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Marginal benefits? Electoral geography and economic outcomes

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Abstract

I exploit a large natural experiment in Australia that saw the House of Representatives expand from 125 districts to 148 districts. This required substantial changes to electoral boundaries, which, for the first time, were determined by a body that was not subject to ministerial discretion. As a result of these changes to electoral boundaries, many postal areas moved from being in relative safe districts to relatively marginal districts. I examine the effect of these exogenous changes to the marginality of postal areas on median and mean incomes in subsequent years. I find no consistent relationship between changes in marginality and incomes in subsequent years. As such, there is no evidence that politicians systematically allocate income-affecting discretionary resources to marginal districts to increase their representation in Parliament, or to safe districts to 'reward the base'.

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1. Introduction and review of literature

Over many decades social scientists have debated whether politicians allocate discretionary resources towards marginal districts which can increase a party's representation in parliament (Dixit and Londregan, 1996; and Ward and John, 1999), or towards safe districts, to reward their core supporters (Cox and McCubbins, 1986). Given that marginality is expected to impact – either positively or negatively – the benefits received by a particular area, it is unsurprising that scholars have considered the short-run and long-run economic outcomes in marginal and safe electorates (Levitt and Poterba, 1999; and Besley, Persson, and Sturm, 2010).

But identifying the effect of marginality on economic outcomes is complicated because marginality is typically not determined exogenously. For instance, in the United States electoral boundaries are often determined by a partisan process (Stephanopoulos and McGhee, 2015). And changed economic circumstances in an electorate could see migration resulting in changed marginality, so the direction of causation between marginality and economic outcomes is ambiguous.

Many earlier papers which have considered the effect of changes in the political importance of an area on resource allocation have focussed on changes stemming from elections. For example, Case (2001) evaluates the implications of variation in vote share for poverty assistance spending. Similarly, Berry, Burden, and Howe (2010) use changes in vote shares to estimate the effect of membership of the president's party on resource allocation. Albouy (2013) and Johanssen (2003) also use changes in votes shares to estimate the effects of partisan politics on the allocation of resources. But changed voting patterns may be correlated with factors which are unobservable, such as demographic or economic changes. These unobservable influences may bias estimates effects. Additionally, focussing on districts which move from one party to another as a result of changed voter preferences may give inordinate weight to marginal districts.

Because of the difficulty in distinguishing cause and effect when the treatment may be endogenous, scholars have sought examples of changes to electoral boundaries that are determined exogenously. For example, Desposato and Petrocik (2004) and Ansolabehere, Snyder, and Stewart (2000) consider the effect of redistricting on the personal vote in the US context. But the electoral boundary movements examined by these studies are not determined by disinterested actors. Nevertheless, Ansolabehere, Snyder, and Stewart (2000) report no evidence of strategic redistricting, though Desposato and Petrocik (2004) are more circumspect, saying that 'California's 1992 redistricting was relatively bipartisan'.[1] Ansolabehere, Gerber, and Snyder (2002) argue that reduced *malapportionment* in the US during the 1960s resulted in a shift of government funding from previously overrepresented counties to previously underrepresented counties, though this paper does not consider gerrymandering, which can exist alongside perfectly apportioned boundaries. In contrast to these studies, this paper takes advantage of electoral boundaries which are determined by an apolitical body whose decisions are not subject to legislative approval.

This is not the first time that the relationship between local electoral competition and economic activity has been considered in the Australian context. Leigh (2008) analyses the distribution of discretionary funding in Australia between 2001 and 2004. He finds that districts held by the governing party receive more government funding, but within this group of government-

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[1] See Stephanopoulos (2017) for brief history of gerrymandering in the US context.

held districts, more politically competitive districts do not receive greater funding. Relatedly, Danemark (2000) shows that marginal districts are more likely to receive small discretionary grants than safe districts. But neither of these papers utilised exogenous changes in marginality.

In contrast to the existing literature, this paper exploits large and exogenous changes to electoral boundaries. These changes to electoral boundaries occurred between the 1983 and 1984 Australian federal elections. Between these elections, the House of Representative expanded from 125 to 148 districts – necessitating many boundary changes – and, for the first time, these boundaries were determined by an independent authority. These changes to electoral boundaries resulted in many postal areas switching from being in an electorally marginal district (referred to as a 'district') to an electorally safe district, and vice versa. I exploit these exogenous boundary changes to estimate the effect of electoral marginality on incomes in subsequent years using a simple research design.

I find no consistent relationship between the change in the electoral importance of an area and incomes. While some alternative - and arguably plausible – specifications suggest otherwise, my preferred specification provides no evidence that politicians allocate income-affecting resources to marginal districts – to increase representation a party's representation in parliament – or to safe districts – to 'reward the base'.

This paper is structured as follows. Section 2 outlines the Australian electoral system. Section 3 describes the data. Section 4 describes the empirical approach and results. Section 5 concludes.

2. The Australian electoral system and electoral boundaries
2.1 The Australian electoral system

The Australian Parliament is comprised of a lower house (House of Representatives) made up of single member districts and an upper house (Senate) made up of multimember districts. Voting is compulsorily in Australia and turnout has averaged 94.5 percent over the study period (1983-2013 election). The penalty for not voting is AUD20. Voting is 'instant-runoff', so voters number candidates from most to least preferred. Australia is a federation of six states and two territories. Each of these states and territories elect members to the House of Representatives. The number of districts in the House of Representatives that each state/territory is entitled to is proportional to the number of enrolled voters in that state/territory. However, all states are guaranteed a minimum of five districts and Territories are guaranteed a minimum of one seat. This paper does not consider the Senate because each state is one electorate in the Senate (represented by 12 senators) and state boundaries have not changed since federation in 1901.

