EEC focused on reducing barriers for the free movement of people, services and capital (McCormick 2017, 67). The EEC brought noticeable achievements to the participating European countries. Britain’s economy began to falter and they realized they could not sustain world power without integration. Britain was accepting with economic integration, but was less positive towards the more political goals associated with the EEC. Rather than integrate with the EEC, they chose to focus their attention towards the European Free Trade Association (EFTA), an association with the goals of free trade rather than political and economic integration (McCormick 2017, 69).

Shortly after EFTA membership, it became clear members of the EEC gained more political power than members of EFTA. Britain realized membership in the EEC was necessary to sustain prominence in Europe. Britain faced obstacles when it first attempted to join the EEC in

1961. The French vetoed the attempt, with French President Charles de Gaulle arguing that Britain's strong relationship with the US would get in the way of their dedication to the EEC, and that they would challenge France's role (McCormick 2017, 70). Britain applied for a second time in 1967, and again de Gaulle vetoed. Following a third attempt in 1973, membership was successful. Britain was obligated to adhere to all the established European Economic Community laws and accept the institution as intergovernmental. They struggled to accept the economic commitment, expressing concern for paying 'too much for too few benefits' (Glencross 2015). The concern became known as Euroscepticism, opposing the increasing powers of European integration.

After only two years into their membership, Prime Minister Harold Wilson held a referendum to see whether UK citizens wanted to leave the European Economic Community. The vote resulted in 67% of the population choosing to stay and the UK was still a member of the EEC. The result of the vote created high level support for the pro-Europeans (Goodwin & Oliver, 2016). Notably, Brexit is not the first referendum on leaving. There is a clear history between Britain and the European Project.

By 1986, the EEC, ECSC, and Euratom joined together and became known as the European Community (EC). Succeeding the establishment of the EC, was the controversial idea of political integration. The common market, a goal of the EC, consisted of free movement of people, capital and services. Trade barriers between member states were eliminated and common policies for transportation, agriculture and economic relations with nonmember countries were implemented. The new regulations exercised a significant shift towards political union, and a loss of sovereignty for member states. To political leaders, Britain included, this was a concern. The concern reaffirmed Britain's feelings of Euroscepticism.

The Maastricht treaty, signed in 1993 sought to enhance the authority of community institutions and officially created the European Union (EU) (Grieco 1995). The treaty also created the Economic and Monetary Union (EMU), and the single currency, the euro. Lengthy political debates took place in Britain around the time of the Maastricht treaty ratification (McCormick 2017, 77). Ultimately, Britain opted out of the social policy, monetary and economic union, further defining their hesitation towards complete integration, (Perisic 2010) and signifying their Euroscepticism. Other member states supported the UK's fight against further integration. For example, Germany was hesitant to join the Eurozone and leave behind the success of their own deutschemark for the euro. The European Union continued to grow. By 2004, the EU had 25 member states.

The Eurozone debt crisis of 2010 further reiterated Britain's distrust in a common currency. The crisis is said to further fuel the Euroscepticism throughout Britain (Wilson 2014). By 2015, the Conservative Party took control of the British government. The Brexit referendum was a culmination of decades of internal division in the British Conservative Party on the issue of European integration (Hobolt 2016). To appease the Eurosceptic members of the party, the people were promised a referendum to determine EU membership by the end of 2017. The Conservative party sought to negotiate a 'new settlement' for Britain in Europe, promising to win big in Brussels (Hobolt 2016). The new settlement failed to win over voters, even garnering support to leave the EU. Despite the failure of the new settlement, the government was convinced they could win the referendum. All major parties showed favoritism towards staying in the European Union (Hobolt 2016).

The second referendum occurred on June 23, 2016. In a shocking and historic vote, the United Kingdom split 51.9% to 48.1%, choosing to leave the European Union (Swales 2016). The

referendum turnout was 71.8%, with more than 30 million people showing up to vote (Hunt and Wheeler 2019). The economy and immigration clearly dominated the agenda of the referendum. The British public was very divided on these issues. Generally, voters who wanted to stay in the EU argued the loss of economic stability if they left. Voters who wanted to leave raised concerns about immigration and a lack of trust in the government. The following sections explore reasons for the Brexit outcome.

## **Chapter 3**

### **Theory**

Considerable research has focused on explaining feelings of Euroscepticism and the Brexit vote. This research outlines a variety of factors. Ray (2003) studied the influence of parties and elites, and found party positions influence electorate opinion. Gabel and Whitten (1997) identify the importance of economic opportunity, specifically the “subjective” economy perceived by the EU, as opposed to the “objective” influences support for integration. Finally, support for national identities, specifically stronger feelings of national identity lead to lower levels of support for the European Union (Carey 2002). Clarke, Godwin and Whiteley (2016) investigate the factors that contributed to the voter’s decisions in the 2016 EU Referendum and find cost and benefits, perceptions of national identity and political influence all contributed to the vote outcome.

