Gender Quota Adoption and the Qualifications of Parliamentarians

Andrea S. Aldrich
andrea.aldrich@yale.edu

William T. Daniel
william.daniel@nottingham.ac.uk

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Abstract

Gender quotas in legislative elections are a central component of institutional reform to foster women's inclusion in politics. However, stigma remains that women elected under quotas may be of lower quality than the men that they replace. We investigate how quotas affect the qualifications of parliamentarians by capitalizing on the unique variation of national electoral systems used in European Parliament elections over its entire 40-year history. We provide compelling evidence that quotas are associated with higher overall levels of educational attainment in parliamentary delegations. Quotas increase the number of educated women within delegations while simultaneously increasing the level of education held by the remaining men. Thus, we provide robust support for the impact of quotas on legislator qualities in a way that has thus far been observed in only single country contexts and fixed time periods.

Keywords: Gender Quotas, Parliamentarians, Women, Education
Short Title: Gender Quotas and Parliamentarians

Supplementary material for this article is available in the appendices in the online edition. Replication files are available in the JOP Dataverse (https://dataverse.harvard.edu/dataverse/jop). The empirical analysis has been successfully replicated by the JOP replication analyst.

Gender quotas are used to encourage the nomination and election of women worldwide. These quotas, whether explicitly codified through legislation and political party statutes or implicitly enforced via candidate recruitment and selection processes, aim to increase the number of women in elected office (Krook 2010; Schwindt-Bayer 2009; Tremblay 2007; Franceschet, Krook and Piscopo 2012*b*). Previous literature indicates that quotas generally increase the representation of women and their access to power. A variety of scholars (e.g., Murray (2012)) show that women elected under quotas have similar background qualifications as elected men and thus similar job performance. That said, such studies have relied predominantly on single country studies at single points in time. Moreover, whereas scholarship implies that gender quotas do not detract from elected qualifications and performance, their usage continues to serve as a touchstone for critics of affirmative action policies who complain about a supposed suppression of merit. By providing cross-national, inter-temporal evidence that there is a positive relationship between quotas and legislator qualification we dispute this narrative and bolster previous single-country studies by offering the most comprehensive evidence to date that quotas and qualifications work hand in hand.

To support this claim, we assemble data on legislative and party gender quotas that structure candidate selection for the European Parliament (EP) across all 28 member states' elected history in the legislature, 1979-2019. Although directly elected to a common parliament, EP elections are conducted according to national electoral laws. This allows us to exploit institutional variation present in hundreds of unique national political parties that come from 28 different national electoral systems, each evolving over the course of 40 years. In line with the broader literature, we demonstrate that in addition to increasing women's presence in party delegations, the use of quotas has a positive effect on the educational attainment of legislators - which is essential for EP work, both relative to delegations without quotas and also within delegations prior to quota implementation. Thus, while previous research has provided evidence that quotas and qualifications are positively correlated in certain times or places, we complement, and expand, these previous results to definitively dispel the myth of the unqualified 'quota woman'. The addition of women to parliamentary delegations has only positive effects on qualifications. Quotas increase the number of educated women within delegations

while simultaneously increasing the level of education held by the remaining men, specially at its introduction.

Quotas and Legislator Background

Scholarship has already been at odds with popular opinion when it comes to whether gender quotas lead to changes in the quality of representation. Popular opinion is often concerned that 'quota women' may be less qualified than the men that they ostensibly replace (Lovenduski 2005; Murray 2010), given the targeted entry that quotas provide. That said, research indicates that the addition of quotas may actually improve background characteristics such as education, expertise and professional diversity for both men and women (Aldrich and Daniel 2020; Baltrunaite et al. 2014; Barnes and Holman 2020; Besley et al. 2017; Weeks and Baldez 2015).

Many of these studies use education as proxy for qualification. For example, Weeks and Baldez (2015) examine electoral reforms in the Italian parliament, finding that women elected under a new quota system were not less educated (and thus less qualified) than those elected prior to the use of quotas. In a similar vein, Baltrunaite et al. (2014) find that the addition of quotas in Italian local elections actually increased education levels among both men and women legislators - gains that were reversed, once the system was later scrapped. Besley et al. (2017) found similar results for the competence of local Swedish party list leaders, once so-called 'zipper lists' were implemented. This and additional, recent literature that focuses on the interaction between quotas and educational background is summarised in Table 1. While education is only one of several qualifications a legislator or legislative candidate can hold, it is one of the most universally recognizable signals of preparation for a professional career. In addition, it is used widely in the literature. The literature cited in Table 1 has over 1600 citations combined, all while being published fairly recently.

While the methodological approaches and scope of this research differs, all identify the impact of quotas on the educational attainment or competence of politicians within a single system or country case. In contrast to existing evidence that quotas can elevate women's descriptive representation in a variety of geographical and political settings, cross-national evidence for the effect of quotas on background qualities remains scarce. Our evidence base features data from more than 200 political parties from across four decades of European poli-

Table 1: Quotas and Educational Qualifications (EQ) in Global Context

Authors	Case	Quota Effect	Time Period
Barnes and Holman (2020)	Argentina	↑ professional diversity, including EQs	2006-2014
Franceschet, Krook and Piscopo (2012*a*)	Argentina	↑ educated women	1999-2007
Aldrich and Daniel (2020)	EP	eliminate gendered differences in EQs	2014
Baltrunaite et al. (2014)	Italy	↑ EQs for men and women	mid-1990s
Weeks and Baldez (2015)	Italy	No reduction in EQs of women	mid-1990s
Besley et al. (2017)	Sweden	↑ competence (incl. EQs) party leaders	1982-2014
O'Brien and Rickne (2016)	Sweden	↑ perception of women as qualified (incl. EQs)	1988-2010
Josefsson (2014)	Uganda	↑ EQs among women	1996-2016
O'Brien (2012)	Uganda	↑ in candidate quality	2006-2011
Allen, Cutts and Campbell (2016)	UK	No reduction in women's EQs	1997

tics, including in a number of countries that have experienced significant democratization and cultural developments during the study period. As such, we are able to offer a broad view of how quotas interact with educational attainment across all European democracies.

Theory and Hypothesis

We anticipate that quotas will correspond to higher levels of education for both male and female representatives. The use of education as a key legislator qualification is particularly relevant in the EP, which is often viewed as a technical and working body, rather than as a forum known for ideological debates and politicking. With educational attainment key to the professional success of Members of the European Parliament (MEPs), it serves as a general proxy for the subject expertise that is useful for obtaining powerful coordinating positions within the EP's elaborate set of legislative standing committees (Daniel 2013). Moreover, quotas help to break down the patriarchal 'homosocial' networks that may make candidate selection more a matter of personal patronage than meritocratic selection (Bjarnegård 2013). This suggests that parties have an incentive to pay closer attention to their candidates' objective background characteristics in the fielding of election lists, rather than relying on tradition male networks. We particularly expect to see this effect at the moment of the quota's adoption, as parties gear up to adapt to new national procedural norms and disrupt previous *modi operandi*. In other words, quotas may provide a shock for systems where overall gender equality is low. Following implementation, however, they may become a mainstay in party life, with the quota effect attenuating or reaching a steady state.

More mechanistically, we also expect that adding quotas will make candidate selection

pools more competitive. To use the language of Besley et al. (2017), this could lead to the future exclusion of 'mediocre men', who must now share a reduced number of effective spots on party electoral lists with women colleagues. Importantly, this assumption does not require us to interrogate the rationale for the quota's adoption. Unlike lines of inquiry that assume that certain systems may be more inclined to implement quotas in the first place (e.g., Tan (2015)), our approach controls for cultural and political context across multiple states and isolates the influence of quotas by comparing the qualifications of legislators at the party level before and after quota implementation. In summary, we anticipate legislators from party delegations subject to gender quotas will have higher levels of educational attainment than those that do not. Quotas can also play an active role in affecting the recruitment practices of parties, following their implementation. In this sense, we expect quotas not only to be associated with higher levels of education but also with heightened levels of educational attainment for future rounds of candidate selection from *within* the same party delegations.

Measuring the Impact of Quota Legislation

In order to measure the impact of gender quotas on educational levels in the EP, we collected information on women's descriptive representation at the national party level over time and paired it with information on the education levels of legislators. This provides several advantages over existing work. First, we capture change in party dynamics, across the entire party system, that might be masked when aggregating at the country delegation or parliament level at a single period of time. Second, our analysis allows for cross-sectional inference on 28 different national political systems, as political parties follow national electoral rules in EP campaigns. Our data capture variation at the national party level, including 402 unique national party delegations with 6,288 legislators that served in the EP between 1979 and 2019 (i.e., 9 waves of parliament) or 1,207 total party-wave observations. We focus on parties that served at least two waves, which provides 237 parties in 1,035 party-wave observations. We coded whether parties were subject to a national legislative quota or had implemented party quotas separate from national requirements.

To create the panel structure of our data, we begin with information on individual legislators. Our complete data set provides the names, gender, national parties, and transnational

European party groups (EPGs) for each MEP, along with their highest attained level of education. Our main dependent variable is the percentage of a party delegation's women, men, or all MEPs with a given of level of education.[1] Our main independent variable captures the adoption of quota legislation or the use of voluntary party quotas, which we predict will shape the educational experience of legislators. We code each party-wave observation for the EP election following the adoption of gender quotas at the national or party level as having been "treated." Our sample includes a total of 11 national quotas and 38 voluntary party quotas between 1994 and 2019. To put this in perspective, 407 party-wave observations, or about 34%, are considered as treated in the data.