From the 1940s onwards, two groups have formed government in Australia. The first, the Australian Labor Party (Labor), is a centre left party. The second, the Coalition, is made up of the Liberal Party and the National Party, which are centre-right parties (the Liberal Party receives most of its votes in urban areas while the National party receives most of its votes in rural areas).

Since the end of World War Two there have been 27 federal elections – roughly once every 2.5 years. Election timing is agreed between the prime minister and the governor general (the representative of the Queen in Australia). Typically, half of the Senate is up for re-election in

any election year, but if the government is unable to pass bills through the Senate it can call a double dissolution election, thus spilling all positions in the House of Representatives and the Senate. This happened in March 1983, and on five other occasions post World War Two. The double dissolution election in 1983 meant that a half-Senate election was needed by April 1985 to prevent staggered elections in the House of Representatives and the Senate (Hansard 1984). As such, the election in December 1984 was earlier than required, but not as early as may be initially perceived given its proximity to the previous election.

2.2 The determination of electoral boundaries

Between Federation in 1901 and 1983, electoral boundaries were drawn by a body that was subject to ministerial discretion and whose decisions required the approval of the Parliament (Australian Electoral Commission, 2004). This meant that the party in government could reject or ignore proposed changes to boundaries. This happened on 35 occasions (Juriansz and Opeskin, 2012). That said, the body responsible for drawing electoral boundaries between 1973 and 1983 – The Australian Electoral Office – had a higher degree of independence than the bodies that preceded it (Orr, 2010, p vi; Hughes, 2001). But political boundaries were biased in favour of the Coalition – the political party most often in government – for most of the pre-1984 period (Jackman 1994).

The *Commonwealth Electoral Legislation Amendment Act 1983* (which came into effect in 1984) removed leeway for the partisan selection of electoral boundaries (Australian Electoral Commission, 2004). This legislation created an independent Statutory Authority called the Australian Electoral Commission (AEC). From 1984 onwards, the AEC has determined electoral boundaries via a process that is not subject to the agreement of the relevant minister (the Special Minister of State) or the Parliament. The AEC's determination of electoral boundaries are not subject to judicial review (Orr, 2010). While it may be argued that no government-funded body is ever totally independent, the AEC is seen as non-partisan (Hughes, 2001, p156) and the redistribution commissions which determine boundary changes are perceived to be independent (Orr, 2010).

The *Commonwealth Electoral Legislation Amendment Act 1983* also removed the governing party's discretion regarding if and when to hold a redistribution, instead establishing population and time-based criteria for redistributions. Redistributions were required if none has occurred within the past 7 years, and malapportionment automatically triggered a redistribution. A redistribution is required whenever one or more of these three criteria are met: when, because of population changes, the number of House of Representatives districts a state is entitled to changes; when number of enrolled persons in more than one third of the districts of a state deviates from the state average by more than ten per cent; or if seven years have passed since the previous redistribution in a state. Between 1949 and 1983, redistributions occurred once every 7.8 years, on average. Since 1983 this figure has fallen to 5.8 years. This has helped to lessen malapportionment since 1983 (Juriansz and Opeskin, 2012). Samuels and Snyder (2001) found Australia to be the third least malapportioned country of 14 federations considered in the late 1990s. The level of malapportionment would be lower still if it were not for Tasmania having more districts than its population warrants, and the rounding of district allocations to states and territories.

While efficiency indicies (which measure wasted votes) and measures of malapportionment (which measures the electoral weight of votes in different electorates) indicate that electoral boundaries were draw more in line with the principle of 'one vote, one value' from 1984

onwards, this does not prove that the AEC draws boundaries in an apolitical manner. There is, however, no evidence that the AEC has drawn boundaries to systematically benefit any political party (Juriansz and Opeskine, 2012) and there is widespread agreement that the assignment of electoral boundaries is apolitical (Medew, 2008). Indeed, standard measures of electoral efficiency suggest that, since 1984, on average, the composition of the House of Representatives has more closely reflected the two party preferred vote share.[2] This is reflected in Table 1. I note, however, that these measures are crude, in part because of the small number of observations.[3]

Table 1 electoral efficiency with respect to the Coalition.		
	Efficiency gap (As defined by Stephanopoulos and McGhee, 2015)	Simple difference (percentage of districts in HoR won – percentage of TPP vote)
1949-1983	4.45	5.86
1984-2016	1.56	1.88

Source: AEC (2018)

2.3 Post-1984 redistribution process

Redistributions since 1984 have followed a set process, as outlined in the *Commonwealth Electoral Legislation Amendment Act 1983[4]*. Firstly, a committee of four public servants (the Committee) determines the number of districts in the House of Representatives that a particular state is entitled to. This decision is based entirely on the total population of each state and territory (Medew, 2008). The public is then invited to suggest particular boundaries, and indicate why they favour those boundaries. The Committee considers the submissions and proposes boundaries which see the number of enrolled voters in each electorate deviate by no more than 3.5 per cent from the average projected district enrolment in 3.5years time.[5] While the main task of the Committee is to see that the number of electors in each district is nearly equal, the Committee is also required to consider four subordinate criteria when deciding upon electoral boundaries (Australian Electoral Commission, 2004). Specifically, the Committee is required to consider: community of interests within the proposed district, including economic, social and regional interests; means of communication and travel within the proposed district; the physical features and area of the proposed electoral district; and the boundaries of existing districts. Importantly, the Committee does not consider political factors, such as how a particular boundary change may affect electoral outcomes.