Many studies have examined the effect of age and gender on the 2016 EU Referendum outcome (Fox and Pearce 2017, Sampson 2017, Clarke, Godwin and Whitely 2016). While there are several factors that influenced individuals’ vote preferences in the 2016 UK Referendum, I chose to focus on a voter’s age and gender. Age and gender are among factors that influence decision making. An individual’s age is likely to influence their vote choice because age differences change a voter’s ability to take advantage of an integrated European Market. An individual’s gender is likely to influence their vote choice because female and males differ on their support for economic stability, political identity and the European Market.

## Age

Support to remain in the EU steadily decreased with age, decreasing from 73% for 18-24 year olds to 40% for voters ages 65 and above (Becker, Fetzer and Novy 2017). Several reasons have been proposed for why young people were more likely to remain. The value of free mobility is higher for young voters, their community identity within European Union membership, and their progressive nature are all reason to believe they are more likely to vote to remain in the European Union. First, younger people are more suited to take advantage of the European Market because of their high mobility. Given that economic growth is a prominent part of European integration, it makes sense that voters evaluate integration using economic criteria (Gabel & Whitten 1997). In Anderson and Reichert's (1995) research, they expect to find younger workers who are better able to succeed in an integrated economy to show more support for the European Union. Similarly, Matthew Gabel (1998) expected to observe individuals to measure their value in EU membership based on whether they could benefit from the economic opportunities. Younger workers are able to move freely and capitalize on the opportunities presented by the integrated market much easier than older workers, which causes them to want to stay in the European Union more than older voters.

Second, younger voters are more likely to identify with the European Union because it is how they socialized while growing up. Fox and Pearce (2017) found today's young people are the most supportive generation of EU membership because of their experience during their formative years. An individual's formative years, identified as years in adolescence, have a strong influence on the rest of their life. Younger voters were socialized during a time of greater EU integration, and view a progressively stronger EU as normal (Down and Wilson 2012). Likewise, Nias (1973) found feelings towards the EU are created by psychological factors like community identity.

Younger voters have only ever known membership in the EU and have a stronger identification with the EU. Older members remember life before European Union membership, when their national government was strong, and the EU had less power. They are more likely to be apprehensive towards a supranational organization like the EU. Additional research suggests an individual's identity shapes their social interactions and their perceptions of 'threats' (Clements 2009), and strong feelings of country identity and national superiority leads to less support of the EU (Carey 2002, McLaren 2002). Younger voters have more sense of identity as European, while older voters identify with the United Kingdom before EU membership, and are more likely to identify as nationalist. This strong sense of national identity will make older voters less likely to vote to remain in the European Union.

Third, there is reason to believe younger voters are more progressive and open to changing policies like immigration policy. Immigration was one of the largest issues surrounding the campaign to leave the EU. Goodwin and Milazzo (2017) find feelings of anti-immigration were related to support for leaving the EU. Likewise, McQuillan (1995) finds as individuals age, they are expected to increase in prejudice. Younger voters are less likely to exhibit high levels of prejudice and are more accepting to immigration, and as a result, should be more inclined to vote to remain in the European Union.

Based on previous research and the implications they have for support of European integration, for these reasons young voters are more likely to vote to remain in the EU, than older voters. Advantages within the European Market, identifying with European Union membership, and progressive attitudes towards immigration are all reason to believe they are more likely to vote to remain in the European Union.

*Age Hypothesis: Older individuals are less likely to vote Remain in the 2016 UK Referendum, than younger individuals.*

## **Gender**

Several explanations have proposed there is a gender gap when it comes to support for European integration (Vitores 2015, Nelson and Guth 2000), specifically, women exhibit less support for the EU (Nelson and Guth 2000). The believed differences in economic benefits, females decreased interest in politics, and the absence of female-benefitting policies all contribute to a woman's decreased likelihood of voting to remain in the EU. First, women and men differ on how they view economic stability. Anderson and Reichert (1995) find women are more sensitive to economic pessimism, meaning they are more likely to derive decisions based on the presence or absence of economic confidence. Nelson and Guth (2000) address feminist scholars' arguments that European Integration is 'gendered' and the economic benefits favor males over females. Individuals assess their support of integration through their personal value, and those who are threatened by changes, or possible changes are going to be more resistant to change (Gabel 1998). For example, females have traditionally worked in sectors that are more domestic. The argument has been made that the EU threatens substantial benefits, including those in the public sector where females more commonly work (Nelson and Guth 2000). Similarly, Liebert (1997) found EU unifications could deprive females of successes they have already sustained at the national level. The threat of economic stability and 'gendered' EU policies result in less support for European

integration, and presumably those results are the same on the Brexit vote, causing females to be less likely to vote to remain in the European Union.

Second, females have a different political identity than men. Togeby (1994) suggests that since women do not have as much interest in foreign policy, and do not feel well informed about the policies, they show less support for them. Women generally show less interest in politics (Nelson and Guth 2000). Likewise, Liebert (1997) explains how women are seen as much more apolitical than men. More women than men know little about the EU, and they let their lack of knowledge influence their perception of the integration. They do not trust things they know little about (Nelson and Guth 2000). Women's lack of knowledge about politics and likelihood to lack support for political topics they do not know much about will make them less likely to support European integration and be in favor of leaving the EU.