Establishing a causal effect for gender quotas on the share of women in the legislature and their background characteristics is challenging for several reasons. The political conditions under which quotas arises is often similar to the conditions under which women are promoted on party lists. In addition, our data show that the election of women is increasing over time across all parties in the data, irrespective of quota adoption. Thus, we use a difference-in-differences approach that captures the relationship between quotas and education in each party delegation to isolate differential impacts within parties. If our hypotheses are correct, we would expect to see an increase in the percentage of educated MEPs for parties subject to gender quotas, compared with those that are not. We would also expect this effect to manifest within-party, following the adoption of a quota. Therefore, the coefficient on our treatment variable, *Any level Quota*, should be positive and significant.

Quota Legislation and Legislator Education

We model the relationship between gender quotas and legislator education using two types of educational qualifications, *undergraduate degree* and *postgraduate degree*, which captures the attainment of any degree beyond the undergraduate level (i.e MA, PhD, MBA, etc). In addition, we analyze this relationship separating women and men. Figure 1 reports these results as coefficient plots.[2] We also test this relationship separately for those parties that have at least three

[1] See the Appendices A (Parties), B (Quotas), C (Estimation) for detailed coding information, summary statistics and sources, and Appendix J for complete details of our educational attainment coding scheme.

[2] Full analysis is available in Table A5 and Table A6 of Appendix C along with analysis of quota impact on the overall share of women in each delegation and analysis of education at the country level (Appendix D.

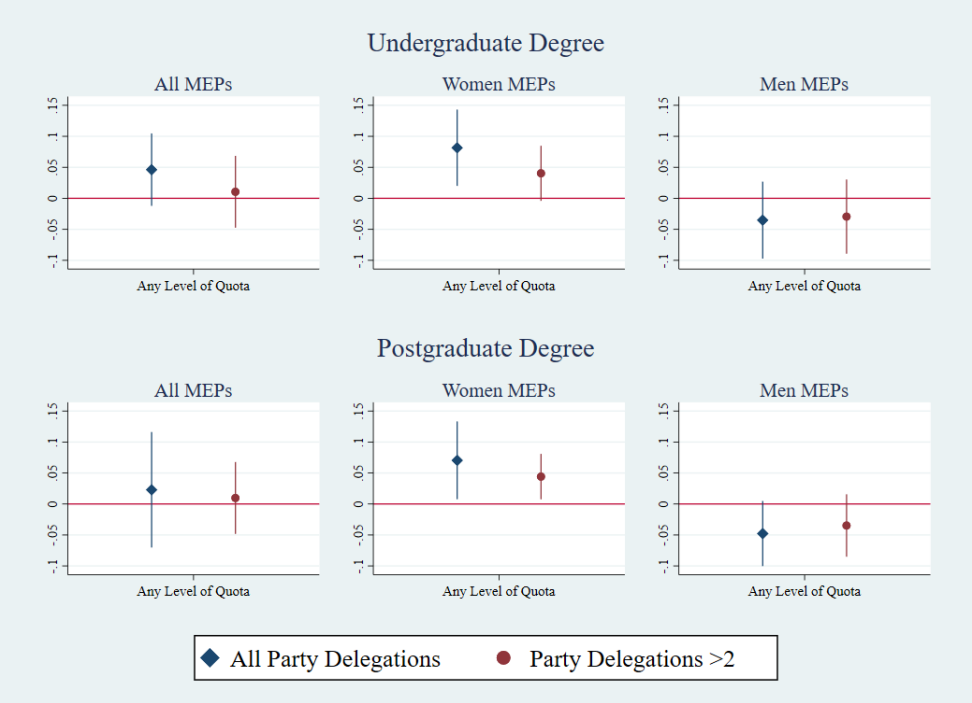

Figure 1: Coefficient Plots: Quotas and Education of Party Delegations

MEPs (*nMEPs>2*), as a number of political parties in the EP come from proportional systems with a large effective number of political parties, shared across a relatively small number of national seats.[3]

Our initial results show that quotas are associated with positive change in the overall share of legislators holding at least an undergraduate degree,[4], driven by increases in the share of women with undergraduate and graduate education. Thus, these models provide evidence that parties that use quotas are at least as qualified, if not *more* qualified when women enter, as parties that do not use quotas. As the figures show, the use of a gender quota in the sample of all parties is associated with about an eight percent increase in the share of women with undergraduate degrees and seven percent for postgraduate degrees. The same relationships are substantively smaller for party delegations where n>2, where the quotas are associated with an increase in the share of women with an undergraduate degree of about four percent and about five percent for postgraduate degrees.

One important reality of quotas to consider is that they also change the ratio of men to women within delegations. As the percentage of women increases, the percentage of men

[3]On average, national party delegations have about five members, but the median party delegation size is two.
[4]90% confidence level

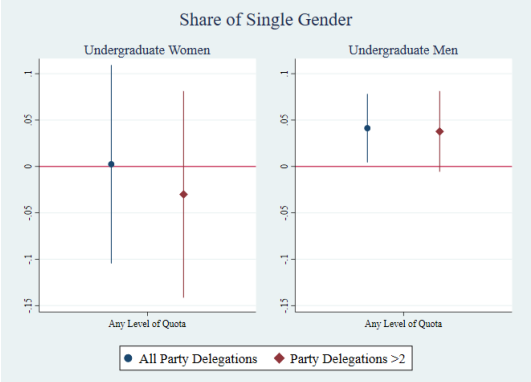

Figure 2: Coefficient Plots: Quotas and Education of Party Delegations

decreases, on average. As such, it is important to look at changes within each gender group over time to understand the underlying mechanism driving the changes reported above. We must distinguish between the quota increasing the overall share of women and decreasing the share of men from the effects within each gender group. Figure 2 reports the results of models constrained to a single gender where the dependent variable is the share of educated women among all women and the share of educated men among all men, in each party delegation.[5] These models offer two important insights into the way gender quotas impact legislator qualifications.

First, because there is no effect on the distribution of education among women in quota and non-quota delegations, we can conclude that quotas are bringing in more women and that these women are equally as qualified as non-quota women. This evidence is consistent with previous research that has found all women who gain access to legislative office are highly qualified women. Also, once we look at changes just among men, the effect on men is consistent with the existing literature. While much of the relationship reported in Figure 1 is driven by the replacement of men by women, examining the single gender group shows that overall, the education of men is higher in quota delegations even if the overall absolute share of men is decreasing.That is, quotas have a positive and significant effect on the distribution of men with undergraduate degrees.

To summarize, when quotas are in use three things happen. First, more women are brought into the party delegation. Second, these women are replacing men in the delegation.

[5]Full results reported in Appendix E.

And third, the remaining men are more likely to have a undergraduate degree than men in delegations without quotas. This suggests that gender quotas increase legislative qualifications by *both* creating opportunities for more women, who are on average highly educated, *and* by raising the bar for men. We also find that these results are robust to a variety of quota measurements, including considering voluntary and involuntary quotas, quota strength or effectiveness, and heterogeneous quota effects over time. These alternative specifications allow us to also conclude that the strongest quotas are those legislated at the national level the require parties without a previous history of quotas to implement them and that have significant sanctions for non-compliance. Quota effects are the strongest immediately after implementation and their positive effect on the educational attainment attenuates over time, except for men - where quotas lead to growth over in the proportion of educated men within party delegations.[6]

Discussion and Conclusion

Beyond simply increasing the number of women legislators in the EP, gender quotas also impact the balance of representative qualities within party delegations. We show that the adoption of quotas is associated with a larger presence of women and men in national delegations that hold higher education qualifications and that this relationship is strongest when quotas are first introduced. Although we do not take a view on whether gender quotas affect other important aspects of gender equality, such as women's substantive representation, [7] we show that they certainly do not lead to decreases in the quality of politicians' backgrounds. The EP is an important location for this result, given its inherently technical nature and demanding set of specialist committees. Our novel set of qualifications data contains more than 6,000 parliamentarians from 28 states, across 40 years of elections and hundreds of political parties, in order to provide a robust and complete answer to our question. We show that gender quota legislation not only enhances women's presence in the legislature, but it can produce positive externalities for institutions, state, and society through an increase in desirable qualifications. We also extensively corroborate single country studies that have shown gender quotas to have substantive impacts on the types legislators chosen by political parties to run for office. The contribution

[6]For a more detailed discussion of these measures, see Appendices G,H, and I respectively.

[7]Although our mechanism for quotas' effect on education may echo the dynamics of Weeks' (2022) model of quotas and substantive representation in policy-making.

here stands in our ability to identify this effect in a large and cross-national dataset that capitalizes on the unique setting of the EP, speaking to nearly all democratic European political systems. The completeness of our evidence base allows for us to view the impact of quotas on qualifications to a greater extent than previous research would allow.

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Biographical Statements

Andrea S. Aldrich is a lecturer in Political Science at Yale University, New Haven, CT 06511
William T. Daniel is an Associate Professor in Comparative Politics at the University of Nottingham, Nottingham, NG7 2RD.

Online Appendices

Gender Quota Adoption and the Qualifications of Parliamentarians

Andrea S. Aldrich* & William T. Daniel†

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*Lecturer, Political Science, Yale University. Contact: andrea.aldrich@yale.edu

†Associate Professor in Comparative Politics at the University of Nottingham. Contact: william.daniel@nottingham.ac.uk

A Identifying Education Attainments and Tracking National Parties Over Time in the European Parliament

In order to create the panel structure of our data, we began with data on individual members of the European Parliament (MEPs) provided by Daniel (2015) for waves one through seven (1979-2009) and Daniel & Thierse (2018) for wave eight (2009-2014). We then collect additional data on the ninth wave (2019-24), using the EP's official website and other publicly available information about MEPs. These data sets all provide the names, gender, national parties, and transnational EPGs and educational attainment for each MEP. To determine the share of women in national party delegations, it was necessary to track parties over time. For some parties, like the Christian Democrats in Germany this was rather straightforward, as the party has remained stable throughout the elected period. For others, party names have changed or different party coalitions have appeared in different waves. For example, the Austrian *Liste Dr. Hans-Peter Martin* appears as *Liste Dr. Hans-Peter Martin - Für echte Kontrolle in Brüssel* in wave 6 of the EP, but as *Liste Dr. Martin - für Demokratie, Kontrolle, und Gerechtigkeit* in wave 7. Thus, we identified each unique party name for each country, in each wave, and coded party observations under the same party code if they belonged the same party over time - even as names changed.