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[2] Labour voters have long been more geographically concentrated than those of the coalition (Rydon, 1993). This suggests that, even with entirely apolitical electoral boundaries, labour will typically need to receive more votes than the coalition to form a majority in the House of Representatives. The existing system of preferential, single member constituencies has contributed to this.

[3] Analysis is further complicated by the fact that the efficiency gap is typically positive wrt the winning party (this is consistent with the 'bonus' noted by Grofman and King, 2007), and Labor won a smaller share of the elections between 1949 and 1983 compared to the period between 1984 and 2016. The 2010 election is excluded because both parties won 72 districts in their own right and Labor formed a minority government. The small number of independents (between zero and six per election) since 1949 are classified as LP if, in the absence of independents, the allocation of preferences suggests that the LP would have won the seat. The corollary applied to independents classified as Labor.

[4] See AEC (2004) or Medew (2008) for a more detailed explanation of the redistribution process.

[5] Note that while the allocation of districts to states is done by population, the drawing of electoral boundaries is based on the number of enrolled electors (Medew, 2008).

The boundaries proposed by the committee are made public and over the following six weeks can be objected to, with the objections made public. The objections can then be commented on. All feedback from the public is considered by a new committee, comprised of the original Committee and two additional members, one judge and one non-judicial appointee – typically the Australian Statistician. If the boundaries proposed by the new committee vary substantially from those proposed by the original Committee further public comment is sought, but typically this is not required. The AEC then sends the boundaries to the Special Minister of State, who is required to table the boundaries in parliament within five sitting days. The new boundaries come into effect at the next election. This process is accepted by all sides of politics – as Orr (2010) puts it, '…There is now a firm, multipartisan consensus behind the key features of redistributions in Australia'.

Of the 125 electorates in 1983, six were abolished and 29 new districts created. So the Parliament increased by 23 districts, to 148 districts. There were redistributions in all states and territories. 30.3 percent of postal areas moved from being in one electorate to another (denoted by name).

In addition to the exogenous nature of the changes to postal area-level marginality, this context is well suited to identifying the impact of marginality on incomes because Labor was in government both before the 1984 election, and until the 1996 election. This extended period of Labor government means the distribution of discretionary resources in the years following the changed boundaries was exclusively the result of decisions taken by Labor, not the Coalition. And electoral boundaries were little changed during the subsequent electoral cycles. As such, I regard the changed boundaries as representing the 'new normal' spread of voters across districts. It is Labor's response to this new normal that I seek to quantify.

The Australian political context is particularly well suited to studying the effects of changed marginality because of the high level of party discipline compared to the United States (Parliamentary Education Office, 2019). This means that any decisions to favour particular geographic areas are likely a result of systematic decisions of party leaders, as opposed to ad hoc decisions by operatives at a lower level.

3. Data
3.1 Converting data over different geographic units

This study uses 1981 postal areas, as defined by the Australian Bureau of Statistics, as the standard geographic unit. The data underpinning most variables is at the suburb or statistical area two (SA2) level. The boundaries of postal areas, suburbs, and SA2s have changed through time. Mapping software has been used to convert each of these different units back to 1981 postal areas. Where multiple units correspond to one 1981 postal area, a population weighted average is used.

3.2 Income

Median and mean measures of income are used. Median income data is from the Census.[6] Mean income data is from the ATO's 'Taxation Statistics' series.[7] I include data at 5-yearly

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[6] Note that exact income is not elicited by in the census questionnaire, only an income band is. The median income value provided by the ABS are estimated from information gathered in each census, in addition to information from other surveys administered by the ABS.

[7] The ATO provides yearly values. These are converted to weekly by dividing by 52.

intervals from 1996 to 2016, which are census years. Table 2 includes summary statistics for postal area-level median and mean incomes. No measures of income that begin earlier are sufficiently disaggregated to be of use in this study. I prefer the median measure of income as it will be less affected by outliers and because there are more observations in each of the census years. But median incomes are only available from 2001 onwards. Mean incomes are used because these values are available from the 1996 census onwards.

Table 2 Mean and median income

Year	Observations	Mean	Min	Max
Panel A: Median income				
2001	2359	367 (98)	182	993
2006	2227	453 (127)	205	1257
2011	2126	566 (173)	264	1800
2016	2213	657 (181)	323	1861
Panel B: Mean income				
1996	1810	567 (116)	366	1462
2001	1819	718 (164)	472	2157
2006	1818	925 (280)	554	4218
2011	1821	938 (271)	495	2820
2016	1812	1062 (333)	447	4429

Note: Standard deviations in parentheses. Source: ATO (2019), ABS (2019).

3.3 Electoral data

Figure 1 provides an example of electoral boundaries, postal area boundaries, and polling place locations in 1983. Thick black lines denote district boundaries, while district names (Lowe, Sydney, and Grayndler) are also shown in black. Thin green lines denote postal area boundaries. Postal areas are labelled in green. Blue crosses denote polling places. The blue at the top left and right of the figure is Sydney Harbour.

