STV in Malta: A crisis?

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Abstract

Malta is one of the relatively few countries that uses the Single Transferable Vote Method for its General and Local Council elections and even to elect its representatives in the European Parliament. Since at least the election of 1981 the method has encountered serious problems because it did not deliver as the winning party the one which had the nation-wide majority of first preference votes. Subsequent constitutional amendments have tried to address the problem. In this article we review the situation and propose solutions which address the incongruence between the results delivered by the system and what the Maltese electorate perceives its voting intention to have been in terms of first preference votes cast. We illustrate our proposed solutions by working out what results they would have given on some past general elections in Malta. We believe that finding a satisfactory answer to the problems which the Single Transferable Vote has faced in Maltese general elections is important not only for Malta but also for anyone who is interested in seeing the system gain more support.

1   Background

STV was introduced in Malta in 1921 by Leopold Amery, who then handled Maltese constitutional issues on behalf of the Secretary of State. He was encouraged to do so by Viscount Alfred Milner who was an honorary member of the then Proportional Representation Society. The Society was well involved in the introduction of STV in Malta as evidenced by the fact that in 1920, Major Morrison Bell from the Proportional Representation Society came to Malta to discuss the workings of the system with the Maltese political leaders who were very reluctant to adopt it. (A full account of the early years of

STV in Malta can be found in [6].) It appears that from early on there were some problems with the system [7, 12, 6], but nevertheless STV remained and it is now considered to be an essential part of the Maltese political scenario. In 1993 Malta had its first Local Council elections and in 2004 its first European Parliament elections [4], and these too were conducted using the STV system. On 8 March 2008 Malta held its 22nd general elections using the Single Transferable Vote system [5].

We take up the story from the General Elections of 1981. These were held in a very politically charged atmosphere and were contested by the two large parties, the Malta Labour Party (MLP) and the Nationalist Party (NP). Nationwide, the NP obtained 114,132 first preference (FP) votes and 31 seats in parliament, and the MLP obtained 105,854 FP votes and the remaining 34 seats [8]. This situation caused a constitutional crisis and threw Malta into five years of political and social turmoil. What happened in 1981 cannot be attributed solely to the STV system but rather to the way the boundaries of the electoral districts were defined.* The NP claimed that these boundaries were the result of a deliberate exercise in gerrymandering, and the perception that the final allocation of seats was engineered was perhaps the main cause of the turmoil that ensued. But whatever the reasons for this result, that period cemented into everyone's minds the importance that the seat distribution in parliament should reflect the nation-wide distribution of FP votes. A result such as that of 1981 is still considered and referred to as a "perverse" result by politicians from all parties, by the electors and by all political commentators in Malta. It is this strong reliance on FP votes which will be the technical issue addressed in this paper.†

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* Malta is divided into thirteen electoral districts. The variation of the number of voters in each district must be within $\pm 5\%$ of the average district size in order to avoid effects due to district sizes. The only exception is the island of Gozo which remains a single district thanks to a recent constitutional amendment providing for an exception to this rule for the island. Each district elects five seats.

† Exhaustive details about the Maltese General Elections

In 1987, the Maltese Parliament approved a constitutional amendment (CA) which laid down that a party which obtains an absolute majority of FP votes but not an absolute majority of seats in parliament would be given the minimum number of top-up seats to enable it to have an absolute majority of the seats in parliament [10, 11]. This amendment had to be invoked in the elections of 1987, 1996 and 2008. The CA went a long way towards setting the minds of the Maltese electorate at rest that elections will yield a fair result. But it did not go far enough for another potential constitutional crisis to be averted. The CA only allowed for top-up seats for the largest party and did not give a majority of seats proportional to the majority of FP votes. But, more seriously, it only catered for the possibility that a party obtains an absolute majority of FP votes. With the emergence of the third small, but not insignificant, *Alternattivà Demokratika* party (AD), the situation where no party obtains a majority of votes was becoming more than a distant possibility. In 2007 the constitution was again amended to cover the possibility of no party obtaining an absolute majority of FP votes but this was only a partial solution [11]. The amendment allows top-up seats to be given to the party with the largest number of FP votes, even if this number is not an absolute majority, only if no more than two parties obtain seats in parliament. One can speculate whether the two large parties agreed on this form of the amendment in order to discourage voting for AD, but there certainly is a technical difficulty in allowing proportionality right down to a possible single seat by a small party, since it is in the very nature of STV that such a seat could be obtained through later preference votes so that basing proportionality of seats on FP votes could necessitate an enormous number of top-up seats.