Third, men and women have different interests, and the EU may not evenly support these interests. Women traditionally have been the primary caregivers. They view their role as 'emotional and social care in society.' (Togeby 1994). This role requires women to traditionally care for people in society who cannot care for themselves. Nelson and Guth (2000) argue a larger, more competitive EU makes caregivers alienated in a modern society. Furthermore, women's interests continue to place emphasis on safeguarding maternity rights, equal pay and women's human rights (Hastrup and Wright and Guerrina 2016). These are seen as gender equality policies, as referred to as "low" politics. These policies are often second to policies regarding security and defense, recognized as "high politics," traditionally male issues. Avdeyeva (2006) found the EU has had a modest effect on harmonizing mothers' employment social policies across the member states. Insufficient support for female-benefitting policies will lead to a decrease in female support for European integration, and more likely to vote to leave the European Union.

Previous literature outlines multiple reasons why females are less likely to support European integration. The perceived differences in economic benefits, the apolitical attitudes of females, and the lack of support for female-benefitting policies will make women less likely to vote to remain in the European Union.

*Female Hypothesis: Females are less likely to vote Remain in the 2016 UK Referendum, than men.*

### **Age and Gender Together**

Existing studies examine the effect of age and gender independently of one another using additive models. There is reason to believe that age and gender might interact to determine the Brexit vote. Traditionally, women had the responsibility of running the home and looking after the children. Older women are more accustomed to this type of work and are less likely to optimize the European Single Market. Young females are better fit to use the opportunities in the European market. Not only has the perspective on work and household roles changed overtime, but also, it was not until the Luxembourg summit in 1997 where the European Union's commitment to gender equality was considerably raised (Rubery 2002). Britain joined the EU in 1973. Consequently, young females at the time of membership did not benefit the same way as young females who were born into the UK after membership. I believe changes in perceived value of the European Union cause age and gender to have interactive effects on the Brexit vote.

The perceived value of the EU also varies across gender. Shorrocks (2018) finds young females are the most left wing in their voting habits, emphasizing an importance in economic

equality. Females are more prone to feeling economic pessimism (Nelson and Guth 2000), but when they believe there is economic stability, they tend to trust the EU more than men (Nelson and Guth 2000). Young voters typically have less responsibility and feel less economic vulnerability. Women typically vote more based on their economic status and are more left wing than male voters, and as a result, young female voters choosing to remain in the EU more than young male voters.

*Conditional Female Hypothesis: Women are less likely vote to remain than men when they are old, however they are more likely to vote remain than men when they are young.*

In an interaction, effects are symmetric. Therefore, if the effect of age on the Brexit vote depends on gender, then the effect of gender on the Brexit vote depends on age. Older women saw less benefits from the EU than older men. Women entered the European market much later than men, and when they first entered the workforce, women had lower education levels, less skill attainment and unequal opportunities for mobility (Kattis 1991). These inequalities confined the opportunities women had and as a result, they did not benefit as much from EU membership.

*Conditional Age Hypothesis: An increase in age always has a negative effect on the probability that individual votes to remain, however the negative effect is bigger for women than men.*

## Chapter 4

### Empirics

In this section, I first describe the data and the methods employed to test the hypotheses outlined above. I then present and discuss the results.

#### Methods and Data

To test my hypotheses, I utilize data from wave 9 of the 2014-2018 British Election Study (British Election Study). The Brexit referendum took place on June 23, 2016. Wave 9 of the British Election Study was conducted between June 24, 2016 and July 4, 2016 and contains information on 30,036 respondents. The upcoming empirical analyses focus on the 28,248 respondents who reported that they voted on the referendum.<sup>2</sup> My dependent variable, *Vote Remain*, is dichotomous and equals 1 if the respondent reports that she voted to remain in the European Union and 0 if the respondent reports that she voted to leave the European Union. Given the dichotomous nature of my dependent variable, I use a probit model to test my hypotheses. I use a latent variable setup in which *Vote Remain*\* measures the underlying propensity that a respondent voted to remain in the European Union. This propensity to vote “remain” in the referendum is then modeled as a linear function of several independent variables,

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<sup>2</sup> According to the British Election Studies sample, we might expect that the turnout rate in the Brexit referendum was 94.05%. In reality, the turnout rate was 72.21%. This difference is in line with previous research suggesting that survey respondents tend to over-report their turnout.

$$\text{Vote Remain}^* = \beta_0 + \beta_1\text{Age} + \beta_2\text{Female} + \beta_3\text{Age} \times \text{Female} + \beta\text{Controls} + \varepsilon,$$

where *Vote Remain*\* is assumed to be less than 0 when the respondent votes to leave the European Union and greater than 1 when the respondent voters to remain in the European Union. My primary independent variables are *Age* and *Female*. *Age* is a continuous variable that captures a respondent's age. *Age* varies from a low of 18 to a high of 96; the average is 53.7.<sup>3</sup> *Female* is a dichotomous variable that equals 1 if the respondent is female and 0 if the respondent is male. The sample is largely gender balanced, with 13,951 (49.4%) female respondents and 14,296 (50.6%) male respondents. The interaction term, *Age x Female*, is included to test the conditional nature of the Conditional Age Hypothesis and the Conditional Female Hypothesis.