Figure 1: Sample of electoral boundaries, postal areas, and polling places
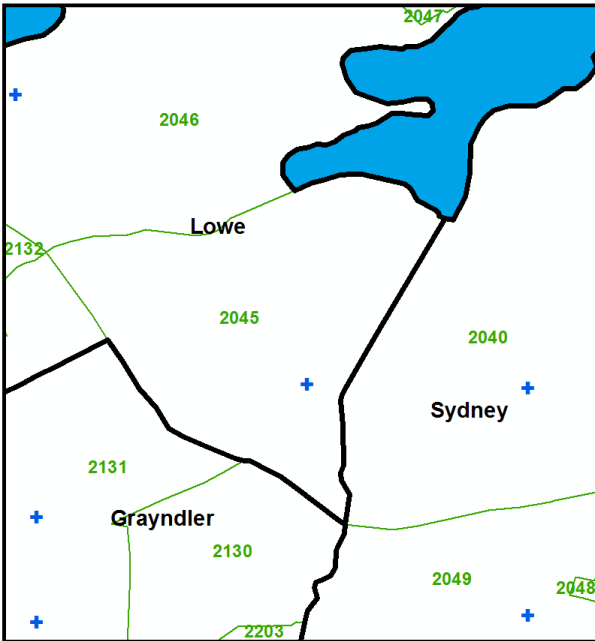
Source: AEC (2018), ABS (2018)

Table 3 shows that, on average, each 1983 district had around 10 polling places, which received around six thousand votes. Polling places were matched to longitude and latitude using the Gazetteer of Australia (Geoscience Australia, 2010). Data is available for a total of 1275 polling places, but 80 of these polling places were not accompanied by sufficient data to establish longitude and latitude. The Australian Capital Territory is excluded from all analysis because vote data is only available at the district level. The 1195 polling places for which data is available include a total of 7,082,877 formal votes for the House of Representatives. This is 94.13 percent of the formal votes cast at polling places.

Table 3 Electoral data

	Mean	Min	Max
Number of polling places per district	10.37 (3.30)	5	20
Votes per polling place	5927 (3881)	74	33672

Note: Standard deviations in parentheses. Source: AEC (2018)

Table 4 provides postcode-level vote statistics at the 1983 election.

Table 4 Electoral variables

Year	Observations	Mean	Minimum	Max
District level Labor TPP vote				
1983	2405	0.483 (0.112)	0.253	0.752

Note: Standard deviations in parentheses. Source: AEC (2018)

3.4 Socio-economic data

Socio-economic data is from the 1981 Census. 'Median income band' reflects the income band that the median income earner in the postal area selected in the 1981 Census. 'High income' and 'low income' reflect the proportion of people in each postal area who are in the top two and bottom two income bands respectively. 'Economic resources' is an index of relative economic resources but is from the 1986 Census as 1981 data is unavailable. 'Unemployment' is the unemployment rate in each postal area. 'Certificate or higher' measures the proportion of people in a postal area who had completed some post-secondary education. 'Population density' is the population of the postal area divided by the area, measured in hectares, of the postal area. 'Anglican' denotes the proportion of residents in a postal area who self-identify as Anglicans. 'Australian born' reflects the proportion of people in the postal area who were born in Australia. These variables, when included in the regressions, are referred to as the 'census controls'.

Table 5 Summary statistics

Variable	Observations	Mean	Min	Max
Median income band	2405	6.6 (0.9)	3	13
High income	2405	0.04 (0.03)	0	0.56
Low income	2405	0.18 (0.04)	0	0.46
Economic resources	2376	991 (73)	695.05	1293.41
Unemployment	2405	0.058 (0.036)	0	0.75
Certificate or higher	2405	0.15 (0.06)	0	0.38
Population density	2405	5.74 (11.73)	0.0001	138.35
Anglican	2405	0.28 (0.09)	0	0.75
Australian born	2405	0.85 (0.11)	0.37	1

Note: Standard deviations in parentheses.

3.5 Change in two party preferred vote

I construct a variable – referred to as the 'change variable' – that measures the change in Labor's two party preferred vote as a result of the AEC's changes to district boundaries ahead of the 1984 election. This is perhaps best understood as superimposing 1983 voting patterns on 1984 boundaries and is akin to the methodology used by Leigh (2008). This is preferable to considering how voters actually voted in 1984 because, once the boundaries for the 1984 election were known (around three months before the election), voters could consider strategic voting, and political parties could pork barrel or campaign strategically. Equation 1 formalises the change variable.

$$Change\ variable = ALP_{83(actual)} - ALP_{84(predicted)} \quad (1)$$

Figure 2, which shows a minor boundary change for two districts adjacent to Sydney Harbour, helps to illustrate the components of the change variable. $ALP_{83(actual)}$ reflects the two party preferred vote in the district that a postal area is located in at the 1983 election. Given that

regressions are at the level of the postal area, it is important to note that the postal areas 2045, 2046, 2047, and 2032 would all have the same value for $ALP_{83(actual)}$, as they are located in the same 1983 district, Lowe. Similarly, $ALP_{84(predicted)}$ reflects the predicted two party preferred vote in the district that postal area is located in for the 1984 election. In figure 1, postal area 2045 moved from being in Lowe in 1983 to Sydney in 1984 and so the votes in this postal area votes count towards the district of Sydney in 1984, not Lowe.

However, vote data at the 1983 election is unavailable at the postal area-level. Therefore, I assign each postal area the two party preferred vote share of the polling place closest to the centre of the postal area.[8] I then scale this two party preferred vote share by the population in that postal area. I then aggregate the results from each postal area in the district to get the two party preferred vote at the district level. Postal areas 2045, 2040, 2049 and all other postal areas in the district of Sydney in 1984 will have the same value for $ALP_{84(predicted)}$.