Whatever the intention of parliament when enacting the 2007 CA, the results of the 2008 elections showed how near Malta was to a repeat of 1981. The NP, MLP and AD obtained, respectively, 143,168, 141,888, and 3,810 FP votes (with 1,634 FP votes going to other smaller parties) and 31, 34 and 0 seats. The CA came into play and the NP was given four top-up seats. But there was great speculation before the elections that, because of the political situation holding in the 10th District, the AD candidate could inherit enough later preference votes to be elected. If that possibility had occurred, we would have had a repeat of 1981. On the other hand,

from 1921 to 2008 can be found in Professor John Lane's website [9]

had some AD candidate obtained a seat due to later preference votes, a naive proportionality based on FP votes would have necessitated around ten top-up seats and it is not impossible that a greater number would be required if a small party obtains an even lower number of FP votes nationwide but elects a seat through later preference votes in one district. Much more serious, perhaps, is that the system encourages tactical voting by the parties. If the MLP had anticipated the result and had wanted to, it could have instructed its members to give second preference (and even some FP) votes to the AD candidate in some district and so losing one of its seats to AD. The 2007 CA would not have been invoked and the MLP would have gained control of parliament with fewer FP votes than the NP.

Clearly, the situation with the 2007 CA is still very unsatisfactory. The smaller parties argue that the system is biased against them because electors feel that it is "dangerous" to vote for a smaller party, even if it is with second or later preference votes, a situation which runs counter to the spirit of STV. And in general, the feeling is that the system does not guarantee a fair reflection of voters' preferences and that it is open to improper practices and gerrymandering. So another constitutional crisis is still a possibility. In fact, following the results of the last election the newly elected Prime Minister declared that it is imperative that Parliament should look into this issue and amend the electoral law. But the potential crisis does not only concern the political situation in Malta. It is also a crisis for STV because should Malta, the first country to adopt STV, decide to abandon the system, it would be quite a blow to this method of conducting elections. We shall try, in this paper, to propose solutions which avert the possibility of another constitutional crisis in Malta while preserving the use of STV.

2 Proposed solutions

One could perhaps rightly argue that the Maltese reliance on FP votes is not compatible with STV. STV is a much more sophisticated system than straightforward proportionality based on FP votes, and the Maltese politicians and voters should adapt themselves to this reality. We believe that although this point of view might be technically correct, it does not address the problem. Reliance on FP votes has now been firmly ingrained in the political mentality in Malta, and it is, after all, not so unnatural especially for the average voter who sees what happens in most other countries in the world. An elec-

toral system should serve to express the electorate's wishes and not the other way round. Insisting that the Maltese public should mend the way they look at STV could lead to a decision to scrap the system entirely. This is an extreme position, and one which we would not like to see happening. Although transfer of votes across parties is very uncommon, it is often clear that the Maltese electorate does send messages to the political parties in the way they transfer their preferences amongst the candidates of the same party. So, the electorate is not completely naive in its use of STV and does express wishes which go beyond the simple choice of which party is to run the country for the following five years. Moreover, if the political situation in Malta were one day to evolve beyond the present dominance by two parties, STV could be a strong tool in the voters' hands to influence better the composition of parliament. It would be a loss for Malta if this sophisticated way of electing representatives were to be discarded.

Our solutions are therefore intended to be simple to apply and understand, to give a final result which best reflects the voters' intentions expressed through FP votes, and to preserve as much as possible the benefits of STV. Basically we are proposing the use of the d'Hondt system* in conjunction with STV. There are two ways of doing this, either using d'Hondt as a pre-processor or using d'Hondt to calculate top-up seats.