In order to determine which observations belonged to the same party over time we consulted the Euromanifesto Project Data (Schmitt *et al.* 2018), which codes major party trajectories across name changes from 1979-2014, and further relied upon party websites and electoral histories. In the case of countries such as France, which have relatively complex and fragmented systems, this meant obtaining the original EP electoral lists and following groups of MEPs across multiple waves, as factions split and/or recombined. To the best of our knowledge, there is no existing data set of individual MEPs from all nine waves that systematically tracks national party affiliations over time and we hope this service will itself be a valuable resource for other researchers.[3]

An additional unique feature of our data is the variation in time served in the parliament,

[3]Exact coding choices by country are available in the replication files and on request from the authors.

across parties. Because the EU has expanded over time, not all parties are present in each wave. Thus for each party we have identified the minimum number of consecutive waves the party has served. As we would expect, the two largest categories in our data are parties from countries that served in all nine waves (which are the EU-12 members) and parties from countries that have served in at least four waves (the post-2004 enlargement countries, which are now in their fourth elected wave).

The data also include several parties that only serve in one wave – a feature that may be notable for the context of EP elections, which often attract single-issue or niche protest parties that cannot or do not compete at the national level. In this analysis, we have opted to exclude these parties since we cannot measure change over time. Thus all of the analysis in the paper is of parties that have served in at least two waves. The summary statistics for parties that have been in at least two waves are reported in Table A1.

Table A1: Summary Statistics for Parties Serving at least Two Waves: Waves 1-9

Wave	1	2	3	4	5
Election Year	1979	1984	1989	1994	1999
Number of Parties	53	67	73	92	108
Number of Countries	10	12	12	15	15
Mean % of Women in Parties	17.67	14.52	19.02	29.63	28.28
Mean % of MEPs with undergraduate degree in Parties	70.63	78.12	81.25	79.58	82.56
Mean % of MEPs with postgraduate degree in Parties	27.344	32.39	36.74	33.80	36.03

Wave	6	7	8	9	Total
Election Year	2004	2009	2014	2019	All
Number of Parties	150	155	182	156	237
Number of Countries	27	28	28	28	28
Mean % of Women in Parties	29.52	34.21	37.30	41.11	30.95
Mean % of MEPs with undergraduate degree in Parties	89.38	87.09	85.36	83.27	83.57
Mean % of MEPs with postgraduate degree in Parties	44.07	48.18	45.50	44.91	41.18

B Quota Legalisation

Table A2 indicates the year of national quota adoption by each of the countries in our sample. Once a country is treated initially, it remains treated for the duration of the sample.The exception to this rule is Italy, which passed quota legislation in 1999 and then rescinded it soon after (affecting the 2004-2014 elections). They are not treated again until the passage of new legislation in 2019. We interpret quota adoption along the lines of Hughes *et al.* (2019) to mean the first time that a quota appears in law, whether this be a constitutional change or the passing of secondary electoral law. We chose this operationalization because we make no claims about the exact mechanism driving party delegation change and understand that the path from quota adoption to increased women's representation can take many forms. Using the Gender Quotas Database and case study research released by the EP (Freidenvall & Dahlerup 2013), we identify the month and year in which quota legislation was adopted in each of our quota countries.

Table A2: Year of Quota Legalisation Adoption (over time)

Country	Year
Belgium	1994*
Italy	1999, 2019*
France	1999*
Slovenia	2004
Portugal	2006
Spain	2007
Croatia	2008*
Poland	2011
Ireland	2012
Greece	2012
Luxembourg	2016

*Belgium introduced equality legislation in 1994 but adapts this to more stringent measures in 2002 and 2009, eventually establishing parity on party lists. France passed constitutional equality provisions in 1999 and a parity law in 2000. Italy introduced a quota in 1999 but later rescinded it, re-establishing the quota in 2019. Croatia passed legislation in 2008 but allowed for gradual implementation.

The coding of party quotas is taken from a variety of sources, in particular the International IDEA Gender Quotas Database. These are listed in Table A3 below. Where a party quota is mentioned by the IDEA database without an implementation date, and no date could be

confirmed, we erred on the side of caution and excluded these parties from any analysis that includes party quotas. This applies only to the Dutch GroenLinks and Cypriot EDEK parties.

Table A3: Voluntary Party Quotas

Country	Party	Wave
Austria	Die Grunen - Die Grune Alternative	4
Austria	Osterreichische Volkspartei	5
Austria	Sozialdemokratische Partei Osterreichs	4
Croatia	Socijaldmokratska Partija Hrvatske	7
Cyprus	Dimokratikos Synagermos	6
France	Parti communiste francais	1
France	Parti socialiste	1
France	Les Verts-Europe-Ecologie	3
Germany	Bundnis 90/die Grunen	3
Germany	Sozialdemokratische Partei Deutschlands	3
Germany	Partei des Demokratischen Sozialismus	5
Germany	Die Linke	7
Germany	Christlich Demokratische Union Deutschlands	5
Germany	Christlich-Soziale Union in Bayern	1
Greece	Panellinio Socialistiko Kinima	5
Greece	Nea Dimokratia	4
Hungary	Magyar Szocialista Party	8
Italy	Partito democratico	7
Lithuania	Lietuvos socialdemokratu partija	6
Luxembourg	Déi Gréng - Les Verts	7
Luxembourg	Parti populaire chrétien social luxembourgeois	7
Luxembourg	Parti ouvrier socialiste luxembourgeois	7
Malta	Partit Laburista	7
Netherlands	Partij van de Arbeid	3
Romania	Partidul Democrat-Liberal	7
Romania	Partidul Social Democrat	6
Romania	Partidul Social Democrat + Partidul Conservator	6
Slovakia	L'udová strana – Hnutie za demokratické Slovensko	7
Spain	Partido Socialista Obrero Espanol	5
Spain	Izquierda Unida	3
Spain	Partit dels Socialistes de Catalunya	3
Spain	Esquerra Republicana de Catalunya	8
Spain	Bloque Nacionalista Galego	8
Sweden	Arbetarepartiet- Socialdemokraterna	4
Sweden	Miljöpartiet de Gröna	7
Sweden	Moderata Samlingspartiet	7
Sweden	Vänsterpartiet	4
UK	Labour Party	5
UK	Liberal Democrat Party	5 & 9 only

C Estimation Strategy

To model this relationship, we use a two-way fixed-effects model that captures within-party variation across our units of time (waves), incorporating fixed effects for both party and time to account for possible confounding factors that we cannot measure. Because each of our parties only compete in one country, the party fixed effects also account for unobserved country-level factors. We also cluster standard errors by country, given that our treatment occurs at the country level. A main assumption of a standard difference in differences approach for causal inference requires that, absent the treatment of quota legislation, the expected outcome of our model should be equal across parties. Given the complexity of the data generating environment that we describe, we cannot be certain this assumption holds in our case. Therefore, what we offer is a robust association between quota legislation and women's education, where we have ruled out a host of confounding factors through the research design.

C.1 Quotas and the Share of Women in Party Delegations

The first step in our analysis was determining if, and how, quotas laws impact on the absolute share of women in EP party delegations that served at least two waves. In order to measure this,we estimate the following equation:

$$Shareof Women_{it} = \beta_1 Quota_{it} + \lambda_i + \gamma_t + \Theta X_i + \beta_2 Partysize_{it} + \varepsilon_{it} \quad (1)$$

Where $shareofwomen_{it}$ is is the proportion of women in a party delegation measured at the party i (1-236) and wave t level (1-9). Quota is an indicator for the application of the quota "treament" in party i in time t, λ_i represents fixed effects for each national party, γ_t is the fixed effect of each legislative wave (time) and ε_{it} is the error term. In addition X_i is a time invariant vector of control variables interacted with time fixed effects and $Partysize_{it}$ is a time varying indicator of parties with more than one member. The control variables we include in the analysis are an indicator for left parties, which may have a higher propensity for including women on their party lists (Lühiste & Kenny 2016). We interact this measure with time to allow for the effect of being a left party to vary over time. We also use a country-level control that

measures the share of women in the overall *country* delegation to the EP when it first entered the parliament. This is meant to capture differences in the baseline level of gender equality in the EP delegation. We understand this as a measure that identifies the different starting points that can lead to different trajectories within countries over time, with respect to women's inclusion. It is also interacted with time to capture these different paths. The results of this modeling strategy are reported below in Table A4 for all parties that served at least two waves (columns 1 and 2) and those that served at least two waves and have more than two members (columns 3 and 4).

This cut point was implemented as a modeling choice in order to guard against a type I error that could result from the lack of gender variation in each party delegation that could be the product of electoral or party system variables for which we do not control. For example, many of our smaller countries have proportional electoral systems with several national parties that all compete for relatively few EP seats. Previous research has also show that electoral systems that encourage large party delegations can positively impact women's descriptive representation (Krook 2018; Matland 1993) As many of these party delegations have only 1 or 2 MEPs, entire party averages would be driven by an individual observation - itself the product of exogenous factors. In other words, in the models that include all parties, the percentage of women (men) that have each qualification could be determined by the presence of just one woman (men), and such large swings in party averages could lead us to draw conclusions that are overstated.