Figure 2: Sample of 1983 and 1984 electoral boundaries.
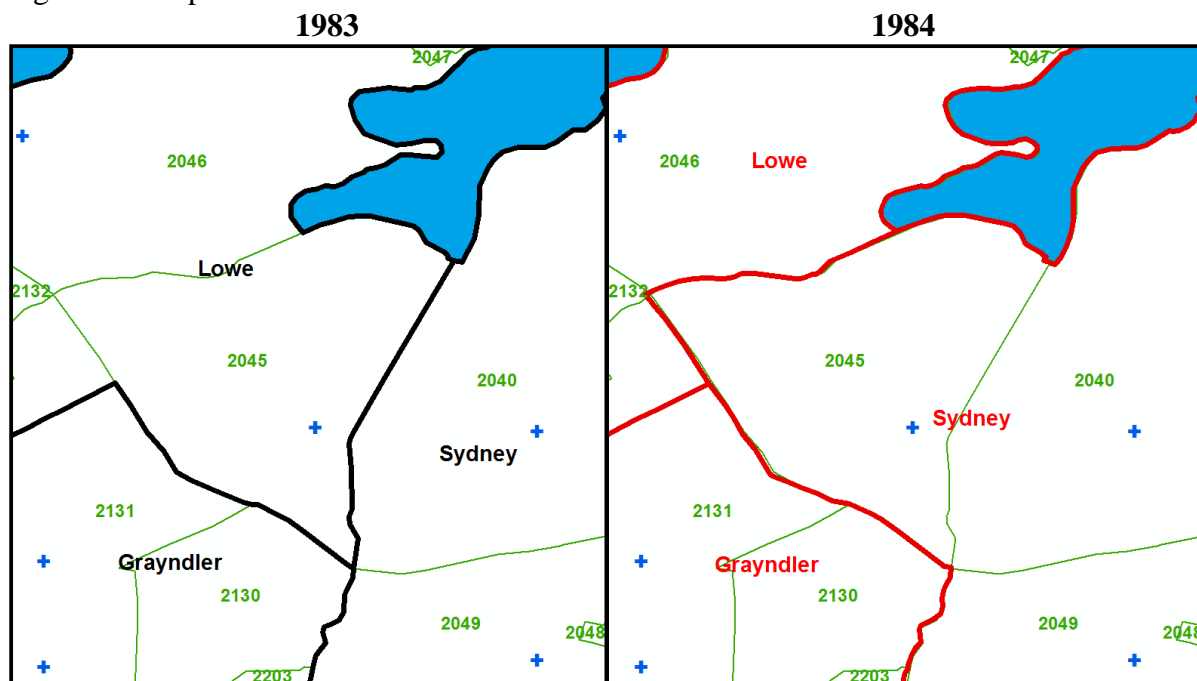
Source: ABS 2018, AEC 2018.

Table 6 shows that the mean of the change variable is -0.020, suggesting that, on average, the two party preferred Labor vote share increased by two percentage points. This is unsurprising given that it was widely considered that the preceding electoral boundaries gave advantaged the Coalition. Table 5 shows that the average two party preferred vote at the postal area-level in 1983 was around 48 percent. This is lower than the national two party preferred figure because districts held by the Coalition contain more postal areas than Labor-held districts do.

Table 6 Change variable				
	Observations	Mean	Min	Max

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[8] Because the complete flow of preferences is not available at the polling place-level, I allocate preferences based on the flow of preferences at the district level.

Change variable	2405	-0.020 (0.072)	-0.331	0.279

Note: Standard deviations in parentheses.

3.6 The marginality variable

But the change variable does not reflect whether, as a result of the changed electoral boundaries, the district that a postal area is in became more or less marginal (with districts that with a two party preferred vote closer to 0.5 being more marginal than districts with a two party preferred vote further from 0.5). Nor does the change variable consider the possibility that there are heterogeneous effects depending on whether the district was predicted to change hands because of the redistribution. The change variable also ignores the possibility that passing – in either direction – the 0.5 two party preferred threshold because of the revised boundaries may have different implications than an equal change in two party preferred vote that does not cause the 0.5 threshold to be crossed. For these reasons, I construct a variable – which I term the 'marginality variable' – that is shown in equation 2.

$$Marginality\ variable = |ALP_{83(actual)}| - |ALP_{84(predicted)}| \quad (2)$$

The absolute value signs are required because, without them, a change in the two party preferred vote from 0.45 to 0.55 would have a different value to the change from 0.55 to 0.45. But, while the level of marginality doesn't change in the example in the previous sentence, it is plausible that a 0.05 level of marginality in favour of Labor has different consequences to a 0.05 level of marginality in favour of the Coalition. Because of this, I do not include all postal areas in regressions where the marginality variable is the key explanatory variable. Instead, postal areas are included in regressions depending on where of the following four groups they fall into: postal areas in districts that were held by the Coalition in both 1983 and 1984; postal areas that were held by Labor in both 1983 and 1984; postal areas in districts that were in districts held by the Coalition in 1983 but Labor in 1984; and postal areas in districts that were held by Labor in 1983 but the Coalition in 1984. I also interact the marginality variable with the 1983 district-level two party preferred vote for each postcode because the effect of a change in marginality may differ depending on the initial level of the two party preferred vote. Because power to allocate discretionary resources is likely related to seniority within Labor, all regressions control for whether the Member of Parliament representing the postal area is a member of Cabinet. State dummies are also included.

