TAXATION AND THE RATIONAL THEORY OF SIZE OF GOVERNMENT IN MULTI-ELECTORATE POLITICAL SYSTEMS: THE MEDIAN OF THE MEDIANS IS KING

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ABSTRACT

Standard treatments of the politics of taxation and the determinants of the size of government draw on the median voter theorem, which assumes that the voting population is effectively a single electorate (see, for example, Meltzer and Richard, 1981). However, in a multi-electorate political system such as Australia's, the policy preferred by the median voter of the entire population will not be stable — the bliss point of the overall median voter will not emerge as a Condorcet winner in a series of pairwise multi-electorate contests. Instead, the Condorcet winner is found by identifying the median voter in each separate electorate, arranging these medians in increasing order, then identifying the median of these medians. The policy distance between this 'median of medians' and the overall median can be very large. In other words, it is possible for 'extreme' policies to emerge as political equilibria. The article discusses the implications of these results for political competition, taxation policy and the size of government.

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I INTRODUCTION

The relative economic size of government in Australia has increased by about a factor of six since Federation (Figure 1). What main factors are likely to have caused this growth? A range of explanations have been proposed in the literature.[1] For example, Wagner's Law argues that the income elasticity of publicly provided goods exceeds unity, so that the relative size of government will tend to grow as societies become wealthier. Another strand of literature argues that relative costs tend to rise in the public sector (for example, in health and education), and that this relatively low productivity growth — combined with inelastic demand for publicly provided goods — leads to a growing share of government spending in national income (this is known as the Baumol effect).

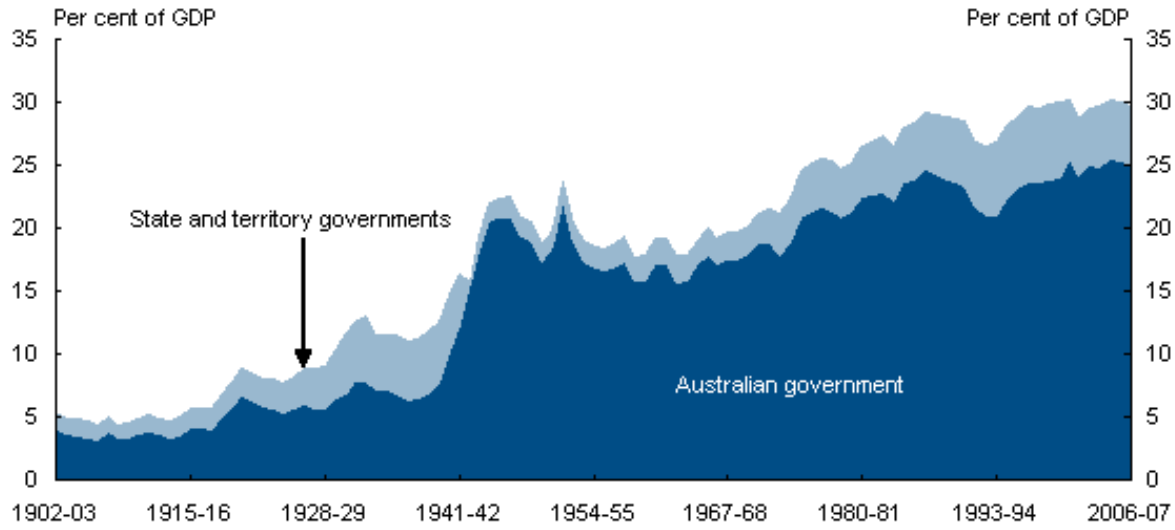

Figure 1: Government Taxation as a Share of GDP, Australia 190 007

Source: AFTS (2008) Architecture of Australia's Tax and Transfer System, Figure 4.1.

Both explanations focus on the demand and supply-side properties of government-supplied goods and services. A third stream of literature focuses on the effect of electoral institutions on the allocation of resources.[2] Within this literature, a number of papers, beginning with Meltzer and Richard,[3] examine government's role as a redistributor of income (either by direct cash payments or by redistribution in kind), and argue that in democracies the amount of redistribution (and therefore the relative

1 The literature is surveyed and summarised in Dennis C Mueller, *Public Choice III* (Cambridge University Press, 3rd ed, 2003).