In order to ensure that our conclusions are robust, we model the relationship between quotas and legislator education in two samples, one with all parties serving at least two waves and a sample of parties with larger delegations. Thus, these models use only parties with at least 3 delegates elected to each wave (*nMEPs>2*). This, alongside analyzing only parties that serve in at least two terms, provides a more conservative test of our theory.

Table A4 column 1 tells us that parties subject to quota legislation have, on average, about 8.2% more women in their delegations than those that are not in countries with legislated quotas. However, this result is slightly lower once we introduce the controls we consider important to explain the introduction of quota legislation. These are identifiers of left parties

and a measure of the number of MEPs each party delegation had in their initial wave which are interacted with wave (column 2). This relationship is similar for parties that have more than 2 MEPs-what we consider large parties. Quotas here are associated with about a seven percent increase in the percentage of women in the national party delegations and about eight percent with the inclusion of the additional fixed effects and the controls.

Table A4: Quotas and Percentage of Women in Delegations

VARIABLES	(1) 2+ Waves	(2) 2+ Waves	(3) 2+ Waves nMEPS>2	(4) 2+ Waves nMEPS>2
Any Level of Quota	0.0790**	0.0848***	0.0705***	0.0731***
	(0.0289)	(0.0287)	(0.0235)	(0.0249)
Observations	1,025	977	547	532
R-squared	0.087	0.105	0.242	0.253
Number of PARTYID	235	235	161	159
Party Fixed FE	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES
Control x Wave FE	NO	YES	NO	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

C.2 Quotas and Education Measures

We estimate a similar equation to measure the share of educated MEPs in the entire party delegation, among women and among men using the following equations:

$$ShareofEducated_{it} = \beta_1 Quota_{it} + \lambda_i + \gamma_t + \varepsilon_{it} \quad (2)$$

$$ShareofEducatedWomen_{it} = \beta_1 Quota_{it} + \lambda_i + \gamma_t + \varepsilon_{it} \quad (3)$$

$$ShareofEducatedMen_{it} = \beta_1 Quota_{it} + \lambda_i + \gamma_t + \varepsilon_{it} \quad (4)$$

Where $ShareofEducated_{it}$ is is the proportion of all MEPs (both men and women) in a party delegation (Equation 2), $ShareofEducatedWomen_{it}$ is the share of women in a party delegation (Equation 3), and $ShareofEducatedMen_{it}$ is the share of men in a party delegation (Equation 4) with a specified level of education measured at the party i (1-236) and wave t level (1-9). Quota is an indicator for the application of the quota "treament" in party i in time t, λ_i represents fixed effects for each national party,γ_t is the fixed effect of each legislative wave (time), and ε_{it} is the error term. The full results of the models reported in Figure 1 and discussed in the main text are reported below. These models are constructed with parties that serve two or more waves only.

Table A5: Share of MEPs in All Parties with Undergraduate and Advanced Degrees

VARIABLES	(1) Undergraduate Degree	(2) Postgraduate Degree	(3) Undergraduate Degree Women	(4) Postgraduate Degree Women	(5) Undergraduate Degree Men	(6) Postgraduate Degree Men
Any Level of Quota	0.0463	0.0229	0.0816**	0.0705**	-0.0352	-0.0477*
	(0.0285)	(0.0454)	(0.0300)	(0.0306)	(0.0302)	(0.0256)
Observations	1,025	1,025	1,025	1,025	1,025	1,025
R-squared	0.049	0.003	0.084	0.029	0.049	0.012
Number of PARTYID	235	235	235	235	235	235
Party Fixed FE	YES	YES	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES	YES	YES
Quota x Wave FE	NO	NO	NO	NO	NO	NO
Control x Wave FE	NO	NO	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A6: Share of MEPs in Parties with nMEPS>2 with Undergraduate and Postgraduate Degrees

VARIABLES	(1) Undergraduate Degree	(2) Postgraduate Degree	(3) Undergraduate Degree Women	(4) Postgraduate Degree Women	(5) Undergraduate Degree Men	(6) Postgraduate Degree Men
Any Level of Quota	0.0105	0.00970	0.0403*	0.0442**	-0.0295	-0.0348
	(0.0282)	(0.0283)	(0.0216)	(0.0179)	(0.0291)	(0.0246)
Observations	547	547	547	547	547	547
R-squared	0.191	0.039	0.283	0.145	0.033	0.015
Number of PARTYID	161	161	161	161	161	161
Party Fixed FE	YES	YES	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES	YES	YES
Quota x Wave FE	NO	NO	NO	NO	NO	NO
Control x Wave FE	NO	NO	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

These tables report the results described in the main text and reported in the coefficient tables. In the full sample of parties that have served at least two terms, quotas are positively associated with an increase in the percentage of MEPs with at least undergraduate degrees (90%) and also the percentage of women with undergraduate and graduate degrees in all samples.

D Quotas and Share of National-Level Education

We also estimated a similar equation to measure the share of educated MEPs in the entire national delegation, among women in the entire national delegation, and among men in the entire national delegation using the following equations:

$$ShareofEducated_{it} = \beta_1 Quota_{it} + \lambda_i + \gamma_t + \varepsilon_{it} \tag{5}$$

$$ShareofEducatedWomen_{it} = \beta_1 Quota_{it} + \lambda_i + \gamma_t + \varepsilon_{it} \tag{6}$$

$$ShareofEducatedMen_{it} = \beta_1 Quota_{it} + \lambda_i + \gamma_t + \varepsilon_{it} \tag{7}$$

Where $ShareofEducated_{it}$ is is the proportion of all MEPs (both men and women) in national delegation (Equation 5), $ShareofEducatedWomen_{it}$ is the share of women in a national delegation (Equation 6), and $ShareofEducatedMen_{it}$ is the share of men in a national delegation (Equation 7) with a specified level of education measured at the country i (1-28) and wave t level (1-9). Quota is an indicator for the application of the quota "treament" in country i in time t, λ_i represents fixed effects for each national delegation, and ε_{it} is the error term. These models show us that an increase in the share of educated women, as a proportion of all national MEPs, is correlated with the adoption of a gender quota when considering both undergraduate degrees and postgraduate degrees. The quotas are not correlated with changes in the education levels of men at the country level.

Table A7 reports the results at the country level. These are consistent with the findings of our party level analysis. Countries implementing quotas are associated with an increase in the percentage of educated women in their EP delegations.

Table A7: Share of Country Delegations with Undergraduate and Postgraduate Degrees

VARIABLES	(1) 4 Year Degree	(2) Advanced Degree	(3) 4 Year Degree	(4) Advanced Degree	(5) 4 Year Degree	(6) Advanced Degree
National Level Quota	0.0217	0.00885	0.0426***	0.0210*	-0.0192	-0.0110
	(0.0322)	(0.0232)	(0.0152)	(0.0115)	(0.0268)	(0.0194)
Observations	175	175	175	175	175	175
Number of ccode	28	28	28	28	28	28
Country FE	YES	YES	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES	YES	YES
Quota x Wave FE	NO	NO	NO	NO	NO	NO
Control x Wave FE	NO	NO	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

E Share of Single Gender: Mechanism for Increased Quality

We also estimated a model to measure the share of educated MEPs among a single gender within a delegation using the following equation:

$$\frac{ShareofEducatedWomen_{it}}{ShareofWomen_{it}} = \beta_1 Quota_{it} + \lambda_i + \gamma_t + \varepsilon_{it} \tag{8}$$

$$\frac{ShareofEducatedMen_{it}}{ShareofMen_{it}} = \beta_1 Quota_{it} + \lambda_i + \gamma_t + \varepsilon_{it} \tag{9}$$

Where $ShareofEducated_{it}$ is is the proportion of all MEPs (either men and women) of all women (Equation 8) or men (Equation 9) in party delegation with a specified level of education measured at the party i (1-236) and wave t level (1-9). Quota is an indicator for the application of the quota "treament" in party i in time t, λ_i represents fixed effects for each national delegation, and ε_{it} is the error term. Note that the models of only women can only contain delegations that have at least 1 woman (and men, at least 1 man), thus the sample size is smaller than our full party models. These models show us the adoption of a gender quota is not associated with an increased share of educated women among women. Thus the effect of the quota appears to be in increase the absolute number of women and thus the share of each party delegation. The quotas are, however, correlated with changes in the education levels of men at the party level.

Table A8: Share of Party Women or Party Men in All Parties with Undergraduate and Postgraduate Degrees

VARIABLES	(1) Undergraduate Women	(2) Postgraduate Women	(3) Undergraduate Men	(4) Postgraduate Men
Any Level of Quota	0.00238	0.0529	0.0413**	-0.0242
	(0.0521)	(0.0612)	(0.0180)	(0.0404)
Observations	663	663	922	922
R-squared	0.072	0.017	0.050	0.005
Number of PARTYID	188	188	229	229
Party Fixed FE	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A9: Share of Party Women or Party Men in All Parties with Undergraduate and Postgraduate Degrees with nMEPS>2

VARIABLES	(1) Undergraduate Women	(2) Postgraduate Women	(3) Undergraduate Men	(4) Postgraduate Men
Any Level of Quota	-0.0301	0.0366	0.0378*	0.00343
	(0.0543)	(0.0625)	(0.0212)	(0.0415)
Observations	475	475	545	545
R-squared	0.115	0.053	0.139	0.024
Number of PARTYID	148	148	160	160
Party Fixed FE	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Quotas increase the proportion of education men (undergraduate degrees) among men when in use.