2.1 d'Hondt as pre-processor

Suppose there are n parties $P_1, P_2, \ldots, P_n$ who, on a nation-wide basis, obtain $v_1, v_2, \ldots, v_n$ votes respectively.† We assume throughout that $v_1 > v_2 > \ldots > v_n$. Suppose that S seats are to be elected. The d'Hondt system is first used to determine how these seats are partitioned amongst the n parties. This can be simply done by constructing an $r \times n$ matrix H whose first row is the vector $(v_1, v_2, \ldots, v_n)$ and the ith row is the vector $\left(\frac{v_1}{i}, \frac{v_2}{i}, \ldots, \frac{v_n}{i}\right)$. The number r is taken to be the smallest number such that adding any more rows will not change the positions of the S largest en-

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* One can use other variations of d'Hondt, like Sainte–Laguë, but we present our workings with the d'Hondt system because we think it is simpler to follow.

† The method we present in this section was proposed by one of the authors in 1994 in two reports to the Gonzi Commission set up to review the Maltese electoral system. Although there seemed to be a general positive attitude towards the proposal, it was eventually never taken up. A similar system but with districts returning one seat each is described in [1]. More details about the Gonzi Commission and the proposals presented to it can be found in [9]

tries of the matrix H. Then, the number of seats allocated to party P_i will be equal to the number of entries amongst the largest S which lie in column i. An example of this procedure for the Maltese General Elections of 2008 is shown in Table 1.1.

Table 1.1: *Phase 1 of the d'Hondt pre-processing for the Maltese General Elections of 2008. The quotients which give an elected candidate are marked with an asterisk. The smallest of these entries is marked with two asterisks and is essentially equal to the quota of a single seat. The number of seats assigned are therefore 33 for the NP, 32 for the MLP and no seats for any of the other parties.*

	NP	MLP	AD	Others
1	143468*	141888*	3810	1633
2	71734*	70944*	1905	817
3	47823*	47296*	1270	544
4	35867*	35472*	953	408
5	28694*	28378*	762	327
6	23911*	23648*		
7	20495*	20270*		
8	17934*	17736*		
9	15941*	15765*		
10	14347*	14189*		
11	13043*	12899*		
12	11956*	11824*		
13	11036*	10914*		
14	10248*	10135*		
15	9565*	9459*		
16	8967*	8868*		
17	8439*	8346*		
18	7970*	7883*		
19	7551*	7468*		
20	7173*	7094*		
21	6832*	6757*		
22	6521*	6449*		
23	6238*	6169*		
24	5978*	5912*		
25	5739*	5676*		
26	5518*	5457*		
27	5314*	5255*		
28	5124*	5067*		
29	4947*	4893*		
30	4782*	4730*		
31	4628*	4577*		
32	4483*	4434*		
33	4348**	4300		
34	4220	4173		
35	4099	4054		
36	3985	3941		
37	3878	3835		
38	3775	3747		

The second phase of the pre-processing consists

in allocating the seats obtained by each party to the respective districts. One straightforward way to do this is to allocate first the seats of the largest party according to the percentage of votes it obtains in each district. These seats are then removed from the number available in the districts, and the process continues with the next party right down to the smallest party which has been allocated seats. In simulations carried out with Maltese General Election results of past years it was found that this does not always give satisfactory results [2]. It can happen, for example, that a single seat obtained by a small party is not allocated to that district in which the party has obtained the highest percentage of votes. This happens because when seats are distributed party-wise, all the seats of a given party will have a higher priority over the choice of district than any seat of a smaller party. It could therefore happen that a seat which was marginal for the larger party could be assigned to a district which should have been assigned to a less marginal seat of a smaller party.