The marginal effect of *Age* on the latent propensity to vote “remain” is  $\beta_1 + \beta_3\text{Female}$ . According to the Conditional Age Hypothesis, the marginal effect of *Age* should always be negative. In other words, an increase in a respondent's age should always lower the propensity that an individual will vote to remain the European Union. As a result,  $\beta_1$ , the marginal effect of *Age* for men, and  $\beta_1 + \beta_3$ , the marginal effect of *Age* for women, should both be negative. Since I expect that the negative effect of *Age* is greater for women than men, it should be the case that  $\beta_3$  is also negative.

The marginal effect of *Female* on the latent propensity to vote “remain” is  $\beta_2 + \beta_3\text{Age}$ . According to the Conditional Female Hypothesis, women should be more likely than men to vote “remain” when they are young, but less likely than men to vote “remain” when they are old. As a

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<sup>3</sup> It turns out that one respondent reported that his age was 116. This was likely an error as this would make this particular respondent the oldest recorded person to ever live in the United Kingdom. I dropped this respondent from the sample.

result,  $\beta_2$  should be positive and  $\beta_3$  should be negative. My theory is not sufficiently strong to predict when the marginal effect of Female on the probability of voting remain will switch from positive to negative. At some point, though, the marginal effect of Female,  $\beta_2 + \beta_3 \text{Age}$ , should become negative once Age is sufficiently large.

Although I am primarily concerned with the impact of age and gender on the probability that individuals vote to remain in the European Union, previous research identifies a number of factors that are expected to influence the Brexit vote choice. It is necessary to control for these factors if we think that they are associated with the independent variables of interest, *Age* and *Female*, and the dependent variable *Vote Remain*. Ignoring these additional factors will lead to omitted variable bias and inferential errors regarding the impact of age and gender on the Brexit vote. Broadly-speaking, scholars have identified three categories of factors that are thought to influence the Brexit vote (Hooghe and Marks 2005): (i) economic factors, (ii) cultural factors, and (iii) political factors. Each of these categories are plausibly related to an individual's age and gender. As a result, I control for them when I estimate my probit model.

Economic factors relate to the economic status of individuals and, according to the literature, speak to the perceived benefits and costs of membership in the European Union. To capture the economic status of respondents, I control for an individual's level of education (*Education*), household income (*Income*), and marital status (*Marital Status*), as well as their risk of unemployment (*Unemployment Risk*) and risk of poverty (*Poverty Risk*).<sup>4</sup> Cultural factors focus on issues related to national identity and support for immigration. To capture these cultural factors, I control for the extent to which an individual identifies as English (*Englishness*) and the extent to which they identify as European (*Europeanness*). I also control for whether they are a UK passport

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<sup>4</sup> More information about these, and my other control, variables can be found in Appendix A.

holder (UK Passport) and the degree to which they support immigration (Accept Immigration). Political factors focus on the partisan identification of the respondents. To control for a respondent's partisan identification, I include a series of dichotomous party variables (Conservative, Labour, Plaid Cymru, Scottish National Party, United Kingdom Independence Party, Green Party) that identify the party with which the respondents most identify. The dichotomous variable for the Liberal Democrat party is omitted and acts as a reference category. In other words, the coefficients on the party variables indicate how likely respondents who identify with these parties are to vote remain compared to respondents who identify with the Liberal Democrat party.

## **Results and Interpretation**

The results from six slightly different models are shown in Table 1. The first column presents results from a purely additive model. The second column presents the results from an interactive model specification that allows us to see whether an individual's age and gender interact to determine their Brexit vote. Neither of the first two models include any control variables. The next four columns add the economic, cultural, and political control variables to the interactive model specification, first separately and then jointly. While I do not show the specific results with respect to the control variables in the main text, interested readers can see them in Table 3 in Appendix B.

The results of the age and gender additive model are shown in the first column of Table 1. The results explain that age has a negative effect on an individual's likelihood of voting to remain in the EU. As a voter gets older, they are more inclined to vote to leave the European Union. This

variable is statistically significant. According to the additive model, gender has no effect on the Brexit vote. This is indicated by the substantively small and statistically insignificant coefficient on Female.

As I have argued, though, age and gender are likely to interact in their effect on the Brexit vote. As a result, we need to look at the results from the interaction models shown in the other columns. I begin by looking at the result associated with Model 2. As predicted, the coefficient on Age is negative and statistically significant. This indicates that increasing age reduces the likelihood that they vote remain. The fact that the coefficient on the interaction term is negative and statistically significant indicates, as predicted, that this negative effect of age is even larger for women. The results with respect to gender are a little harder to interpret from Model 2. The coefficient on Female is positive and significant. This suggests that being female increases the probability of voting to remain when they are young. Technically, the positive coefficient on Female indicates the effect of being female when an individual is 0 years old. Later on, I will look at the effect of being female at a more realistic age. The negative and significant coefficient on the interaction term indicates that this positive effect of being female on the likelihood of voting to remain declines with age. This is exactly as predicted.