F National Level Quotas Only

The following section reports the results of our analysis using national level quotas only. The modeling strategy remains the same but the quota variable now captures just the use of national, legislative quotas.

These results show that quota legislation is associated with positive change in the overall share of women from all sizes of party delegations with both levels of education. We do not

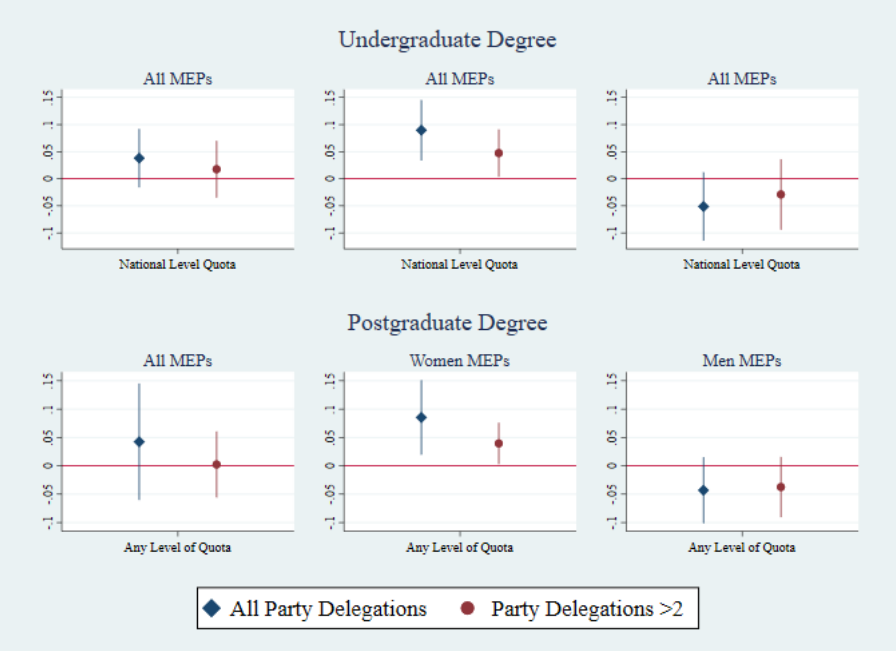

Figure 3: Coefficient Plots: Quotas and Education of Party Delegations

find that the presence of quotas on change in the share of men with either degree. Thus, these models provide evidence that parties in countries with quota legislation have a higher share of educated women MEPs, as compared with parties in countries that do not use quotas.

As the figures show, the use of a gender quota in the sample of all parties is associated with about a 8.5 percent increase in the share of women with undergraduate degrees and an 7.5 percent increase in those with postgraduate degrees. The same relationships are substantively smaller for larger party delegations, where the use of a gender quota is associated with an increase in the share of women with an undergraduate degree by about five percent and an increase in the share of women with a postgraduate degree of about four percent.

Table A10: Share of MEPs in All Parties with Undergraduate and Advanced Degrees: National Quotas Only

VARIABLES	(1) Undergraduate Degree	(2) Postgraduate Degree	(3) Undergraduate Degree Women	(4) Postgraduate Degree Women	(5) Undergraduate Degree Men	(6) Postgraduate Degree Men
National Level Quota	0.0322	0.0319	0.0856***	0.0751**	-0.0530	-0.0432
	(0.0265)	(0.0575)	(0.0278)	(0.0323)	(0.0315)	(0.0347)
Observations	1,036	1,036	1,036	1,036	1,036	1,036
R-squared	0.047	0.004	0.085	0.030	0.052	0.010
Number of PARTYID	237	237	237	237	237	237

All models include party and wave fixed effects
*** p<0.01, ** p<0.05, * p<0.1

Table A11: Share of MEPs in Parties with nMEPS>2 with Undergraduate and Postgraduate Degrees-National Quotas Only

VARIABLES	(1) Undergraduate Degree	(2) Postgraduate Degree	(3) Undergraduate Degree Women	(4) Postgraduate Degree Women	(5) Undergraduate Degree Men	(6) Postgraduate Degree Men
National Level Quota	0.0253	-0.00810	0.0536**	0.0369*	-0.0275	-0.0450*
	(0.0248)	(0.0370)	(0.0213)	(0.0207)	(0.0322)	(0.0262)
Observations	552	552	552	552	552	552
R-squared	0.186	0.043	0.286	0.142	0.038	0.017
Number of PARTYID	162	162	162	162	162	162

All models include party and wave fixed effects
*** p<0.01, ** p<0.05, * p<0.1

G Voluntary vs. Involuntary Quotas

In order to fully understand the relationship between quotas and the qualifications of MEPs, we also investigate whether a heterogenous effect exists across parties that may adopt gender quotas willingly and those that only adopt them due to a national-level mandate. We use the language of involuntary vs. voluntary to distinguish between quotas that were mandated by national legislation in a party that did not already embrace gender quotas and those that exist within political parties that willingly adopted them into their organization.

Thus a party is considered treated by an *involuntary* quota if a national quota exists but no party quota has been enacted, with parties that have a party level quotas or no quota at all considered untreated. Separately, parties that have established their own quota are considered

to be treated by *voluntary* quotas and all parties without a party-level quota are considered untreated by this variable.

In our main analysis, our variable *Any Level Quota* is the combination of national (involuntary) and party (voluntary) quotas and is the most inclusive measure of a quota with about 33% of our observations treated with a quota. Voluntary (Party) quotas are the most exclusive with about 13% of the data treated. National quotas exist in about 21% of our data but restricting these to involuntary quotas means only 19% of the data is treated.

Table A12 reports the results distinguishing between these two types of quotas in all party delegations serving two terms and with more than two members. Table A13 does the same with the party share of women and party share of men. The results for involuntary quotas continue to support our main conclusions and are substantively similar to the models where we consider national-level quotas only (Appendix F). This is unsurprising given that involuntary quotas are a subset of national-level quotas. They do shower weaker effects on the education levels of men as a share of party men. However, testing this relationship with many different quotas measurements allow us to be certain that our main conclusions are robust to alternative conceptualizations of gender quotas and their measurement.

Table A12: Share of Women or Men with Undergraduate and Postgraduate Degrees

(a) All Parties

A12a

VARIABLES	(1) Undergraduate Degree	(2) Postgraduate Degree	(3) Undergraduate Degree Women	(4) Postgraduate Degree Women	(5) Undergraduate Degree Men	(6) Postgraduate Degree Men
Voluntary Quota	0.0574	0.0247	0.0741	0.0488	-0.0168	-0.0244
	(0.0525)	(0.0381)	(0.0478)	(0.0415)	(0.0431)	(0.0296)
Involuntary Quota	0.0410	0.0221	0.0851**	0.0806*	-0.0438	-0.0586*
	(0.0265)	(0.0589)	(0.0320)	(0.0395)	(0.0340)	(0.0301)
Observations	1,025	1,025	1,025	1,025	1,025	1,025
R-squared	0.049	0.003	0.084	0.030	0.049	0.012
Number of PARTYID	235	235	235	235	235	235
Party Fixed FE	YES	YES	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES	YES	YES
Quota x Wave FE	NO	NO	NO	NO	NO	NO
Control x Wave FE	NO	NO	NO	NO	NO	NO

(b) All Parties with nMEPs> 2

VARIABLES	(1) Undergraduate Degree	(2) Postgraduate Degree	(3) Undergraduate Degree Women	(4) Postgraduate Degree Women	(5) Undergraduate Degree Men	(6) Postgraduate Degree Men
Voluntary Quota	-0.0265	0.0201	0.0153	0.0411	-0.0419	-0.0215
	(0.0440)	(0.0268)	(0.0365)	(0.0309)	(0.0343)	(0.0344)
Involuntary Quota	0.0351	0.00280	0.0569**	0.0463*	-0.0212	-0.0436*
	(0.0248)	(0.0410)	(0.0234)	(0.0265)	(0.0339)	(0.0248)
Observations	547	547	547	547	547	547
R-squared	0.198	0.039	0.286	0.145	0.034	0.016
Number of PARTYID	161	161	161	161	161	161
Party Fixed FE	YES	YES	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES	YES	YES
Quota x Wave FE	NO	NO	NO	NO	NO	NO
Control x Wave FE	NO	NO	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A13: Share of Party Women or Party Men with Undergraduate and Postgraduate Degrees

(a) All Parties

VARIABLES	(1) Undergraduate Degree Women	(2) Postgraduate Degree Women	(3) Undergraduate Degree Men	(4) Postgraduate Degree Men
Voluntary Quota	-0.0824	0.0121	0.0485	0.0120
	(0.0854)	(0.0972)	(0.0300)	(0.0470)
Involuntary Quota	0.0564	0.0789	0.0376*	-0.0422
	(0.0498)	(0.0871)	(0.0214)	(0.0445)
Observations	663	663	922	922
R-squared	0.083	0.019	0.050	0.006
Number of PARTYID	188	188	229	229
Party Fixed FE	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES
Quota x Wave FE	NO	NO	NO	NO
Control x Wave FE	NO	NO	NO	NO

(b) All Parties with nMEPs>2

VARIABLES	(1) Undergraduate Degree Women	(2) Postgraduate Degree Women	(3) Undergraduate Degree Men	(4) Postgraduate Degree Men
Voluntary Quota	-0.106	0.00438	0.0258	0.0348
	(0.0825)	(0.103)	(0.0353)	(0.0523)
Involuntary Quota	0.0251	0.0600	0.0457	-0.0174
	(0.0504)	(0.0752)	(0.0286)	(0.0440)
Observations	475	475	545	545
R-squared	0.131	0.055	0.139	0.026
Number of PARTYID	148	148	160	160
Party Fixed FE	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES
Quota x Wave FE	NO	NO	NO	NO
Control x Wave FE	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

H Quota Strength

In order to account for heterogeneous effects of quotas based on the strength of the quota, we incorporate two measures from the Quota Adoption and Reform over Time (QAROT) database (Hughes *et al.* 2019). This database provides details about quota design and reform between 1947 and 2015. We match our national level quota data with the database for each year of the European Elections (1979, 1984, 1989, 1994, 1999, 2004, 2009, and 2014). We also update our data to include these measures for 2019.[4] The two variables are summarized in Table A14. They are meant to account for quota strength and height and are as follows:

Effective Quota: the QAROT database provides a dichotomous variable that classifies a quota as effective (in the sense of meaningful) if it has at least a 10% de facto threshold and has strong sanctions for noncompliance and/or a placement mandate. While the database uses this variable only for countries where a quota is present, we code all non-quota countries as 0.