To try and get round this problem we follow the proposal put forward in [3]. We specify what we call the d'Hondt priority queue Q which determines the order in which the S seats are to be allocated to the respective parties. This is an ordered list of S numbers each in $\{1, 2, \ldots, n\}$ such that if the ith entry in Q is j that the ith seat should go to party P_j. The entries in Q are very simply determined from the table constructed during the first phase. The queue Q records the order of the parties according to the descending order of the quotients in the matrix H. An example of the d'Hondt priority queue corresponding to Table 1.1 is shown in Table 1.2, where instead of the numbers 1,2 as entries in the queue we give the abbreviations NP and MLP. *(The remaining tables are at the end of this article - Ed.)*

Having determined Q, the third and final pre-processing phase allocates the seats to the parties in the respective electoral districts following the order established by Q. This is done as follows. Suppose there are d districts and each district returns k seats (in Malta, $d = 13$ and $k = 5$). Then for each party P_i which has been allocated at least one seat in the first phase create a $k \times d$ matrix D_i whose first row is the percentage of FP votes obtained by the party in the respective districts. The jth row of the matrix D_i equals the first row divided by j. The seats are then allocated as follows. If the first entry of the priority queue Q is i then locate the largest entry in the matrix D_i and give a seat to party P_i in the district corresponding to the column where this largest entry lies. Having allocated the first $j - 1$ seats, if

the jth entry in the priority queue Q is i then the jth seat will be given to party P_i and the district is determined by locating in which column (district) of D_i lies the largest entry which does not correspond to an already assigned seat.

The two matrices D_1, D_2 corresponding to the two parties NP and MLP in the Maltese General Elections of 2008 are shown in Tables 1.3 and 1.4. The tables give the quotients and also, where applicable, the corresponding order (in brackets) in which that quotient yielded a seat for the party.

Having allocated the number of seats each party obtains in each district, the process continues as usual using the STV system with the one proviso that as soon as a party elects all its seats in a particular district, ballots for the remaining candidates of that party are eliminated and their votes are distributed according to their later preferences. From simulations carried out in [2, 3] using the d'Hondt priority queue this way gives an allocation of seats to the parties which reflects better their performance in the respective districts.

In Table 1.5 we show the number of seats and FP votes obtained by different parties in different elections held in Malta without and with (where applicable) the CA, and the number of seats they would have obtained using the modified system we are proposing here.

This method has the advantage that it is simple to apply and understand, it reflects the opinion of an electorate which gives prime importance to FP votes, it quickly gives the result of the election, namely, which party or coalition of parties will lead parliament, and it removes the threat of gerrymandering or any other practice which could be perceived to be an abuse of the electoral process. It also gives smaller parties which do not manage to obtain a quota in a single district but which receive a significant nation-wide support the possibility of gaining a seat in Parliament (Table 1.5 shows that in 1992 AD would have obtained a seat with this method). Its main disadvantage is that it does not make it possible for the smaller parties to obtain seats on the strength of second or later preference votes. To cater for this possibility we propose a second method of using the d'Hondt system to supplement the STV.

2.2 d'Hondt as post-processor

Here we first count the ballots and elect candidates in the usual manner. As before, we assume that there are n parties $P_1, P_2, \ldots, P_n$ who obtain $v_1, v_2, \ldots, v_n$ FP votes, in non-increasing order, and we suppose that the respective seats elected by the

parties in the normal STV election are $s_1, s_2, \ldots, s_n$ (where some s_i could be zero). We shall now use the d'Hondt method on the FP votes as above to calculate the number of seats $d_1, d_2, \ldots, d_n$ to be allocated to the respective parties. The final number of seats party P_i wins will be the larger of s_i or d_i. The question now is: how large should the d_i be, and to what extent is proportionality with FP votes to be guaranteed? As we have already mentioned, insisting on strict proportionality right down to the last seat obtained by the smallest party could lead to an enormous number of top-up seats, especially if some seats were obtained with few FP votes but several later preference votes. We therefore proceed this way.