2 The classic references are Howard R Bowen, 'The Interpretation of Voting in the Allocation of Resources' (1943) 58(1) *Quarterly Journal of Economics*, 27; Theodore Bergstrom, 'When Does Majority Rule Supply Public Goods Efficiently?' (1979) *Scandinavian Journal of Economics* 216; and Theodore Bergstrom, 'Do Governments Spend too Much?' (1979) 32(2) *National Tax Journal,* 81.

3 Allan H Meltzer and Scott F Richard, 'A Rational Theory of the Size of Government' (1981) 89 *Journal of Political Economy* 914.

size of government) will tend, ceteris paribus, to increase as the relative productivity of the median voter declines.[4] Specifically, Meltzer and Richard argue that:

> The principal reasons for increased size of government … are extensions of the franchise that change the position of the decisive voter in the income distribution and changes in relative productivity. An increase in mean income relative to the income of the decisive voter increases the size of government.[5]

In the Meltzer–Richard approach the 'decisive voter' is synonymous with the median voter of the overall voting population. As this median voter becomes relatively less productive and earns less income relative to the average income earner, their gains from redistribution increase, while the personal costs of redistribution decline. Hence, assuming that the productivity of the median voter has declined over time, it follows that they will be willing to impose higher rates of taxation on the rest of the population. As a result, tax rates and the size of government (as measured by the amount of redistribution) will tend to rise over time due to these majoritarian electoral forces.

However, even the most casual follower of Australian politics would be familiar with the tendency of politicians to appeal to the narrow interests of voters in a small number of marginal electorates, rather than putting forward policies preferred by the majority of the population as a whole. Thus, although the data in Figure 1 suggests that the amount of redistribution undertaken by Australian governments has certainly increased over time, it raises a number of questions for the Meltzer–Richard approach. In particular, the data suggest that the greatest increase in the size of government occurred during the Second World War (and this increase was not reversed); the size of government also jumped in the early 1970s. Did the majority of voters in Australia become relatively less productive during these periods — or are there other, more plausible explanations of the historical evolution of aggregate taxation and spending?

This article examines the role of one of the key assumptions of Meltzer and Richard's analysis: the assumption that the relevant electorate is the entire voting population (ie there is effectively a single electorate). The analysis demonstrates that even if all other assumptions of the standard median voter theorem hold, in a multi-electorate political system such as Australia's (in which the winner must gain a majority of votes in a majority of electorates), the equilibrium policy can differ dramatically from the policy preferred by the overall majority. The implication of this result is that a fall in the relative productivity of the median voter is neither necessary nor sufficient for taxation and the size of government to increase over time. If we are seeking to explain the increase in the size of government in Australia, looking at the productivity of the overall median voter is unlikely to be very helpful.

The basis of this critique is not new, but appears to have been ignored in most studies which have used the median voter theorem as the basis for predictions regarding

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4 See also Allan H Meltzer and Scott F Richard, 'Why Government Grows (and Grows) in a Democracy' (1978) 52 *Public Interest* 111 and Allan H Meltzer and Scott F Richard, 'Tests of A Rational Theory of the Size of Government' (1983) 41 *Public Choice* 403.

5 Meltzer and Richard above n 3, 914.

political equilibrium. In particular, Hinich and Ordeshook[6] studied the median voter theorem in the context of the US Electoral College, and argue that candidates will converge on the policy chosen by the median voter in the median state, where states are ranked in increasing order of their Electoral College votes. The above result is therefore a special case of their more general result, applied to the determination of tax rates and the size of government. Although Hinich and Ordeshook's result was published many years before the Meltzer–Richard paper and other political analyses of tax policy, the main lessons of Hinich and Ordeshook appear to have been largely ignored in many applied settings.