De Facto Threshold: the QAROT database calculates the de facto threshold for each national quota by multiplying the stated threshold of the quota by the percentage of seats in the legislature to which it applies. While the database uses this variable only for countries where a quota is present, we code all non-quota countries as 0.

The models in Table A15 again support our main conclusions. In both models, quotas are significantly and positively correlated with the share of educated women. The measure of an effective quota performs much like our national quota variable (Table A11 in Appendix F) but is stronger. It also now identifies a negative and significant correlation between the share of education men and effective quotas. This suggests that the replacement of men by women is even stronger in these delegations. The variable of *De Facto Threshold* (Table A16) also reports significant but small substantive effects. This is largely driven by the lack of variation in the quota height, as most of the national quotas in our data range between 30% and parity. The tables reporting the single gender models no longer provide significant results. These are the only models where our main results are not supported.

[4] In most instances, we were able to use the value in the QAROT database for 2015, because no quota reform took place in our sample countries. However, we did need to add Luxembourg, which instituted a quota in 2019, and Italy, which returned to a quota in 2019. We used the coding rules of the database to add these measures to our data.

Table A14: Measuring Quota Strength

(a) Effective Quotas

Effective Quota	All Parties	$\geq$2 Waves	$\geq$2 Wave $>$ 2 MEPs
YES	177 (14.65%)	142 (13.7%)	63 (11.4%)
NO	1031 (85.35%)	894 (86.3%)	489 (88.6%)
Total	1208	1036	552

(b) De Facto Threshold

Defacto Threshold	All Parties	$\geq$2 Waves	$\geq$2 Wave $>$ 2 MEPs
No Quota (0%)	914	810	440
0%	25	18	6
25%	4	3	2
30%	9	8	3
33%	58	46	26
35%	27	16	9
40%	67	53	20
50%	104	82	46
Total	1208	1036	552

Table A15: Share of Women or Men in Parties with Undergraduate and Postgraduate Degrees: Effective Quota

(a) All Parties

VARIABLES	(1) Undergraduate Degree	(2) Postgraduate Degree	(3) Undergraduate Degree Women	(4) Postgraduate Degree Women	(5) Undergraduate Degree Men	(6) Postgraduate Degree Men
Effective Quota	0.0241	-0.0108	0.0975***	0.0504	-0.0732**	-0.0613
	(0.0325)	(0.0684)	(0.0257)	(0.0350)	(0.0314)	(0.0415)
Observations	1,036	1,036	1,036	1,036	1,036	1,036
R-squared	0.046	0.003	0.085	0.023	0.053	0.011
Number of PARTYID	237	237	237	237	237	237
Party Fixed FE	YES	YES	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES	YES	YES
Quota x Wave FE	YES	YES	YES	YES	YES	YES
Control x Wave FE	NO	NO	NO	NO	NO	NO

(b) Parties with nMEPs>2

VARIABLES	(1) Undergraduate Degree	(2) Postgraduate Degree	(3) Undergraduate Degree Women	(4) Postgraduate Degree Women	(5) Undergraduate Degree Men	(6) Postgraduate Degree Men
Effective Quota	-0.0246	-0.0660**	0.0525*	0.00910	-0.0764**	-0.0751***
	(0.0335)	(0.0318)	(0.0274)	(0.0275)	(0.0365)	(0.0269)
Observations	552	552	552	552	552	552
R-squared	0.185	0.049	0.282	0.136	0.048	0.022
Number of PARTYID	162	162	162	162	162	162
Party Fixed FE	YES	YES	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES	YES	YES
Quota x Wave FE	YES	YES	YES	YES	YES	YES
Control x Wave FE	NO	NO	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A16: Share of Women or Men in Parties with Undergraduate and Postgraduate Degrees: Quota Strength

(a) All Parties

VARIABLES	(1) Undergraduate Degree	(2) Postgraduate Degree	(3) Undergraduate Degree Women	(4) Postgraduate Degree Women	(5) Undergraduate Degree Men	(6) Postgraduate Degree Men
De Facto Threshold	0.00133*	0.000778	0.00251***	0.00176	-0.00117*	-0.000979
	(0.000748)	(0.00183)	(0.000637)	(0.00105)	(0.000648)	(0.000960)
Observations	1,036	1,036	1,036	1,036	1,036	1,036
R-squared	0.049	0.004	0.087	0.028	0.051	0.010
Number of PARTYID	237	237	237	237	237	237
Party Fixed FE	YES	YES	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES	YES	YES
Quota x Wave FE	NO	NO	NO	NO	NO	NO

(b) Parties with nMEPs$>$ 2

VARIABLES	(1) Undergraduate Degree	(2) Postgraduate Degree	(3) Undergraduate Degree Women	(4) Postgraduate Degree Women	(5) Undergraduate Degree Men	(6) Postgraduate Degree Men
De Facto Threshold	0.000710	-0.000107	0.00139***	0.000793	-0.000657	-0.000894
	(0.000620)	(0.000999)	(0.000483)	(0.000630)	(0.000620)	(0.000711)
Observations	552	552	552	552	552	552
R-squared	0.186	0.043	0.287	0.140	0.038	0.014
Number of PARTYID	162	162	162	162	162	162
Party Fixed FE	YES	YES	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES	YES	YES
Quota x Wave FE	NO	NO	NO	NO	NO	NO
Control x Wave FE	NO	NO	NO	NO	NO	NO

Robust standard errors in parentheses
*** p$<$0.01, ** p$<$0.05, * p$<$0.1

Table A17: Share of Party Women or Party Men with Undergraduate and Postgraduate Degrees: Effective Quota

(a) All Parties

VARIABLES	(1) Undergraduate Degree Women	(2) Postgraduate Degree Women	(3) Undergraduate Degree Men	(4) Postgraduate Degree Men
Effective Quota	-0.0198	-0.0397	-0.0115	-0.0494
	(0.0486)	(0.0935)	(0.0332)	(0.0520)
Observations	671	671	933	933
R-squared	0.074	0.018	0.046	0.006
Number of PARTYID	189	189	231	231
Party Fixed FE	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES
Quota x Wave FE	YES	YES	YES	YES
Control x Wave FE	NO	NO	NO	NO

(b) Parties with nMEPs>2

VARIABLES	(1) Undergraduate Degree Women	(2) Postgraduate Degree Women	(3) Undergraduate Degree Men	(4) Postgraduate Degree Men
Effective Quota	-0.0323	-0.0582	-0.0327	-0.0668
	(0.0487)	(0.0724)	(0.0497)	(0.0404)
Observations	480	480	550	550
R-squared	0.114	0.055	0.132	0.026
Number of PARTYID	149	149	161	161
Party Fixed FE	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES
Quota x Wave FE	YES	YES	YES	YES
Control x Wave FE	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A18: Share of Party Women or Party Men with Undergraduate and Postgraduate Degrees: Quota Strength

(a) All Parties

VARIABLES	(1) Undergraduate Degree Women	(2) Postgraduate Degree Women	(3) Undergraduate Degree Men	(4) Postgraduate Degree Men
De Facto Threshold	0.00181	0.00104	0.000306	-0.000718
	(0.00124)	(0.00226)	(0.000734)	(0.00137)
Observations	671	671	933	933
R-squared	0.080	0.019	0.046	0.005
Number of PARTYID	189	189	231	231
Party Fixed FE	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES
Quota x Wave FE	NO	NO	NO	NO

(b) Parties with nMEPs$>$ 2

VARIABLES	(1) Undergraduate Degree Women	(2) Postgraduate Degree Women	(3) Undergraduate Degree Men	(4) Postgraduate Degree Men
De Facto Threshold	0.00184	0.000775	0.000344	-0.000397
	(0.00132)	(0.00178)	(0.000844)	(0.00110)
Observations	480	480	550	550
R-squared	0.122	0.054	0.131	0.022
Number of PARTYID	149	149	161	161
Party Fixed FE	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES
Quota x Wave FE	NO	NO	NO	NO
Control x Wave FE	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

I Quota effects over time

A unique feature of our data is that it also allows us to investigate the relationship between gender quotas and legislator qualifications over time. Spanning the first EP wave, which began in 1979, until the most recent (ninth) wave, which began in 2019, we have 40 years of party and legislator data. The models below capitalize on the time series nature of our data to explore how the impact of quotas changes over time. Our main results report the average treatment effect of gender quotas at the party level and include fixed effects for time, in order to account for changes that have occurred over time in women's equality and opportunity that cannot be attributed to gender quotas and are not modeled explicitly in our analyses. However, it is also important to examine the relationship between the use of quotas and time itself. Thus, the models reported in Tables A19, A20, A21, and A22 capture the effect of national-level quotas and also include QuotaXWAVE fixed effects to account for this directly. As we would expect, as women experience more gender equality over time (evidenced by the positive and significant coefficients on the WAVE fixed effects), the effect of gender quotas is slightly attenuated (evidenced by the negative a significant quotaXWAVE coefficients). The models below use Wave 4 (1994-1999) as the baseline year of quota entry, given that there were no national quotas in use before this wave. However, this attenuation is the smallest in Wave 8 (2014-2019), when quotas appear in four countries, the single largest increase in quota use in our data.