First of all, let us define the total number of seats allocated to party P_i to be $T_i = \max\{s_i, d_i\}$. It could very well happen that $s_i = d_i$ and therefore party P_i receives no top-up seat. But it could also happen that $s_i > d_i$ because the d'Hondt method is based on FP votes and party P_i could have won seats thanks to later preference votes. In this case also, P_i gets no top-up seats. Top-up seats are only gained if $d_i > s_i$. We then employ the following heuristic criterion. The d'Hondt method will be continued until M seats are allocated to all parties, where M is the smallest number such that the total number of seats $T_1, T_2, \ldots, T_n$ obtained by the respective parties satisfy:

1. $T_1 > T_2 \geq T_3 \geq \ldots \geq T_n$; and

2. if $v_1 > \sum_{i=2}^{n} v_i$ then $T_1 > \sum_{i=2}^{n} T_i$.

The number of top-up seats given to each party will then be $T_i - s_i$ provided this difference is positive, otherwise the party gets no top-up seats.

Since the number of top-up seats will be relatively small in comparison with the total number of seats T_i, the way they are allocated amongst party candidates is not very critical in our view. They could be given to the candidates who are left "hanging" from the first phase and who end up with the largest number of votes, or they could be assigned according to some pre-declared party lists.

We again use the results of the 2008 election to illustrate the method. We have seen that in this election the NP, the MLP and the AD obtained 143,468, 141,888 and 3810 FP votes, respectively. STV actually gave 31 seats to the NP, 34 seats to the MLP and no seats to the AD. To restore proportionality the CA had to be invoked to give four seats to the NP. In our proposal, the d'Hondt method will be used to determine the number of seats the parties should obtain

according to the above criterion. This is the same working as in Table 1.1, but now we might need to go down more rows in the matrix H in order to allocate the Mth seat. Referring to Table 1.1 we see that we need to go down to the 35th row, giving 35 seats to the NP, 34 seats to the MLP, and no seats to the other parties, and this turns out in this case to be identical to the top-up effected through the CA.

But a better test of this method is when one party obtains more than a half of the FP votes cast and the STV election does not give it a majority of seats. The situation is made even more interesting if another party obtains seats thanks to second or later preference votes. So let us take the following as a hypothetical example. Suppose parties A, B and C get 148,308 (51%), 140,000 and 2,492 FP votes respectively, and that the STV election gives them 31, 33, and 1 seat, respectively. Therefore a correction is required since party A has an absolute majority of FP votes. This correction should give party A at least one more seat than parties B and C together. Moreover, the low number of votes obtained by party C indicates that its one seat has been obtained thanks to later preference votes. The d'Hondt table for this hypothetical election is given in Table 1.6. From this table we see that we need to stop at line 35 of the d'Hondt table, for this is the first instance which gives a distribution of seats satisfying the above criteria. Stopping at line 35 and taking the largest 69 entries in the matrix gives Party A 35 seats, Party B 33 seats and Party C no seats. Combining this with the one seat obtained in the STV election by Party C gives a distribution of 35, 33 and 1 seat. Therefore Party A has to be given four top-up seats and no top-up seats for the other parties. The final result gives an absolute majority of seats to Party A corresponding to its absolute majority of FP votes.

Note that if, in this hypothetical election, Party C had obtained two instead of one seat in the STV election, then we would have had to go down to row 36 and allocate seats corresponding to the 71 largest entries in the matrix. This would have given a total distribution of seats to parties A, B and C of 36, 33 and 2. The number of top-up seats would therefore be 5 to Party A and none to the other parties.

Finally, as in Table 1.5 we give in Table 1.7 a comparison between the results obtained by this method and the actual results of the Maltese General Elections since 1987.

This second method probably preserves better the nature and spirit of STV. From the point of view of the smaller parties, it retains both the possibility of allocating seats on the basis of a nation-wide total

number of FP votes and also on the basis of second or later preference votes. One can even consider modifying the nature of the votes $v_1, v_2, \ldots, v_n$ on which it is based to make it respect better the spirit of STV. For example, instead of taking them to be the respective parties' FP votes one could take the ballots remaining after the first phase using STV and letting v_i be the number of candidates of party i which appear as the highest candidate in these remaining ballots. This, however, has the disadvantage of delaying the declaration of the final result. In a country like Malta, where a 93% voting turn-out is considered surprisingly low compared to other years, and where everything almost comes to a standstill awaiting the outcome of the elections, an inordinate delay in knowing the result of the general elections can cause political tension and this is not an issue which should be ignored. Also, with such a choice for the v_i, there would be the risk of having a result which does not reflect the parties' FP votes, which goes against the point of this exercise in the first place.