II THE MELTZER–RICHARD RESULT

A *Synopsis of the Meltzer–Richard Model*

Meltzer and Richard study a single electorate with many voters, each of whom has preferences for consumption and leisure.[7] Wage income is assumed to be taxed at a constant rate for all individuals. They show that for any given tax rate, an individual will, under a particular set of assumptions, work a longer number of hours if their productivity is higher.[8] Moreover, individuals who work longer hours prefer lower tax rates. And since there is an increasing, one-to-one relationship between hours worked and productivity, more productive individuals will prefer lower tax rates. Finally, they are able to demonstrate that under their assumptions, preferences over tax rates are single-peaked, so that the conditions of the standard median voter theorem is satisfied. Hence, in a single electorate, τ^m, the tax rate preferred by the median voter has the property that it cannot be defeated in a pairwise majority election against any other alternative.[9]

The proof of the median voter in the context of taxation is straightforward and well known. Rowley and Schneider[10] explain it as follows:

> This tax rate and the implied subsidy level maximise the welfare of the median voter – the voters preferred tax rate is that the median of those most desired by each voter … If the median voter's income is below the average, the median voter demands and receives a positive tax rate and corresponding subsidy.

To see the argument more formally, suppose there was a majority voting contest between τ^m and any other tax rate, τ'. Suppose further, without loss of generality, that

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6 Melvin J Hinich and Peter C Ordeshook, 'The Electoral College: A Spatial Analysis' (1974) 1(3) *Political Methodology* 1.

7 Torsten Persson and Guido Tabellini, *Political Economics: Explaining Economic Policy* (MIT Press, 2000) 118–21 set out a simple version of the Meltzer–Richard model.

8 One assumption that produces this result is that an increase in productivity is equivalent to an increase in the amount of effective time available to a worker. An increase in effective time then leads to an increase in both the number of hours worked and the number of hours of leisure consumed.

9 In the language of social choice theory, the tax rate preferred by the median voter is a *Condorcet winner*.

10 Charles K Rowley and Friedrich Schneider (eds) *Encyclopedia of Public Choice* (Kluwer, 2004) 178.

$\tau' > \tau^m$. Since τ^m is the policy preferred by the median voter and since all voters with productivity greater than the median will prefer τ^m to $\tau' > \tau^m$, it follows that more than half the voting population will prefer τ^m to $\tau' > \tau^m$. Hence τ^m will defeat τ' in a pairwise majority contest. Since this argument holds for any $\tau' \neq \tau^m$, it follows that τ^m is the Condorcet winner.

The implications of this result for policies proposed under two-party Downsian political competition[11] are also straightforward. In a plurality (simple majority) contest between two candidates or political parties whose only objective when choosing policy platforms is electoral victory, there is a unique Nash equilibrium. In this equilibrium, both candidates will choose τ^m, the tax rate preferred by the median voter. Hence the tax rate that will emerge in a political contest will be that which is preferred by the individual with the median level of productivity.

These results can be applied to explain changes in the size of government and overall taxation. As the voting population changes, the distribution of productivity levels in the voting population also is also likely to change. In particular, if the relative productivity (and hours worked) of the median voter declines, the equilibrium tax rate, as well as the size of government should, *ceteris paribus*, also increase. The main contention of Meltzer and Richard is that the relative productivity of the median voter has declined, and that this was one of the main drivers of the increase in the amount of redistribution and the size of government over the last century. The empirical prediction of this model for Australia is very clear: the model hypothesises that the increase in the size of government shown in Figure 1 above has been driven, in large part, by a decline in the relative productivity of the median voter.

B *A Problem with the Meltzer–Richard Explanation*

One possible problem with the standard Meltzer–Richard explanation is that it relies on the median voter theorem, which states that under certain institutional arrangements (and under the assumptions of a unidimensional policy space and single-peaked voter preferences), the policy chosen by the median voter will be a Condorcet winner (ie will remain undefeated in a series of pairwise majority voting contests against all other alternatives). Clearly Australia's electoral institutions are far richer than those envisaged by the simple median voter theorem — but exactly how do our voting arrangements affect the predictions of the standard result?

The assumption of a single electorate is crucial to the result. To see why, consider the following simple numerical example. Suppose there are three electorates with seven voters in each electorate. The policy space is assumed to be unidimensional, and voters have single-peaked preferences. Voter bliss points are set out in Table 1 below. Now suppose that there is an election between two candidates, A and B. The winner must gain a majority of votes in a majority (ie at least two) electorates. Suppose that candidate A, in accordance with the predictions of the standard median voter theorem, proposes the policy preferred by the overall median voter (5) as the policy they will implement. Then candidate B will defeat candidate A by proposing policy 6.5. To see

11 See Anthony Downs, *An Economic Theory of Democracy* (Harper & Row, 1957).

this, note that although a majority of voters in electorate 1 will prefer policy 5 to 6.5, voters in electorates 2 and 3 will prefer policy 6.5 to 5. Hence the overall median is not a political equilibrium in this example, and party B could win the election by proposing a policy that differs from the overall median for the entire population, provided that the policy proposed appeals to a majority of voters in a majority of electorates.