Figure 1 shows the values of the marginality variable in each of these group of postal areas, while Table 7 shows corresponding summary statistics.
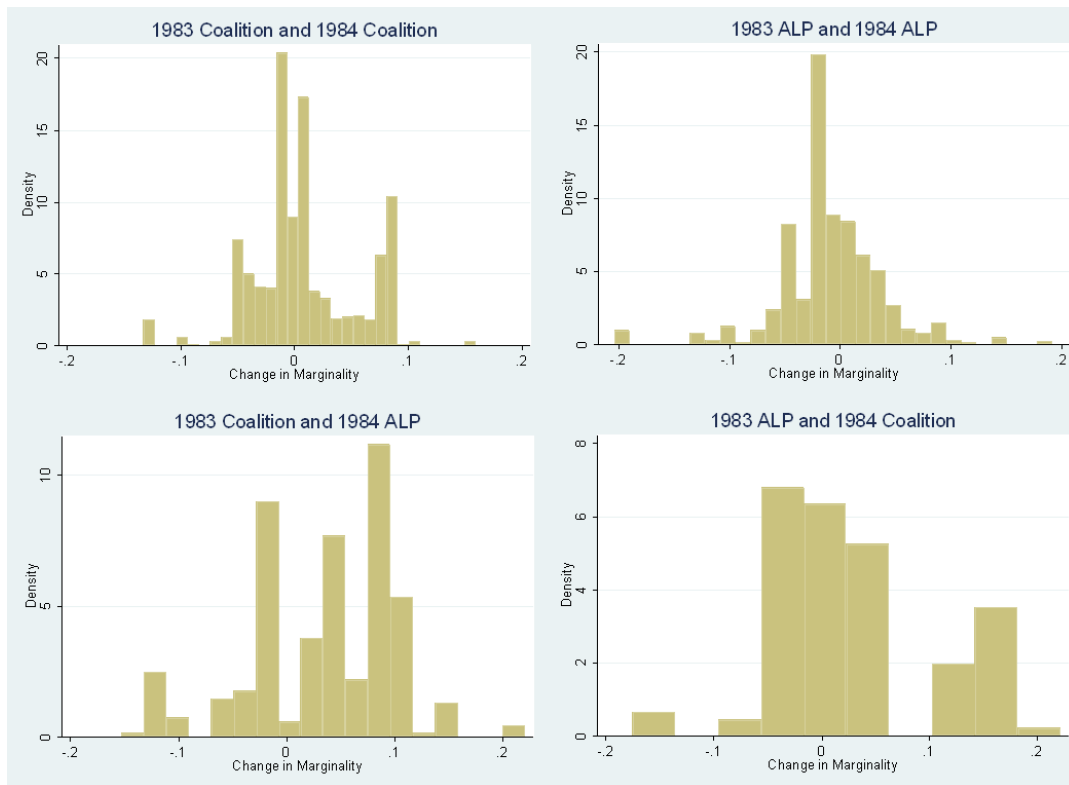
Figure 3 Change in marginality resulting from changed electoral boundaries

Table 7 Change in marginality between 1983 and 1984				
	Observations	Mean	Min	Max
1983 Coalition and 1984 Coalition	1032	0.007 (0.046)	-0.133	0.159
1983 Labor and 1984 Labor	926	-0.010 (0.047)	-0.204	0.191
1983 Coalition and 1984 Labor	332	0.034 (0.68)	-1.53	0.221
1983 Labor and 1984 Coalition	115	0.21 (0.74)	-0.175	0.222

Note: Standard deviations in parentheses.

Even though the 1984 boundaries were determined by a body that was not subject to ministerial discretion, correcting 'unbiasing' previously biased boundaries may lead to postal-area level changes in marginality being correlated with the characteristics of postal areas. Indeed, regressing change in marginality on census controls reveals that; economic resources; unemployment; certificate or higher; Anglican and Australian born are correlated with the change in marginality (high income, low income, median income, and population density are not correlated with change in marginality). Accordingly, I include the census controls in the regressions below. The correlations between some census variables and change in marginality are explored further in Wokker (2019).

3.7 Marginality dummies

I also consider marginality in intervals. As per AEC (2019), I classify districts as: 'marginal' if the winning party receives less than 56 percent of the two party preferred vote; 'fairly safe'

if the winning party receives between 56 and 60 percent of the two party preferred vote; and 'safe' if the winning party receives more than 60 percent of the two party preferred vote. Corresponding dummy variables are used in regressions. For example, the dummy variable 'marginal_83_marginal_84' is equal to one when a postal area is located in a marginal district in 1983 as well as 1984.

Table 8 lists the number of postcodes in each category in 1983 and 1984. The nine possibilities in the table correspond to the nine dummy variables. Regressions exclude the dummy variable indicating postal areas which were safe in 1983 as well as 1984.

Table 8 Number of postal areas in marginal, fairly safe, and safe districts in 1983 and 1984

	Marginal 1984	Fairly safe 1984	Safe 1984
Marginal 1983	527	197	68
Fairly safe 1983	262	138	286
Safe 1983	199	159	569

Unlike regressions where the marginality variable is the key explanatory variable, regressions with marginality dummies do not include a control for the 1983 level of the two party preferred vote, nor is there a variable reflecting the interaction between the change variable and the two party preferred vote in 1983. Instead, dummies indicate whether the postal area was in a labor district in 1983, and whether the postal area would, as a result of redistricting, be expected to change hands to be in a coalition district in 1984.

4. Regression specifications and results

4.1 Regression specifications

There is no measure of median or mean income in 1981 or 1986. Given the lack of baseline measure of median or mean income, a before-after comparison or the use of differences-in-differences approach is not viable. However, the treatment – change in marginality as a result of movements in electoral boundaries – is exogenous to mean and median incomes, and so I am able to proceed using a standard regression approach and employing the controls mentioned above.