The main disadvantage of this method is that, since it allows small parties to get seats with later preference votes and therefore possibly with a low overall total of FP votes, the number of top-up seats might be too large. However, in the present political context in Malta this does not seem to be a very likely possibility. And even if we go further back in Malta's electoral history when the present two-party dominance had not yet been established, we would find that the occurrence of a small party winning seats despite having a small number of FP votes is very rare indeed. The only time it happened was in 1947 when the Jones Party obtained two seats with 3664 FP votes, an average of 1832 FP votes per seat, and the Gozo Party obtained three seats with 5491 FP votes, an average of 1830 FP votes per seat [9]. But in 1947 there were 105,494 voters to elect 40 seats (an average of 2637 voters per seat) whereas in the last general elections the average number of voters for each of the 65 seats was 4475. Therefore although the method dealt with a scenario like the second hypothetical election above quite well, it nevertheless seems that such a situation with a party obtaining two STV seat with 2492 FP votes or even less is not very likely to occur.

Applying this method would therefore seem to give very reasonable results which respect the electorate's wish for proportionality with FP vote and at the same time does not penalise the smaller parties. Table 1.8 summarises the results which this method would have given for the Maltese general elections since 1987 and compares them with the results given

using the CA.

3 Conclusion

Arithmetic alone cannot determine which is the fairest election method. Other considerations are important, not the least being the electorate's expectation of what its vote is supposed to mean. We believe that the two related methods we are proposing in this paper give a good compromise between the aims of the STV system and the expectations of an electorate that FP votes should determine who is to run government for the subsequent five years. Choosing between these two systems is, in our opinion, a political choice between two equally acceptable methods. We believe that the issue of STV in Malta is of interest not only to the Maltese electorate. If STV cannot be shown to be flexible enough to accommodate the expectations of an electorate in one of the few countries which has been using it for over eighty years, then it would be more difficult for the system to be widely accepted and introduced where it has not been tried before.

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The authors

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4 References

[1] M. Balinsky. Fair majority voting (or How to eliminate Gerrymandering), *American Mathematical Monthly*, February 97-112 2008,

[2] A. Buhagiar. Can one achieve nationwide proportional representation in Malta without major changes to the present method of election?
`http://www.maltadata.com/buhag.htm.`

[3] A. Buhagiar. The priority queue: a fair method for the assignment of seats to districts.
`http://www.maltadata.com/buhag2.htm,`

[4] Department of Information—Malta. Elections in Malta.
`http://www.doi.gov.mt/EN/elections/.`

[5] Department of Information—Malta. General Election Results. For URL, see McDougall site resources page.

[6] D. Fenech. Responsibility and Power in Malta. Endemic Democracy (1919–1930), PEG Malta 2005.

[7] W. Hirczy. Explaining near-universal turnout: the case of Malta. *European Journal of Political Research*, 27 255–272 1995.

[8] J. Lane. A comprehensive tabulation.
`http://www.maltadata.com/by-dist.xls.`

[9] J. Lane. Elections in Malta: The Single-Transferable-Vote System in Action, 1921 - 2008.
`http://www.maltadata.com.`

[10] Ministry for Justice and Home Affairs—Malta. The Constitution of Malta. For URL, see McDougall site resources page.

[11] Ministry for Justice and Home Affairs—Malta. General Elections Act. For URL, see McDougall site resources page.