To account for potential omitted variable bias, economic, cultural and political characteristics were used. The following four models add the various controls, first separately and then jointly. The key part to note is that the coefficients on the interaction term always remain negative and statistically significant. The coefficients on Age and Female also remain the same sign and almost always have similar levels of statistical significance. In other words, the results with respect to age and gender are robust to the inclusion of various control variables.

**Table 1: The Effect of Age and Gender and Voting to Remain in the European Union**

*Dependent Variable: Vote Remain (1,0)*

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age	-0.016*** (0.000)	-0.014*** (0.001)	-0.011*** (0.001)	-0.003*** (0.001)	-0.012*** (0.001)	-0.002 (0.001)
Female	-0.006 (0.015)	0.216*** (0.055)	0.204*** (0.062)	0.396*** (0.068)	0.142** (0.071)	0.226** (0.094)
Female*Age		-0.004*** (0.001)	-0.003*** (0.001)	-0.006*** (0.001)	-0.003** (0.001)	-0.003** (0.002)
Constant	0.867*** (0.029)	0.751*** (0.040)	-0.070 (0.052)	-1.100*** (0.055)	1.397*** (0.059)	-0.870*** (0.091)
<b>Control Variables</b>						
Economic Controls	No	No	Yes	No	No	Yes
Cultural Controls	No	No	No	Yes	No	Yes
Political Controls	No	No	No	No	Yes	Yes
Observations	28,247	28,247	23,320	26,787	22,168	17,541
Log-Likelihood	-19052.316	-19043.602	-15138.286	-12700.907	-12464.88	-7421.8626

Note: Table 1 shows results from a series of probit models examining the effect of age and gender on the probability that an individual votes to remain in the European Union. The “Yes” and “No” in the table indicate which control variables were included in that model. The specific results regarding the individual control variables are shown in Table 3 in Appendix B. Data come from Wave 9 of the 2014-2018 British Election Survey.

What is the substantive impact of age and gender on the probability of voting to remain in the European Union? Table 2 looks at the substantive impact of age. The first column shows the predicted probabilities that a 25-year-old female and 25-year-old male will vote to remain in the European Union. The second column shows the predicted probabilities that a 50-year-old female and 50-year-old male will vote to remain in the European Union. Finally, the third column indicates the change in predicted probabilities that these individuals will vote to remain in the

European Union as they age. In other words, the third column indicates the effect of becoming 25 years older for women and men on their probability of voting to remain.

**Table 2: The Effect of Age on the Probability of Voting to Remain in the European Union**

	25-year-old	50-year-old	Difference
Female	0.70*** [0.68, 0.71]	0.53*** [0.52, 0.54]	-0.17*** [-0.16, -0.18]
Male	0.66*** [0.64, 0.68]	0.53*** [0.52, 0.54]	-0.13*** [-0.12, -0.14]
Difference	-0.04*** [-0.02, -0.06]	-0.0004 [-0.02, 0.01]	-0.04*** [-0.02, -0.05]

Note: Table 2 provides information about how the predicted probability of voting to remain in the European Union changes for women and men as they age from 25 to 50. Two-tailed 95% confidence intervals are shown in parentheses. These predicted probabilities are based on the results from Model 2 in Table 1.

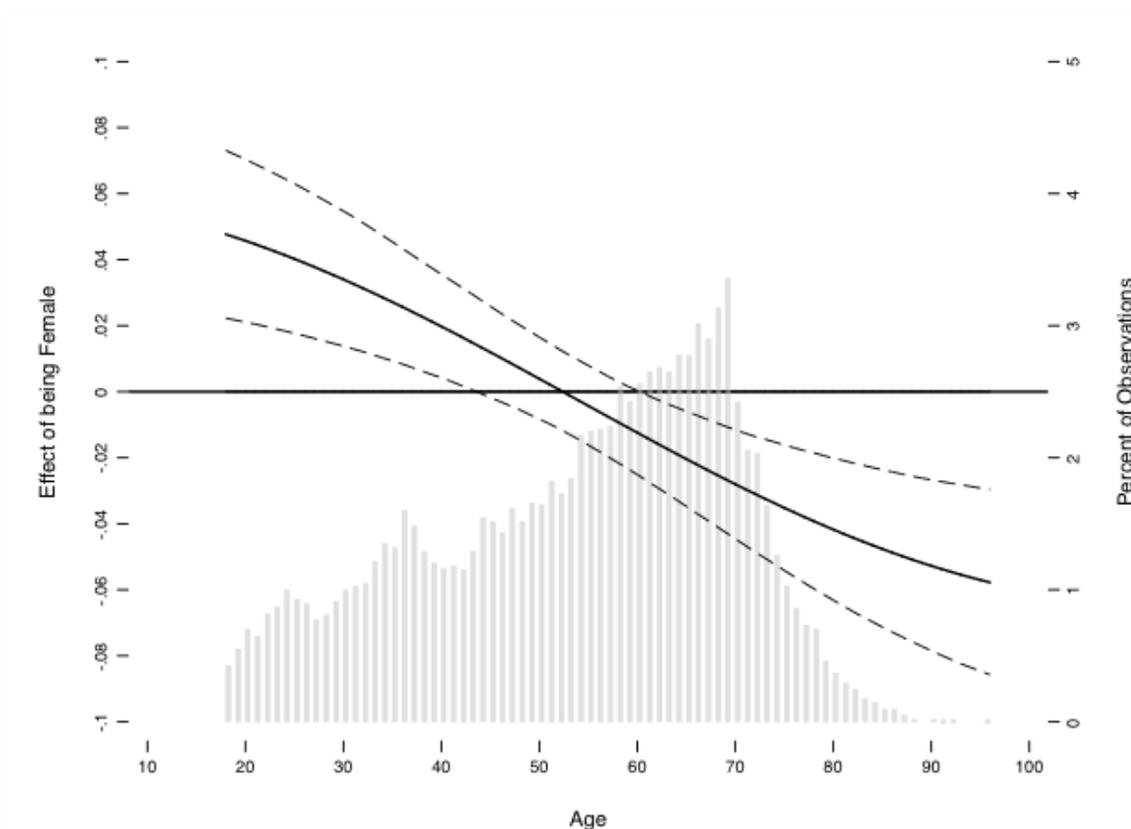
The probability that a 25-year-old female votes to remain is 0.70, while the probability that a 25-year-old male votes remain is 0.66. This difference is statistically significant and indicates young women are more likely to remain than young men. However, what is more interesting in Table 2 is the effect of age on men and women. In that regard, we see that the probability that a 50-year-old woman votes remain is 0.53. This is a 24.3% reduction in the probability that she votes remain compared to when she is 25 years old. This difference is statistically significant. The probability that a man votes remain also falls when he is 50 years old compared to when he is 25 years old. Specifically, the probability of voting to remain drops by 19.7%. As you can see, the negative effect of age on the probability of voting to remain is significantly larger for women than