Table 1: Failure of the Median Voter Theorem in a Multi-Electorate System

	Electorate 1	Electorate 2	Electorate 3
	1	1	1
	2	2	2
	3	3	3
	5	6	7
	5	9	7
	6	10	8
	7	11	9
Median in Each Electorate	**5**	**6**	**7**
Median of Entire Population	**5**		

Note that in this multi-electorate political system, a policy is a Condorcet winner if it cannot be defeated by any other alternative in a series of pairwise multi-electorate majority contests. The unique Condorcet winner in the example in Table 1 is 6. As a general rule, in such voting systems the policy preferred by the median voter of the entire population will not be a Condorcet winner. And, as a result, under Downsian competition between two parties, the standard median voter theorem fails to hold. In the next section we extend the Meltzer–Richard result to a multi-electorate system and explore the implications for redistribution, taxation and the size of government.

III EQUILIBRIUM TAX RATES IN A MULTI-ELECTORATE POLITICAL SYSTEM

In contrast to the single-electorate setting envisaged by Meltzer and Richard, Australia has a multi-electorate system. Parties are elected to government only if they are able to obtain a majority of votes in a majority of electorates. This section argues that the Meltzer–Richard result is not generalisable if political institutions are such that equilibrium policies must be supported by a majority of voters in a majority of electorates.

To see this in the standard Meltzer–Richard framework, assume that there are $j = 1, \ldots, J$ electorates of equal size. In each electorate we assume there is a continuum of voters. Normalise the mass of each electorate to 1. Hence the size of the total voting population is J. To find the Condorcet winning tax rate in this case, in each electorate j, arrange voters in increasing order of preferences over taxation. Then let τ^{mj} be the preferred policy of the median voter in electorate j. Now arrange these medians in increasing order, and let τ^{mm} be the median of these medians. Call the electorate in which this voter is located the median electorate. If there are J electorates then τ^{mj}, the

tax rate preferred by the median voter in the median electorate is the unique Condorcet winner.

To see why this must be the case, we follow the reasoning use earlier to explain the Meltzer–Richard analysis. Suppose there is a pairwise contest between τ^{mm} and any other tax rate, τ', and suppose, without loss of generality, that $\tau' > \tau^{mm}$. Since τ^{mm} is the policy preferred by the median voter in the median electorate, all voters in the median electorate with productivity higher than the median will prefer τ^{mm} to $\tau' > \tau^{mm}$. Moreover, since τ^{mm} is the policy preferred by the median voter in the median electorate, a majority of voters in all electorates to the left of the median electorate will prefer support more than all voters in the median electorate with productivity below the median will prefer τ^{mm} to $\tau' > \tau^{mm}$. In other words, τ^{mm} will win majority of votes in a majority of electorates against $\tau' > \tau^{mm}$. Since this argument holds for any $\tau' \neq \tau^{mm}$, it follows that τ^{mm} is the Condorcet winning tax rate.

The argument is illustrated diagrammatically in Figure 2 below, where we have assumed that there are five electorates and that electorate 3 is the median electorate. We claim that τ^{3m}, the tax rate preferred by the median voter in electorate 3, is the unique Condorcet winner. To see why, consider $\tau' > \tau^{3m}$. By construction of the medians in each electorate, more than half the voters in electorates 1, 2 and 3 will prefer τ^{3m} to τ'. Hence τ^{3m} must defeat τ' in a pairwise multi-electorate contest.