The relationship is the opposite for men with undergraduate education. The models reported in Table A19 and A20 shows a negative correlation between quotas and the percentage of men in party delegations with at least an undergraduate education in the first wave of quota use. However, in subsequent waves, this negative effect is reversed, with an overall positive effect in Wave 7 (2009-2014, when Spanish and Portuguese parties are added to the treatment group). Similar to our main results, this relationship is likely driven by the replacement of men by women following the adoption of quotas. The model in Tables A21 and A22 reports this relationship within the portion of men in the delegation. Here we see that quotas have a positive and significant effect on the share of party men that hold postgraduate degrees, suggesting that while quotas decreased the overall share of men, those that remain are highly educated. Over

time this relationship is strongest in Wave 4 and again attenuates over time.

Table A19: Share of Women or Men in Parties with with Undergraduate and Postgraduate Degrees: Changes Over Time

A17a

VARIABLES	(1) Undergraduate Degree	(2) Postgraduate Degree	(3) Undergraduate Degree Women	(4) Postgraduate Degree Women	(5) Undergraduate Degree Men	(6) Postgraduate Degree Men
National Level Quota	0.0500**	0.0796*	0.224***	0.0952***	-0.174***	-0.0156
	(0.0243)	(0.0389)	(0.0292)	(0.0203)	(0.0325)	(0.0359)
WAVE = 2	0.0768**	0.0258	0.0299	0.0292	0.0470	-0.00322
	(0.0367)	(0.0407)	(0.0319)	(0.0260)	(0.0358)	(0.0293)
WAVE = 3	0.113**	0.0419	0.0629*	0.0379	0.0505	0.00415
	(0.0522)	(0.0665)	(0.0330)	(0.0225)	(0.0569)	(0.0554)
WAVE = 4	0.107**	0.0226	0.0944*	0.0255	0.0128	-0.00280
	(0.0437)	(0.0489)	(0.0476)	(0.0293)	(0.0651)	(0.0453)
WAVE = 5	0.140**	0.0431	0.105**	0.0307	0.0359	0.0124
	(0.0521)	(0.0325)	(0.0466)	(0.0323)	(0.0650)	(0.0235)
WAVE = 6	0.194***	0.0375	0.151***	0.0530	0.0428	-0.0162
	(0.0465)	(0.0388)	(0.0473)	(0.0352)	(0.0545)	(0.0292)
WAVE = 7	0.144***	0.0568	0.190***	0.0781*	-0.0461	-0.0214
	(0.0509)	(0.0535)	(0.0494)	(0.0425)	(0.0656)	(0.0380)
WAVE = 8	0.119*	0.0262	0.184***	0.0593	-0.0657	-0.0331
	(0.0611)	(0.0775)	(0.0449)	(0.0528)	(0.0646)	(0.0423)
WAVE = 9	0.112*	0.00570	0.205***	0.0545	-0.0932	-0.0488
	(0.0600)	(0.0686)	(0.0531)	(0.0529)	(0.0662)	(0.0384)
Quota X WAVE 5	-0.0688	-0.113**	-0.173***	-0.0209	0.104	-0.0922*
	(0.0573)	(0.0533)	(0.0324)	(0.0183)	(0.0765)	(0.0480)
Quota X WAVE 6	-0.0854	-0.0519	-0.208***	-0.0577	0.124*	0.00646
	(0.0634)	(0.0740)	(0.0427)	(0.0457)	(0.0619)	(0.0537)
Quota X WAVE 7	0.0309	-0.0552	-0.176***	-0.0638	0.208***	0.00872
	(0.0387)	(0.102)	(0.0514)	(0.0436)	(0.0576)	(0.0720)
Quota X WAVE 8	0.0245	-0.0293	-0.117**	0.00158	0.143***	-0.0309
	(0.0422)	(0.0769)	(0.0448)	(0.0484)	(0.0464)	(0.0505)
Quota X WAVE 9	-0.0240	-0.0114	-0.111	0.00108	0.0870*	-0.0125
	(0.0465)	(0.0685)	(0.0651)	(0.0450)	(0.0481)	(0.0474)
Observations	1,036	1,036	1,036	1,036	1,036	1,036
R-squared	0.054	0.006	0.091	0.033	0.058	0.013
Number of PARTYID	237	237	237	237	237	237
Party Fixed FE	YES	YES	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES	YES	YES
Quota x Wave FE	YES	YES	YES	YES	YES	YES
Control x Wave FE	NO	NO	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A20: Share of Women or Men in Parties with nMEPs>2 with Undergraduate and Postgraduate Degrees: Changes Over Time

VARIABLES	(1) Undergraduate Degree	(2) Postgraduate Degree	(3) Undergraduate Degree Women	(4) Postgraduate Degree Women	(5) Undergraduate Degree Men	(6) Postgraduate Degree Men
National Level Quota	0.0320	0.102***	0.162***	0.0971***	-0.131***	0.00455
	(0.0221)	(0.0311)	(0.0230)	(0.0143)	(0.0197)	(0.0295)
WAVE = 2	0.0344	0.00473	0.0359*	0.0154	-0.00113	-0.0104
	(0.0298)	(0.0302)	(0.0194)	(0.0151)	(0.0344)	(0.0273)
WAVE = 3	0.116***	0.0447	0.0855***	0.0299	0.0313	0.0151
	(0.0400)	(0.0549)	(0.0198)	(0.0192)	(0.0437)	(0.0424)
WAVE = 4	0.112***	0.0318	0.116***	0.0355**	-0.00278	-0.00351
	(0.0318)	(0.0407)	(0.0238)	(0.0172)	(0.0305)	(0.0414)
WAVE = 5	0.171***	0.0712**	0.165***	0.0679***	0.00730	0.00340
	(0.0380)	(0.0309)	(0.0224)	(0.0203)	(0.0387)	(0.0236)
WAVE = 6	0.204***	0.0447	0.202***	0.0782***	0.00141	-0.0350
	(0.0352)	(0.0336)	(0.0285)	(0.0225)	(0.0302)	(0.0301)
WAVE = 7	0.189***	0.0930**	0.214***	0.113***	-0.0257	-0.0204
	(0.0366)	(0.0433)	(0.0277)	(0.0351)	(0.0233)	(0.0383)
WAVE = 8	0.185***	0.143**	0.224***	0.138***	-0.0424	0.00462
	(0.0450)	(0.0614)	(0.0335)	(0.0323)	(0.0416)	(0.0454)
WAVE = 9	0.197***	0.101**	0.242***	0.111***	-0.0444*	-0.0105
	(0.0408)	(0.0446)	(0.0307)	(0.0233)	(0.0239)	(0.0389)
Quota X WAVE 5	-0.00871	-0.144**	-0.137***	-0.0637***	0.128***	-0.0806
	(0.0370)	(0.0638)	(0.0234)	(0.0200)	(0.0456)	(0.0541)
Quota X WAVE 6	-0.0280	-0.0820*	-0.149***	-0.0944***	0.123***	0.0141
	(0.0398)	(0.0447)	(0.0482)	(0.0200)	(0.0333)	(0.0387)
Quota X WAVE 7	0.0215	-0.0572	-0.144***	-0.0496	0.166***	-0.00742
	(0.0369)	(0.0413)	(0.0462)	(0.0331)	(0.0508)	(0.0482)
Quota X WAVE 8	0.00977	-0.151**	-0.0732	-0.0748**	0.0875*	-0.0765
	(0.0441)	(0.0605)	(0.0430)	(0.0361)	(0.0510)	(0.0559)
Quota X WAVE 9	-0.0358	-0.119*	-0.106**	-0.0460	0.0704	-0.0732
	(0.0558)	(0.0602)	(0.0480)	(0.0412)	(0.0429)	(0.0459)
Observations	552	552	552	552	552	552
R-squared	0.189	0.053	0.299	0.148	0.050	0.027
Number of PARTYID	162	162	162	162	162	162
Party Fixed FE	YES	YES	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES	YES	YES
Quota x Wave FE	YES	YES	YES	YES	YES	YES
Control x Wave FE	NO	NO	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A21: Share of Party Women or Party Men with Undergraduate and Postgraduate Degrees: Changes over Time