4.2 Marginality variable results

As outlined in Section 3.6, because the change variable does not necessarily reflect deviations in *marginality* and due to the possibility of heterogeneous effects depending on whether a postcode was in a Labor or Liberal-held district in 1983, I do not use it in regressions. Instead, I use the marginality variable, with postal areas considered in four distinct groupings. Table 9 outlines the results for the groupings of postal areas when census variables are included. This specification is outlined in equation 3, where i indexes postcodes and *TPP83* is the two party preferred vote in the district that the postcode is located in at the 1983 election.

$$Y_i = \beta Marginality_i + \alpha TPP83_i + \delta MarginalityXTPP83_i + \gamma X_i + \varepsilon_i \qquad (3)$$

Panels A and B of Table 9 do not indicate a consistent, statistically significant relationship between changed marginality – resulting from the revised electoral boundaries – and incomes, for postal areas which were in Coalition-held districts in 1983 and would, based on voting

patterns in 1983, be in Coalition-held districts in 1984. While the coefficients in Panels C and D indicate a negative relationship between marginality and income for postal areas in Labor-held districts that are not expected to change hands, these coefficients are statistically insignificant. Panels E through H demonstrate that, for postal areas in districts that would change hands, there is no consistent, statistically significant relationship between marginality and incomes. Overall, there is no consistent and statistically significant relationship within any of the four groupings.

I note that these results are sensitive to the specification chosen. This is particularly true regarding the inclusion of the interaction term. Specifically, if the interaction term is excluded from regressions, the coefficients on the marginality variable in Panels A and B are typically positive and significant, while the coefficients on the marginality variable in Panels E and F are typically negative and significant. The coefficient on the interaction term is rarely significant. Nevertheless, I consider the outputs reported in Table 9 the most appropriate.

Table 9 Dependent variable: Median or mean income. With census controls.[9]

	(1) 1996	(2) 2001	(3) 2006	(4) 2011	(5) 2016
Coalition in 1983 and 1984					
Panel A: Median income					
Marginality	NA	333.89	532.31	1132.79**	1028.61*
		277.12	386.10	545.39	616.56
Observations	NA	1,012	953	888	945
R-squared	NA	0.6951	0.7048	0.6602	0.6038
Panel B: Mean income					
Marginality	-393.09	-1329.76**	-940.58	267.83	-1159.57
	(461.19)	(653.92)	(1213.18)	(1102.21)	(1457.48)
Observations	760	756	751	741	734
R-squared	0.7415	0.7476	0.7276	0.7138	0.6812
Labor in 1983 and 1984					
Panel C: Median income					
Marginality	NA	-938.37	-964.85	-836.5871	-1461.91
		(572.09)	(641.02)	(942.28)	(1003.38)
Observations	NA	878	852	839	850
R-squared	NA	0.3122	0.4337	0.4128	0.3644
Panel D: Mean income					
Marginality	-408.99	-738.77	-1562.393	-1137.16	-1806.49
	(403.37)	(651.26)	(1287.08)	(1183.60)	(1377.79)
Observations	718	730	730	743	741
R-squared	0.6164	0.5092	0.3503	0.3991	0.4008
Coalition in 1983 and Labor 1984					
Panel E: Median income					
Marginality	NA	22.03	-938.92**	-1180.59*	-1457.359**
		(393.28)	(457.54)	(672.09)	(666.83)
Observations	NA	327	315	294	312
R-squared	NA	0.3342	0.4705	0.4027	0.3515
Panel F: Mean income					
Marginality	496.39	-984.37*	833.30	368.46	-1528.46

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[9] Full results are available from the author on request.

	(385.83)	(544.80)	(891.75)	(1024.00)	(1134.65)
Observations	244	244	248	250	253
R-squared	0.5333	0.4557	0.5121	0.4733	0.5023
Labor in 1983 and Coalition 1984					
Panel G: Median income					
Marginality	NA	-426.25	1857.27	7784.07**	6456.25**
		(897.14)	(1423.41)	(2994.47)	(2185.85)
Observations	NA	115	103	100	100
R-squared	NA	0.4866	0.4918	0.2595	0.4452
Panel H: Mean income					
Marginality	3677.82**	1503.66	3570.29	3237.98	4435.65
	(1455.97)	(1873.70)	(2618.67)	(3601.54)	(4784.69)
Observations	87	87	86	84	81
R-squared	0.4687	0.4619	0.4798	0.4414	0.4649

Note: Standard errors in parentheses. ***, **, and * denote 1%, 5%, and 10% levels.

4.5 Marginality dummies results

As outlined in section 3.7, I include dummy variables indicating whether postal areas were located in marginal, fairly safe, or safe seats in 1983 and 1984.

When median income is employed as the dependent variable, only one dummy – denoting postal areas which were in safe districts in 1983 and in fairly safe districts in 1984 – is statistically significant in each of the four years. This result, however, is not replicated in the regressions which use mean income as the dependent variable. Similarly, while the dummy denoting postal areas in safe districts in 1983 and marginal districts in 1984 is consistently significant when mean income is the dependent variable, only one of the corresponding coefficients is significant when median income is used as the dependent variable. Rarely are the dummy variables that indicate that a postal area was in a Labor held district in 1983, or that the postal area was in a district which changed hands, significant. In all, these results which employ dummy variables, like the results which use a continuous measure of marginality, show no consistent relationship between changed marginality and subsequent economic outcomes.