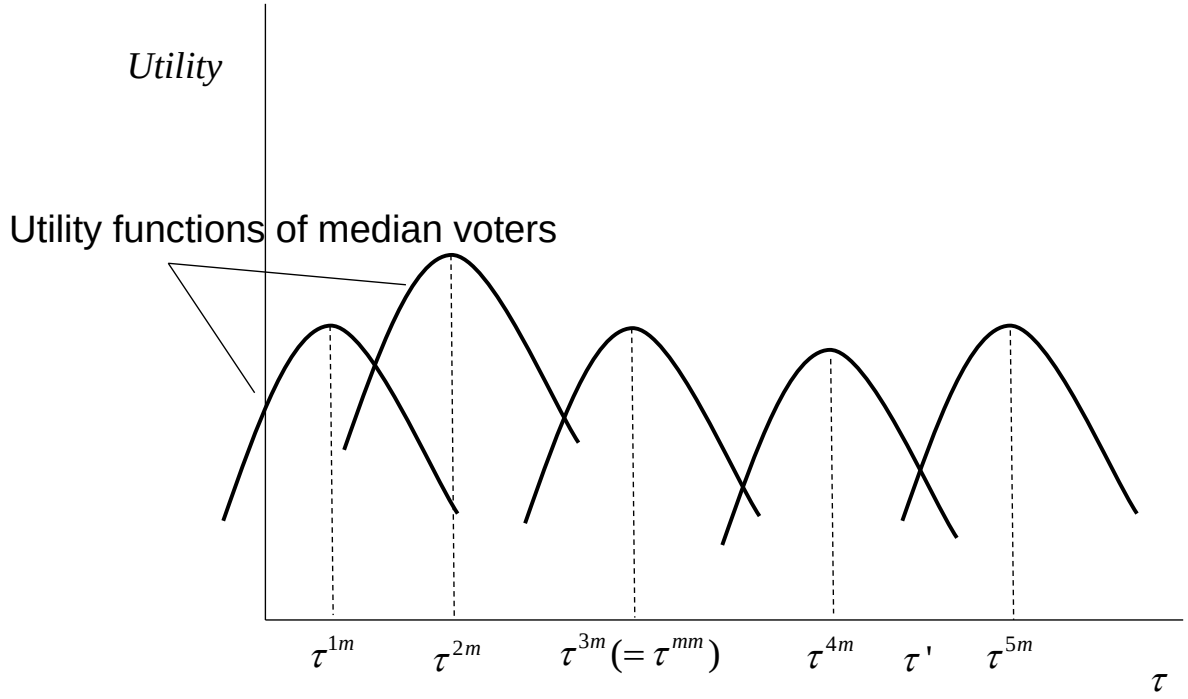

Figure 2: The Median of the Medians is King

IV IMPLICATIONS FOR THE RATIONAL THEORY OF THE SIZE OF THE SIZE OF GOVERNMENT

A *Instability of the Overall Median*

How does this compare with the standard result which seeks to explain changes in the size of government? One immediate implication is that if τ^m is the policy preferred by the median of the overall population of voters, then in general, $\tau^m \neq \tau^{mm}$. Moreover, τ^{mm} will defeat τ^m in a pairwise multi-electorate contest. In other words, in a multi-electorate system, the tax rate preferred by the overall median voter is not politically stable.

This result also has interesting implications for the choice of tax platforms in a political contest between national candidates or political parties in a multi-electorate system. In particular, since τ^{mm} is a Condorcet winner, in a contest between two parties both will choose this tax rate, rather than τ^m. Again, this happens because of the institutions in which voting actually takes place – since voters are split into electorates, the popular vote is irrelevant to individual candidate incentives, and this affects candidate policy behaviour.

To confirm that τ^{mm} is a Nash equilibrium, suppose that both candidates choose it as a policy platform. Then they each have an equal chance of winning the election. If either candidate deviated from this choice while the other continues to propose τ^{mm}, the candidate that continues to propose τ^{mm} would win the support of a majority of voters in a majority of electorates and so would win the electoral contest with certainty. Hence any deviation from τ^{mm} cannot improve a candidate's payoff. Hence τ^{mm} is a Nash equilibrium. To see that τ^{mm} is unique, note that if one the candidates chooses $\tau' \neq \tau^{mm}$, the other could always propose τ^{mm} and win. Hence there is no other equilibrium.