VARIABLES	(1) Undergraduate Degree Women	(2) Postgraduate Degree Women	(3) Undergraduate Degree Men	(4) Postgraduate Degree Men
National Level Quota	0.164***	0.154**	-0.0118	0.127***
	(0.0449)	(0.0558)	(0.0283)	(0.0408)
WAVE = 2	0.0902**	0.0556	0.0423	-0.0170
	(0.0399)	(0.0333)	(0.0353)	(0.0355)
WAVE = 3	0.110**	0.104	0.0932	0.00876
	(0.0410)	(0.0739)	(0.0577)	(0.0690)
WAVE = 4	0.131*	0.0590	0.115**	0.00238
	(0.0732)	(0.0796)	(0.0485)	(0.0584)
WAVE = 5	0.160**	0.100	0.144***	0.0749**
	(0.0696)	(0.0860)	(0.0487)	(0.0359)
WAVE = 6	0.279***	0.157	0.179***	-0.00171
	(0.0560)	(0.0965)	(0.0438)	(0.0286)
WAVE = 7	0.234***	0.151*	0.150***	0.0443
	(0.0583)	(0.0883)	(0.0516)	(0.0464)
WAVE = 8	0.208***	0.146	0.144**	0.0620
	(0.0748)	(0.105)	(0.0580)	(0.0748)
WAVE = 9	0.210***	0.0994	0.154**	0.0494
	(0.0603)	(0.105)	(0.0675)	(0.0647)
Quota X WAVE 5	-0.146	-0.0881	0.0109	-0.277***
	(0.0933)	(0.0752)	(0.0565)	(0.0702)
Quota X WAVE 6	-0.267***	-0.245***	0.0188	-0.0871
	(0.0899)	(0.0754)	(0.0518)	(0.0631)
Quota X WAVE 7	-0.127*	-0.150	0.0761*	-0.153**
	(0.0630)	(0.0904)	(0.0407)	(0.0726)
Quota X WAVE 8	-0.0199	-0.0784	0.0197	-0.161*
	(0.0678)	(0.0934)	(0.0415)	(0.0882)
Quota X WAVE 9	-0.120	-0.0394	-0.0295	-0.160*
	(0.0766)	(0.0895)	(0.0508)	(0.0816)
Observations	671	671	933	933
R-squared	0.094	0.028	0.050	0.015
Number of PARTYID	189	189	231	231
Party Fixed FE	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES
Quota x Wave FE	YES	YES	YES	YES
Control x Wave FE	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A22: Share of Party Women or Party Men with Undergraduate and Postgraduate Degrees with nMEPs>2: Changes over Time

VARIABLES	(1) Undergraduate Degree Women	(2) Postgraduate Degree Women	(3) Undergraduate Degree Men	(4) Postgraduate Degree Men
National Level Quota	0.0998	0.136**	-0.0362	0.202***
	(0.0656)	(0.0579)	(0.0291)	(0.0367)
WAVE = 2	0.0586	0.00999	0.0144	-0.0246
	(0.0487)	(0.0422)	(0.0300)	(0.0356)
WAVE = 3	0.0717	0.0904	0.120**	0.0383
	(0.0448)	(0.0848)	(0.0562)	(0.0594)
WAVE = 4	0.123	0.0246	0.119***	0.0228
	(0.0921)	(0.0962)	(0.0407)	(0.0520)
WAVE = 5	0.133*	0.0748	0.173***	0.0928**
	(0.0762)	(0.0925)	(0.0405)	(0.0393)
WAVE = 6	0.230***	0.121	0.190***	-0.00850
	(0.0659)	(0.0939)	(0.0374)	(0.0427)
WAVE = 7	0.216***	0.165*	0.180***	0.0467
	(0.0664)	(0.0912)	(0.0404)	(0.0522)
WAVE = 8	0.210**	0.213**	0.158***	0.0985
	(0.0812)	(0.0882)	(0.0534)	(0.0699)
WAVE = 9	0.203***	0.116	0.226***	0.102
	(0.0597)	(0.0936)	(0.0590)	(0.0682)
Quota X WAVE 5	-0.0685	-0.0941	0.0953**	-0.331***
	(0.0850)	(0.100)	(0.0389)	(0.101)
Quota X WAVE 6	-0.136	-0.261***	0.0726*	-0.134***
	(0.0851)	(0.0667)	(0.0412)	(0.0399)
Quota X WAVE 7	-0.0415	-0.0219	0.0857*	-0.190***
	(0.0924)	(0.0672)	(0.0443)	(0.0512)
Quota X WAVE 8	0.0279	-0.135*	0.0398	-0.266***
	(0.0925)	(0.0788)	(0.0589)	(0.0904)
Quota X WAVE 9	-0.0710	-0.0228	0.00971	-0.233**
	(0.129)	(0.109)	(0.0628)	(0.0887)
Observations	480	480	550	550
R-squared	0.128	0.069	0.137	0.045
Number of PARTYID	149	149	161	161
Party Fixed FE	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES
Quota x Wave FE	YES	YES	YES	YES
Control x Wave FE	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

J Educational Attainment in Europe and the EP

Our measure for education considers three possible categories: postgraduate education, which includes MEPs with a masters degree or equivalent and higher (i.e., doctoral); undergraduate education, which includes MEPs with at least an undergraduate degree (i.e., bachelors) or equivalent and higher; and all other MEPs, which include those with no formal educational qualifications, vocational/technical qualifications not granted as part of an academic or university degree, or primary and secondary educations. This scheme roughly aligns with the UNESCO (2011) International Standard Classification of Education's definition of tertiary education,[5] with our undergraduate variable aligning with ISCED Level 5 or above and our postgraduate variable aligning with ISCED Level 7 or above.

Over the past two decades, European Union member states have undertaken a process of aligning national educational qualifications for mutual recognition under the Bologna Process. Our data on MEP educational qualifications predates this process. However, we are able to use the Bologna framework and ISCED classification scheme to trace evolution of national legacy qualifications over time and align them with how they would be considered today.

We note that our analysis only speaks to the educational attainment of MEPs, which may be more or less reflective of the key underlying demographics of the populations that represent. In the below tables, we provide country-level averages for educational attainment from our data (MEPs), alongside statistics provided by EUROSTAT from member state populations since the mid-1990s. As is apparent from the tables, MEPs are disproportionately educated relative to the citizens that they represent. However, both MEPs and European citizens have increased in their levels of education over time. We believe that this is worth mentioning within the context of our analysis, as we are able to show that the addition of quotas speeds up a process of increased educational attainment that is already underway, similar to the ways in which quotas also speed up the formal processes of gender equality that are also underway in society. Given the diverse developmental characteristics of (particularly post-2004 enlargement) member states' political and economic systems, the robust effect of quotas on the educational attainment of politicians

[5] https://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf

is all the more substantively significant.

Table A23: Average Education in European Countries and EP Delegations

(a) 1999-2004

	1994		1999	
	MEPs	Population	MEPs	Population
Austria	84.21	N/A	77.78	14.3
Belgium	92.59	22.9	93.75	26.7
Denmark	70.59	26	83.33	26.5
Finland	83.33	N/A	86.67	31.3
France	80	17.4	78.79	20.9
Germany	73	21.6	77	23
Greece	92.59	13.9	86.67	16.8
Ireland	73.33	18.4	75	20.3
Italy	80.22	7.1	84.38	9.5
Luxembourg	71.43	22.6	87.5	18.3
Portugal	81.25	10.8	96.88	8.8
Spain	88.89	15.4	89.47	21.1
Sweden	77.78	N/A	69.23	28.5
United Kingdom	86.67	21	87.91	27.2
EU Average	81.3	N/A	84.05	20.5

(b) 2004-2019

	2004		2009		2014		2019	
	MEPs	Population	MEPs	Population	MEPs	Population	MEPs	Population
Austria	88.89	18	95.24	18.9	72.22	29.9	76.47	33.8
Belgium	100	30.4	100	33.4	95.24	36.9	90.48	40.7
Bulgaria	92.31	21.7	95	23	100	27	94.12	28.1
Croatia					90.91	21.3	81.82	25.3
Cyprus	100	29.4	100	34.1	100	40.3	100	44.7
Czechia	95.65	12.3	95.83	15.5	95.24	21.5	95.24	24.2
Denmark	94.44	32.9	86.67	32	76.92	35.7	76.92	40.4
Estonia	100	30.9	100	36.1	85.71	37.6	66.67	39.5
Finland	100	34.2	93.7	37.3	76.92	41.8	69.23	46
France	80.46	24.5	82.93	28.4	76.71	33.2	80.82	38
Germany	77.67	24.9	73.08	26.4	70.83	27.1	72.92	29.9
Greece	96.67	20.6	92.31	22.9	84.21	28.1	84.21	31.9
Hungary	96	16.7	96.3	19.8	95.24	23.4	100	26
Ireland	85.71	28.2	86.67	37.1	72.73	43.3	63.34	47.3
Italy	73.83	11.6	74.68	14.5	79.17	16.9	79.45	19.6
Latvia	87.5	19.8	88.89	25.8	100	30.2	100	35.7
Lithuania	100	25.6	100	30.8	81.82	36.7	90.91	43.1
Luxembourg	100	23.7	66.67	34.8	66.67	45.9	83.33	47
Malta	100	11.2	88.89	13.9	100	21.2	100	29.5
Netherlands	83.87	29.5	82.76	30.8	92.31	34.4	80	40.4
Poland	96.55	15.6	96.23	21.2	96.08	27	96	32
Portugal	100	12.4	100	14.6	100	21.7	100	26.3
Romania	89.47	10.6	97.3	13.2	90.62	15.9	93.75	18.4
Slovakia	92.86	12.8	84.62	15.8	92.31	20.4	92.31	25.8
Slovenia	85.71	19	100	23.3	87.5	28.6	87.5	33.3
Spain	94.74	26.7	93.1	30	92.59	34.7	88.46	38.6
Sweden	77.27	28.1	66.67	33.1	75	38.7	89.47	44
United Kingdom	80.72	29.4	80.52	33.4	71.23	40.6	84.93	44.7
EU Average	86.73	20.9	86.33	23.9	83.86	29.3	84.97	33.3

Note: Tables reflect the percentage of MEP delegation that has at least an undergraduate degree; population figures include the percentage of working-age adults (25-64 years) with at least an undergraduate degree.
SOURCE: MEP averages are from Authors' Calculations; Population averages are taken from EUROSTAT's EDAT_LFSE_03 measure of educational attainment.

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