[12] R. Zanella. The Maltese electoral system and its distorting effect. *Electoral Studies*.9. 202-215. 1990

Table 1.2: *Phase 2 of the d'Hondt pre-processing for the Maltese General Elections of 2008, the d'Hondt priority queue with the corresponding quotients. This gives the order in which the seats will be allocated to each party in the next phase.*

d'Hondt quotient	Party winning seat	Seat number for party	Seat number overall	d'Hondt quotient	Party winning seat	Seat number for party	Seat number overall
143468	NP	1	1	6832	NP	21	41
141888	MLP	1	2	6757	MLP	21	42
71734	NP	2	3	6521	NP	22	43
70944	MLP	2	4	6449	MLP	22	44
47823	NP	3	5	6238	NP	23	45
47296	MLP	3	6	6169	MLP	23	46
35867	NP	4	7	5978	NP	24	47
35472	MLP	4	8	5912	MLP	24	48
28694	NP	5	9	5739	NP	25	49
28378	MLP	5	10	5676	MLP	25	50
23911	NP	6	11	5518	NP	26	51
23648	MLP	6	12	5457	MLP	26	52
20495	NP	7	13	5314	NP	27	53
20270	MLP	7	14	5255	MLP	27	54
17934	NP	8	15	5124	NP	28	55
17736	MLP	8	16	5067	MLP	28	56
15941	NP	9	17	4947	NP	29	57
15765	MLP	9	18	4893	MLP	29	58
14347	NP	10	19	4782	NP	30	59
14189	MLP	10	20	4730	MLP	30	60
13043	NP	11	21	4628	NP	31	61
12899	MLP	11	22	4577	MLP	31	62
11956	NP	12	23	4483	NP	32	63
11824	MLP	12	24	4434	MLP	32	64
11036	NP	13	25	4348	NP	33	65
10914	MLP	13	26				
10248	NP	14	27				
10135	MLP	14	28				
9565	NP	15	29				
9459	MLP	15	30				
8967	NP	16	31				
8868	MLP	16	32				
8439	NP	17	33				
8346	MLP	17	34				
7970	NP	18	35				
7883	MLP	18	36				
7551	NP	19	37				
7468	MLP	19	38				
7173	NP	20	39				
7094	MLP	20	40				

Table 1.3: *The matrix D for the NP for the thirteen districts. The numbers in the first row give the percentage of votes obtained by the NP in the relevant district multiplied by 10. The numbers marked by an asterisk show the order in which seats are assigned.*

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
	493	319	357	373	383	453	478	565	611	632	613	586	553
1	493	319	357	373	383	453	478	565	611	632	613	586	553
	*13	*25	*23	*21	*19	*17	*15	*9	*5	*1	*3	*7	*11
2	246	160	178	186	191	227	239	283	306	316	307	293	277
	*39	*65	*61	*57	*53	*43	*41	*35	*31	*27	*29	*33	*37
3	164	106	119	124	128	151	159	188	204	211	204	195	184
	*63							*55	*49	*45	*47	*51	*59
4	123	80	89	93	96	113	119	141	153	158	153	147	138
5	99	64	71	75	77	91	96	113	122	126	123	117	111
Seats:	3	2	2	2	2	2	2	3	3	3	3	3	3

Table 1.4: *The matrix D for the MLP for the thirteen districts. The numbers in the first row give the percentage of votes obtained by the NP in the relevant district multiplied by 10. The numbers marked by an asterisk show the order in which seats are assigned.*

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
	497	667	625	615	603	536	506	414	362	339	357	390	429
1	497	667	625	615	603	536	506	414	362	339	357	390	429
	*14	*2	*4	*6	*8	*10	*12	*18	*22	*26	*24	*20	*16
2	249	333	312	308	301	268	253	207	181	170	179	195	214
	*40	*28	*30	*32	*34	*36	*38	*48	*56	*62	*60	*54	*44
3	166	222	208	205	201	179	169	138	121	113	119	130	143
		*42	*46	*50	*52	*58	*64						
4	124	167	156	154	151	134	127	103	90	85	89	97	107
5	99	133	125	123	121	107	101	83	72	68	71	78	86
Seats:	2	3	3	3	3	3	3	2	2	2	2	2	2

Table 1.5: *Results for some Maltese General Elections compared with d'Hondt pre-processing*