The practical implication of this result is clear: in designing tax policy, politicians will have an incentive to appeal to a narrow set of voters in the median or marginal electorate, rather than targeting policies preferred by the majority of the overall population. As a consequence, for multi-electorate systems, empirical predictions regarding tax rates which are based on the standard median voter model will, in general, almost certainly be wrong — even if we assume that all of the standard assumptions of the median voter theorem hold. The simple lesson is that in multi-electorate systems, the size of government will be determined by the amount of redistribution desired by the median voter in the median electorate, not by the level of redistribution desired by the median voter of the overall population.

B *Policy Extremism*

An important characteristic of standard median voter results is that equilibrium policies cannot be 'extreme' – parties locate in the middle of the overall distribution of voter preferences, and any deviation from this means certain defeat. In contrast, a second important lesson from our analysis of multi-electorate systems – and one that is more disturbing — is that 'extreme' policies (ie policies located far away from the preferred point of the overall median of the population) may emerge as equilibria in political competition in multi-electorate systems.

Consider, for example, our earlier example with three electorates. In that example, the median of the medians was 6, which was not that far from 5, the overall median. This example can be changed in a relatively minor and seemingly innocuous way to generate an 'extreme' policy as an equilibrium. This is shown in Table 2 below. In this table, only the cells in red have been changed. The overall median, as in the earlier example, is 5. However, the median voters in electorates 2 and 3 are now 'extreme' in the sense that their preferred policy differs markedly from that preferred by the overall median. The median of the medians is now 8, which is on the far right fringe of the policy space.

Table 2: Modification of the Example in Table 1

	Electorate 1	Electorate 2	Electorate 3
	1	1	1
	2	2	2
	3	3	3
	5	**9**	**8**
	5	9	**8**
	6	10	9
	7	11	9
Median in Each Electorate	**5**	**9**	**8**
Median of Entire Population	**5**		

In other words, a majority of voters oppose the Condorcet winner in this example, but because the preferences of 'extreme' electorates must be respected, this can happen in equilibrium. A natural question is: just how 'extreme' can political equilibria get? We can modify the above example to show that in principle, just about anything is possible. Consider Table 3 below, for example. In this example, the overall median is still 5 but the median voter in the median electorate prefers the policy of 499, which is very far from the median.

Table 3: Modification of the Example in Table 2

	Electorate 1	Electorate 2	Electorate 3
	1	1	1
	2	1	1
	3	1	1
	5	500	499
	5	500	499
	6	500	499
	7	500	499
Median in Each Electorate	**5**	**500**	**499**
Median of Entire Population	**5**		

Thus, depending on the preferences of voters, and their distribution among electorates, in a multi-electorate system 'extreme' policies (those that are a long distance from the overall median) can emerge as political equilibria.

In particular, a key implication of this observation is that the overall median and the median of the medians could move in completely different directions, with different implications for political equilibria and the size of government. In other words, the overall median voter is likely to be largely irrelevant for determining the political direction of tax policy — in a multi-electorate system such as Australia's, a fall in the productivity of the overall median voter is neither necessary nor sufficient to generate an increase in tax rates or the size of government. Even if all other restrictive assumptions of the standard median voter theorem hold, the theory has little — if any – hope of explaining changes in the size of government over time in constitutional democracies where governments are elected on the basis of a majority of voters in a majority of electorates.

V CONCLUSION

The notion that a fall in the relative productivity of the overall median voter has been a key driver of observed growth in the size of government is a popular one in the public choice literature, but it does not sit well with reality, at least in Australia. Politicians in Australia have an incentive to target voters in marginal electorates — not the median voter in the overall population. This paper has examined the equilibrium determination of tax rates in a standard median voter model under the more realistic assumption that there is more than one electorate. Assuming a unidimensional policy space, and in contrast to the standard Meltzer–Richard result, we showed that the Condorcet winning tax rate is found not by finding the overall median, but is determined by identifying the median voter in each separate electorate, arranging these medians in increasing order, and then identifying the median of these medians. This tax rate will, in general, be very different from the tax rate preferred by the overall median.

The paper also developed a series of simple examples which demonstrate that the policy distance between this 'median of medians' and the overall median can be very large; in other words, it is possible for extreme policies to emerge as equilibria. Hence, in multi-electorate political systems such as Australia's, where governments are elected on the basis of a majority of voters in a majority of electorates, the overall median is at best irrelevant, and is likely to be a poor predictor of equilibrium tax rates and the evolution of the size of government spending over time.

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