Table 10 Dependent variable: Median or mean income. With controls.[10]

	(1) 1996	(2) 2001	(3) 2006	(4) 2011	(5) 2016
Panel A: Median income					
marg_83_marg_84		-16.06***	-9.72	-11.39	-17.28
		(5.69)	(6.74)	(9.96)	(10.63)
f_safe_83_f_safe_84		-18.88**	-16.37*	1.62	-14.98
		(7.44)	(8.88)	(13.12)	(13.87)
marg_83_f_safe_84		-6.20	-8.14	7.01	11.78
		(7.12)	(8.59)	(12.59)	(13.33)
marg_83_safe_84		-18.31*	-17.82	-10.24	-25.42
		(9.98)	(11.68)	(17.42)	(18.40)
f_safe_83_marg_84		-0.18 (6.22)	2.70	19.51*	6.79
			(7.45)	(10.96)	(11.65)
f_safe_83_safe_84		4.59	6.88	33.98***	14.00
		(5.83)	(6.96)	(10.37)	(10.91)
Safe_83_marg_84		5.89	17.90*	25.69*	22.64
		(7.92)	(9.37)	(13.76)	(14.66)
safe_83_f_safe_84		18.89*	13.98017	37.30***	43.45***
		(7.58)	(9.06)	(13.65)	(14.17)
ALP_winner_83		4.33	-1.04	30.73***	17.84**
		(4.04)	(4.79)	(7.09)	(7.53)
change_hands		2.57	-8.53	-2.48	16.91*
		(4.77)	(5.68)	(8.42)	(8.91)
Observations		2170	2140	2074	2206
R-squared		.4721	.5696	.5074	.4694
Panel B: Mean income					
marg_83_marg_84	-13.47**	-5.06	37.99**	15.69	13.03
	(5.82)	(8.67)	(16.02)	(14.71)	(18.84)
f_safe_83_f_safe_84	6.12	-1.47	15.69	36.44*	2.78
	(7.85)	(11.71)	(21.59)	(19.84)	(25.41)
marg_83_f_safe_84	0.51	-11.67	18.46**	45.86**	9.36
	(7.52)	(11.24)	(20.90)	(18.99)	(24.73)
marg_83_safe_84	-11.01	7.08	20.87	27.11	16.26
	(10.67)	(15.91)	(29.74)	(25.96)	(32.72)
f_safe_83_marg_84	5.36	9.38	60.68***	57.90***	70.73***
	(6.46)	(9.63)	(17.93)	(16.50)	(20.94)
f_safe_83_safe_84	-12.37**	-5.70	-14.43	2.76	-30.20
	(6.13)	(9.15)	(16.77)	(15.44)	(19.76)
Safe_83_marg_84	21.36**	31.97**	51.32**	52.23*	62.37**
	(8.28)	(12.37)	(22.48)	(20.48)	(26.34)
safe_83_f_safe_84	-2.55	-22.49*	-3.29	-8.89	-0.59
	(8.12)	(12.11)	(22.50)	(20.77)	(26.60)
ALP_winner_83	12.16***	-3.04	35.18***	4.49	-20.92
	(4.20)	(6.27)	(11.55)	(10.63)	(13.54)

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[10] Full results are available from the author on request.

change_hands	-1.52	-5.45	25.89*	-13.72	-29.01*
	(5.00)	(7.44)	(13.75)	(12.72)	(16.27)
Observations	1753	1761	1754	1781	1791
R-squared	.6763	.6407	.5857	.6133	.5845

Note: Standard errors in parentheses. ***, **, and * denote 1%, 5%, and 10% levels.

4.4 Discussion

I find no clear relationship between the exogenous change to the marginality of a postal area incomes in subsequent years. A limitation of this paper is that distributions of discretionary resources are not measured. So, it is possible that discretionary resources are systematically allocated to postal areas which became more marginal or safe as a result of the boundary changes, but that there is no effect on incomes in the years for which highly disaggregated income data is available. But the existing literature suggests that income shocks are highly persistent (Karahan and Ozkan, 2013; Newhouse 2005). Indeed, there are many studies have considered the effects of interventions in previous *centuries* (Dell and Olken, 2017; Acemoglu, Johnson, Robinson, 2002). As such, it seems implausible that, if meaningful changes in resource distributions did occur as a result of the changed boundaries, these distributions had no measurable ongoing effects.

A related limitation is that the pattern of distributions may have changed as a result of the altered boundaries, but that these distributions had no economic effects. For instance, it may be that these distributions resulted in greater cultural activity within an area, such as through grants for the arts. But it seems likely that, if this were the case, there would be direct or indirect financial implications from such distributions. For example, if an area wins a larger share of the arts expenditures, this could be expected to induce greater tourism or migration.

Overall, this paper finds no ongoing impact of large-scale and exogenous changes to electoral boundaries. This is in contrast to existing empirical studies which suggest that discretionary resources are allocated to government-held districts (Leigh 2008) or marginal districts (Danemark 2000; Levitt and Poterba 1999), though marginality is endogenous in these studies. This paper also provides no empirical support for the existing theoretical literature, which suggests that discretionary resources should be systemtically allocated to marginal or safe districts (Ward and John, 1999; Cox and McCubbins, 1986).

6. Conclusion

This paper exploits the substantial and exogenously determined changes to electoral boundaries that occurred between the 1983 and 1984 elections in Australia. This context allows examination of whether political parties redistribute discretionary resources towards marginal districts – which can increase a party's representation in the House of Representatives – or to safe districts so as to 'reward the base'. While others have considered the effects of changed political boundaries, the determination of boundaries in these instances are generally not accepted as apolitical. As such, I argue that, this setting allows stronger causal conclusions to be drawn than is possible from the existing literature. After considering marginality as a continuous as well as discontinuous variable, I conclude that the changed boundaries had no systematic, lasting effect on incomes.

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