Election Year	Party	FP votes	Seats obtained with STV	Top-up Seats obtained with CA	Total number of seats	Seats obtained with d'Hondt pre-processing
1987	NP	119,721	31	4	35	33
	MLP	114,936	34	0	34	32
	AD	511	0	0	0	0
1992	NP	127,932	34	0	34	34
	MLP	114,911	31	0	31	30
	AD	4186	0	0	0	1
1996	NP	124,864	34	0	34	32
	MLP	132,497	31	4	35	33
	AD	3820	0	0	0	0
1998	NP	137,037	34	0	34	34
	MLP	124,220	31	0	31	31
	AD	3208	0	0	0	0
2003	NP	146,172	35	0	35	34
	MLP	134,092	30	0	30	31
	AD	1929	0	0	0	0
2008	NP	143,468	31	4	35	33
	MLP	141,888	34	0	34	32
	AD	3810	0	0	0	0

Table 1.6: *A hypothetical election result. The d'Hondt table is continued until Party A gets an absolute majority of seats, counting also the seats obtained in the STV election.*

Part 1	Party A	Party B	Party C
1	148308	140000	2492
2	74,154	70,000	1,246
3	49,436	46,667	831
4	37,077	35,000	623
5	29,662	28,000	498
6	24,718	23,333	415
7	21,187	20,000	356
8	18,539	17,500	312
9	16,479	15,556	277
10	14,831	14,000	249
11	13,483	12,727	227
12	12,359	11,667	208
13	11,408	10,769	192
14	10,593	10,000	178
15	9,887	9,333	166
16	9,269	8,750	156
17	8,724	8,235	147
18	8,239	7,778	138
19	7,806	7,368	131
20	7,415	7,000	125
21	7,062	6,667	119
22	6,741	6,364	113
23	6,448	6,087	108
24	6,180	5,833	104
25	5,932	5,600	100
26	5,704	5,385	96
27	5,493	5,185	92
28	5,297	5,000	89

Part 2	Party A	Party B	Party C
29	5,114	4,828	86
30	4,944	4,667	83
31	4,784	4,516	80
32	4,635	4,375	78
33	4,494	4,242	76
34	4,362	4,118	73
35	4,237	4,000	71
36	4,120	3,889	69
37	4,008	3,784	67
38	3,903	3,684	66
39	3,803	3,590	64
40	3,708	3,500	62
41	3,617	3,415	61
42	3,531	3,333	59
43	3,449	3,256	58
44	3,371	3,182	57
45	3,296	3,111	55
46	3,224	3,043	54
47	3,155	2,979	53
48	3,090	2,917	52
49	3,027	2,857	51
50	2,966	2,800	50
51	2,908	2,745	49
52	2,852	2,692	48
53	2,798	2,642	47
54	2,746	2,593	46
55	2,697	2,545	45

Table 1.7: *Top-up seats for Maltese General Elections since 1987 using d'Hondt post-processing and the CA*

Election Year	Top-up seats with d'Hondt	Top-up seats with CA
1987	5 to the NP	4 to the NP
1992	1 to the NP, 1 to AD	CA not invoked
1996	6 to the MLP, 1 to AD	4 to the MLP
1998	None required	None required
2003	2 to the MLP	Not invoked
2008	4 to the NP	4 to the NP

Table 1.8: *Results for some Maltese General Elections compared with d'Hondt post-processing*

Election Year	Party	FP votes	Seats obtained with STV	Top-up seats obtained with CA	Top-up seats obtained with d'Hondt post-processing
1987	NP	119,721	31	4	5
	MLP	114,936	34	0	0
	AD	511	0	0	0
1992	NP	127,932	34	0	1
	MLP	114,911	31	0	0
	AD	4186	0	0	1
1996	NP	124,864	34	0	0
	MLP	132,497	31	4	6
	AD	3820	0	0	1
1998	NP	137,037	34	0	0
	MLP	124,220	31	0	0
	AD	3208	0	0	0
2003	NP	146,172	35	0	0
	MLP	134,092	30	0	2
	AD	1929	0	0	0
2008	NP	143,468	31	4	4
	MLP	141,888	34	0	0
	AD	3810	0	0	0