it is for men. Additionally, the results for a 50-year-old female and a 50-year-old male indicate there is no difference in the probability that a man and a woman will vote to remain at this age.

To further examine the substantive effect of gender on the probability of voting to remain, I now turn to Figure 1. The curved solid black line indicates how the predicted probability of voting remain changes if an individual is female instead of male across the observed age range (18-96) in the data. The dashed lines represent two tailed 95% confidence intervals around this change in predicted probability. The substantive magnitude of the change in predicted probability associated with being female is shown on the vertical axis on the left of the plot. The effect of being female is statistically significant when both the upper and lower bounds of the confidence interval are on one side of the horizontal zero line. The histogram behind the plot indicates how age is distributed across the respondents in the sample. The vertical axis on the right of the plot is for the histogram and indicates the percentage of respondents that fall into each age category.

**Figure 1: Effect of being Female on the Probability of Voting Remain in the European Union**

*Dependent Variable: Vote Remain (1,0)*



Note: Figure 1 shows how being female changes the predicted probability of voting to remain in the European Union at different ages.

Females are more likely to vote to remain as long as the voter is less than 44 years old. This age group consisted of 7,529 voters of the total population sampled. Between 44 and 60, there is no difference between males and females. The result is consistent with the findings in Table 2 that 50-year-old old women and old men have the same probability of voting to remain. This age group consisted of 9,230 of the total sampled population. After 61 years old, women are significantly less likely to vote to remain. The age group consisted of 11,488 of the total population sampled. The oldest age group had the highest turnout of voters. To summarize, and in line with my

predictions, Figure 1 shows that young women are significantly more likely to vote Remain than young men but that old women are significantly less likely to vote Remain than old men.

Before concluding, I briefly discuss the results with respect to the control variables. In the economic model, unemployment risk, poverty risk and household income are not significant. Marriage has a significantly negative effect, indicating that voters who are married are less supportive to vote to remain. Education has a significant positive effect. This means that voters with higher education levels are more supportive of remaining in the EU. In the cultural model, the extent to which a voter identifies as English is not significant, but their level of identification as European is positive, and statistically significant. This means that voters who strongly identify as European are more supportive of remaining in the EU. The coefficients on immigration acceptance and UK passport ownership are positive and statistically significant. Voters who own a UK passport, and voters who are more accepting of immigration support remaining in the European Union. In the political model the coefficients on the party dummies have to be interpreted relative to the Liberal Democrats. The Plaid Cymru party is not significant. The Green Party coefficient is positive and statistically significant. Compared to the Liberal Democrats, members of the Green Party are more supportive of remaining in the EU. The coefficients on the Conservative Party, Labour Party, Scottish National Party, and United Kingdom Independence Party (UKIP) are negative and statistically significant. Compared to the Liberal Democrat party, members of the Conservative, Labour, Scottish National Party and UKIP are less supportive of remaining in the European Union.

## **Chapter 5**

### **Conclusion**

In this undergraduate thesis, I explore the effect age and gender have on the 2016 EU Referendum. I examined the additive effects of age and gender and the interaction between age and gender to determine support for remaining the European Union. I theorized older voters are less likely to vote Remain in the 2016 UK Referendum, than younger voters, and females are less likely to vote Remain in the 2016 UK Referendum, than men. To test these hypotheses, I measured the effect of age and gender on the likelihood to vote to remain in the EU. I find evidence to support my hypothesis that age has a negative effect on voting to remain in the EU. Females are more supportive of remaining in the European Union. These results do not support my hypothesis that females are less likely to vote to remain in the EU.

Furthermore, I theorized age and gender interact to cause women to be less likely to vote to remain when they are old, and the effect of age is larger for women. To test the conditional theories, I broke the analysis into three steps. First, I created an interactive model to test significance of the variable on support to remain. I accounted for omitted variable bias using economic, cultural and political controls. The results support my hypothesis that the interaction between age and gender has a negative effect on support to remain. I tested the effect of age on the probability of voting to remain in the European Union. I found young females are more likely to vote to remain. As a voter ages, they are less likely to vote remain, but the effect is more significant for women. Lastly, I measured the marginal effects of age and gender. My findings suggest young females are more supportive of remaining in the EU, there is no difference between old females

and old males, until old females continue to age and are significantly more supportive of leaving the EU.

The results of my research contribute to our understanding of support for vote choice, and has important ramifications for future research. The majority of the literature analyzes vote choice using the effects of additive models, without considering the effects of intersectionality explained by interactive models. This finding is important because it provides researchers with an additional method to quantitatively analyze the relationship between variables and their effect on vote outcome.

## **Appendix A**

### **Key Variables**

In what follows, I provide more details on how the dependent variable, independent variables, and control variables. The variables come from the wave 9 of the 2014-2018 British Election Study Internet Panel (2016 EU Referendum Study, Post-election survey). The data were downloaded from <https://www.britishelectionstudy.com/data-object/wave-9-of-the-2014-2017-british-election-study-internet-panel-2016-eu-referendum-study-post-election-survey/> on June 10, 2016.

Dependent Variable:

1. *Vote Remain* is based on the following question in the codebook:

How did you vote in the EU Referendum?

This variable took on the value of 0 if the voter chose to remain in the EU, and 1 if the voter chose to leave the EU. I recoded this variable to reflect if the voter chose to remain. This variable is coded with a remain vote as 1 and a leave vote as 0. If the voter chose that they “didn’t know,” their vote was coded as “missing.” This variable contains 28,248 observations.

Independent Variables:

2. *Female* is based on the following question in the codebook:

Are you male or female?

Male was coded as 1, and female was coded as 2. I recoded this variable to indicate if the voter was female. This variable, now named “female,” values female as 1 and male as 0. The dataset contains 13,951 female observations and 14,296 male observations.

3. *Age* is based on the following question in the codebook:

What is your age?

This is a continuous variable, and was not recoded. The voting ages ranged from 18 – 96 years old. The average voting age was 53.7 years old. This variable contains 30,036 observation.

Control Variables:

4. *Marital* was a profile variable. It was recoded to indicate if the voter was married or not.

The “married” identification includes voters who are married, engaged, and married but living separately. The not married includes the voters who are single, divorced and widowed. Voters married were coded as 1, and voters not married were coded as 0.

5. *Poverty risk* was based on the following statement in the codebook:

During the next 12 months, how likely or unlikely is it that there will be times when you don’t have enough money to cover your day to day living costs.

This variable is measured on a numeric scale ranging from 1-5, one measuring “very unlikely” the voter would not have enough money, five measuring “Very likely” the voter would not have enough money. Individuals who answered “Don’t know” were counted as missing.

6. *Unemployment risk* was based on the following statement in the codebook:

During the next 12 months, how likely or unlikely is it that you will be out of a job and looking for work.

The variable is measured on a numeric scale ranging from 1-5, one measuring “very unlikely” the voter will be out of work, five measuring “Very likely” the voter will be out of work. Individuals who answered “Don’t know” were counted as missing.

7. *Household income* was based on the following question in the codebook:

What is your gross household income?

The variable was coded from 1 to 15, and measured using intervals, with one measuring “under £5,000 per year”, and 15 measuring “£150,000 and over.” Voters who answered “Don’t know” counted as missing.

8. *Education* was based on the following question in the codebook:

What is the highest educational of work-related qualification you have?

The variable was coded ranging from 1-20, with one measuring “no formal education” and 20 measuring “a professional degree or higher”.

9. *Englishness* was based on the following question in the codebook:

Where would you place yourself on these scales?

The variable was coded on a scale of 1 to 7. One indicated minimum identification, 7 indicated maximum identification.

10. *Europeanness* was based on the following question in the codebook:

Where would you place yourself on these scales?

The variable was coded on a scale of 1 to 7. One indicated minimum identification, 7 indicated maximum identification.

11. *UK passport owner* was based on the following question in the codebook:

Do you hold a current passport?

Voters with a UK passport were coded as a one, and voters without a UK passport were coded as 0.

12. *Immigration acceptance* was based on the following question in the codebook:

Some people think that the UK should allow \*many more\* immigrants to come to the UK to live and others think that the UK should allow \*many fewer\* immigrants. Where would you place yourself and the parties on this scale?

The feelings towards immigration variable was coded on a scale of 0 to 10, with zero indicating no acceptance of immigrants, and 10 indicating very accepting of more immigrants.

13. *Party Identification* was based on the following question in the codebook:

Generally speaking, do you think of yourself as Labour, Conservative, Liberal Democrat or what?

I created dummy variables for each political party affiliation – Conservative, Labour, Scottish National Party, Plaid Cymru, United Kingdom National Party (UKIP), and Green Party. Voters who did not specify a partisan affiliation were not included in the mode

## Appendix B

## Full Probit Models

Table 3: Probit Models Illustrating Effects of Voting to Remain in the European Union

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age	0.016*** (0.000)	0.014*** (0.001)	0.011*** (0.001)	0.003*** (0.001)	0.012*** (0.001)	0.002 (0.001)
Female	0.006 (0.015)	0.216*** (0.055)	0.204*** (0.062)	0.396*** (0.068)	0.142** (0.071)	0.226** (0.094)
Female*Age		0.004*** (0.001)	0.003*** (0.001)	0.006*** (0.001)	0.003** (0.001)	-0.003** (0.002)
<b>Socioeconomic</b>						
Married			0.050*** (0.019)			0.005 (0.026)
Unemployment Risk			0.000 (0.000)			0.000 (0.000)
Poverty Risk			0.000 (0.000)			0.000** (0.000)
Household Income			0.000 (0.000)			0.000 (0.000)
Education			0.056*** (0.002)			0.024*** (0.002)
<b>Identity</b>						
Englishness				0.000 (0.000)		0.000 (0.000)
Europeanness				0.000** (0.000)		0.000 (0.000)
UK passport owner				0.182*** (0.024)		0.161*** (0.032)
Immigration Acceptance				0.344*** (0.004)		0.304*** (0.005)
<b>Political Policy</b>						
Conservative					1.070*** (0.035)	0.633*** (0.045)
Labour					0.321*** (0.035)	0.135*** (0.045)
Scottish National					0.185*** (0.051)	0.174*** (0.067)
Plaid Cymru					0.114 (0.111)	0.099 (0.148)
UKIP					2.969*** (0.082)	2.216*** (0.108)
Green					0.242*** (0.067)	0.105 (0.092)
Constant	0.867*** (0.029)	0.751*** (0.040)	0.070 (0.052)	1.100*** (0.055)	1.397*** (0.059)	0.870*** (0.091)
Observations	28,247	28,247	23,320	26,787	22,168	17,541

Standard errors in parentheses \*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

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# ACADEMIC VITA

**Kaylyn A. Macaluso**  
KaylynMacaluso@gmail.com

## EDUCATION

**The Pennsylvania State University**, College of Liberal Arts, Schreyer Honors College  
Bachelor of Science in Political Science

University Park, PA (May 2019)

## GOVERNMENT EXPERIENCE

**AECOM**, Contracts/Pre-Law Intern

Chantilly, VA (Summer 2018)

- Performed contract administration functions including preparing correspondence and assisting with contract documentation
- Analyzed areas of improvement regarding the contracts database and created flow charts to streamline process improvement
- Supported company's compliance with government socioeconomic programs and initiatives
- Identified work environment needs and collaborated with four other interns to pitch an innovation idea/ space to upper management

**Intermarkets**, StandUnited Intern

Reston, VA (Summer 2017)

- Throughout the summer, created 30 online petitions supporting free enterprise, fiscal responsibility and limited government
- Identified and conducted outreach to potential petition sponsors through calling, emailing and social media
- Assisted with video planning and production for petition promotion
- Researched and wrote daily article/blog posts for StandUnited's content hub

**Capitol Hill**, Office of Virginia Senator Tim Kaine Intern

Washington DC (Spring 2015)

- Maintained a dataset of all incoming petitions from organized groups and individual constituents
- Attended biweekly Hearings and summarized important information provided
- Efficiently separated mail to ensure timely delivery to all staff specialists

## LEADERSHIP EXPERIENCE

**Penn State University**, Athletic Compliance Intern

University Park, PA (Winter 2017)

- Assisted the Athletic Compliance Office with adhering to the NCAA regulations during Football Recruitment
- Managed a team of 20 Athletic Tour Guides who interact with recruits during Football events
- Trained Athletic Tour Guides on NCAA compliance and ensures rules are carried out during all interactions with prospective athletes

**Penn State University**, Lion Scout Tour Guide

University Park, PA (October 2015 – Present)

- Lead groups of 20+ people on tour throughout campus, engaging them with interesting facts and stand out achievements about the university
- Handle questions, enrollment and problems for prospective students and parents

## INVOLVEMENT

**Penn State Dance Marathon**

University Park, PA (Winter 2017)

- Participated in largest student-run philanthropy in the world
- Active member of Donor and Alumni Relations Committee

**Camp Kesem – Penn State**

University Park, PA (November 2016 – Present)

- Counselor for a week-long summer camp for 90 kids affected by a parent's cancer
- Provide year-round support and communicate with donors
- Trained in facilitating conversations around difficult topics such as death, loss and cancer

## TECHNICAL SKILLS

### Software

- Basic Functions of R-Studio and Python, Microsoft Office (Word, Excel, Powerpoint, Outlook), iLife (GarageBand, iMovie)